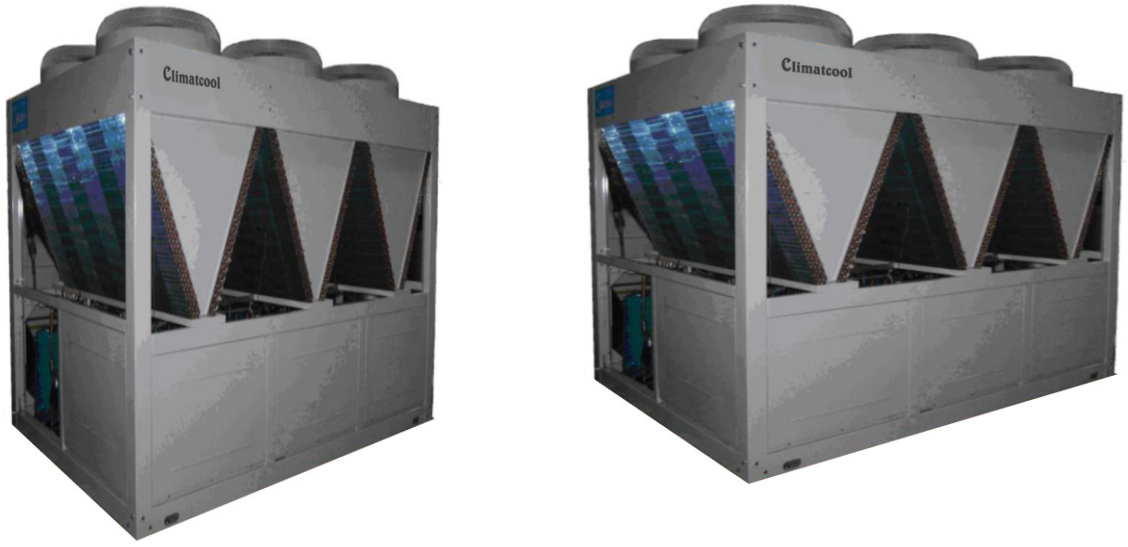
Climatcool U.S.A.
Hi-Tech Airconditioning

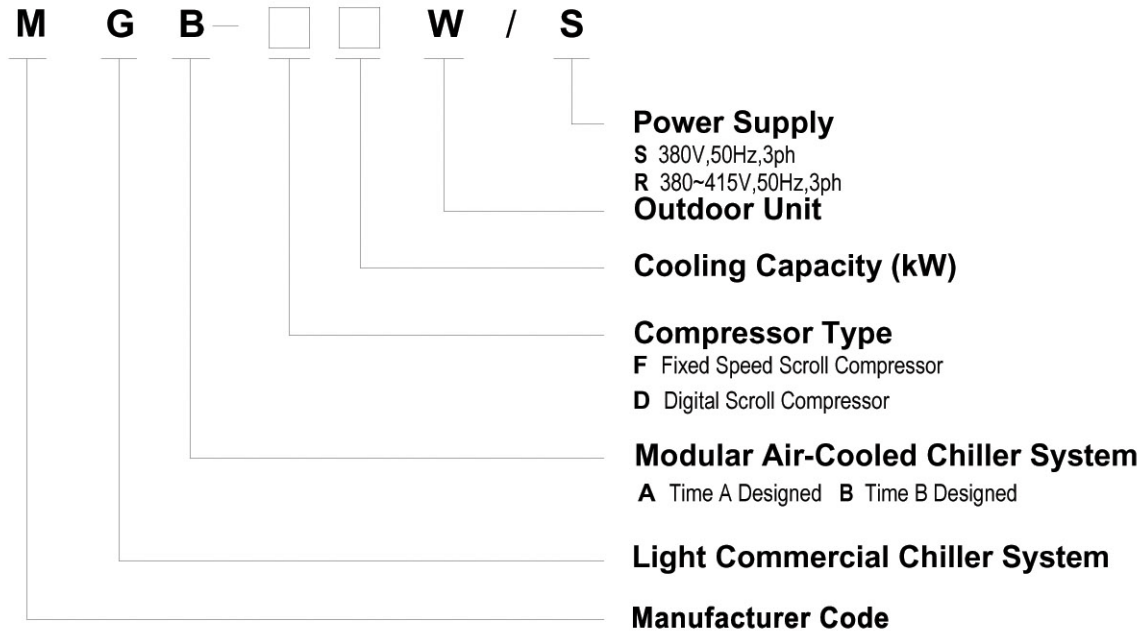
MODULAR AIR COOLED CHILLER
R-22 REFRIGERANT



INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Contents

1 Nomenclature



2 Product Schedule

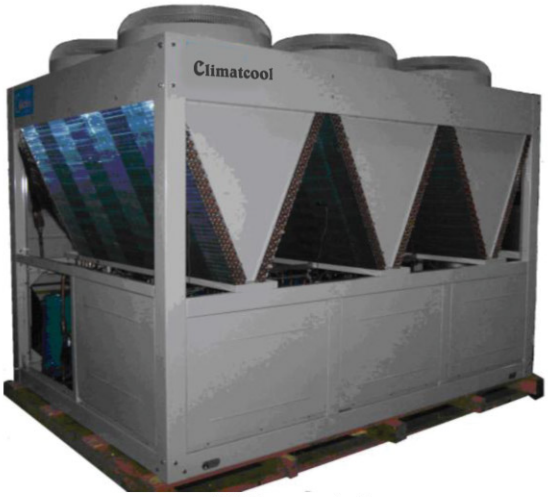
No	Model	Refrigerant	Net dimension (L×W×H) (unit: mm)	Net weight (kg)	Power supply
1	MGB-F25W/S(R)	R22	1514×850×1820	380	380~415V/3ph/50Hz
2	MGB-D25W/S(R)	R22	1514×850×1820	380	380~415V/3ph/50Hz
3	MGB-F30W/S(R)	R22	1514×850×1820	380	380~415V/3ph/50Hz
4	MGB-D30W/S(R)	R22	1514×850×1820	380	380~415V/3ph/50Hz
5	MGB-F35W/S(R)	R22	1514×850×1820	380	380~415V/3ph/50Hz
6	MGB-D35W/S(R)	R22	1514×850×1820	380	380~415V/3ph/50Hz
7	MGB-F55W/S(R)	R22	2000×900×1880	580	380~415V/3ph/50Hz
8	MGB-F60W/S(R)	R22	2000×900×1880	580	380~415V/3ph/50Hz
9	MGB-F65W/S(R)	R22	2000×900×1880	580	380~415V/3ph/50Hz
10	MGB-F130W/S(R)	R22	2000×1685×2090	1080	380~415V/3ph/50Hz
11	MGB-F200W/S(R)	R22	2850×2000×2130	1730	380~415V/3ph/50Hz

3 External appearance:

25/30/35 module

55/60/65 module

130 module



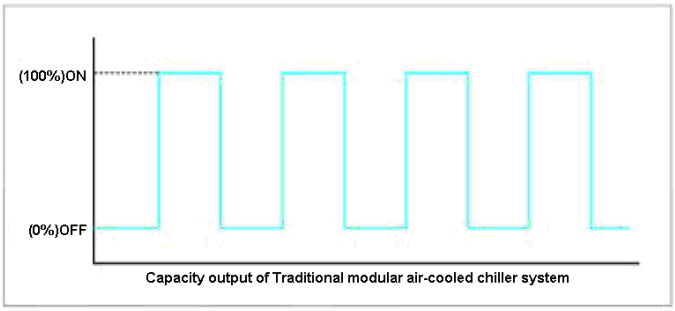
200 module

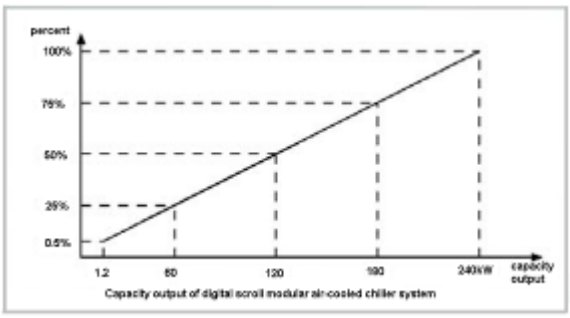
4 Features

1.Digital scroll technic，new type modular air-cooler chiller system.

Capacity output is controlled depending on controlling compressor to on/off in traditional modular air-cooler chiller system control. The precision of the control mode is not very good, and the compressor is frequently on and off, which is very bad for the compressor's life.

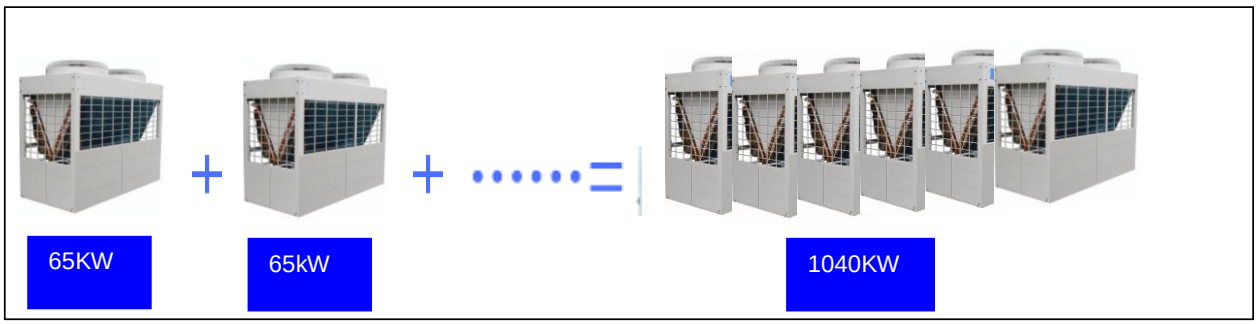
Digital scroll modular air-cooled chiller system breaks traditional design, which is inconceivably designed with digital scroll compressor and constant scroll compressor parallel connection. the system can achieve linear capacity adjustion within 0.5%-100%,the scope is widest in industry. When the system operates at the part-load, the system can accurately adjust cooling and heating capacity output basing on actual requirement of the indoor room





2.Modular design, flexible combination, more convenient for design and installation.

The unit adopt modular design, which can makes more unit connect together. The unit can combine 16 separate module(25,30.35.55.60.65module) or 8 module(130module).Cooling(heating) capacity can increase step by step by 5KW per each time within 25kW-1040kW,meanwhile every separate module can operate as main unit, also each module can be a slave unit with modules combination, more convenient for design and installation.



3.The maximum combination of the system consists of 1 main unit and 15 slave units for 25,30.35.55.60 and 65 module， 1 main unit and 7 slave units for 130 module and 1 main unit and 4 slave units for 130 module.

4.Chilled water outlet temperature adjustable.

Chilled water outlet temperature can be adjusted by wire controller according to customer's demand. In cooling mode, the adjustable range from 5℃-17℃.

5.Easy connection between main unit and slave units.

6.Compact structure, no cooling tower is needed, which reduces the installation cost.

7.Strong micro-computer intelligent control and monitor function.

8.System will be more reliable with new type efficient heat exchanger

Evaporator of 25,30 and 35 module adopts double-pipe heat exchanger and Evaporator of 55,60,65,130 and 200 module adopt Shell and tube heat exchange.

5 Specification

Model			MGB-F25W/S(R)	MGB-F30W/S(R)	MGB-F35W/S(R)
Cooling Capacity		kW	25	30	35
Heating Capacity		kW	27	32	37
Power supply		V/Ph/Hz	380-415/3/50		
Compressor	Type		Scroll (constant speed)		
	Quantities	Pieces	2	2	2
Power input	Cooling	kW	8.2	9.8	11.5
	Heating	kW	8.1	9.6	11.3
Refrigerant	Type		R22		
	Weight	kg	7		
Condenser (Air side)	Air side heat-exchanger type		Copper-fin-coil		
	Quantities of fan motor	Pieces	1		
	Air flow volume	$\times 10^3 m^3/h$	12		
	Fan motor input	kW	0.3		
Evaporator (Water side)	Water side heat-exchanger type		double-pipe heat exchanger		
	Water resistance loss	kPa	20		
	Water inlet/outlet pipeline diameter	mm	DN40		
	Water flow volume	m^3/h	4.4	5.2	5.9
	Max. Pressure	MPa	1		
	Water pipe connection type		Flexible joint		
Dimension	L	mm	1514		
	W	mm	850		
	H	mm	1820		
Packing size	L×W×H	mm	1620×1034×2041		
Weight	Net weight	kg	380		
	Operating weight	kg	400		
Connection wiring	Power wiring	$mm^2 \times No.$	16×4+10 ×1		
	Signal wiring	$mm^2 \times No.$	0.75×3-core		
Control type			Wired controller		
Safety protection device			High/low-pressure switch, anti-frost protection, target flow switch, over-load protection, and power phases sequence protection etc.		
Noise level		dB(A)	65		
Operation water temp		℃	Cooling：5～17 Heating：45～50		
Ambient temp		℃	Cooling：10～46 Heating：-10～21		

Note: Please refer to the water flow volume in the above table strictly to design and install.Model			MGB-D25W/S(R)	MGB-D30W/S(R)	MGB-D35W/S(R)
Cooling Capacity		kW	25	30	35
Heating Capacity		kW	27	32	37
Power supply		V/Ph/Hz	380-415/3/50		
Compressor	Type		Constant Speed Scroll + Digital Scroll		
	Quantities	Pieces	1+1	1+1	1+1
Power input	Cooling	kW	8.2	9.8	11.5
	Heating	kW	8.1	9.6	11.3
Refrigerant	Type		R22		
	Weight	kg	7		
Condenser (Air side)	Air side heat-exchanger type		Copper-fin-coil		
	Quantities of fan motor	Pieces	1		
	Air flow volume	$\times 10^3 m^3/h$	12		
	Fan motor input	kW	0.3		
Evaporator (Water side)	Water side heat-exchanger type		Double-pipe heat exchanger		
	Water resistance loss	kPa	20		
	Water inlet/outlet pipeline diameter	mm	DN40		
	Water flow volume	m^3/h	4.4	5.2	5.9
	Max. Pressure	MPa	1		
	Water pipe connection type		Flexible joint		
Dimension	L	mm	1514		
	W	mm	850		
	H	mm	1820		
Packing size	L×W×H	mm	1620×1034×2041		
Weight	Net weight	kg	380		
	Operating weight	kg	400		
Connection wiring	Power wiring	$mm^2 \times No.$	16×4+10 ×1		
	Signal wiring	$mm^2 \times No.$	0.75×3-core		
Control type			Wired controller		
Safety protection device			High/low-pressure switch, anti-frost protection, target flow switch, over-load protection, and power phases sequence protection etc.		
Noise level		dB(A)	65		
Operation water temp		℃	Cooling：5～17 Heating：45～50		
Ambient temp		℃	Cooling：10～46 Heating：-10～21		

Note: Please refer to the water flow volume in the above table strictly to design and install.

Model			MGB-F55W/S(R)	MGB-F60W/S(R)	MGB-F65W/S(R)
Cooling Capacity		kW	55	60	65
Heating Capacity		kW	59	64	69
Power supply		V/Ph/Hz	380-415/3/50	380-415/3/50	380-415/3/50
Compressor	Type		fixed speed Scroll		
	Quantities	Pieces	2	2	2
Power input	Cooling	kW	17.0	18.6	20.2
	Heating	kW	16.8	18.3	19.8
Refrigerant	Type		R22		
	Weight	kg	15	15	15
Condenser (Air side)	Air side heat-exchanger type		Copper-fin-coil		
	Quantities of fan motor	Pieces	2	2	2
	Air flow volume	$\times 10^3 m^3/h$	24	24	24
	Fan motor input	kW	0.65	0.65	0.65
Evaporator (Water side)	Water side heat-exchanger type		Shell and tube heat exchanger		
	Water resistance loss	kPa	15	15	15
	Water inlet/outlet pipeline diameter	mm	DN100	DN100	DN100
	Water flow volume	m^3/h	9.4	10.3	11.2
	Max. Pressure	MPa	1		
	Water pipe connection type		Flexible joint		
Dimension	L	mm	2000	2000	2000
	W	mm	900	900	900
	H	mm	1880	1880	1880
Packing size	L×W×H	mm	2090×985×2020	2090×985×2020	2090×985×2020
Weight	Net weight	kg	600	600	580
	Operating weight	kg	670	670	670
Connection wiring	Power wiring	$mm^2 \times$No.	16×4+10 ×1	16×4+10 ×1	16×4+10 ×1
	Signal wiring	$mm^2 \times$No.	0.75×3-core		
Control type			Wired controller		
Safety protection device			High/low-pressure switch, anti-frost protection, target flow switch, over-load protection, and power phases sequence protection etc.		
Noise level		dB(A)	65	65	65
Operation water temp		℃	Cooling：5～17 Heating：45～50		
Ambient temp		℃	Cooling：10～46 Heating：-10～21		

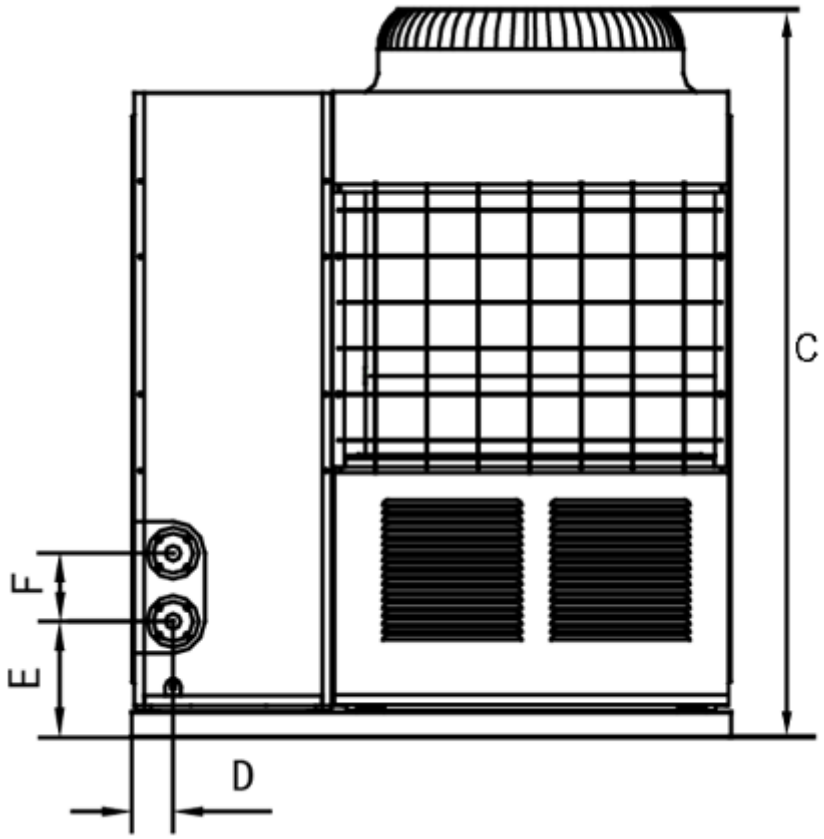
Note: Please refer to the water flow volume in the above table strictly to design and install.

Model			MGB-F130W/S(R)	MGB-F200W/S(R)
Cooling Capacity		kW	130	185
Heating Capacity		kW	138	200
Power supply		V/Ph/Hz	380-415/3/50	380/3/50
Compressor	Type		fixed speed Scroll	
	Quantities	Pieces	4	6
Power input	Cooling	kW	40.4	63
	Heating	kW	39.0	61
Refrigerant	Type		R22	
	Weight	kg	30	42
Condenser (Air side)	Air side heat-exchanger type		Copper-fin-coil	
	Quantities of fan motor	Pieces	4	6
	Air flow volume	$\times 10^3 m^3/h$	48	72
	Fan motor input	kW	1.3	2.0
Evaporator (Water side)	Water side heat-exchanger type		Shell and tube heat exchanger	
	Water resistance loss	kPa	25	30
	Water inlet/outlet pipeline diameter	mm	DN65	DN100
	Water flow volume	m^3/h	22.4	31.8
	Max. Pressure	MPa	1	
	Water pipe connection type		Flexible joint	
Dimension	L	mm	2000	2850
	W	mm	1685	2000
	H	mm	2090	2130
Packing size	L×W×H	mm	2080×1755×2240	2980×2135×2260
Weight	Net weight	kg	1150	1730
	Operating weight	kg	1270	1880
Connection wiring	Power wiring	mm^2×No.	35×4+16 ×1	70×4+35 ×1
	Signal wiring	mm^2×No.	0.75×3-core	
Control type			Wired controller	
Safety protection device			High/low-pressure switch, anti-frost protection, target flow switch, over-load protection, and power phases sequence protection etc.	
Noise level		dB(A)	68	72
Operation water temp		℃	Cooling：5～17 Heating：45～50	
Ambient temp		℃	Cooling：10～46 Heating：-10～21	

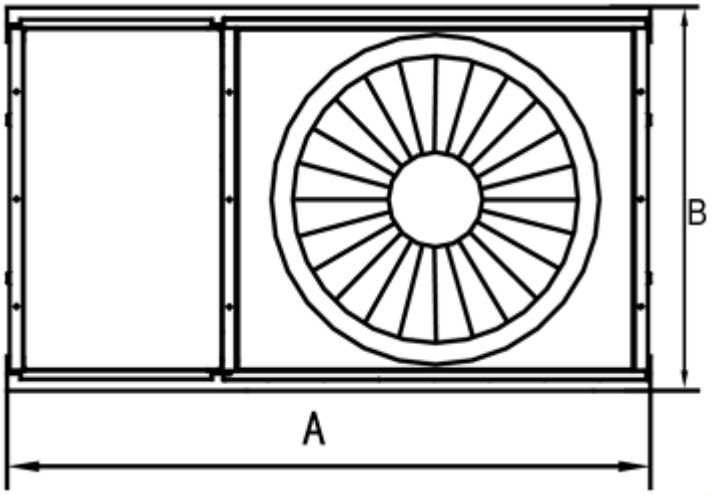
Note: Please refer to the water flow volume in the above table strictly to design and install.

Dimension

25/30/35 module



Front view

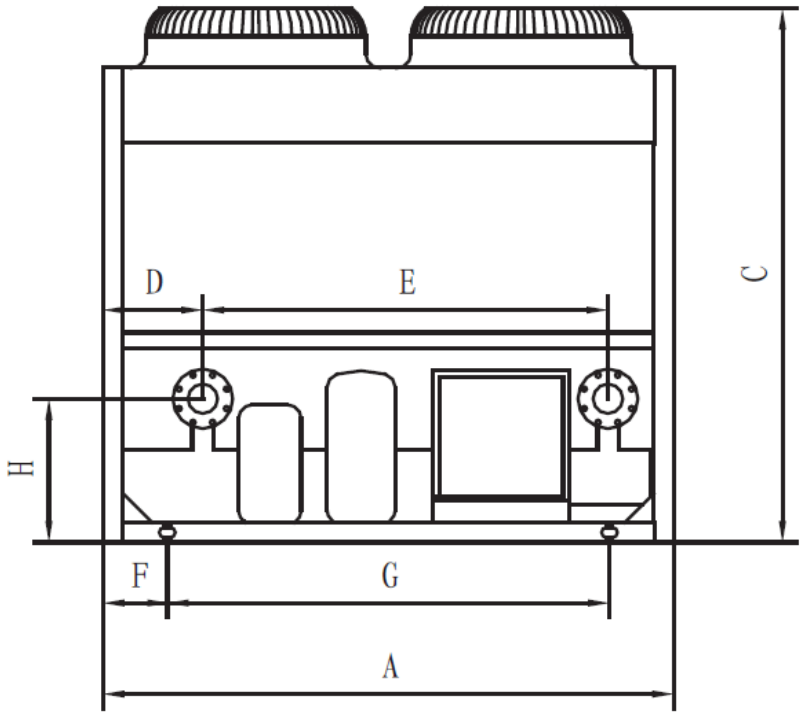


Top view

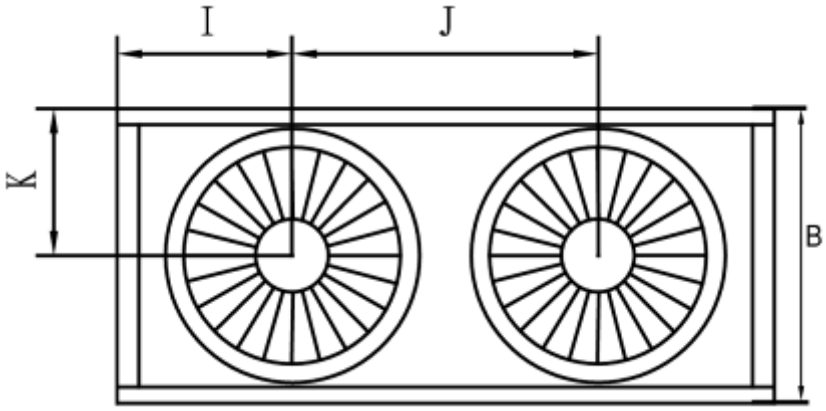
Unit: mm

Model	A	B	C	D	E	F
MGB-F(D)25W/S(R)	1514	850	1820	104	292	172
MGB- F(D)30W/S(R)						
MGB-F(D)35W/S(R)						

55/60/65 module



Front view

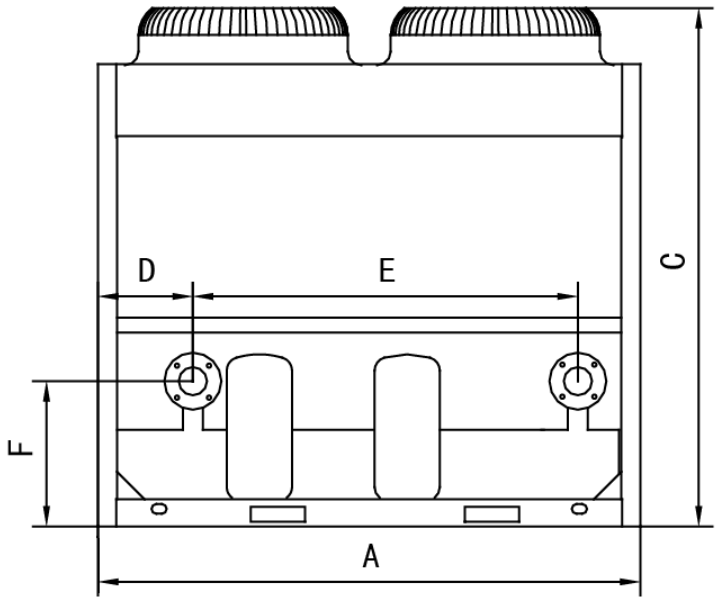


Top view

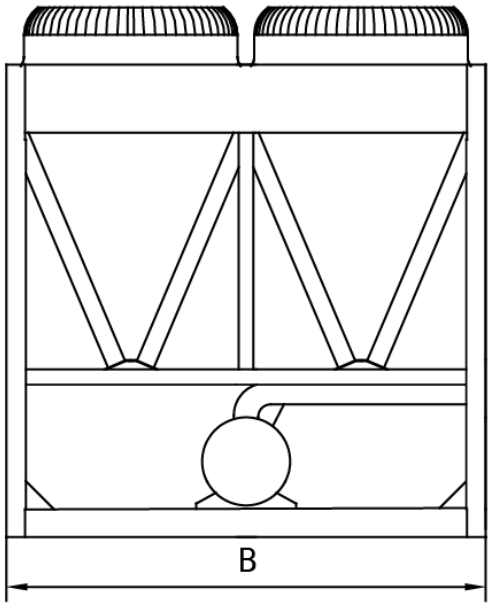
Unit: mm

Model	A	B	C	D	E	F	G	H	I	J	K
MGB-F55W/S(R)	2000	900	1880	350	1420	225	1500	506	530	930	450
MGB-F60W/S(R)	2000	900	1880	350	1420	225	1500	506	530	930	450
MGB-F65W/S(R)	2000	900	1880	350	1420	225	1500	506	530	930	450

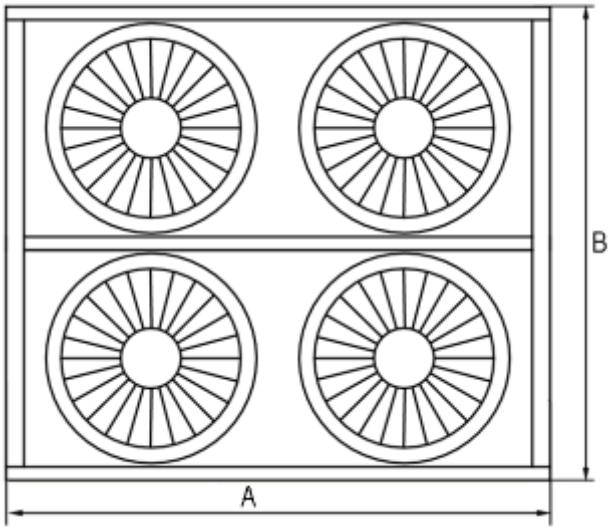
130 module



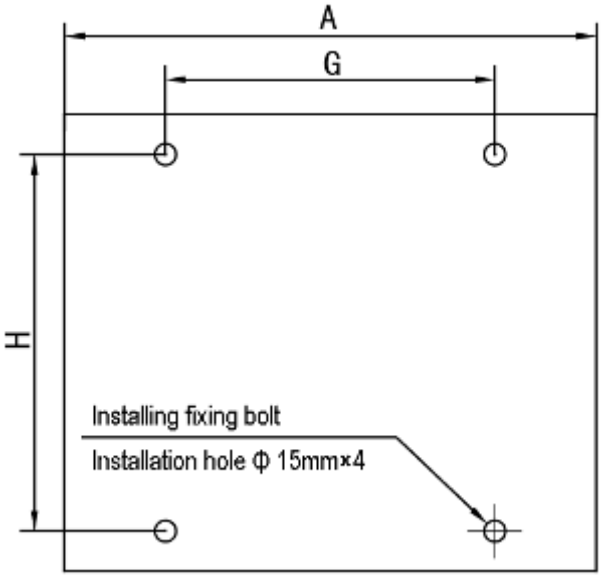
Front view



Side view



Top view

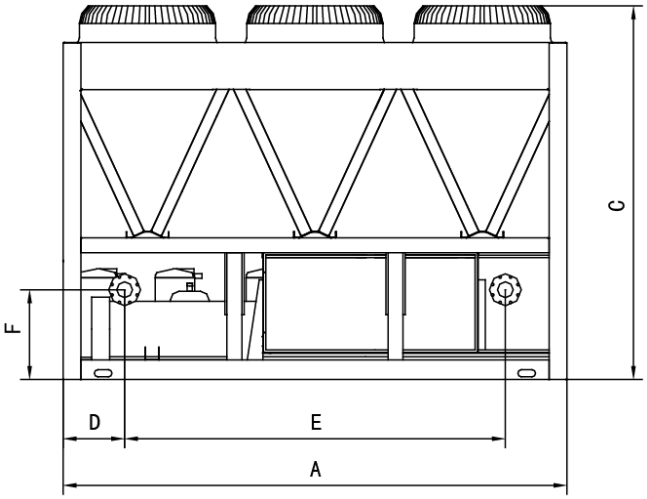


Anchor hole

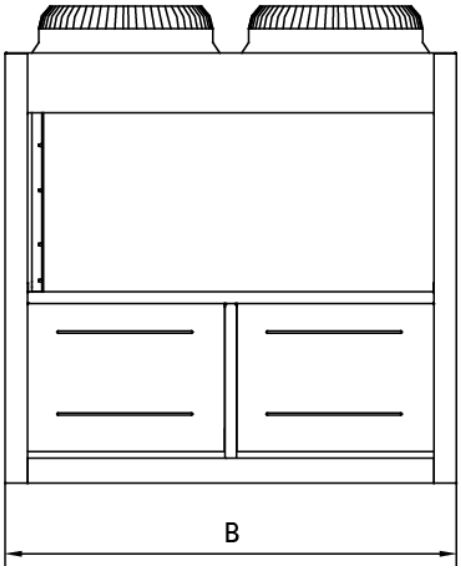
Unit: mm

Model	A	B	C	D	E	F	G	H
MGB-F130W/S(R)	2000	1700	1940	350	1420	506	1550	1586

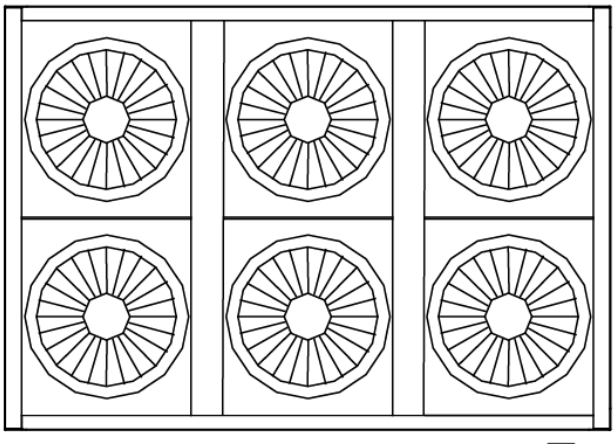
200 module



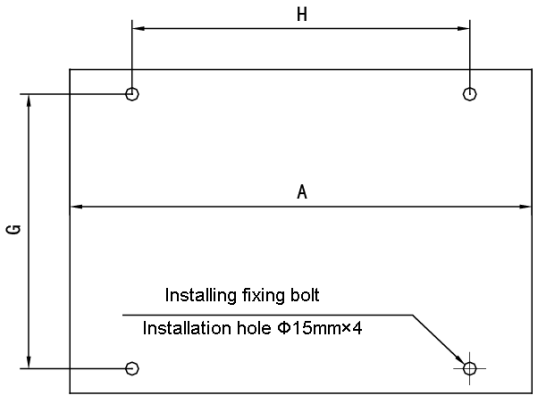
Front view



Side view



Top view



Anchor hole

Unit: mm

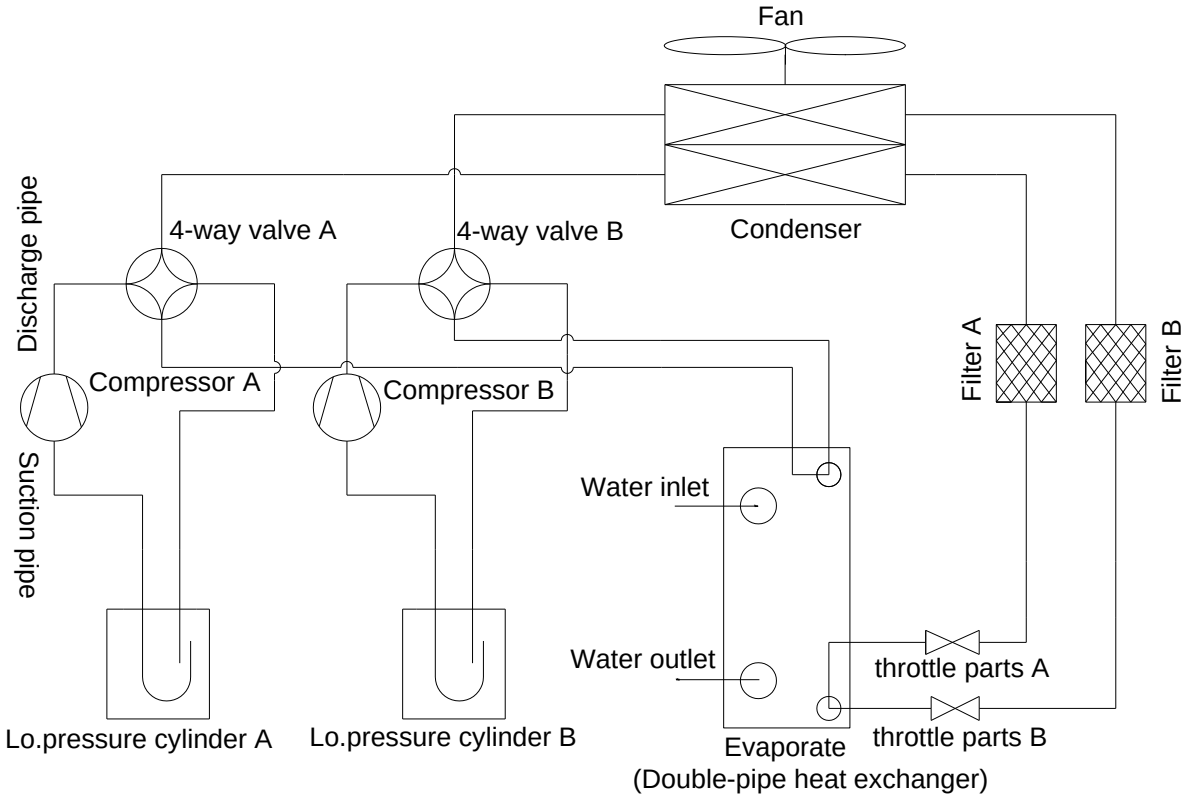
Model	A	B	C	D	E	F	G	H
MGB-F200W/S(R)	2850	2000	2110	347	2156	506	1888	2388

Piping Diagram & Pipe Connection Drawing

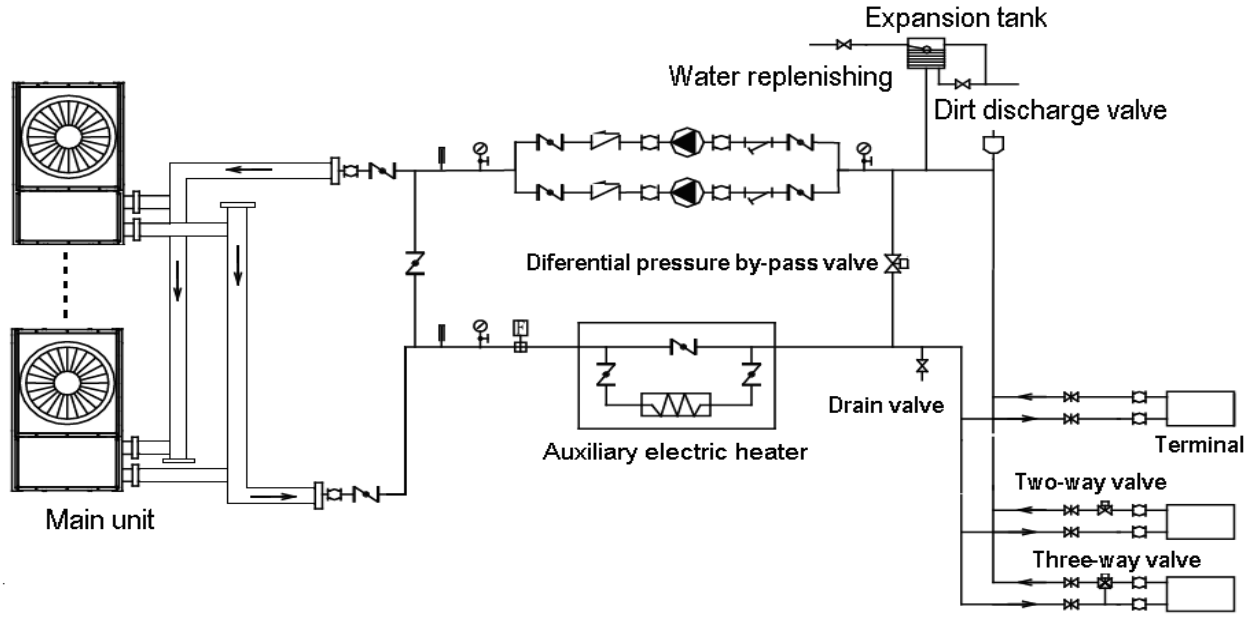
6.1 25/30/35 Module refrigeration system sketch drawing and pipe connection drawing

6.1.1 25/30/35 Module refrigeration system sketch drawing

Each module has two compressors with two separate A/C systems, one double-pipe evaporate for two systems.



6.1.2 25/30/35 Module water pipeline sketch drawing

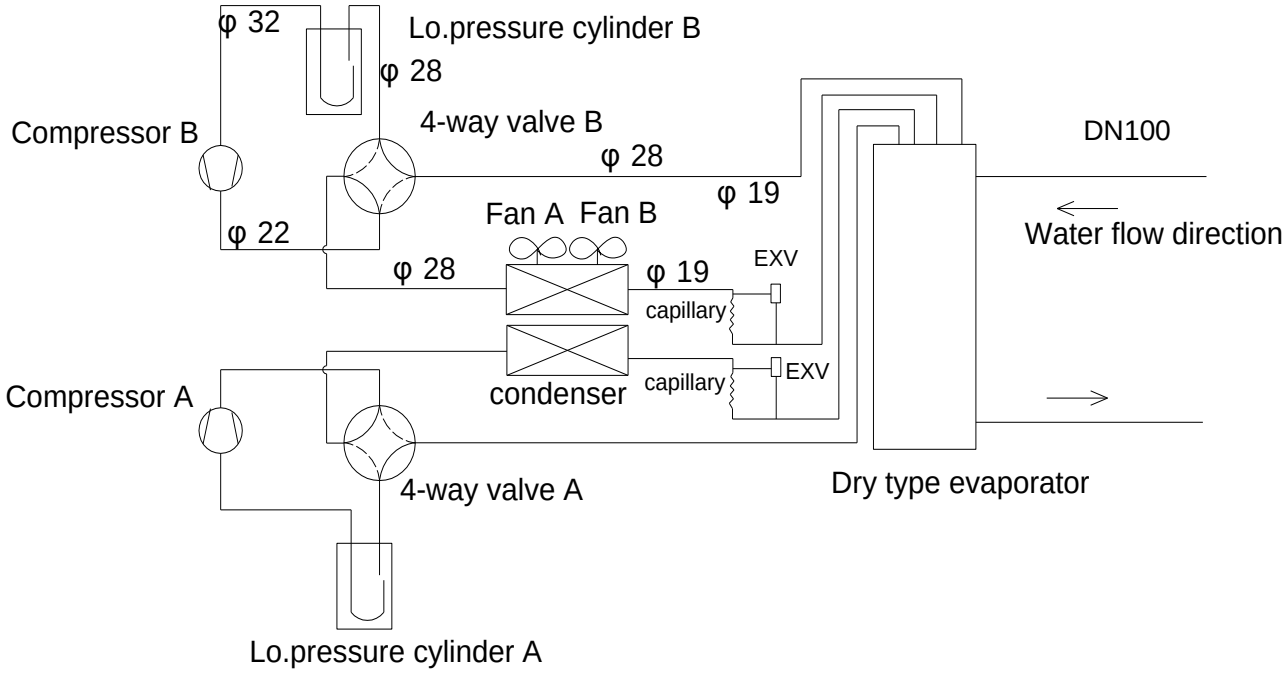


Symbol explanation				
Stop valve	Pressure gauge	Water flow switch	Gate valve	Flexible joint
Y-shaped filter	Thermometer	Circulating pump	Check valve	Automatic discharge valve

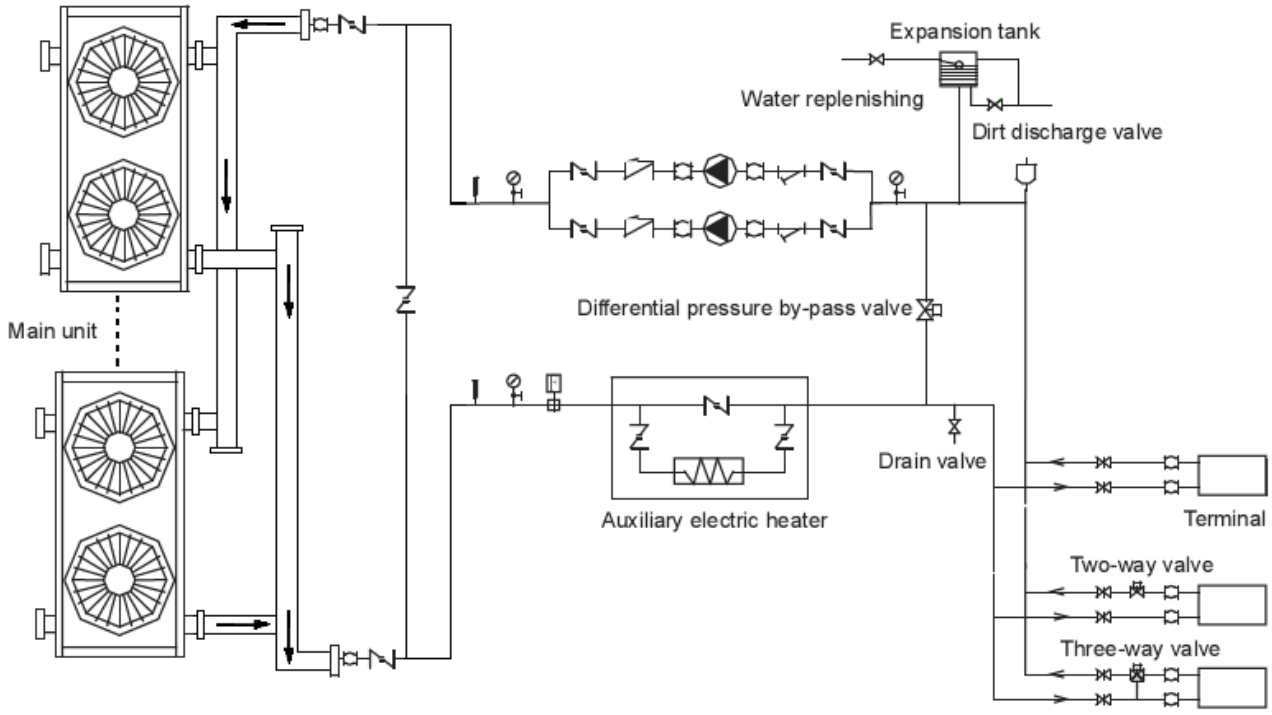
6.2 55/60/65 Module refrigeration system sketch drawing and pipe connection drawing

6.2.1 55/60/65 Module refrigeration system sketch drawing

Each module has two compressors with two separate A/C systems, one shell and tube evaporate for two systems.



6.2.2 55/60/65 Module water pipeline sketch drawing

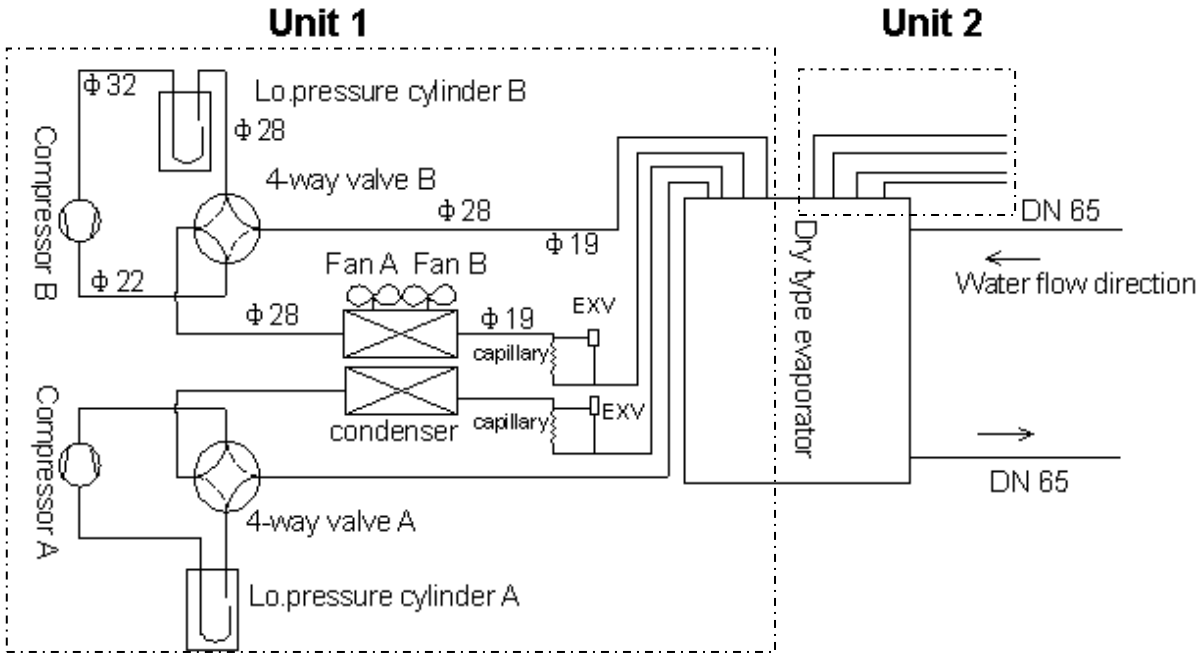


Symbol explanation				
Stop valve	Pressure gauge	Water flow switch	Gate valve	Flexible joint
Y-shaped filter	Thermometer	Circulating pump	Check valve	Automatic discharge valve

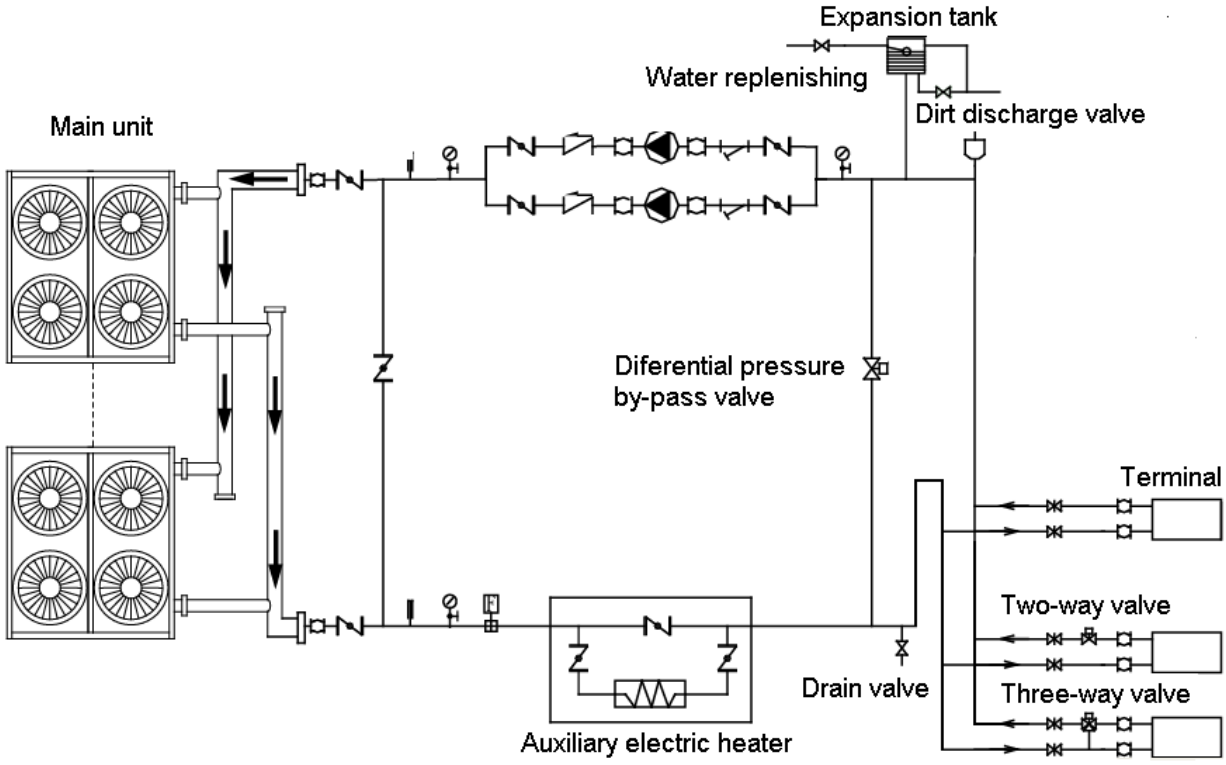
6.3 130 Module refrigeration system sketch drawing and pipe connection drawing

6.3.1 130 Module refrigeration system sketch drawing

Each module has four compressors with two separate units, one shell and tube evaporate for two systems.



6.3.2 130 Module water pipeline sketch drawing



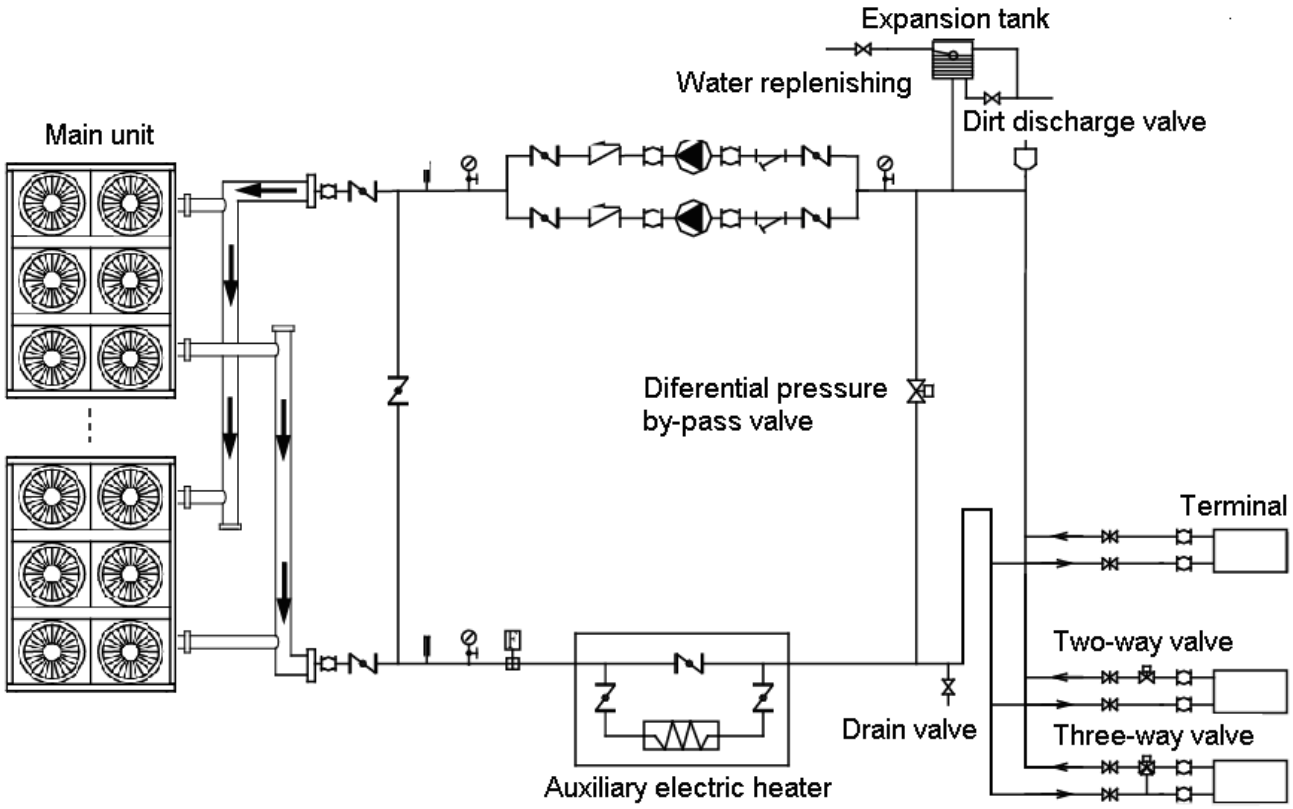
Symbol explanation				
Stop valve	Pressure gauge	Water flow switch	Gate valve	Flexible joint
Y-shaped filter	Thermometer	Circulating pump	Check valve	Automatic discharge valve

6.4 200 Module refrigeration system sketch drawing and pipe connection drawing

6.4.1 200 Module refrigeration system sketch drawing

Each module has six compressors with three separate units, one shell and tube evaporate for three systems.

错误!链接无效。**6.4.2 200 Module water pipeline sketch drawing**

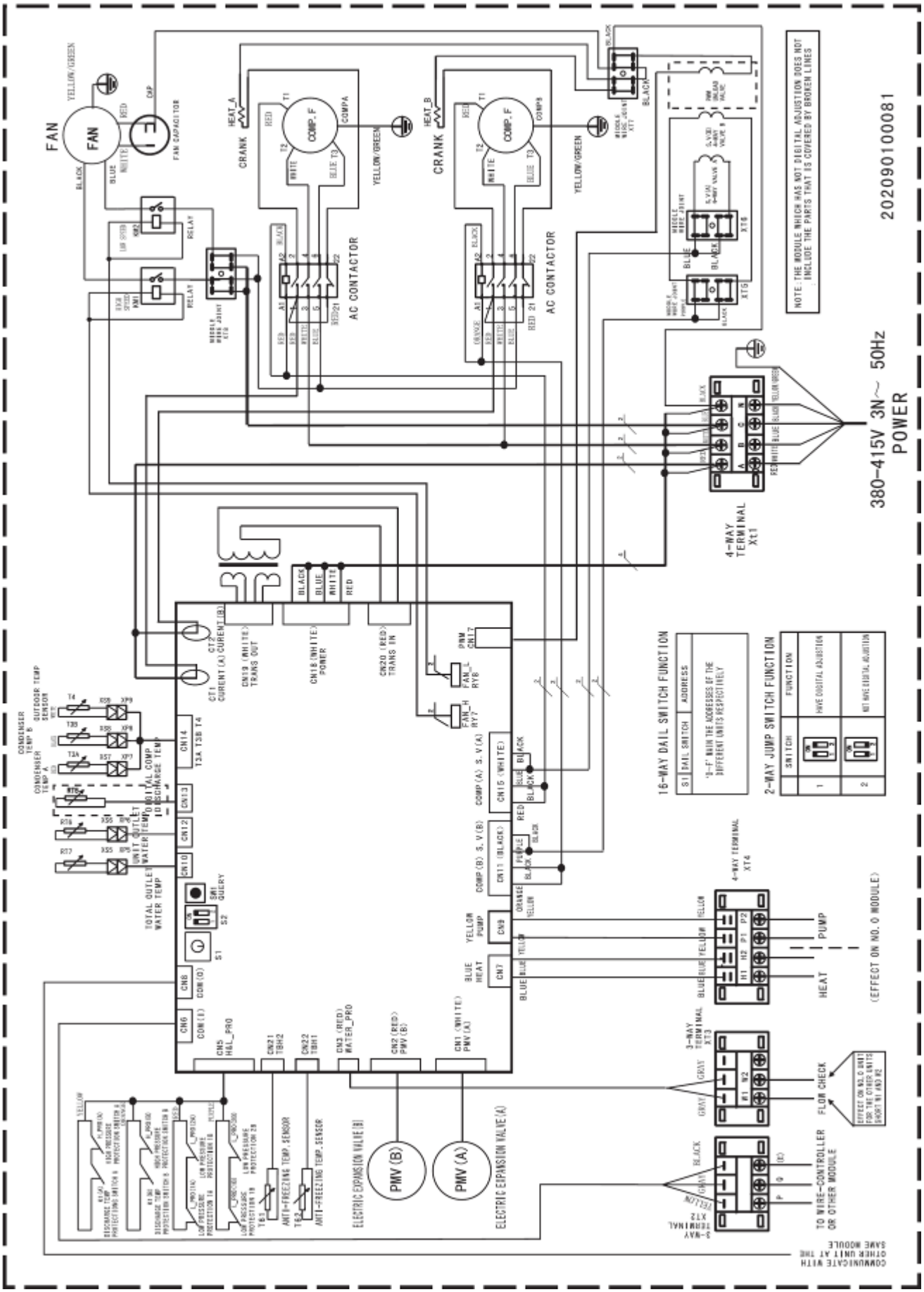


Symbol explanation				
Stop valve	Pressure gauge	Water flow switch	Gate valve	Flexible joint
Y-shaped filter	Thermometer	Circulating pump	Check valve	Automatic discharge valve

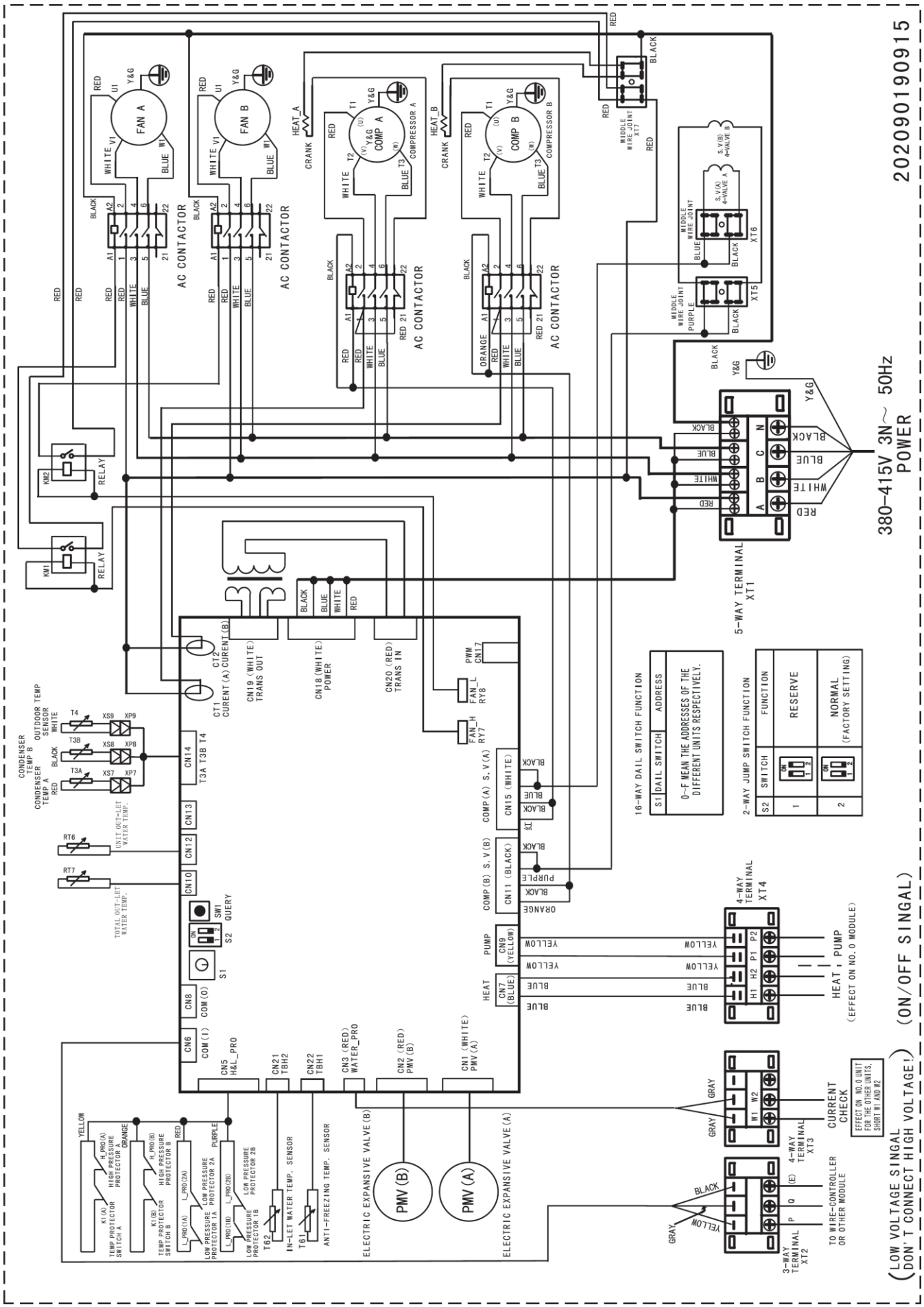
Wiring Diagrams

7.1 Outdoor Wiring Diagram

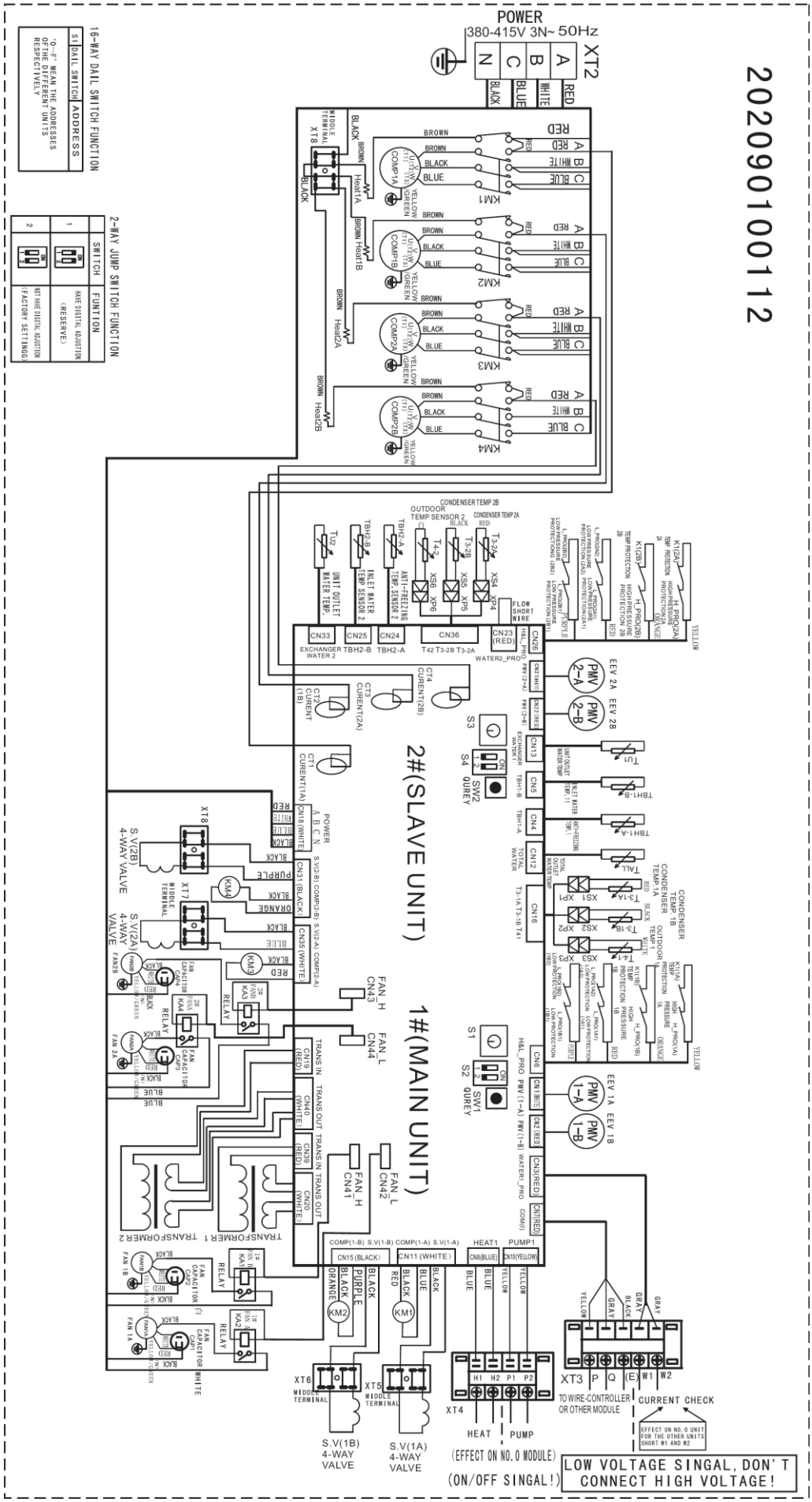
25/30/35 Module



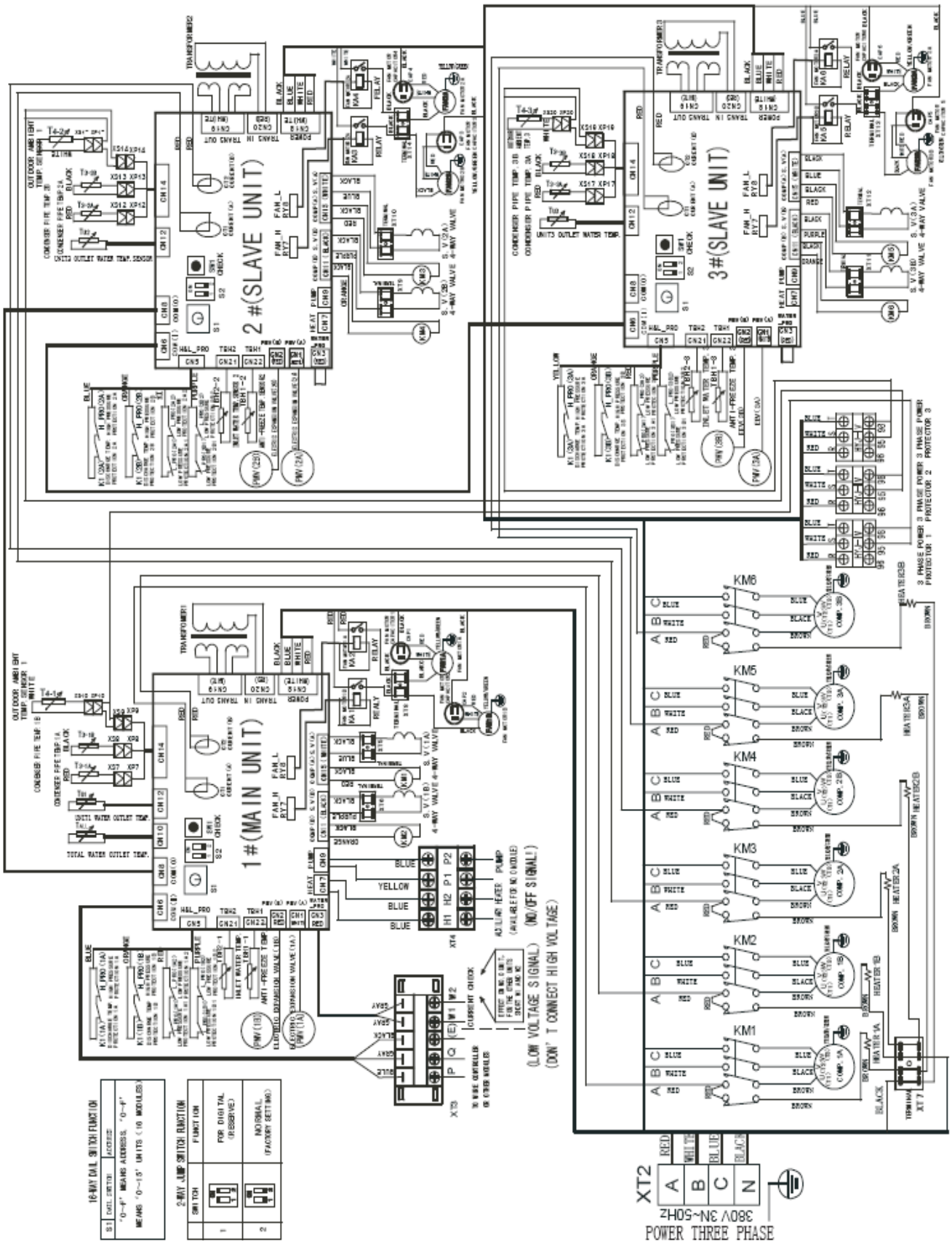
55/60/65 Module



130 Module


20209010011 2
POWER
380-415V 3N~ 50Hz
XT2
2#(SLAVE UNIT)
1#(MAIN UNIT)
16-WAY DAIL SWITCH FUNCTION
2-WAY JUMP SWITCH FUNCTION
TRANSFORMER 1
TRANSFORMER 2
S.V(1B) 4-WAY VALVE
S.V(1A) 4-WAY VALVE
S.V(2B) 4-WAY VALVE
S.V(2A) 4-WAY VALVE
HEAT
PUMP
(EFFECT ON NO.0 MODULE)
(ON/OFF SINGAL!)
CURRENT CHECK
TO WIRE-CONTROLLER OR OTHER MODULE
LOW VOLTAGE SINGAL, DON'T CONNECT HIGH VOLTAGE!

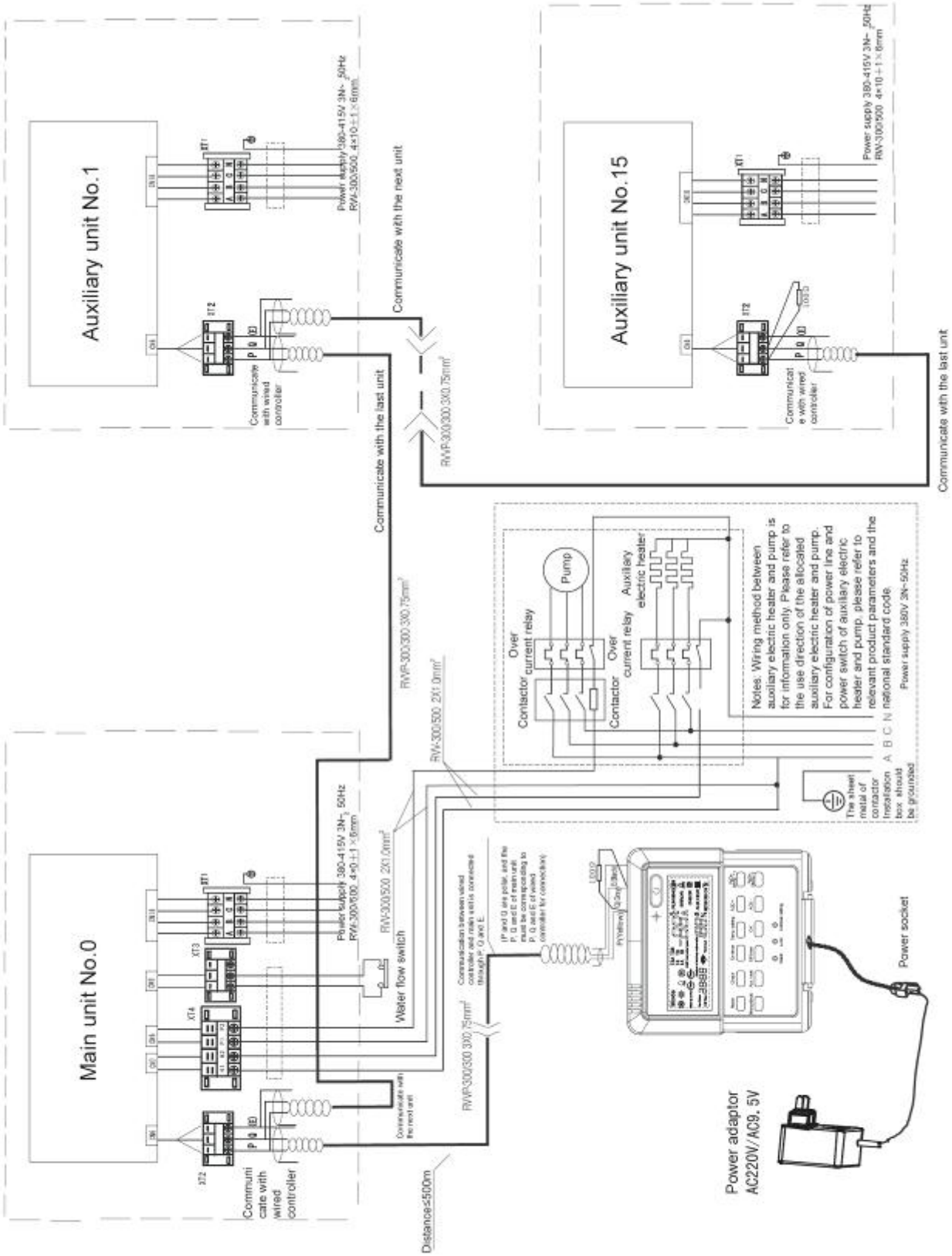
200 module


1#(MAIN UNIT)
2#(SLAVE UNIT)
3#(SLAVE UNIT)
KM6
KM5
KM4
KM3
KM2
KM1
XT2
A
B
C
N
380V 3N~50HZ
POWER THREE PHASE
(LOW VOLTAGE SIGNAL) (NO/OFF SIGNAL)
(DON' T CONNECT HIGH VOLTAGE)
16-WAY DIAL SWITCH FUNCTION
2-WAY JUMP SWITCH FUNCTION
FOR DIGITAL (RESERVE)
NORMAL (FACTORY SETTING)

7.2 Networking Communication Schematic of Main Unit and Auxiliary Unit

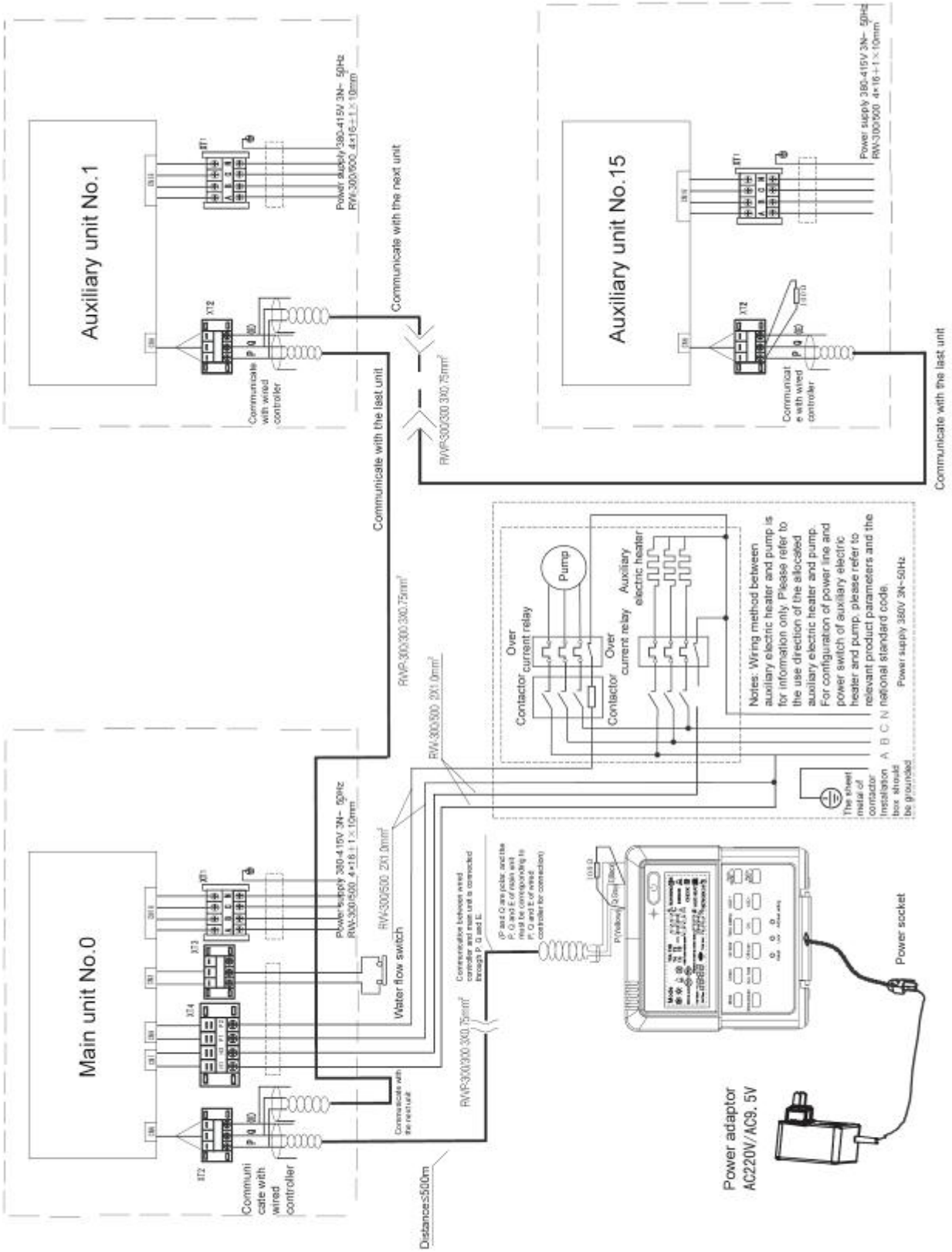
25/30/35 Module

Attached picture (II) Networking Communication Schematic of Main Unit and Auxiliary Unit



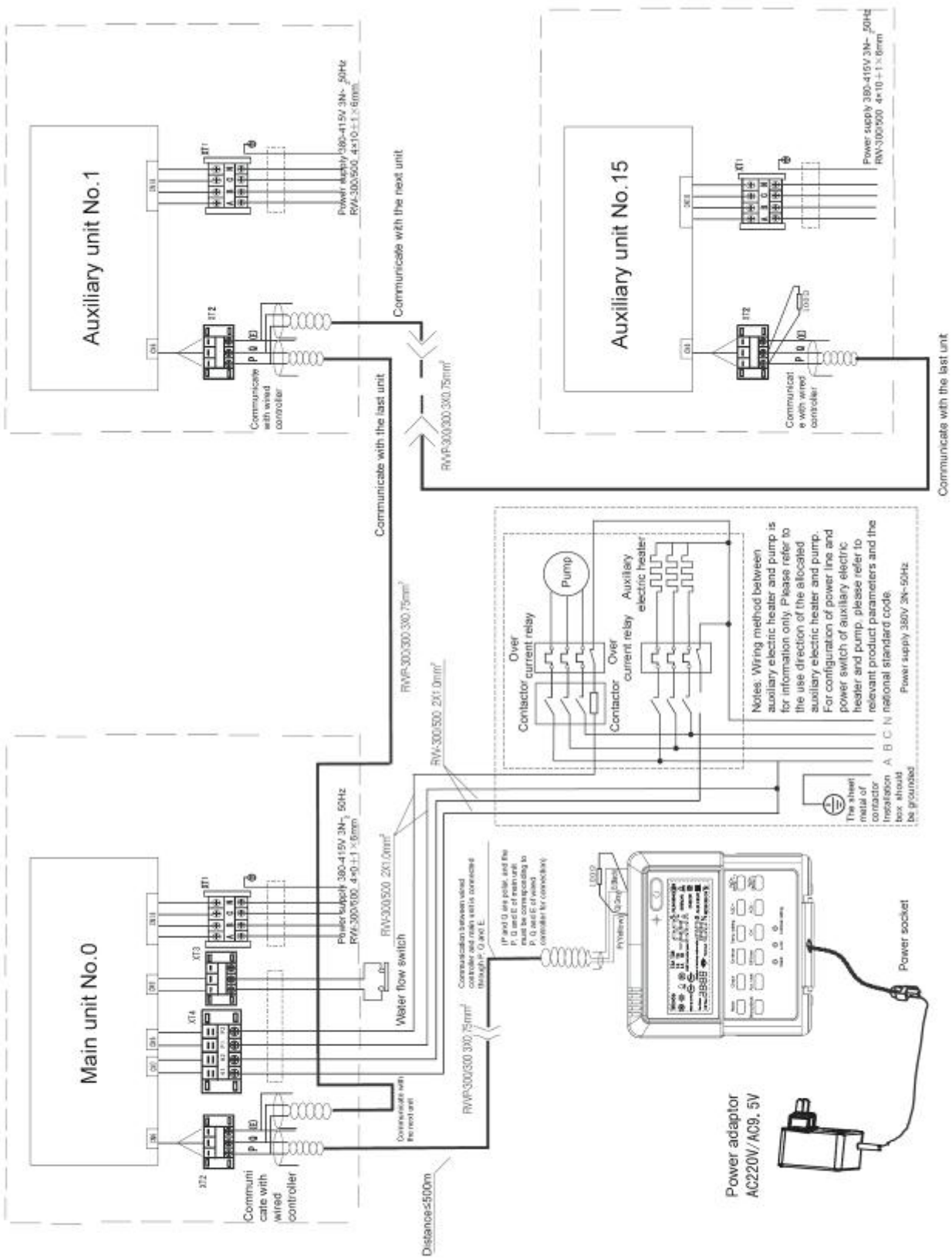
55/60/65 Module

Attached picture (II) Networking Communication Schematic of Main Unit and Auxiliary Unit

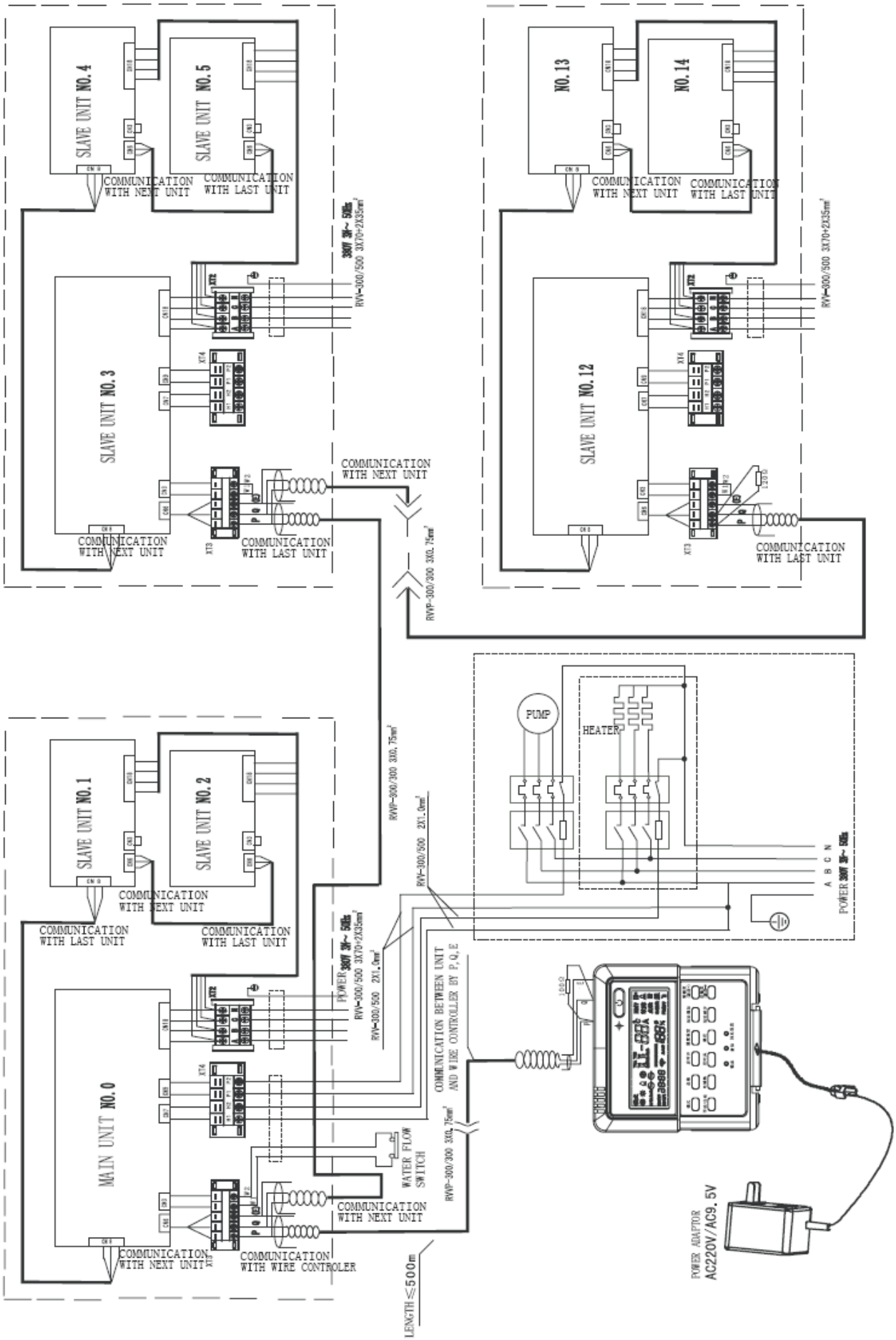


130 Module

Attached picture (II) Networking Communication Schematic of Main Unit and Auxiliary Unit



200 module


SLAVE UNIT NO.4
SLAVE UNIT NO.5
SLAVE UNIT NO.3
NO.13
NO.14
SLAVE UNIT NO.12
SLAVE UNIT NO.1
SLAVE UNIT NO.2
MAIN UNIT NO.0
PUMP
HEATER
COMMUNICATION WITH NEXT UNIT
COMMUNICATION WITH LAST UNIT
COMMUNICATION WITH WIRE CONTROLER
WATER FLOW SWITCH
COMMUNICATION BETWEEN UNIT AND WIRE CONTROLLER BY P,Q,E
POWER ADAPTOR AC220V/AC9.5V
LENGTH≤500m

Electric Characteristics

Model	Outdoor Unit				Power Supply		Compressor		OFM	
	Hz	Voltage	Min.	Max.	TOCA	MFA	MSC	RLA	KW	FLA
MGB-F25W/S(R)	50	380-415	342	418	21.3	36	9.7(×2)	8.1(×2)	0.67	3.1
MGB-D25W/S(R)	50	380-415	342	418	21.3	36	9.7(×2)	8.1(×2)	0.67	3.1
MGB-F30W/S(R)	50	380-415	342	418	22.6	36	9.7(×2)	8.1(×2)	0.67	3.1
MGB-D30W/S(R)	50	380-415	342	418	22.6	36	9.7(×2)	8.1(×2)	0.67	3.1
MGB-F35W/S(R)	50	380-415	342	418	24.1	36	9.7(×2)	8.1(×2)	0.67	3.1
MGB-D35W/S(R)	50	380-415	342	418	24.1	36	9.7(×2)	8.1(×2)	0.67	3.1
MGB-F55W/S(R)	50	380-415	342	418	49.8	100	110(×2)	17.6 (×2)	0.65(×2)	3.0(×2)
MGB-F60W/S(R)	50	380-415	342	418	51.7	100	110(×2)	17.6(×2)	0.65(×2)	3.0(×2)
MGB-F65W/S(R)	50	380-415	342	418	54.5	100	110(×2)	17.6 (×2)	0.65(×2)	3.0(×2)
MGB-F130W/S(R)	50	380-415	342	418	100.2	200	110(×4)	17.6 (×4)	0.88(×4)	4.0(×4)
MGB-F200W/S(R)	50	380-415	342	418	150	250	110(×6)	17.6 (×6)	0.88(×6)	4.0(×6)

Remark:

TOCA: Total Over-current Amps. (A)

MFA: Max. Fuse Amps. (A)

MSC: Locked Rotor Amps. (A)

RLA: Rated Locked Amps. (A)

OFM: Outdoor Fan Motor.

FLA: Full Load Amps. (A)

KW: Rated Motor Input (KW)

Capacity Tables

9.1 Cooling:

MGB-F(D)25W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Chilled water outlet temp. (˚C)											
		5			7			9			12		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(˚C)	(˚C)	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW
25	3	26.0	7.4	7.1	27.6	7.9	7.3	28.7	8.2	7.5	29.6	8.5	7.6
	4	26.0	5.6		27.6	5.9		28.7	6.1		29.6	6.3	
	5	26.0	4.5		27.6	4.7		28.7	4.9		29.6	5.1	
28	3	25.6	7.3	7.3	27.0	7.7	7.4	28.1	8.0	7.5	29.0	8.3	7.8
	4	25.6	5.5		27.0	5.8		28.1	6.0		29.0	6.2	
	5	25.6	4.4		27.0	4.6		28.1	4.8		29.0	5.0	
30	3	25.1	7.2	7.6	26.4	7.5	7.6	27.5	7.9	7.8	28.4	8.1	8.1
	4	25.1	5.4		26.4	5.7		27.5	5.9		28.4	6.1	
	5	25.1	4.3		26.4	4.5		27.5	4.7		28.4	4.9	
32	3	24.5	7.0	7.8	25.7	7.4	7.9	26.8	7.7	8.0	27.7	7.9	8.3
	4	24.5	5.3		25.7	5.5		26.8	5.7		27.7	5.9	
	5	24.5	4.2		25.7	4.4		26.8	4.6		27.7	4.7	
35	3	23.9	6.8	8.0	25.0	7.1	8.3	26.1	7.4	8.5	26.9	7.7	8.7
	4	23.9	5.1		25.0	5.4		26.1	5.6		26.9	5.8	
	5	23.9	4.1		25.0	4.3		26.1	4.5		26.9	4.6	
38	3	23.3	6.6	8.5	24.2	6.9	8.7	25.2	7.2	9.0	26.1	7.5	9.0
	4	23.3	5.0		24.2	5.2		25.2	5.4		26.1	5.6	
	5	23.3	4.0		24.2	4.1		25.2	4.3		26.1	4.5	
40	3	22.5	6.4	8.8	23.3	6.7	9.0	24.3	7.0	9.2	25.2	7.2	9.2
	4	22.5	4.8		23.3	5.0		24.3	5.2		25.2	5.4	
	5	22.5	3.9		23.3	4.0		24.3	4.2		25.2	4.3	
42	3	21.7	6.2	9.2	22.3	6.4	9.4	23.3	6.7	9.7	24.1	6.9	9.8
	4	21.7	4.6		22.3	4.8		23.3	5.0		24.1	5.2	
	5	21.7	3.7		22.3	3.8		23.3	4.0		24.1	4.1	
44	3	20.7	5.9	9.7	21.0	6.0	9.9	21.8	6.2	10.3	22.5	6.4	10.4
	4	20.7	4.4		21.0	4.5		21.8	4.7		22.5	4.8	
	5	20.7	3.5		21.0	3.6		21.8	3.7		22.5	3.9	
46	3	19.5	5.6	10.3	19.6	5.6	10.6	20.0	5.7	11.0	20.8	5.9	11.2
	4	19.5	4.2		19.6	4.2		20.0	4.3		20.8	4.4	
	5	19.5	3.3		19.6	3.4		20.0	3.4		20.8	3.6	

MGB-F(D)30W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Chilled water outlet temp. (˚C)											
		5			7			9			12		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(˚C)	(˚C)	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW
25	3	31.2	8.9	8.6	33.1	9.5	8.8	34.4	9.8	9.0	35.5	10.1	9.2
	4	31.2	6.7		33.1	7.1		34.4	7.4		35.5	7.6	
	5	31.2	5.3		33.1	5.7		34.4	5.9		35.5	6.1	
28	3	30.7	8.8	8.8	32.4	9.3	8.9	33.7	9.6	9.1	34.8	9.9	9.4
	4	30.7	6.6		32.4	6.9		33.7	7.2		34.8	7.5	
	5	30.7	5.3		32.4	5.6		33.7	5.8		34.8	6.0	
30	3	30.1	8.6	9.2	31.7	9.1	9.2	33.0	9.4	9.4	34.0	9.7	9.7
	4	30.1	6.4		31.7	6.8		33.0	7.1		34.0	7.3	
	5	30.1	5.2		31.7	5.4		33.0	5.7		34.0	5.8	
32	3	29.4	8.4	9.4	30.9	8.8	9.5	32.2	9.2	9.7	33.2	9.5	10.0
	4	29.4	6.3		30.9	6.6		32.2	6.9		33.2	7.1	
	5	29.4	5.0		30.9	5.3		32.2	5.5		33.2	5.7	
35	3	28.7	8.2	9.7	30.0	8.6	10.0	31.3	8.9	10.3	32.3	9.2	10.5
	4	28.7	6.2		30.0	6.4		31.3	6.7		32.3	6.9	
	5	28.7	4.9		30.0	5.1		31.3	5.4		32.3	5.5	
38	3	27.9	8.0	10.3	29.0	8.3	10.5	30.3	8.7	10.8	31.3	8.9	10.8
	4	27.9	6.0		29.0	6.2		30.3	6.5		31.3	6.7	
	5	27.9	4.8		29.0	5.0		30.3	5.2		31.3	5.4	
40	3	27.0	7.7	10.6	28.0	8.0	10.8	29.2	8.3	11.1	30.2	8.6	11.1
	4	27.0	5.8		28.0	6.0		29.2	6.3		30.2	6.5	
	5	27.0	4.6		28.0	4.8		29.2	5.0		30.2	5.2	
42	3	26.0	7.4	11.1	26.7	7.6	11.3	28.0	8.0	11.7	29.0	8.3	11.8
	4	26.0	5.6		26.7	5.7		28.0	6.0		29.0	6.2	
	5	26.0	4.5		26.7	4.6		28.0	4.8		29.0	5.0	
44	3	24.8	7.1	11.7	25.2	7.2	12.0	26.1	7.5	12.4	27.0	7.7	12.5
	4	24.8	5.3		25.2	5.4		26.1	5.6		27.0	5.8	
	5	24.8	4.3		25.2	4.3		26.1	4.5		27.0	4.6	
46	3	23.4	6.7	12.4	23.5	6.7	12.7	24.0	6.9	13.2	24.9	7.1	13.5
	4	23.4	5.0		23.5	5.0		24.0	5.1		24.9	5.3	
	5	23.4	4.0		23.5	4.0		24.0	4.1		24.9	4.3	

MGB-F(D)35W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Chilled water outlet temp. (˚C)											
		5			7			9			12		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(˚C)	(˚C)	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW
25	3	36.4	10.4	10.0	38.6	11.0	10.3	40.1	11.5	10.5	41.4	11.8	10.8
	4	36.4	7.8		38.6	8.3		40.1	8.6		41.4	8.9	
	5	36.4	6.2		38.6	6.6		40.1	6.9		41.4	7.1	
28	3	35.8	10.2	10.3	37.8	10.8	10.4	39.3	11.2	10.6	40.6	11.6	11.0
	4	35.8	7.7		37.8	8.1		39.3	8.4		40.6	8.7	
	5	35.8	6.1		37.8	6.5		39.3	6.7		40.6	7.0	
30	3	35.1	10.0	10.7	37.0	10.6	10.8	38.5	11.0	11.1	39.7	11.3	11.4
	4	35.1	7.5		37.0	7.9		38.5	8.2		39.7	8.5	
	5	35.1	6.0		37.0	6.3		38.5	6.6		39.7	6.8	
32	3	34.4	9.8	11.0	36.0	10.3	11.1	37.5	10.7	11.3	38.7	11.1	11.7
	4	34.4	7.4		36.0	7.7		37.5	8.0		38.7	8.3	
	5	34.4	5.9		36.0	6.2		37.5	6.4		38.7	6.6	
35	3	33.5	9.6	11.3	35.0	10.0	11.7	36.5	10.4	12.0	37.7	10.8	12.3
	4	33.5	7.2		35.0	7.5		36.5	7.8		37.7	8.1	
	5	33.5	5.7		35.0	6.0		36.5	6.3		37.7	6.5	
38	3	32.6	9.3	12.0	33.9	9.7	12.3	35.3	10.1	12.6	36.5	10.4	12.6
	4	32.6	7.0		33.9	7.3		35.3	7.6		36.5	7.8	
	5	32.6	5.6		33.9	5.8		35.3	6.1		36.5	6.3	
40	3	31.5	9.0	12.4	32.6	9.3	12.6	34.1	9.7	13.0	35.2	10.1	13.0
	4	31.5	6.8		32.6	7.0		34.1	7.3		35.2	7.5	
	5	31.5	5.4		32.6	5.6		34.1	5.8		35.2	6.0	
42	3	30.4	8.7	13.0	31.2	8.9	13.3	32.7	9.3	13.7	33.8	9.7	13.8
	4	30.4	6.5		31.2	6.7		32.7	7.0		33.8	7.2	
	5	30.4	5.2		31.2	5.3		32.7	5.6		33.8	5.8	
44	3	29.0	8.3	13.7	29.4	8.4	14.0	30.5	8.7	14.5	31.5	9.0	14.7
	4	29.0	6.2		29.4	6.3		30.5	6.5		31.5	6.8	
	5	29.0	5.0		29.4	5.0		30.5	5.2		31.5	5.4	
46	3	27.2	7.8	14.5	27.4	7.8	14.9	28.0	8.0	15.5	29.1	8.3	15.8
	4	27.2	5.8		27.4	5.9		28.0	6.0		29.1	6.2	
	5	27.2	4.7		27.4	4.7		28.0	4.8		29.1	5.0	

MGB-F55W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Chilled water outlet temp. (˚C)											
		5			7			9			12		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(˚C)	(˚C)	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW
25	3	57.2	16.3	15.7	60.7	17.3	16.1	63.0	18.0	16.4	65.1	18.6	16.9
	4	57.2	12.3		60.7	13.0		63.0	13.5		65.1	13.9	
	5	57.2	9.8		60.7	10.4		63.0	10.8		65.1	11.2	
28	3	56.2	16.1	16.1	59.4	17.0	16.3	61.8	17.7	16.6	63.8	18.2	17.2
	4	56.2	12.0		59.4	12.7		61.8	13.2		63.8	13.7	
	5	56.2	9.6		59.4	10.2		61.8	10.6		63.8	10.9	
30	3	55.2	15.8	16.8	58.1	16.6	16.9	60.5	17.3	17.3	62.4	17.8	17.8
	4	55.2	11.8		58.1	12.4		60.5	13.0		62.4	13.4	
	5	55.2	9.5		58.1	10.0		60.5	10.4		62.4	10.7	
32	3	54.0	15.4	17.2	56.6	16.2	17.4	59.0	16.9	17.7	60.9	17.4	18.3
	4	54.0	11.6		56.6	12.1		59.0	12.6		60.9	13.0	
	5	54.0	9.3		56.6	9.7		59.0	10.1		60.9	10.4	
35	3	52.7	15.0	17.7	55.0	15.7	18.3	57.3	16.4	18.8	59.2	16.9	19.2
	4	52.7	11.3		55.0	11.8		57.3	12.3		59.2	12.7	
	5	52.7	9.0		55.0	9.4		57.3	9.8		59.2	10.1	
38	3	51.2	14.6	18.8	53.2	15.2	19.2	55.5	15.9	19.7	57.4	16.4	19.7
	4	51.2	11.0		53.2	11.4		55.5	11.9		57.4	12.3	
	5	51.2	8.8		53.2	9.1		55.5	9.5		57.4	9.8	
40	3	49.5	14.1	19.4	51.3	14.7	19.7	53.5	15.3	20.3	55.3	15.8	20.3
	4	49.5	10.6		51.3	11.0		53.5	11.5		55.3	11.9	
	5	49.5	8.5		51.3	8.8		53.5	9.2		55.3	9.5	
42	3	47.7	13.6	20.3	49.0	14.0	20.7	51.4	14.7	21.4	53.1	15.2	21.5
	4	47.7	10.2		49.0	10.5		51.4	11.0		53.1	11.4	
	5	47.7	8.2		49.0	8.4		51.4	8.8		53.1	9.1	
44	3	45.5	13.0	21.4	46.2	13.2	21.9	47.9	13.7	22.7	49.5	14.2	22.9
	4	45.5	9.8		46.2	9.9		47.9	10.3		49.5	10.6	
	5	45.5	7.8		46.2	7.9		47.9	8.2		49.5	8.5	
46	3	42.8	12.2	22.7	43.0	12.3	23.3	44.0	12.6	24.2	45.7	13.0	24.7
	4	42.8	9.2		43.0	9.2		44.0	9.4		45.7	9.8	
	5	42.8	7.3		43.0	7.4		44.0	7.6		45.7	7.8	

MGB-F60W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Chilled water outlet temp. (˚C)											
		5			7			9			12		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(˚C)	(˚C)	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW
25	3	62.4	17.8	17.1	66.2	18.9	17.6	68.8	19.6	18.0	71.0	20.3	18.4
	4	62.4	13.4		66.2	14.2		68.8	14.7		71.0	15.2	
	5	62.4	10.7		66.2	11.3		68.8	11.8		71.0	12.2	
28	3	61.3	17.5	17.6	64.8	18.5	17.8	67.4	19.3	18.2	69.6	19.9	18.8
	4	61.3	13.1		64.8	13.9		67.4	14.4		69.6	14.9	
	5	61.3	10.5		64.8	11.1		67.4	11.6		69.6	11.9	
30	3	60.2	17.2	18.3	63.4	18.1	18.4	66.0	18.8	18.9	68.1	19.5	19.4
	4	60.2	12.9		63.4	13.6		66.0	14.1		68.1	14.6	
	5	60.2	10.3		63.4	10.9		66.0	11.3		68.1	11.7	
32	3	58.9	16.8	18.8	61.8	17.6	19.0	64.3	18.4	19.4	66.4	19.0	20.0
	4	58.9	12.6		61.8	13.2		64.3	13.8		66.4	14.2	
	5	58.9	10.1		61.8	10.6		64.3	11.0		66.4	11.4	
35	3	57.5	16.4	19.4	60.0	17.1	20.0	62.5	17.9	20.6	64.6	18.4	21.0
	4	57.5	12.3		60.0	12.9		62.5	13.4		64.6	13.8	
	5	57.5	9.9		60.0	10.3		62.5	10.7		64.6	11.1	
38	3	55.8	15.9	20.6	58.1	16.6	21.0	60.6	17.3	21.6	62.6	17.9	21.6
	4	55.8	12.0		58.1	12.4		60.6	13.0		62.6	13.4	
	5	55.8	9.6		58.1	10.0		60.6	10.4		62.6	10.7	
40	3	54.0	15.4	21.2	55.9	16.0	21.6	58.4	16.7	22.2	60.4	17.2	22.2
	4	54.0	11.6		55.9	12.0		58.4	12.5		60.4	12.9	
	5	54.0	9.3		55.9	9.6		58.4	10.0		60.4	10.3	
42	3	52.1	14.9	22.2	53.5	15.3	22.7	56.0	16.0	23.4	57.9	16.5	23.5
	4	52.1	11.2		53.5	11.5		56.0	12.0		57.9	12.4	
	5	52.1	8.9		53.5	9.2		56.0	9.6		57.9	9.9	
44	3	49.7	14.2	23.4	50.4	14.4	24.0	52.2	14.9	24.8	54.0	15.4	25.1
	4	49.7	10.6		50.4	10.8		52.2	11.2		54.0	11.6	
	5	49.7	8.5		50.4	8.6		52.2	9.0		54.0	9.3	
46	3	46.7	13.3	24.8	46.9	13.4	25.5	48.0	13.7	26.5	49.8	14.2	27.0
	4	46.7	10.0		46.9	10.1		48.0	10.3		49.8	10.7	
	5	46.7	8.0		46.9	8.0		48.0	8.2		49.8	8.5	

MGB-F65W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Chilled water outlet temp. (˚C)											
		5			7			9			12		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(˚C)	(˚C)	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW
25	3	67.6	19.3	18.6	71.7	20.5	19.1	74.5	21.3	19.5	76.9	22.0	20.0
	4	67.6	14.5		71.7	15.4		74.5	16.0		76.9	16.5	
	5	67.6	11.6		71.7	12.3		74.5	12.8		76.9	13.2	
28	3	66.5	19.0	19.1	70.3	20.1	19.3	73.1	20.9	19.7	75.4	21.5	20.4
	4	66.5	14.2		70.3	15.1		73.1	15.7		75.4	16.2	
	5	66.5	11.4		70.3	12.0		73.1	12.5		75.4	12.9	
30	3	65.2	18.6	19.9	68.7	19.6	20.0	71.5	20.4	20.5	73.8	21.1	21.1
	4	65.2	14.0		68.7	14.7		71.5	15.3		73.8	15.8	
	5	65.2	11.2		68.7	11.8		71.5	12.2		73.8	12.6	
32	3	63.8	18.2	20.4	66.9	19.1	20.6	69.7	19.9	21.0	72.0	20.6	21.7
	4	63.8	13.7		66.9	14.3		69.7	14.9		72.0	15.4	
	5	63.8	10.9		66.9	11.5		69.7	11.9		72.0	12.3	
35	3	62.3	17.8	21.0	65.0	18.6	21.7	67.8	19.4	22.3	70.0	20.0	22.8
	4	62.3	13.3		65.0	13.9		67.8	14.5		70.0	15.0	
	5	62.3	10.7		65.0	11.1		67.8	11.6		70.0	12.0	
38	3	60.5	17.3	22.3	62.9	18.0	22.8	65.6	18.7	23.4	67.8	19.4	23.4
	4	60.5	13.0		62.9	13.5		65.6	14.1		67.8	14.5	
	5	60.5	10.4		62.9	10.8		65.6	11.2		67.8	11.6	
40	3	58.5	16.7	23.0	60.6	17.3	23.4	63.3	18.1	24.1	65.4	18.7	24.1
	4	58.5	12.5		60.6	13.0		63.3	13.6		65.4	14.0	
	5	58.5	10.0		60.6	10.4		63.3	10.8		65.4	11.2	
42	3	56.4	16.1	24.1	58.0	16.6	24.6	60.7	17.3	25.4	62.8	17.9	25.6
	4	56.4	12.1		58.0	12.4		60.7	13.0		62.8	13.4	
	5	56.4	9.7		58.0	9.9		60.7	10.4		62.8	10.8	
44	3	53.8	15.4	25.4	54.6	15.6	26.0	56.6	16.2	26.9	58.6	16.7	27.2
	4	53.8	11.5		54.6	11.7		56.6	12.1		58.6	12.5	
	5	53.8	9.2		54.6	9.4		56.6	9.7		58.6	10.0	
46	3	50.6	14.5	27.0	50.9	14.5	27.7	52.1	14.9	28.7	54.0	15.4	29.3
	4	50.6	10.8		50.9	10.9		52.1	11.2		54.0	11.6	
	5	50.6	8.7		50.9	8.7		52.1	8.9		54.0	9.2	

MGB-F130W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Chilled water outlet temp. (˚C)											
		5			7			9			12		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(˚C)	(˚C)	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW
25	3	135.2	38.6	37.2	143.4	41.0	38.2	149	42.6	39	153.8	43.9	40
	4	135.2	29.0		143.4	30.7		149	31.9		153.8	33.0	
	5	135.2	23.2		143.4	24.6		149	25.5		153.8	26.4	
28	3	132.9	38.0	38.2	140.5	40.1	38.6	146.1	41.7	39.4	150.8	43.1	40.8
	4	132.9	28.5		140.5	30.1		146.1	31.3		150.8	32.3	
	5	132.9	22.8		140.5	24.1		146.1	25.0		150.8	25.9	
30	3	130.4	37.3	39.8	137.3	39.2	40	142.9	40.8	41	147.5	42.1	42.2
	4	130.4	27.9		137.3	29.4		142.9	30.6		147.5	31.6	
	5	130.4	22.4		137.3	23.5		142.9	24.5		147.5	25.3	
32	3	127.6	36.5	40.8	133.8	38.2	41.2	139.4	39.8	42	143.9	41.1	43.4
	4	127.6	27.3		133.8	28.7		139.4	29.9		143.9	30.8	
	5	127.6	21.9		133.8	22.9		139.4	23.9		143.9	24.7	
35	3	124.5	35.6	42	130	37.1	43.4	135.5	38.7	44.6	139.9	40.0	45.6
	4	124.5	26.7		130	27.9		135.5	29.0		139.9	30.0	
	5	124.5	21.3		130	22.3		135.5	23.2		139.9	24.0	
38	3	120.9	34.5	44.6	125.8	35.9	45.6	131.2	37.5	46.8	135.6	38.7	46.8
	4	120.9	25.9		125.8	27.0		131.2	28.1		135.6	29.1	
	5	120.9	20.7		125.8	21.6		131.2	22.5		135.6	23.2	
40	3	117	33.4	46	121.2	34.6	46.8	126.5	36.1	48.2	130.8	37.4	48.2
	4	117	25.1		121.2	26.0		126.5	27.1		130.8	28.0	
	5	117	20.1		121.2	20.8		126.5	21.7		130.8	22.4	
42	3	112.8	32.2	48.2	115.9	33.1	49.2	121.4	34.7	50.8	125.5	35.9	51.1
	4	112.8	24.2		115.9	24.8		121.4	26.0		125.5	26.9	
	5	112.8	19.3		115.9	19.9		121.4	20.8		125.5	21.5	
44	3	107.6	30.7	50.8	109.2	31.2	52	113.2	32.3	53.8	117.1	33.5	54.4
	4	107.6	23.1		109.2	23.4		113.2	24.3		117.1	25.1	
	5	107.6	18.4		109.2	18.7		113.2	19.4		117.1	20.1	
46	3	101.2	28.9	53.9	101.7	29.1	55.3	104.1	29.7	57.4	107.9	30.8	58.5
	4	101.2	21.7		101.7	21.8		104.1	22.3		107.9	23.1	
	5	101.2	17.3		101.7	17.4		104.1	17.8		107.9	18.5	

MGB-F200W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Chilled water outlet temp. (˚C)											
		5			7			9			12		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(˚C)	(˚C)	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW	kW	m3/h	kW
25	3	192.4	55.0	53.1	204.1	58.3	54.6	212.0	60.6	55.7	218.9	62.5	57.1
	4	192.4	41.2		204.1	43.7		212.0	45.4		218.9	46.9	
	5	192.4	33.0		204.1	35.0		212.0	36.3		218.9	37.5	
28	3	189.1	54.0	54.6	199.9	57.1	55.1	207.9	59.4	56.3	214.6	61.3	58.3
	4	189.1	40.5		199.9	42.8		207.9	44.6		214.6	46.0	
	5	189.1	32.4		199.9	34.3		207.9	35.6		214.6	36.8	
30	3	185.6	53.0	56.9	195.4	55.8	57.1	203.4	58.1	58.6	209.9	60.0	60.3
	4	185.6	39.8		195.4	41.9		203.4	43.6		209.9	45.0	
	5	185.6	31.8		195.4	33.5		203.4	34.9		209.9	36.0	
32	3	181.6	51.9	58.3	190.4	54.4	58.9	198.4	56.7	60.0	204.8	58.5	62.0
	4	181.6	38.9		190.4	40.8		198.4	42.5		204.8	43.9	
	5	181.6	31.1		190.4	32.6		198.4	34.0		204.8	35.1	
35	3	177.2	50.6	60.0	185.0	52.9	62.0	192.8	55.1	63.7	199.1	56.9	65.1
	4	177.2	38.0		185.0	39.6		192.8	41.3		199.1	42.7	
	5	177.2	30.4		185.0	31.7		192.8	33.1		199.1	34.1	
38	3	172.1	49.2	63.7	179.0	51.1	65.1	186.7	53.3	66.9	193.0	55.1	66.9
	4	172.1	36.9		179.0	38.4		186.7	40.0		193.0	41.4	
	5	172.1	29.5		179.0	30.7		186.7	32.0		193.0	33.1	
40	3	166.5	47.6	65.7	172.5	49.3	66.9	180.0	51.4	68.9	186.1	53.2	68.9
	4	166.5	35.7		172.5	37.0		180.0	38.6		186.1	39.9	
	5	166.5	28.5		172.5	29.6		180.0	30.9		186.1	31.9	
42	3	160.5	45.9	68.9	164.9	47.1	70.3	172.8	49.4	72.6	178.6	51.0	73.0
	4	160.5	34.4		164.9	35.3		172.8	37.0		178.6	38.3	
	5	160.5	27.5		164.9	28.3		172.8	29.6		178.6	30.6	
44	3	153.1	43.7	72.6	155.4	44.4	74.3	161.1	46.0	76.9	166.6	47.6	77.7
	4	153.1	32.8		155.4	33.3		161.1	34.5		166.6	35.7	
	5	153.1	26.2		155.4	26.6		161.1	27.6		166.6	28.6	
46	3	144.0	41.1	77.0	144.7	41.4	79.0	148.1	42.3	82.0	153.6	43.9	83.6
	4	144.0	30.9		144.7	31.0		148.1	31.7		153.6	32.9	
	5	144.0	24.7		144.7	24.8		148.1	25.4		153.6	26.3	

9.2 Heating:

MGB-F(D)25W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Hot water outlet temp. (℃)															
		39			42			45			48			50			
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	
(℃)	(℃)	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	
13	3	32.8	9.4	7.8	32.3	9.2	8.1	31.8	9.1	8.5	30.7	8.8	9.0	30.1	8.6	9.3	
	4		7.0			6.9			6.8			6.6			6.5		
	5		5.6			5.5			5.5			5.3			5.2		
10	3	30.7	8.8	7.6	30.1	8.6	8.0	29.6	8.5	8.3	28.8	8.2	8.7	28.0	8.0	9.0	
	4		6.6			6.5			6.4			6.2			6.0		
	5		5.3			5.2			5.1			4.9			4.8		
7	3	28.3	8.1	7.5	27.5	7.9	7.8	26.7	7.6	8.1	26.1	7.5	8.5	25.3	7.3	8.9	
	4		6.1			5.9			5.7			5.6			5.4		
	5		4.9			4.7			4.6			4.5			4.4		
2	3	25.1	7.2	7.3	24.3	7.0	7.6	23.5	6.7	8.0	22.7	6.5	8.3	21.9	6.3	8.5	
	4		5.4			5.2			5.0			4.9			4.7		
	5		4.3			4.2			4.0			4.9			3.8		
-2	3	21.6	6.2	7.1	20.8	6.0	7.4	20.0	5.7	7.8	19.5	5.6	8.1	18.7	5.3	8.5	
	4		4.6			4.5			4.3			4.2			4.0		
	5		3.7			3.6			3.4			3.3			3.2		
-6	3	18.7	5.3	6.9	18.1	5.2	7.3	17.3	5.0	7.6	16.8	4.8	8.0	16.7	4.6	8.3	
	4		4.0			3.9			3.7			3.6			3.4		
	5		3.2			3.1			3.0			2.9			2.8		
-10	3	17.1	4.9	6.8	16.5	4.7	7.1	16.0	4.6	7.5	15.2	4.4	7.8	14.4	4.1	8.1	
	4		3.7			3.6			3.4			3.3			3.1		
	5		2.9			2.8			2.8			2.6			2.5		

MGB-F(D)30W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Hot water outlet temp. (℃)														
		39			42			45			48			50		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(℃)	(℃)	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW
13	3	39.4	11.3	9.4	38.7	11.1	9.8	38.1	10.9	10.3	36.8	10.5	10.8	36.2	10.4	11.1
	4		8.5			8.3			8.2			7.9			7.8	
	5		6.8			6.7			6.6			6.3			6.2	
10	3	36.4	10.5	9.2	36.2	10.4	9.6	35.5	10.2	10.0	34.5	9.9	10.4	33.6	9.6	10.8
	4		7.9			7.8			7.6			7.4			7.2	
	5		6.3			6.2			6.1			5.9			5.8	
7	3	33.9	9.7	9.0	33.0	9.5	9.4	32.0	9.2	9.8	31.4	9.0	10.3	30.4	8.7	10.7
	4		7.3			7.1			6.9			6.7			6.5	
	5		5.8			5.7			5.5			5.4			5.2	
2	3	30.1	8.6	8.8	29.2	8.4	9.2	28.2	8.1	9.6	27.2	7.8	10.0	26.3	7.5	10.3
	4		6.5			6.3			6.1			5.8			5.6	
	5		5.2			5.0			4.8			4.7			4.5	
-2	3	25.9	7.4	8.5	25.0	7.2	8.9	24.0	6.9	9.4	23.4	6.7	9.8	22.4	6.4	10.2
	4		5.6			5.4			5.2			5.0			4.8	
	5		4.5			4.3			4.1			4.0			3.9	
-6	3	22.4	6.4	8.3	21.8	6.2	8.7	20.8	6.0	9.2	20.2	5.8	9.6	19.2	5.5	10.0
	4		4.8			4.7			4.5			4.3			4.1	
	5		3.9			3.7			3.6			3.5			3.3	
-10	3	20.5	5.9	8.1	19.9	5.7	8.5	19.2	5.5	9.0	18.3	5.2	9.4	17.3	5.0	9.8
	4		4.4			4.3			4.1			3.9			3.7	
	5		3.5			3.4			3.3			3.1			3.0	

MGB-F(D)35W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Hot water outlet temp. (℃)														
		39			42			45			48			50		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(℃)	(℃)	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW
13	3	45.9	13.2	10.9	45.2	12.9	11.4	44.5	12.7	12.0	42.9	12.3	12.5	42.2	12.1	13.0
	4		9.9			9.7			9.6			9.2			9.1	
	5		7.9			7.8			7.8			7.4			7.3	
10	3	42.9	12.3	10.7	42.2	12.1	11.1	41.4	11.9	11.6	40.3	11.5	12.1	39.2	11.2	12.6
	4		9.2			9.1			8.9			8.7			8.4	
	5		7.4			7.3			7.1			6.9			6.7	
7	3	39.8	11.3	10.4	38.5	11.0	10.9	37.3	10.7	11.4	36.6	10.5	12.0	35.5	10.2	12.4
	4		8.5			8.3			8.0			7.9			7.6	
	5		6.8			6.6			6.4			6.3			6.1	
2	3	35.1	10.1	10.3	34.0	9.7	10.7	32.8	9.4	11.1	31.7	9.1	11.6	30.6	8.8	12.0
	4		7.5			7.3			7.1			6.8			6.6	
	5		6.0			5.8			5.6			5.5			5.3	
-2	3	30.2	8.7	9.9	29.1	8.3	10.3	28.0	8.0	10.9	27.2	7.8	11.4	26.1	7.5	11.8
	4		6.5			6.3			6.0			5.9			5.6	
	5		5.2			5.0			4.8			4.7			4.5	
-6	3	26.1	7.5	9.7	25.4	7.3	10.2	24.3	7.0	10.7	23.5	6.7	11.1	22.4	6.4	11.6
	4		5.6			5.5			5.2			5.1			4.8	
	5		4.5			4.4			4.2			4.0			3.9	
-10	3	23.9	6.9	9.5	23.2	6.6	9.9	22.4	6.4	10.4	21.3	6.1	10.9	20.2	5.8	11.4
	4		5.1			5.0			4.5			4.6			4.3	
	5		4.1			4.0			3.9			3.7			3.5	

MGB-F55W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Hot water outlet temp. (℃)														
		39			42			45			48			50		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(℃)	(℃)	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW
13	3	72.1	20.7	17.1	71	20.3	17.9	69.9	20.0	18.8	67.5	19.3	19.7	66.3	19.0	20.4
	4		15.5			15.3			15.0			14.5			14.2	
	5		12.4			12.2			12.0			11.6			11.4	
10	3	67.5	19.3	16.8	66.3	19.0	17.5	65.1	18.7	18.2	63.3	18.1	19.1	61.6	17.7	19.8
	4		14.5			14.2			14.0			13.6			13.2	
	5		11.6			11.4			11.2			10.9			10.6	
7	3	62.2	17.8	16.4	60.5	17.3	17.1	58.7	16.8	17.9	57.5	16.5	18.8	55.7	16.0	19.5
	4		13.4			13.0			12.6			12.4			12.0	
	5		10.7			10.4			10.1			9.9			9.6	
2	3	55.2	15.8	16.1	53.4	15.3	16.8	51.6	14.8	17.5	49.9	14.3	18.2	48.1	13.8	18.8
	4		11.9			11.5			11.1			10.7			10.3	
	5		9.5			9.2			8.9			8.6			8.3	
-2	3	47.5	13.6	15.6	45.7	13.1	16.2	44.0	12.6	17.1	42.8	12.3	17.9	41.1	11.8	18.6
	4		10.2			9.8			9.5			9.2			8.8	
	5		8.2			7.9			7.6			7.4			7.1	
-6	3	41.1	11.8	15.2	39.9	11.4	16	38.1	10.9	16.8	36.9	10.6	17.5	35.2	10.1	18.2
	4		8.8			8.6			8.2			7.9			7.6	
	5		7.1			6.9			6.6			6.4			6.1	
-10	3	37.6	10.8	14.9	36.4	10.4	15.6	35.2	10.1	16.4	33.5	9.6	17.1	31.7	9.1	17.9
	4		8.1			7.8			7.6			7.2			6.8	
	5		6.5			6.3			6.1			5.8			5.5	

MGB-F60W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Hot water outlet temp. (℃)														
		39			42			45			48			50		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(℃)	(℃)	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW
13	3	78.7	22.6	18.7	77.4	22.2	19.5	76.2	21.8	20.5	73.6	21.1	21.5	72.3	20.7	22.2
	4		16.9			16.6			16.4			15.8			15.5	
	5		13.5			13.3			13.1			12.7			12.4	
10	3	73.6	21.1	18.3	72.3	20.7	19.1	71	20.3	19.9	69	19.8	20.8	67.2	19.3	21.6
	4		15.8			15.5			15.3			14.8			14.4	
	5		12.7			12.4			12.2			11.9			11.6	
7	3	67.8	19.4	17.9	66	18.9	18.7	64	18.3	19.5	62.7	18.0	20.5	60.8	17.4	21.3
	4		14.6			14.2			13.8			13.5			13.1	
	5		11.7			11.3			11.0			10.8			10.5	
2	3	60.2	17.3	17.6	58.3	16.7	18.3	56.3	16.1	19.1	54.4	15.6	19.9	52.5	15.0	20.5
	4		12.9			12.5			12.1			11.7			11.3	
	5		10.4			10.0			9.7			9.4			9.0	
-2	3	51.8	14.8	17	49.9	14.3	17.7	48	13.8	18.7	46.7	13.4	19.5	44.8	12.8	20.3
	4		11.1			10.7			10.3			10.0			9.6	
	5		8.9			8.6			8.3			8.0			7.7	
-6	3	44.8	12.8	16.6	43.5	12.5	17.4	41.6	11.9	18.3	40.3	11.6	19.1	38.4	11.0	19.9
	4		9.6			9.4			8.9			8.7			8.3	
	5		7.7			7.5			7.2			6.9			6.6	
-10	3	41.0	11.8	16.2	39.7	11.4	17	38.4	11.0	17.9	36.5	10.5	18.7	34.6	9.9	19.5
	4		8.8			8.5			8.3			7.8			7.4	
	5		7.1			6.8			6.6			6.3			5.9	

MGB-F65W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Hot water outlet temp. (℃)														
		39			42			45			48			50		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(℃)	(℃)	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW
13	3	85.3	24.4	20.3	83.9	24.0	21.1	82.6	23.7	22.2	79.7	22.9	23.3	78.3	22.4	24.1
	4		18.3			18.0			17.7			17.1			16.8	
	5		14.7			14.4			14.2			13.7			13.5	
10	3	79.7	22.9	19.8	78.3	22.4	20.7	76.9	22.0	21.6	74.8	21.4	22.5	72.8	20.9	23.4
	4		17.1			16.8			16.5			16.1			15.6	
	5		13.7			13.5			13.2			12.9			12.5	
7	3	73.5	21.1	19.4	71.5	20.5	20.3	69.3	19.9	21.1	67.9	19.5	22.2	65.9	18.9	23.1
	4		15.8			15.4			14.9			14.6			14.2	
	5		12.6			12.3			11.9			11.7			11.3	
2	3	65.2	18.7	19.1	63.2	18.1	19.8	61	17.5	20.7	58.9	16.9	21.6	56.9	16.3	22.2
	4		14.0			13.6			13.1			12.7			12.2	
	5		11.2			10.9			10.5			10.1			9.8	
-2	3	56.1	16.1	18.4	54.1	15.5	19.2	52	14.9	20.3	50.6	14.5	21.1	48.5	13.9	22
	4		12.1			11.6			11.2			10.9			10.4	
	5		9.6			9.3			8.9			8.7			8.3	
-6	3	48.5	13.9	18	47.1	13.5	18.9	45.1	12.9	19.8	43.7	12.5	20.7	41.6	11.9	21.6
	4		10.4			10.1			9.7			9.4			8.9	
	5		8.3			8.1			7.7			7.5			7.2	
-10	3	44.4	12.7	17.6	43	12.3	18.4	41.6	11.9	19.4	39.5	11.3	20.3	37.5	10.7	21.1
	4		9.5			9.2			8.9			8.5			8.1	
	5		7.6			7.4			7.2			6.8			6.4	

MGB-F130W/S(R)

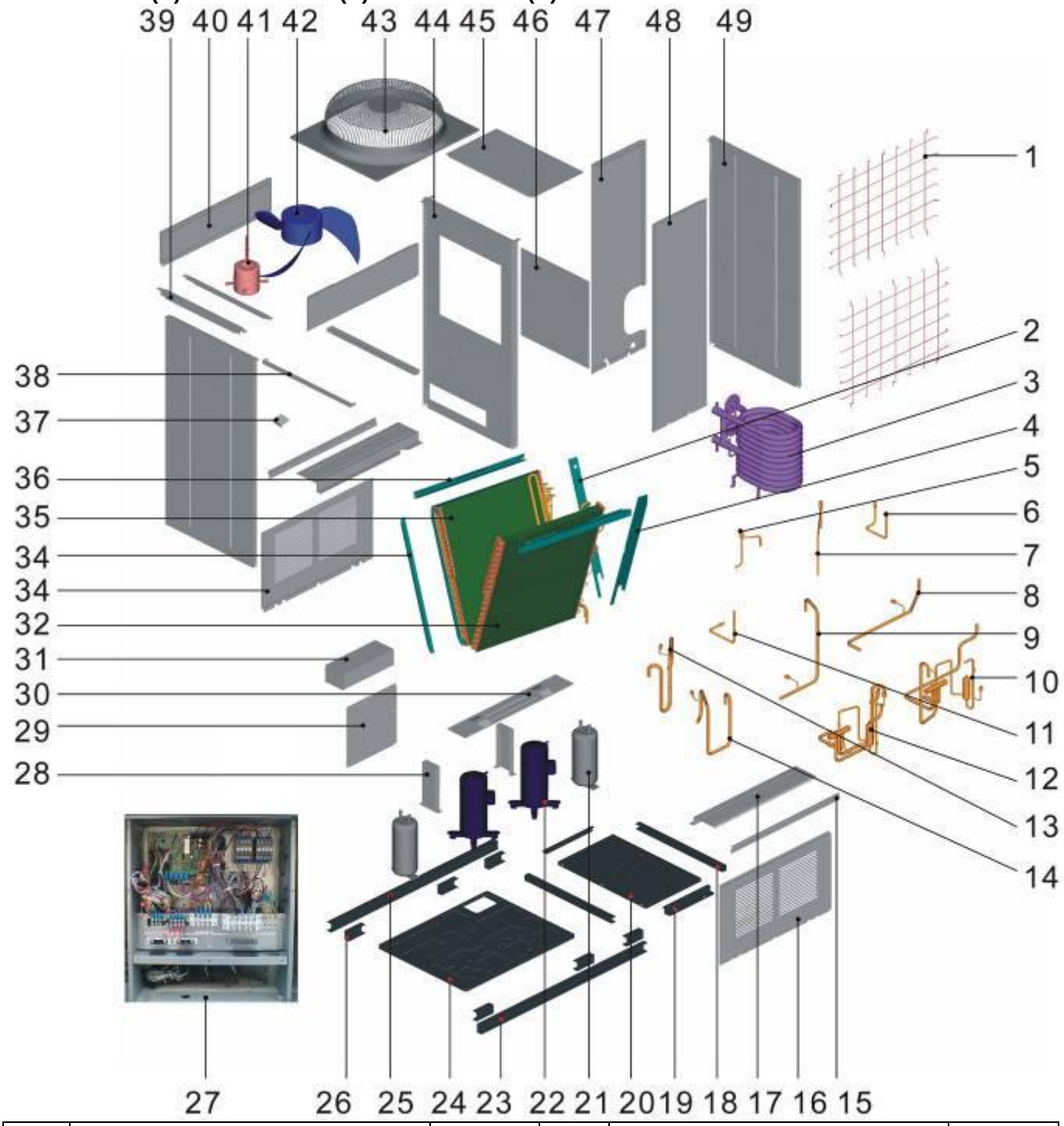
Ambient temp.	Difference of water inlet and outlet temp.	Hot water outlet temp. (℃)														
		39			42			45			48			50		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(℃)	(℃)	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW
13	3	170.6	48.8	40.6	167.8	48.0	42.2	165.2	47.4	44.4	159.4	45.8	46.6	156.6	44.8	48.2
	4		36.6			36.0			35.4			34.2			33.6	
	5		29.4			28.8			28.4			27.4			27.0	
10	3	159.4	45.8	39.6	156.6	44.8	41.4	153.8	44.0	43.2	149.6	42.8	45.0	145.6	40.8	46.8
	4		34.2			33.6			33.0			32.2			31.2	
	5		27.4			27.0			26.4			25.8			25.0	
7	3	147.0	42.2	38.8	143.0	41.0	40.6	138.6	39.8	42.2	135.8	39.0	44.4	131.8	37.8	46.2
	4		31.6			30.8			30.8			29.2			28.4	
	5		25.2			24.6			23.8			23.4			22.6	
2	3	130.4	37.4	38.2	126.4	36.2	39.6	122.0	35.0	41.4	117.8	33.8	43.2	113.8	32.6	44.4
	4		28.0			27.2			26.2			25.4			24.4	
	5		22.4			21.8			21.0			20.2			19.6	
-2	3	112.2	32.2	36.8	108.2	31.0	38.4	104.0	29.8	40.6	101.2	29.0	42.2	97.0	27.8	44.0
	4		24.2			23.2			22.4			21.8			20.8	
	5		19.2			18.6			17.8			17.4			16.6	
-6	3	97.0	27.8	36.0	94.2	27.0	37.8	90.2	25.8	39.6	87.4	25.0	41.4	83.2	23.8	43.2
	4		20.9			20.0			19.4			18.8			17.8	
	5		16.6			16.2			15.4			15.0			14.4	
-10	3	88.8	25.4	35.2	86.0	24.6	36.8	63.2	23.8	38.6	79.0	22.6	40.6	75.0	21.4	42.2
	4		19.0			18.4			17.8			17.0			16.2	
	5		15.2			14.8			14.4			13.6			12.8	

MGB-F200W/S(R)

Ambient temp.	Difference of water inlet and outlet temp.	Hot water outlet temp. (℃)														
		39			42			45			48			50		
		Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power	Capacity	Water flow	Power
(℃)	(℃)	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW	kW	m^3/h	kW
13	3	245.9	65.3	57.5	241.9	64.2	60.0	238.1	63.0	63.1	230.0	61.0	66.2	225.9	59.8	68.3
	4		48.9			48.0			47.4			45.7			44.8	
	5		39.0			38.4			37.9			36.7			35.8	
10	3	230.0	61.0	56.3	225.9	59.8	58.8	221.9	58.7	61.2	215.6	57.2	64.0	210.0	55.8	66.5
	4		45.7			44.8			44.2			42.8			41.6	
	5		36.7			35.8			35.3			34.4			33.5	
7	3	211.9	56.1	55.1	206.3	54.6	57.5	200.0	52.9	60.0	195.9	52.0	63.1	190.0	50.3	65.5
	4		42.2			41.1			39.9			39.0			37.9	
	5		33.8			32.7			31.8			31.2			30.4	
2	3	188.1	50.0	54.2	182.2	48.3	56.3	175.9	46.5	58.8	170.0	45.1	61.2	164.1	43.4	63.1
	4		37.3			36.1			35.0			33.8			32.7	
	5		30.1			28.9			28.0			27.2			26.0	
-2	3	161.9	42.8	52.3	155.9	41.3	54.5	150.0	39.9	57.5	145.9	38.7	60.0	140.0	37.0	62.5
	4		32.1			30.9			29.8			28.9			27.8	
	5		25.7			24.9			24.0			23.1			22.3	
-6	3	140.0	37.0	51.1	135.9	36.1	53.5	130.0	34.4	56.3	125.9	33.5	58.8	120.0	31.8	61.2
	4		27.8			27.2			25.7			25.2			24.0	
	5		22.3			21.7			20.8			19.9			19.1	
-10	3	128.1	34.1	49.8	124.1	33.0	52.3	120.0	31.8	55.1	114.1	30.4	57.5	108.1	28.6	60.0
	4		25.4			24.6			24.0			22.5			21.4	
	5		20.5			19.7			19.1			18.2			17.1	

Exploded View

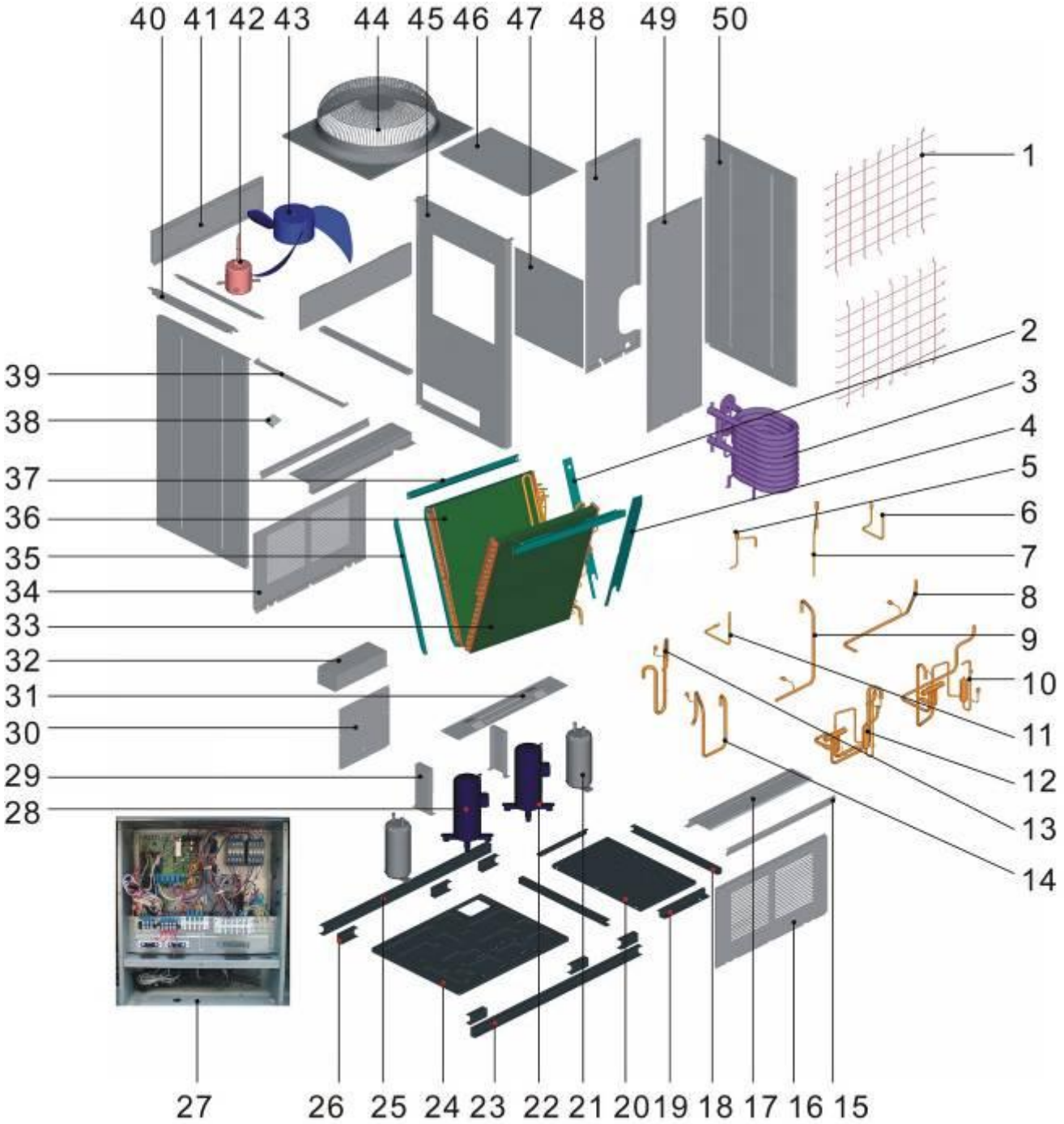
MGB-F25W/S(R) MGB-F30W/S(R) MGB-F35W/S(R)



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Rear—front net	2	24	underpan parts	1
2	Condenser right seal board ass'y	1	25	underpan bracket	1
3	Double-pipe heat exchanger	1	26	Reinforcement bracket	6
4	Condenser right seal board ass'y	1	27	E-part box ass'y	1
5	Input pipe ass'y of B unit	1	27.1	Main control board ass'y	1
5.1	Electronic expansion valve	1	27.2	Relay	2
6	Input pipe ass'y of A unit	1	27.3	Contactor	1
6.1	Filter	1	27.4	Contactor	1
7	Input pipe ass'y of A unit	1	27.5	Transformer	1
7.1	Electronic expansion valve	1	27.6	Wire joint	2
8	Output pipe ass'y of B unit	1	27.7	Wire joint	1

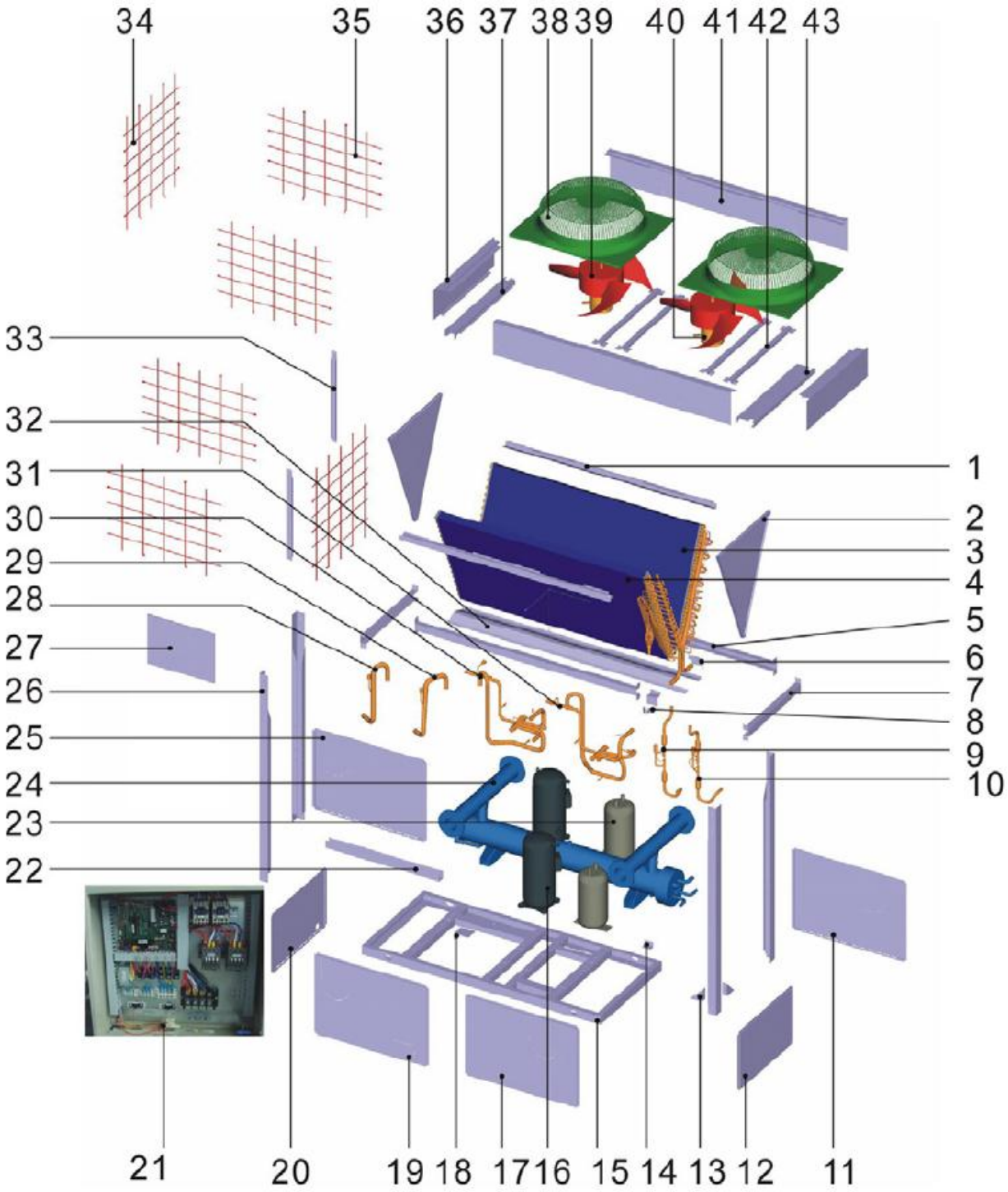
8.1	Pressure controller	1	27.8	Wire joint	4
9	Output pipe ass'y of A unit	1	27.9	Wire joint	1
9.1	Pressure controller	1	27.10	Comp capacitor	1
10	4-Way valve ass'y of A unit	1	28	Drainage pan bracket	2
10.1	4-Way valve	1	29	E-part box cover board	1
10.2	4-Way valve solenoid	1	30	Drainage pan	1
10.3	Muffler	1	31	Prevent water box	1
10.4	Filter	1	32	Condenser of A unit	1
10.5	Pipe joint	1	33	Rear—below cover board	1
10.6	Pressure controller	1	34	Condenser left seal board ass'y	2
11	Input pipe ass'y of B unit	1	35	Condenser of B unit	1
11.1	Filter	1	36	Motor bracket	2
12	4-Way valve ass'y of B unit	1	37	Side seal board	4
12.1	4-Way valve	1	38	Side bracket	2
12.2	4-Way valve solenoid	1	39	Motor bracket	2
12.3	Muffler	1	40	Rear—front cover board	2
12.4	Filter	1	41	Motor	1
12.5	Pipe joint	1	42	Axial flow fan	1
12.6	Pressure controller	1	43	Top cover	1
13	Suction pipe ass'y of A unit	1	44	Partition board	1
13.1	Pressure controller	1	45	Top cover	1
14	Suction pipe ass'y of A unit	1	46	Seal partition board	1
14.1	Pressure controller	1	47	Rear cover board	1
15	Rear-below and front below bracket	2	48	Rear—front cover board	1
16	front-below cover board	1	49	Left—right side board	2
17	comp cover board	2	50	R22	7Kg
18	Small underpan bracket ass'y	2	51	EEV solenoid	2
19	Small underpan bracket ass'y	2	52	Ambient temp sensor	1
20	Small underpan	1	53	Discharge temp controller	2
21	Separator	2	54	Comp electric heater	2
22	Compressor	2	55	Pipe sensor	6
23	underpan bracket	1	56	Pipe sensor wire	3

MGB-D25W/S(R) MGB-D30W/S(R) MGB-D35W/S(R)



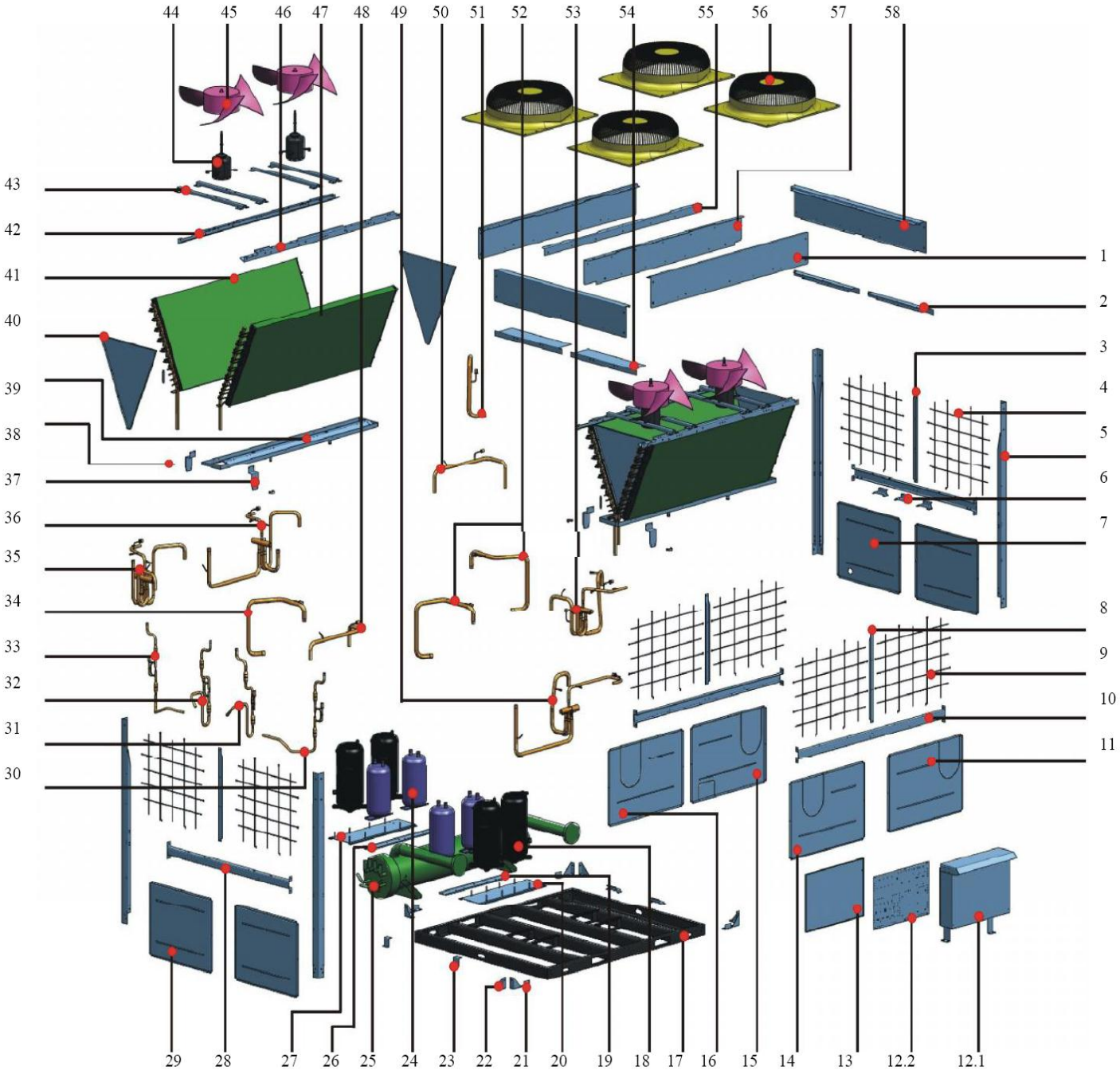
No.	Part Name	Quantity	No.	Part Name	Quantity
1	Rear—front net	2	24	Underpan	1
2	Condenser right seal board ass'y	1	25	Underpan bracket	1
3	Double-pipe heat exchanger	1	26	reinforcement bracket	6
4	Condenser right seal board ass'y	1	27	E-part box ass'y	1
5	Input pipe ass'y of B unit	1	27.1	Main control board ass'y	1
5.1	Electronic expansion valve	1	27.2	Relay	2
6	Input pipe ass'y of A unit	1	27.3	Contactor	1
6.1	Filter	1	27.4	Contactor	1
7	Input pipe ass'y of A unit	1	27.5	Transformer	1
7.1	Electronic expansion valve	1	27.6	Wire joint	2
8	Output pipe ass'y of B unit	1	27.7	Wire joint	1
8.1	Pressure controller	1	27.8	Wire joint	4
9	Output pipe ass'y of A unit	1	27.9	Wire joint	1
9.1	Pressure controller	1	27.10	Compressor capacitor	1
10	4-Way valve ass'y of A unit	1	28	Compressor	1
10.1	4-Way	1	29	Drainage pan bracket	2
10.2	4-Way solenoid	1	30	E-part box cover board	1
10.3	Muffler	1	31	Drainage pan	1
10.4	Filter	1	32	Preventing water box	1
10.5	Pipe joint	1	33	Condenser of A unit	1
10.6	Pressure controller	1	34	Rear-below cover board	1
11	Input pipe ass'y of B unit	1	35	Left seal board ass'y of condenser	2
11.1	Filter	1	36	Condenser of B unit	1
12	4-Way ass'y of B unit	1	37	Motor bracket	2
12.1	4-Way	1	38	side seal board	4
12.2	4-Way solenoid	1	39	Side bracket	2
12.3	Muffler	1	40	Motor bracket	2
12.4	Filter	1	41	Rear-above and front-above cover	2
12.5	Pipe joint	1	42	Motor	1
12.6	Pressure controller	1	43	Axial flow fan	1
13	Suction pipe ass'y of A unit	1	44	Top cover board	1
13.1	Pressure controller	1	45	Partition board	1
14	Suction pipe ass'y of B unit	1	46	Top cover board	1
14.1	Pressure controller	1	47	Seal partition board	1
14.2	Filter	1	48	Rear cover board	1
14.3	Reducing valve	1	49	Rear-front cover board	1
15	Rear—below and front—below bracket	2	50	Left-right side board	2
16	Front—below cover board	1	51	R22	7Kg
17	comp cover board	2	52	EEV solenoid	2
18	small underpan bracket ass'y	2	53	Ambient sensor	1
19	small underpan bracket ass'y	2	54	Discharge temp sensor	2
20	small underpan	1	55	Comp electric heater	1
21	Accumulater cylinder	2	56	Pipe sensor	6
22	compressor	1	57	Pipe sensor wire	3
23	Underpan bracket	1	58	Comp electric heater	1

MGB-F55W/S(R) MGB-F60W/S(R) MGB-F65W/S(R)



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Condenser fixing board ass'y	2	21.8	Wire joint	1
2	Condenser seal board	2	21.9	Main control board ass'y	1
3	Condenser ass'y of A unit	1	22	Wire connecting groove	0.5
3.1	Condenser of A unit	1	23	Separator	2
3.2	Fluted pipe ass'y of A unit	1	24	Shell and tube evaporator	1
3.3	Condenser distributor ass'y of A unit	1	25	Cover board	1
4	Condenser ass'y of B unit	1	26	Pole	4
4.1	Condenser of B unit	1	27	E-part box door	1
4.2	Fluted pipe ass'y of B unit	1	28	Suction pipe ass'y of A unit	1
4.3	Condenser distributor ass'y of B unit	1	28.1	Low pressure switch	1
5	Beam	2	29	Suction pipe ass'y of B unit	1
6	Fixing board	2	29.1	Low pressure switch	1
7	Beam	2	30	4-way valve ass'y of A unit	1
8	Pipe clamp	2	30.1	4-way valve	1
9	Evaporator input pipe ass'y of A unit	1	30.2	Pipe joint	2
9.1	Strainer	2	30.3	Pressure controller	1
9.2	Electronic expansion valve	1	30.4	Pressure controller	1
9.3	Capillary	1	30.5	Solenoid	1
9.4	EEV solenoid	1	31	4-way valve ass'y of B unit	1
10	Evaporator input pipe ass'y of B unit	1	31.1	4-way valve	1
10.1	Strainer	2	31.2	Pipe joint	2
10.2	Electronic expansion valve	1	31.3	Pressure controller	1
10.3	Capillary	1	31.4	Pressure controller	1
10.4	EEV solenoid	1	31.5	Solenoid	1
11	left-front cover board	1	32	Drainage pan	1
12	Left cover board	1	33	Partition board	2
13	Reinforcement	8	34	Left-right net	2
14	Strengthen board	4	35	Rear—front net	4
15	Base weldment	1	36	Top bracket beam	2
16	Compressor	2	37	Condenser seal connecting joint II	1
17	Cover board	1	38	Top cover	2
18	Fixing board	1	39	Axial flow fan	2
19	Cover board	1	40	Motor	2
20	Right cover board	1	41	Beam	2
21	E-part box ass'y	1	42	Motor bracket	4
21.1	Relay	2	43	Condenser seal connecting joint I	1
21.2	AC contactor	2	44	Compressor electric heater	2
21.3	AC contactor	2	45	Discharge temp. sensor	2
21.4	Transformer	1	46	Room temp. sensor	1
21.5	Wire joint	2	47	Pipe temp. sensor	2
21.6	Wire joint	1	48	Pipe temp. sensor	1
21.7	Wire joint	3	49	Pipe temp. sensor	3

MGB-F130W/S(R)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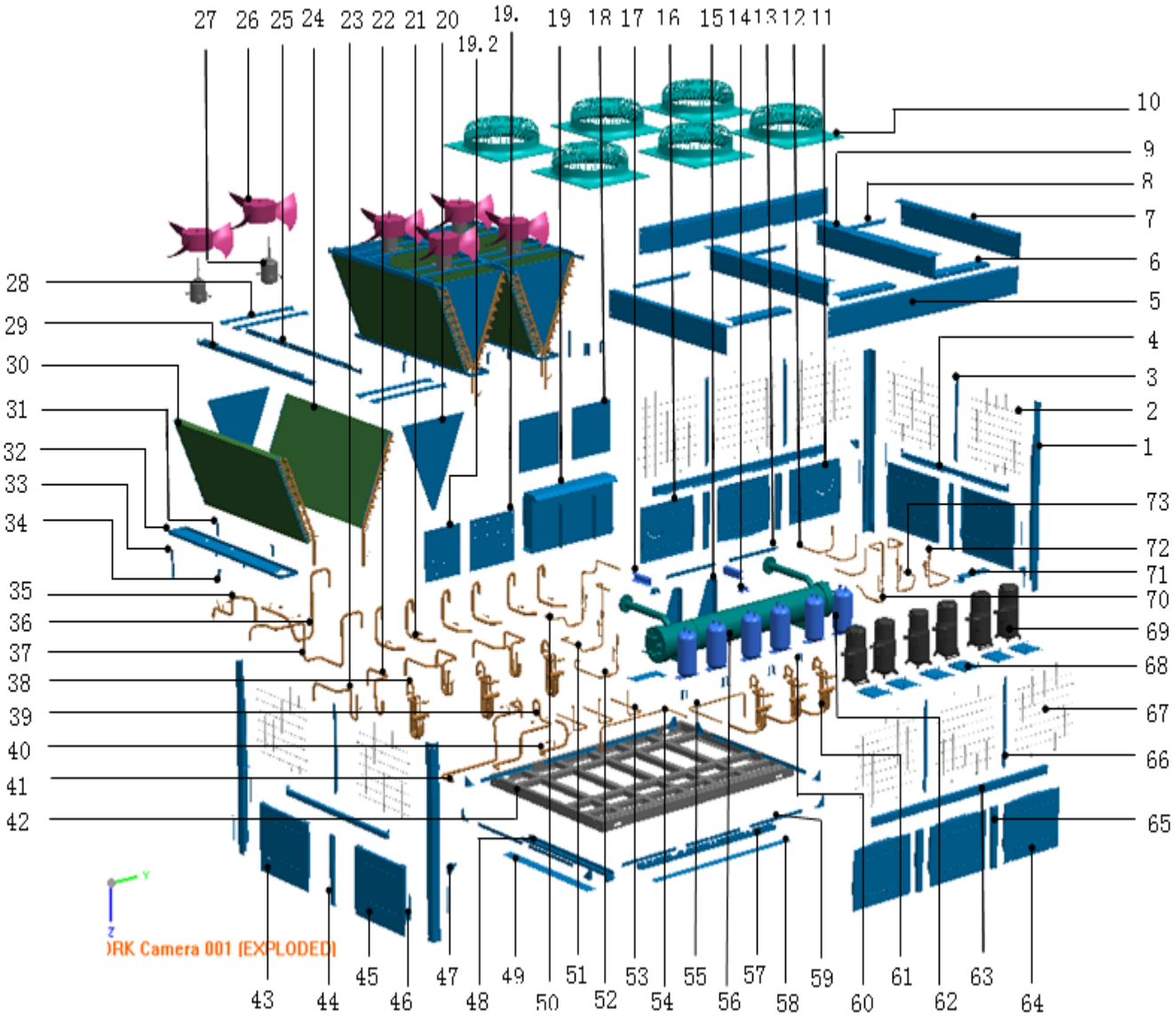
No.	Part Name	Quantity	No.	Part Name	Quantity
1	Beam	2	38	Pipe fixing clip	6
2	Condenser seal connecting joint II	2	39	Drainage pan	2
3	Fixing board of metal net	2	40	Condenser seal board	4
4	Left-right net	4	41	Condenser ass'y of A unit	2
5	Pillar	4	41.1	Condenser of A unit	1
6	Fixing board	5	41.2	Condenser distributor ass'y of A	1
7	Left-right cover board II	1	41.3	Distributary pipe ass'y of A unit	1
8	Fixing board of metal net	2	42	Condenser fixing board of A unit	2
9	Rear-front net	4	43	Motor bracket	8
10	Beam	2	44	Motor	4
11	Front-right cover board	1	45	Axial flow fan	4
12	E-part box ass'y	1	46	Condenser fixing board of B unit	2
12.1	E-part box	1	47	Condenser ass'y of B unit	2
12.2	Elec-installation board	1	47.1	Condenser of B unit	1
12.3	Main control board ass'y	1	47.2	Condenser distributor ass'y of B	1
13	E-part box gate	1	47.3	Distributary pipe ass'y of B unit	1
14	Front-left cover board	1	48	Connection pipe ass'y of A1 unit	1
15	Rear-right coner board	1	48.1	Pressure controller	1
16	Rear-right coner board	1	49	4-way valve ass'y of B2 unit	1
17	Base weldment	1	49.1	4-way valve	1
18	Compressor	4	49.2	Pressure controller	1
19	Bottom board II for accumulator tank	1	50	Connection pipe ass'y of B2 unit	1
20	Compressor base weldment II	1	50.1	Pressure controller	1
21	Strengthen board	4	51	Suction pipe ass'y of A2 unit	1
22	Reinforcement	8	51.1	Pressure controller	1
23	Pipe support weldment	2	52	Suction pipe ass'y of B1 unit	2
24	separator	4	52.1	Pressure controller	1
25	Shell and tube evaporator	1	53	4-way valve ass'y of A2 unit	1
26	Bottom board I for accumulator tank	1	53.1	4-way valve	1
27	Compressor base weldment I	1	53.2	Pressure controller	1
28	Beam	2	54	Condenser seal connecting joint I	2
29	Left-right cover board I	3	55	Beam	1
30	Evaporator input pipe ass'y of B2 unit	1	56	Top cover	4
30.1	Electronic expansion valve	1	57	Beam	1
31	Evaporator input pipe ass'y of A2 unit	1	58	Beam	2
31.1	Electronic expansion valve	1	59	Total outlet water position ass'y	1
32	Evaporator input pipe ass'y of B1 unit	1	60	Coil temp sensor ass'y(T2A)	2
32.1	Electronic expansion valve	1	61	Coil temp sensor ass'y(T2B)	1
33	Evaporator input pipe ass'y of A1 unit	1	62	Coil temp sensor ass'y(Tall)	3
33.1	Electronic expansion valve	1	63	Coil temp sensor （T34)	2
34	Suction pipe ass'y of A1 unit	1	64	Coil temp sensor （T31)	2
34.1	Pressure controller	1	65	Coil temp sensor （T41)	2
35	4-way valve ass'y of B1 unit	1	66	Coil temp sensor ass'y	1
35.1	4-way valve	1	67	Discharge temp controller	4
35.2	Pressure controller	1	68	Comp electric heater	2
35.3	Pressure controller	1	69	Comp electric heater	2
36	4-way valve ass'y of A1 unit	1	70	R22	28Kg
36.1	4-way valve	1	71	4-way valve solenoid	2
36.2	Pressure controller	1	72	Electric expansion valve solenoid	4
37	Fixing board	4	73	4-way valve solenoid	2

MGB-F200W/S(R)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No.	Part Name	Quantity	No.	Part Name	Quantity
1	Beam	4	41	Evaporator outlet pipe ass'y for D unit	1
2	Left-right net	4	41.1	Pressure controller	1
3	Fixing board of metal net	2	42	Base weldment	1
4	Beam	2	43	Left-right board	1
5	Beam	2	44	Reinforce beam	2
6	Condenser seal connecting joint I	3	45	Left-right board	3
7	Beam	2	46	Board fixed ass'y	8
8	Condenser seal connecting joint II	3	47	Three angle reinforce ass'y	12
9	Beam weldment	2	48	Wire trough	1
10	Top cover	6	49	Wire trough board	1
11	Rear cover board II	1	50	Evaporator intake pipe for B unit	1
12	Condenser outlet pipe II	3	50.1	Electronic expansion valve	1
13	Beam for wire	2	51	Evaporator intake pipe for A unit	1
14	Terminal of control box I	2	51.1	Electronic expansion valve	1
15	Terminal of control box III	2	52	Evaporator intake pipe for C unit	1
16	Rear cover board I	1	52.1	Electronic expansion valve	1
17	Terminal of control box II	2	53	Condenser outlet pipe	3
18	Door of control box	2	54	Condenser connection pipe	1
19	Control box	1	55	Condenser connection pipe	1
20	Seal board for condenser	6	56	Shell and tube	1
21	Suction pipe ass'y	6	57	Wire trough	1
21.1	Pressure controller	1	58	Wire trough board	1
22	Condenser intake pipe II	3	59	Fixed ass'y for board	10
23	Condenser intake pipe I ass'y	3	60	Fixed board for pipe	4
24	B unit condenser	3	61	4-way valve ass'y	3
25	Fixed board for B unit condenser	3	61.1	4-way valve	1
26	Axial fan	6	61.2	Pressure controller	1
27	Asynchronous motor	5	61.3	Pipe joint	2
28	Motor fixed beam ass'y	12	62	separator	6
29	Fixed board for A unit condenser	3	63	Beam	2
30	A unit condenser	3	64	Front board	4
31	Fixed board for pipe II	2	65	Reinforce beam	4
32	Water pan weldment	3	66	Fixed board for metal net	4
33	Beam for wire II	2	67	Front-rear net	6
34	Fixed board for pipe III	6	68	Comp. installation base weldment	6
35	Evaporator outlet pipe ass'y for A unit	1	69	Scroll compressor	6
35.1	Pressure controller	1	70	Evaporator intake ass'y for F unit	1
36	Evaporator outlet pipe ass'y for B unit	1	70.1	Electronic expansion valve	1
36.1	Pressure controller	1	71	Fixed board for throttle part	2
37	Evaporator outlet pipe ass'y for C unit	1	72	Evaporator intake ass'y for D unit	1
37.1	Pressure controller	1	72.1	Electronic expansion valve	1
38	4-way valve ass'y	3	73	Evaporator intake ass'y for E unit	1
38.1	4-way valve	1	73.1	Electronic expansion valve	1
38.2	Pressure controller	1	74	Auxiliary electric heater for comp.	6
38.3	Pipe joint	2			
39	Evaporator outlet pipe ass'y for E unit	1			
39.1	Pressure controller	1			
40	Evaporator outlet pipe ass'y for F unit	1			
40.1	Pressure controller	1			

Troubleshooting

11.1 Failure & Protection Codes of the Module

25/30/35 Module

No,	Code	Trouble
1	E0	Water flow detection error (The third time)
2	E1	Power phase sequence error
3	E2	Communication error
4	E3	Total water outlet temperature sensor error
5	E4	Outlet water temperature sensor in Shell and tube exchanger error
6	E5	Pipe temperature sensor in condenser A error
7	E6	Pipe temperature sensor in condenser B error
8	E7	Outdoor ambient temperature sensor error
9	E8	System A is air discharge temperature sensor in digital compressor error
10	E9	Water flow detection error (The first and second times)
11	EA	Main unit detect that auxiliary unit's quantity have decreased
12	EB	Freeze-proof temperature sensor 1 in shell and tube exchanger error
13	EC	Wire control did not found out any on-line module unit
14	ED	Wire control and module unit communication error
15	Ed	1-hour consecutive 4-times PE protection
16	EE	Wire control and computer communication error
17	EF	Inlet water temperature sensor error
18	P0	High pressure or air discharge temperature protection error in system A
19	P1	Low pressure protection system A
20	P2	High pressure or air discharge temperature protection in system B
21	P3	Low pressure protection System B
22	P4	Current protection in system A
23	P5	Current protection in system B
24	P6	Condenser high pressure protection in system A
25	P7	Condenser high pressure protection in system B
26	P8	System A is air discharge temperature sensor in digital compressor
27	Pb	System freeze-proof protection
28	PE	Low-temperature protection of double-pipe heat exchanger
29	F1	EEPROM failure
30	F2	Failure of reduction of wired controller number at parallel connection of multiple wired controller (reserved) parallel connection of multiple wired controller

55/60/65 Module

No,	Code	Trouble
1	E0	Water flow detection error (The third time)
2	E1	Power phase sequence error
3	E2	Communication error
4	E3	Total water outlet temperature sensor error
5	E4	Outlet water temperature sensor in Shell and tube exchanger error
6	E5	Pipe temperature sensor in condenser A error
7	E6	Pipe temperature sensor in condenser B error
8	E7	Outdoor ambient temperature sensor error
9	E8	System A is air discharge temperature sensor in digital compressor error
10	E9	Water flow detection error (The first and second times)
11	EA	Main unit detect that auxiliary unit's quantity have decreased
12	EB	Freeze-proof temperature sensor 1 in shell and tube exchanger error
13	EC	Wire control did not found out any on-line module unit
14	ED	Wire control and module unit communication error
15	Ed	1-hour consecutive 4-times PE protection
16	EE	Wire control and computer communication error
17	EF	Inlet water temperature sensor error
18	P0	High pressure or air discharge temperature protection error in system A
19	P1	Low pressure protection system A
20	P2	High pressure or air discharge temperature protection in system B
21	P3	Low pressure protection System B
22	P4	Current protection in system A
23	P5	Current protection in system B
24	P6	Condenser high pressure protection in system A
25	P7	Condenser high pressure protection in system B
26	P8	System A is air discharge temperature sensor in digital compressor
27	P9	Protection of outlet and inlet water temperature difference
28	PA	Starting protection of low-temp cooling
29	Pb	System freeze-proof protection
30	PC	(Reserved failure code)
31	PE	Low-temperature protection of shell-and-tube heat exchanger
32	F1	EEPROM failure
33	F2	Failure of reduction of wired controller number at parallel connection of multiple wired controller (reserved) parallel connection of multiple wired controller

130 Module

No,	Code	Trouble
1	E0	Water flow detection error (The third time)
2	E1	Power phase sequence error
3	E2	Communication error
4	E3	Total water outlet temperature sensor error
5	E4	Outlet water temperature sensor in Shell and tube exchanger error
6	E5	Pipe temperature sensor in condenser A error
7	E6	Pipe temperature sensor in condenser B error
8	E7	Outdoor ambient temperature sensor error
9	E8	System A is air discharge temperature sensor in digital compressor error
10	E9	Water flow detection error (The first and second times)
11	EA	Main unit detect that auxiliary unit's quantity have decreased
12	EB	Freeze-proof temperature sensor 1 in shell and tube exchanger error
13	EC	Wire control did not found out any on-line module unit
14	ED	Wire control and module unit communication error
15	Ed	1-hour consecutive 3-times PE protection
16	EE	Wire control and computer communication error
17	EF	Inlet water temperature sensor error
18	P0	High pressure or air discharge temperature protection error in system A
19	P1	Low pressure protection system A
20	P2	High pressure or air discharge temperature protection in system B
21	P3	Low pressure protection System B
22	P4	Current protection in system A
23	P5	Current protection in system B
24	P6	Condenser high pressure protection in system A
25	P7	Condenser high pressure protection in system B
26	P8	System A is air discharge temperature sensor in digital compressor
27	P9	Protection of outlet and inlet water temperature difference
28	PA	Starting protection of low-temp cooling
29	Pb	System freeze-proof protection
30	PC	(Reserved failure code)
31	PE	Low-temperature protection of shell-and-tube heat exchanger
32	F1	EEPROM failure
33	F2	Failure of reduction of wired controller number at parallel connection of multiple wired controller (reserved) parallel connection of multiple wired controller

200 Module

No,	Code	Trouble
1	E0	Water flow detection error (The third time)
2	E1	Power phase sequence error
3	E2	Communication error
4	E3	Total water outlet temperature sensor error
5	E4	Outlet water temperature sensor in Shell and tube exchanger error
6	E5	Pipe temperature sensor in condenser A error
7	E6	Pipe temperature sensor in condenser B error
8	E7	Outdoor ambient temperature sensor error or power protection
9	E8	(Reserved failure code)
10	E9	Water flow detection error (The first and second times)
11	EA	Main unit detect that auxiliary unit's quantity have decreased
12	Eb	Freeze-proof temperature sensor 1 in shell and tube exchanger error
13	EC	Wire control did not found out any on-line module unit
14	Ed	1-hour consecutive 3-times PE protection
15	EF	Inlet water temperature sensor error
16	P0	High pressure or air discharge temperature protection error in system A
17	P1	Low pressure protection system A
18	P2	High pressure or air discharge temperature protection in system B
19	P3	Low pressure protection System B
20	P4	Current protection in system A
21	P5	Current protection in system B
22	P6	Condenser high pressure protection in system A
23	P7	Condenser high pressure protection in system B
24	P8	System A is air discharge temperature sensor in digital compressor
25	P9	Protection of outlet and inlet water temperature difference
26	PA	Starting protection of low-temp cooling
27	Pb	System freeze-proof protection
28	PC	(Reserved failure code)
29	PE	Low-temperature protection of shell-and-tube heat exchanger
30	F1	EEPROM failure
31	F2	Failure of reduction of wired controller number at parallel connection of multiple wired controller (reserved) parallel connection of multiple wired controller

11.2 Troubles and Solutions

Troubles	Possible reasons	Solutions
Over high air discharge pressure (Cooling operation)	Air or other non-condensing gas still in the system	Discharge gas from refrigerant charging inlet. Re-vacuum the system if necessary.
	Fins in the condenser are dirty or foreign substance blocking fins	Clean condenser fins
	Insufficient chilling air volume or condenser fan error	Check and repair the condenser fan, recover the normal operation
	Excessive high air suction pressure	See “Excessive high air suction pressure”
	Excessive refrigerant charging volume	Discharge the excessive refrigerant
	Over high ambient temperature	Check ambient temperature
Over low air discharge pressure (Cooling operation)	Surrounding Temp. is lower	Measure the surrounding Temp
	Refrigerant leak or insufficient	Leak-hunting or recharging
	Low suction pressure	Refer to the “low suction pressure”
Over high air suction pressure (Cooling operation)	Refrigerant over-charged	Discharge the additional refrigerant
	High Temp. of the inlet chilled-water	Check the heat insulation of water pipeline
Over low air suction pressure (Cooling operation)	Insufficient water flow	Measure the Temp difference between inlet and outlet water, adjust the water flow
	Low Temp. of inlet chilled-water	Check installation
	Refrigerant leak or insufficient	Leak-hunting or recharging
	Scaling in the evaporator	Descaling
Over high air discharge pressure (Heating operation)	Insufficient water flow	Check temperature difference at water inlet and outlet, and adjust the water flow volume
	Air or other non-condensing gas still in the system	Discharge gas from refrigerant charging inlet. Re-vacuum the system if necessary
	Scaling in water side of heat exchanger	Descaling
	Over high temperature in chilling water inlet	Check water temperature
	Excessive high air suction pressure	See “Excessive high air suction pressure”
Over low air discharge pressure (Heating operation)	Over low temperature of chilling water	Check chilling water temperature
	Refrigerant leakage or insufficient refrigerant volume	Test leakage or charge sufficient refrigerant to the system
	Excessive low air suction pressure	See “Excessive low air suction pressure”
Over high air suction pressure (Heating operation)	Over heat air in the side of air heat exchanger	Check ambient temperature around it
	Excessive refrigerant charging volume	Discharge the excessive refrigerant
Over low air suction pressure (Heating operation)	Insufficient refrigerant charging volume	Charge sufficient refrigerant to the system
	Insufficient air flow volume	Check fan rotating direction
	Air loop short-circuit	Reason about remove air short-circuit
	Insufficient frost-removal operation	Error comes out from 4-way valve or thermal resistor. Replace a new one if necessary
Compressor stops because of freeze-proof protection (Cooling operation)	Insufficient chilling water flow volume	Error comes from pump or flow-type water volume control. Check and repair or replace a new one.
	Gas still in water loop	Discharge air
	Thermal resistor error	Upon error have been confirmed, please replace a new one
Compressor stops because of Hi-pressure protection	Over high air expelling pressure	See “Over high air expelling pressure”
	Hi-pressure switch error	Upon error have been confirmed, please replace a new one
Compressor stops because of motor Overload.	Over high air expelling pressure and air suction pressure	See “Over high air expelling pressure” and “Over high air suction pressure”
	Hi-voltage or Lo-voltage, signal phase or phase unbalance	Confirm voltage not higher or lower than the rated voltage 20V
	Short circuit comes out from motor or connecting interface	Confirm resistors at motor are connected corresponding to terminals
	Overload assembly error	Replace a new one

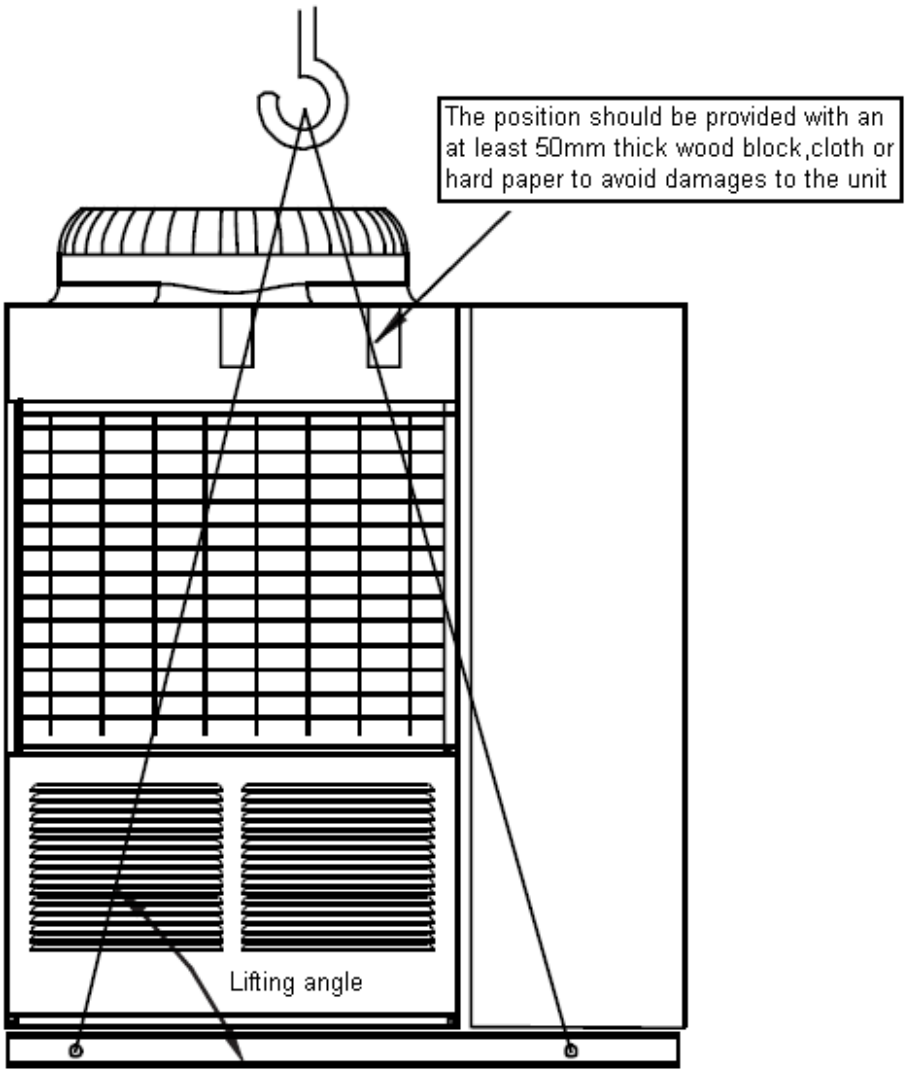
Troubles	Possible reasons	Solutions
Compressor stops because of integrate temperature sensor or air discharge temperature protection.	Over high or over low voltage	Confirm voltage not higher or lower than the rated voltage 20V
	Over high air expelling pressure or excessive low air suction pressure	See “Over high air expelling pressure” and “excessive low air suction pressure ”
	Component error	Check the integrated temperature sensor after motor is cool down
Compressor stops because of Lo.-pressure protection	Filter in front (or rear) of expanding valve is blocked	Replace a new filter
	Lo-voltage switch error	If the switch is defective, please replace a new one
	Excessive low air suction pressure	See “Excessive low air suction pressure”
Abnormal noise gives out form compressor	Liquid refrigerant flows into compressor from evaporator result in liquid slugging.	Adjust refrigerant charge volume
	Aging of compressor	Replace a new compressor
Compressor can’t start	Over current relay trip up, fuse burnt out	Replace damaged assembly
	Control circuit without power though	Check the wring of control system
	Hi-voltage or lo-voltage protection	Reference to mention in above the parts of air suction and discharge pressure error
	Coils in contactor are burnt out	Replace damaged assembly
	Wrong connection of phase sequence	Re-connect and adjust the any 2 wires among 3 phases
	Water system error and flow type volume controller short connection	Check water system
	Error signal delivered from wire controller	Find out the error type and carry out the corresponding measure to settle
Air side heat exchanger excessive frost	4-way valve or thermal resistor error	Check the running state. Replace a new one if necessary
	Air loop short-circuit	Settle the short-circuit of air discharge
With noise	Fixing screws at panel are loosen	Fix up all assemblies

Installation

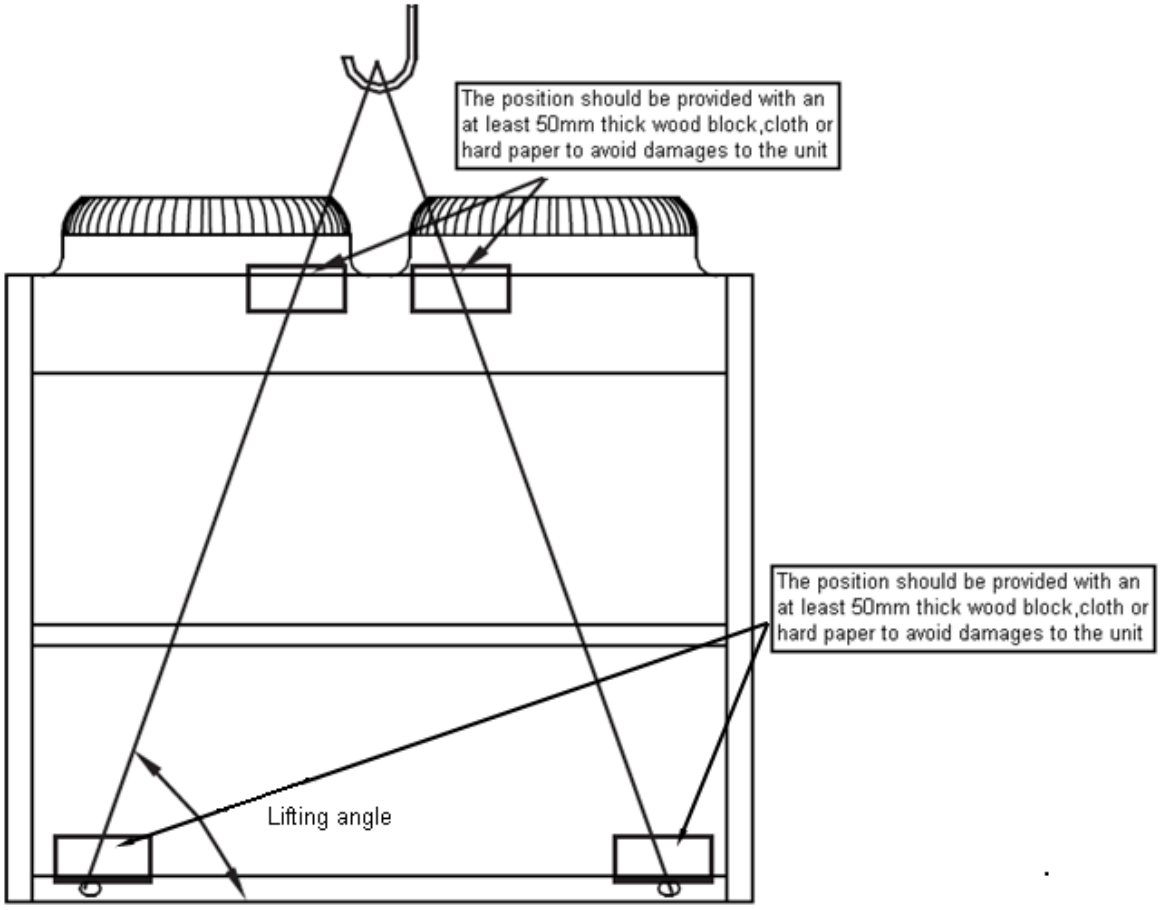
12.1 Unit Installation

12.1.1 Transportation

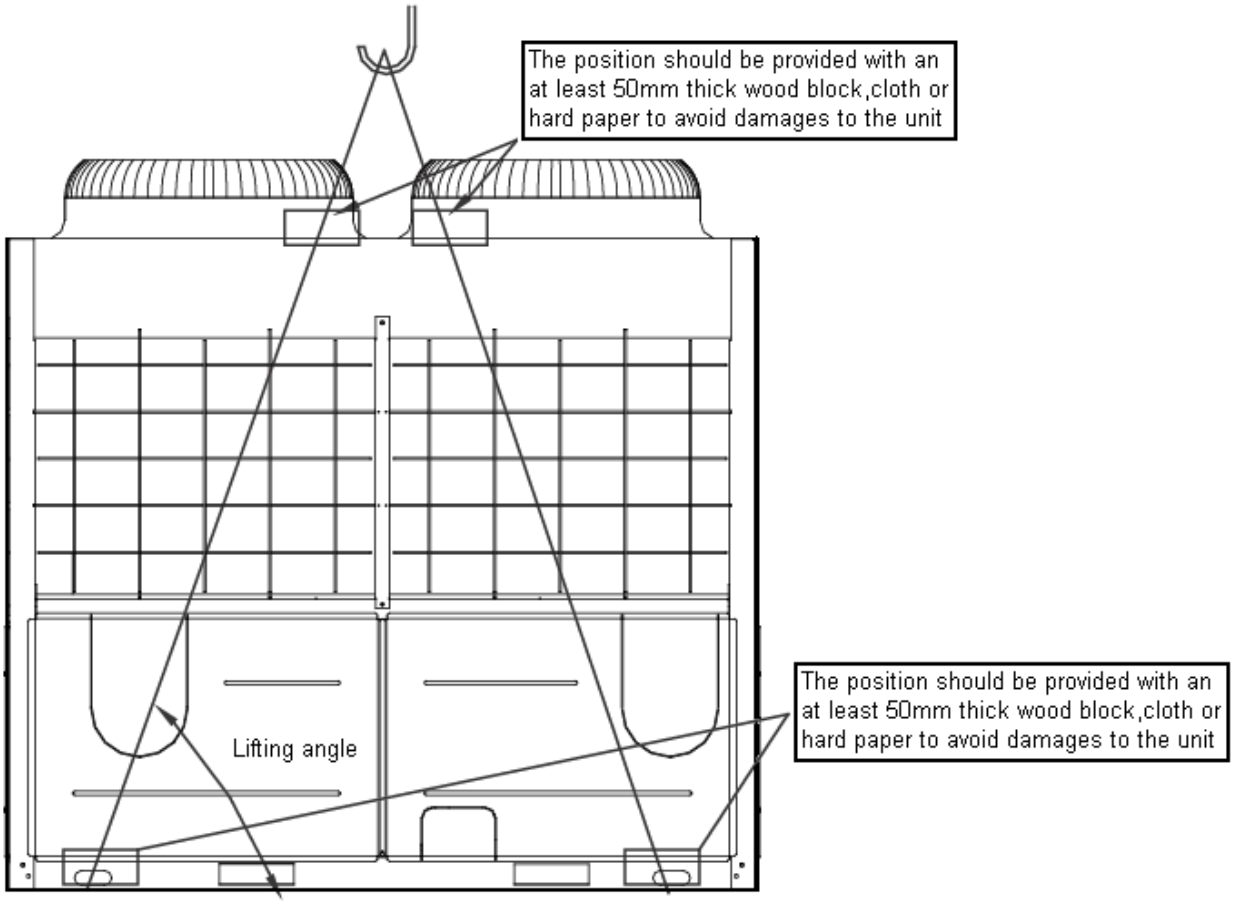
The angle of inclination should not be more than 15º when carrying the unit, to avoid overturn of the unit.
a. Rolling handling: several rolling rods of the same size are placed under the base of the unit, and the length of each rod must be more than the outer frame of the base and suitable for balancing of the unit.
b. Lifting: the strength lifting rope (belt) can bear should be 4 times the weight of the unit. Check the lifting hook and ensure that it is firmly attached to the unit, and the lifting angle should be more than 60º. To avoid damages to the unit, the contact position of the unit and lifting rope should be provided with an at least 50mm thick wood block, cloth or hard paper. Any person is not allowed to stand below the unit when lifting it.



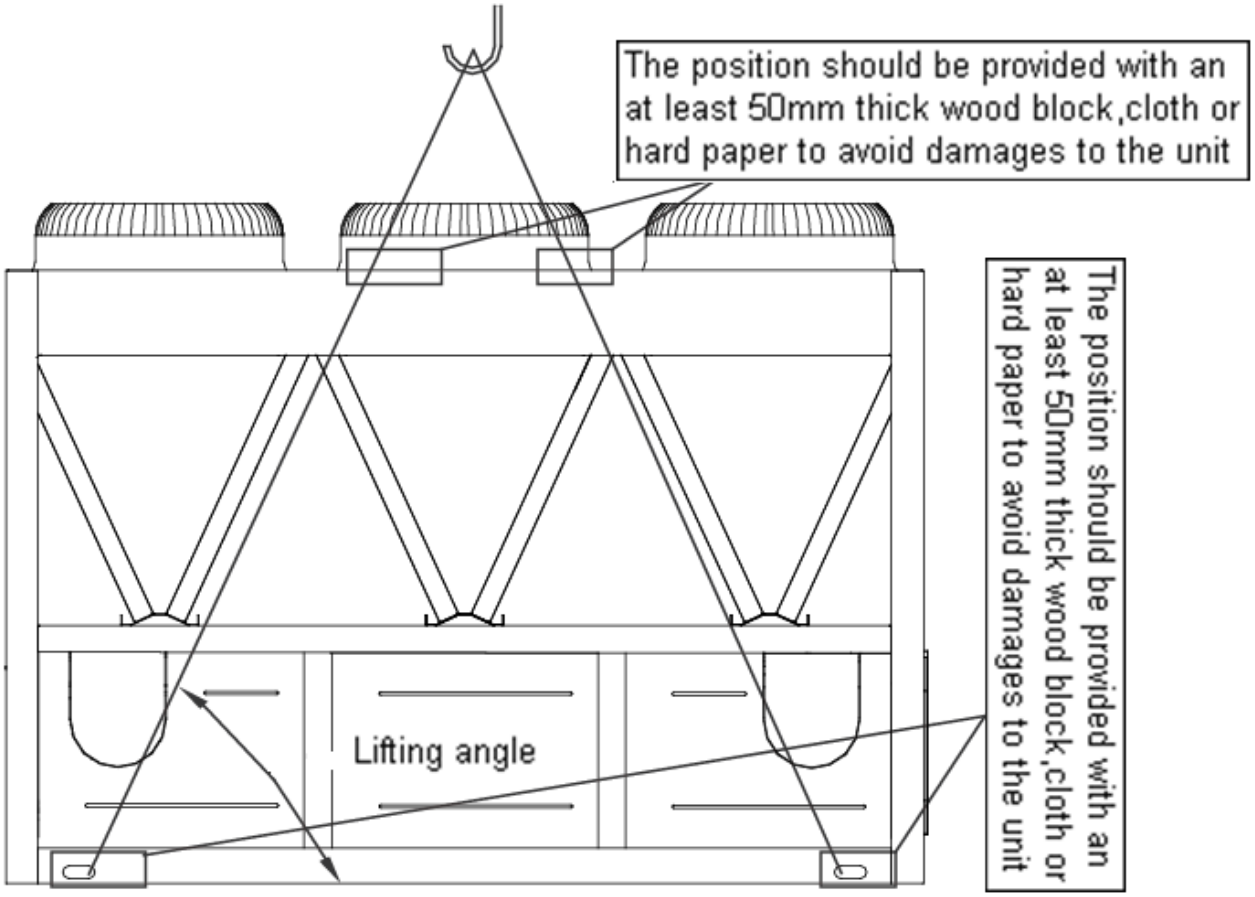
25/30/35 Module



55/60/65 Module



130 Mobule



200 Module

12.1.2 Installation space

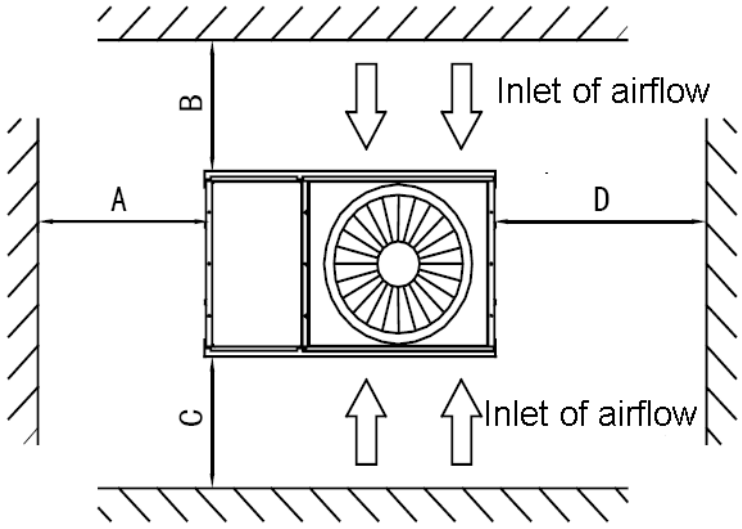
● Requirements of arrangement space of the unit

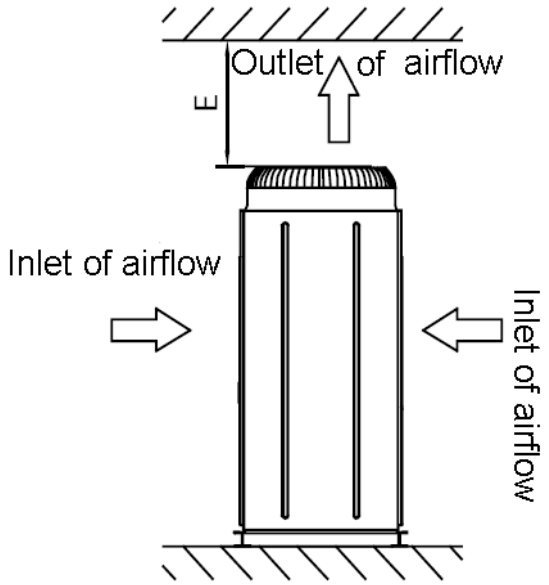
1) To ensure adequate airflow entering the condenser, the influence of descending airflow caused by the high-rise buildings around upon the unit should be taken into account when installing the unit.

2) If the unit is installed where the flowing speed of air is high, such as on the exposed roof, the measures including sunk fence and Persian blinds can be taken, to prevent the turbulent flow from disturbing the air entering the unit. If the unit needs to be provided with sunk fence, the height of the latter should not be more than that of the former; if Persian blinds are required, the total loss of static pressure should be less than the static pressure outside the fan. The space between the unit and sunk fence or Persian blinds should also meet the requirement of the minimum installation space of the unit.

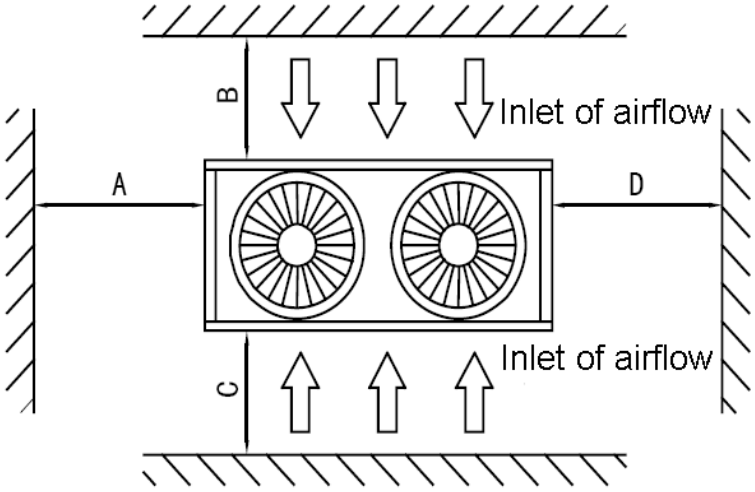
3) If the unit needs to operate in winter, and the installation site may be covered by snow, the unit should be located higher than the snow surface, to ensure that air flows through the coils smoothly.

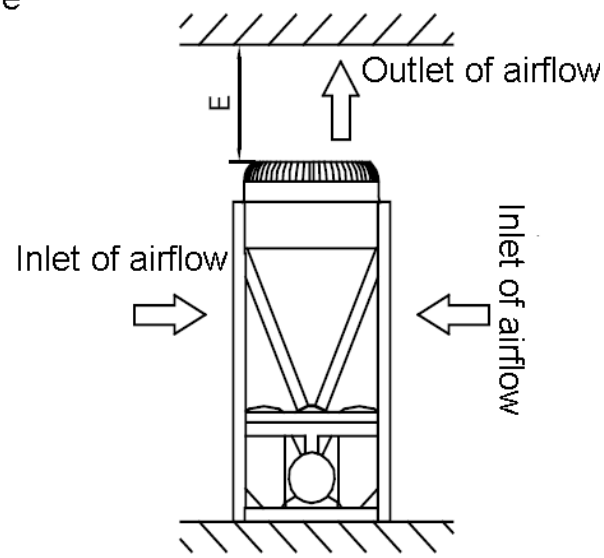
25/30/35 Module



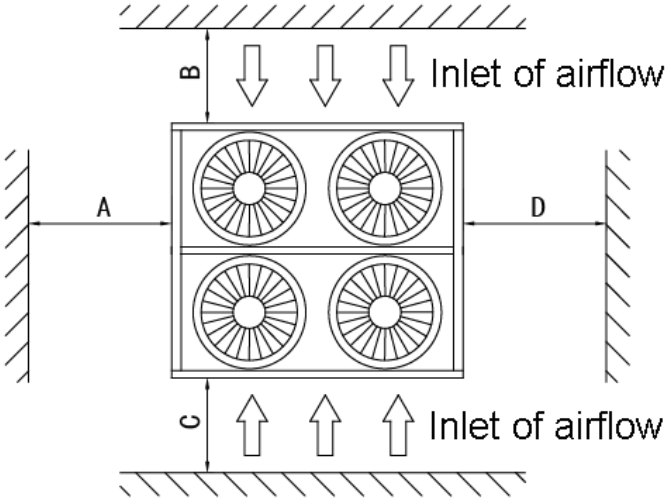


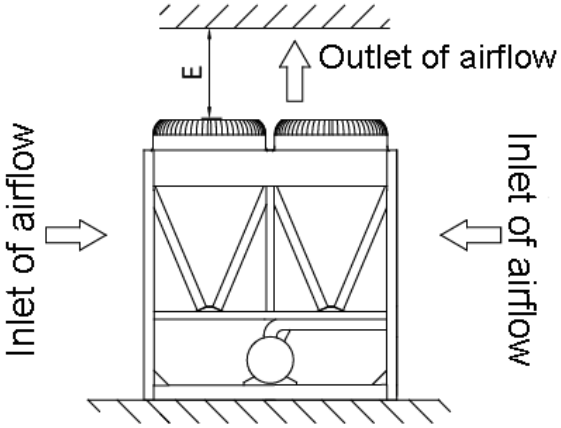
55/60/65 Module

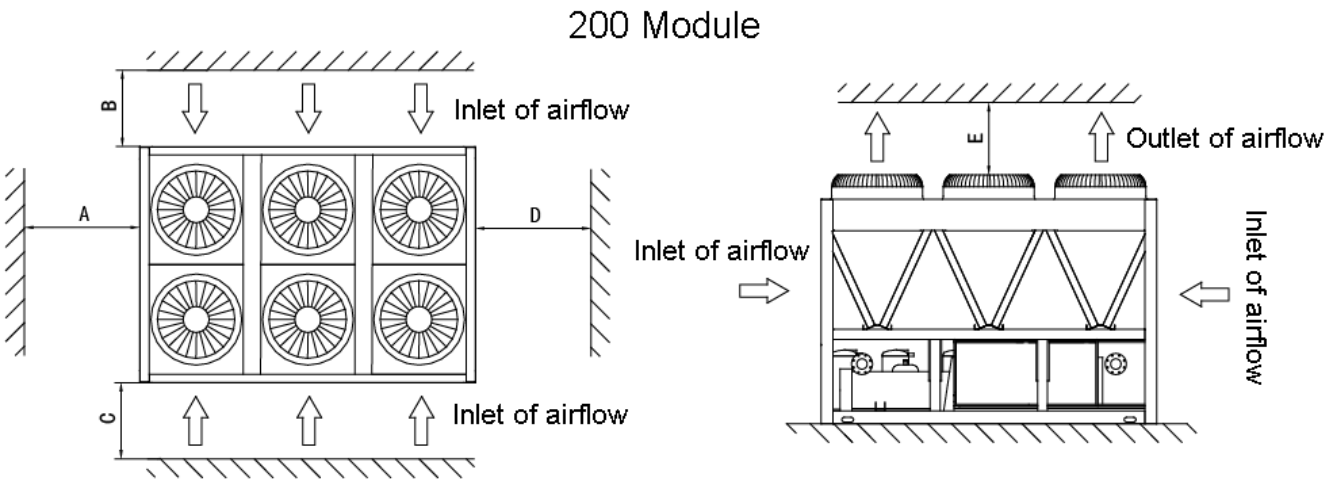




130 Module







The recommend space parameter

Module	Installation space (mm)				
	A	B	C	D	E
MGB-F(D)25W/S(R)	≥1500	≥2000	≥2000	≥1500	≥8000
MGB-F(D)30W/S(R)					
MGB-F(D)35W/S(R)					
MGB-F55W/S(R)					
MGB-F60W/S(R)					
MGB-F65W/S(R)					
MGB-F130W/S(R)					
MGB-F200W/S(R)	≥2000	≥2000	≥2000	≥2000	≥8000

● Space requirements for parallel installation of multiple modular units

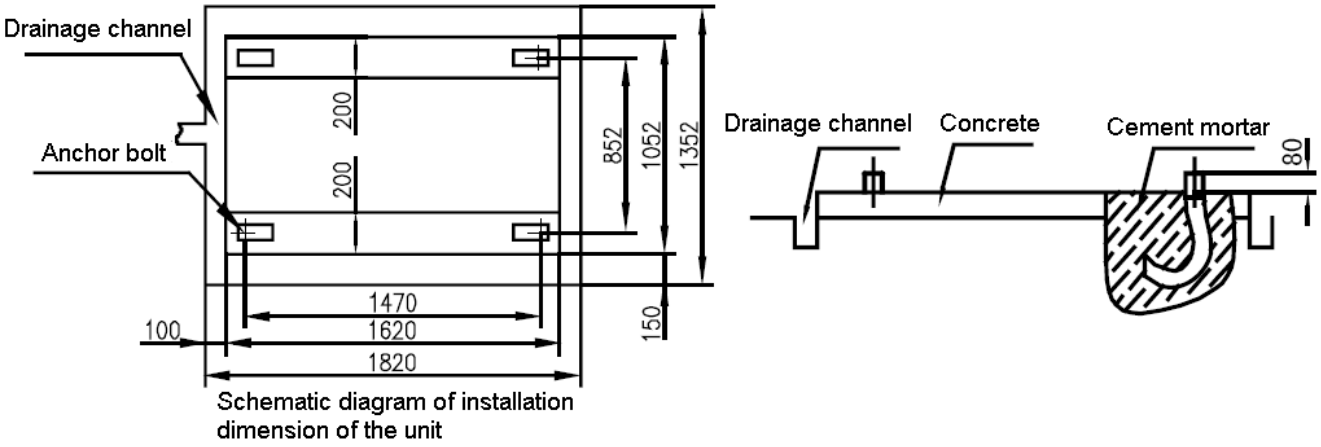
To avoid back flow of the air in the condenser and operational faults of the unit, the parallel installation of multiple modular units can follow the direction A and D as shown in the figure above, the spaces between the unit and the obstacle are given in the figure above, and the space between adjacent modular units should not be less than 300mm; the installation can also follow the direction B and C as shown in the figure above, the spaces between the unit and the obstacle are given in the figure above, and the space between adjacent modular units should not be less than 600mm; the installation can also follow the direction combination of A and D, and B and C, the spaces between the unit and the obstacle are given in the figure above, the space between adjacent modular units in the direction A and D should not be less than 300mm, and the space between adjacent modular units in the direction B and C should not be less than 600mm.
If the spaces mentioned above cannot be met, the air passing from the unit to the coils may be restricted, or back flow of air discharge may occur, and the performance of the unit may be affected, or the unit may fail to operate.

12.1.3 Installation Foundation

- The unit should be located on the horizontal foundation, the ground floor or the roof which can bear operating weight of the unit and the weight of maintenance personnel. Refer to the operating weight parameters in specification table.
- If the unit is located so high that it is inconvenient for maintenance personnel to conduct maintenance, the suitable scaffold can be provided around the unit.
- The scaffold must be able to bear the weight of maintenance personnel and maintenance facilities.
- The bottom frame of the unit is not allowed to be embedded into the concrete of installation foundation.

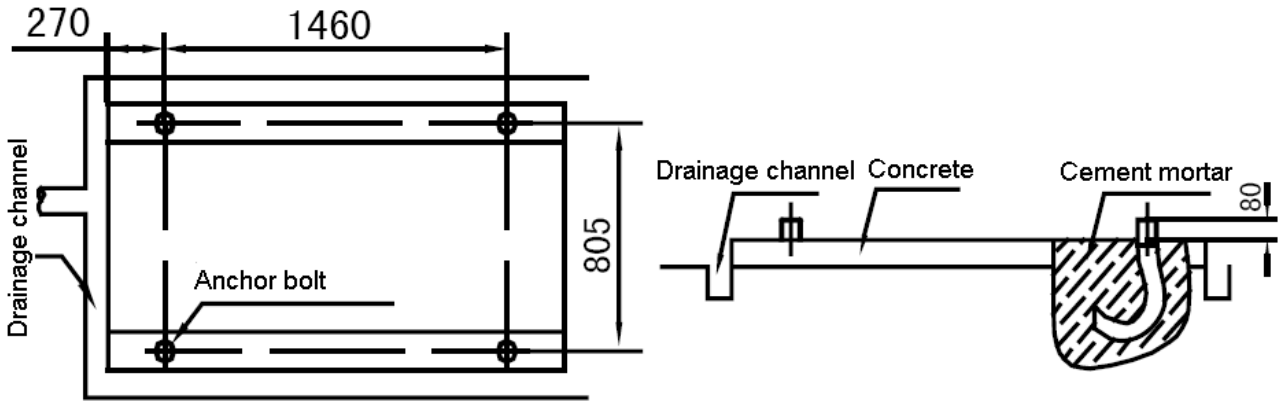
Location drawing of installation foundation of the unit (unit: mm)

25/30/35 Module



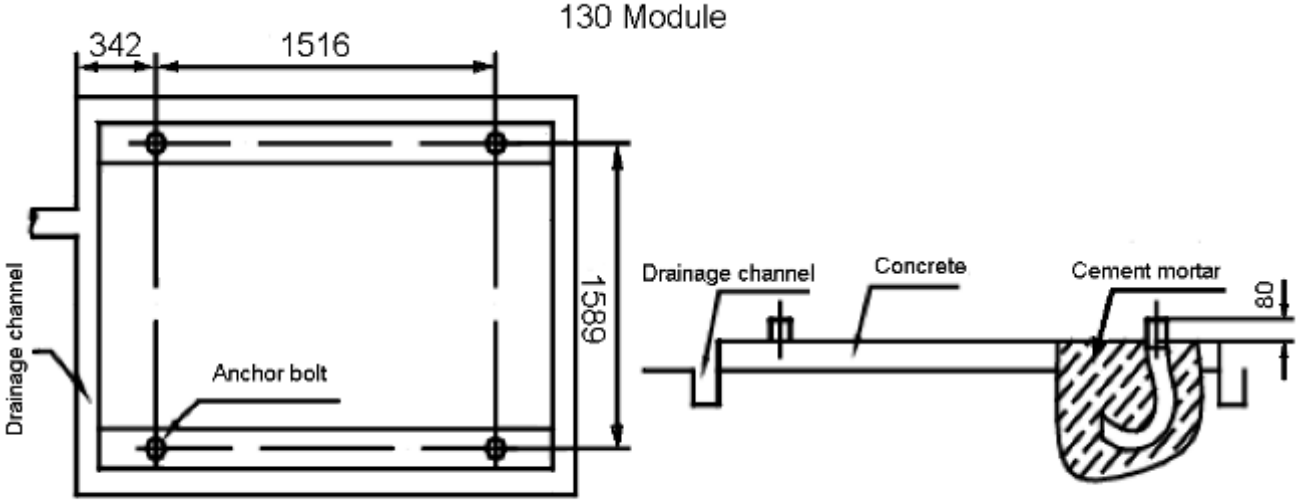
Schematic diagram of installation dimension of the unit

55/60/65 Module

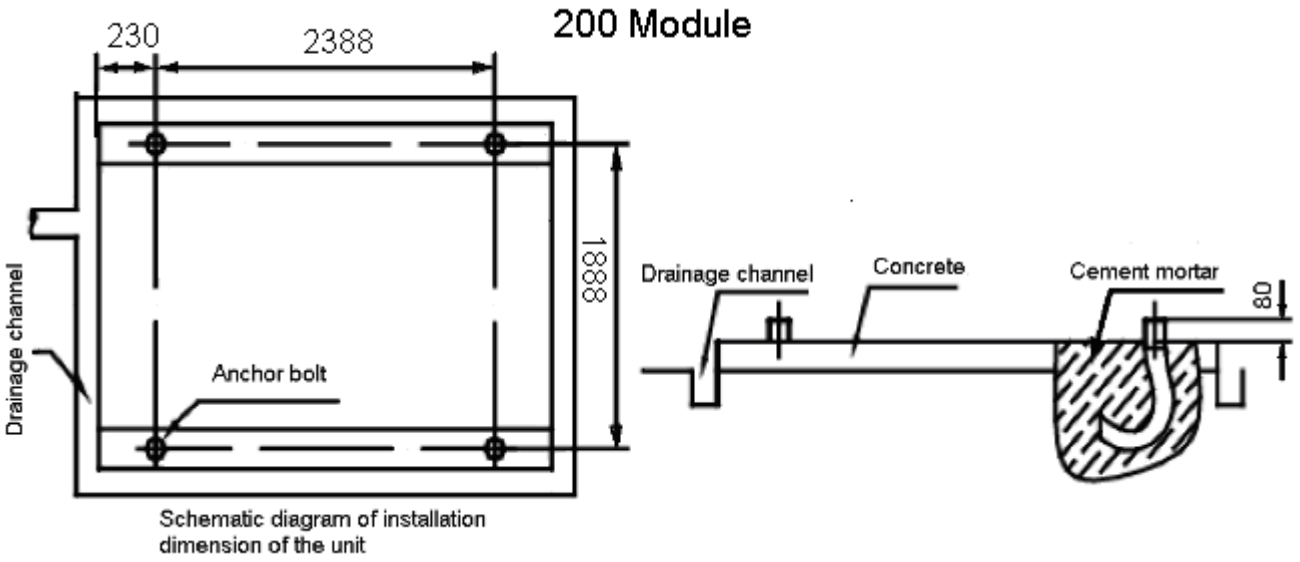


Schematic diagram of installation dimension of the unit

130 Module



Schematic diagram of installation dimension of the unit



Schematic diagram of installation dimension of the unit

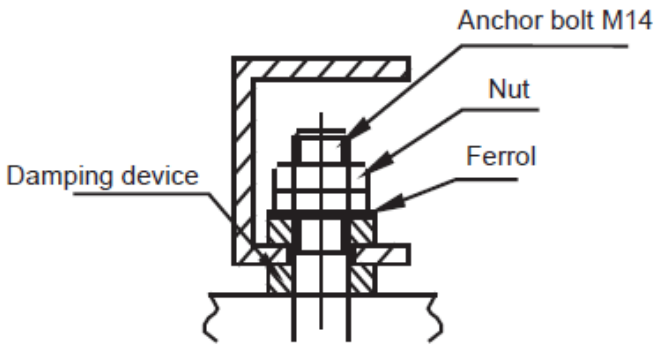
12.4 Installation of damping devices

※ Damping devices must be provided between the unit and its foundation.

By means of the Φ15mm diameter installation holes on the steel frame of the unit base, the unit can be fastened on the foundation through the spring damper. See *figure above*(Schematic diagram of installation dimension of the unit) for details about center distance of the installation holes. The damper does not go with the unit, and the user can select the damper according to the relevant requirements. When the unit is installed on the high roof or the area sensitive to vibration, please consult the relevant persons before selecting the damper.

※ Installation steps of the damper

Step 1. Make sure that the flatness of the concrete foundation is within ±3mm, and then place the unit on the cushion block.
Step 2. Raise the unit to the height suitable for installation of the damping device.
Step 3. Remove the clamp nuts of the damper.
Step 4. Place the unit on the damper, and align the fixing bolt holes of the damper with the fixing holes on the unit base.
Step 5. Return the clamp nuts of the damper to the fixing holes on the unit base, and tighten them into the damper.
Step 6. Adjust the operational height of the damper base, and screw down the leveling bolts. Tighten the bolts by one circle to ensure equal height adjustment variance of the damper.
Step 7. The lock bolts can be tightened after the correct operational height is reached.



12.2 Water System Installation

Notice:

- After the unit is in place, chilled water pipes can be laid.
- The relevant installation regulations should be abided with when conducting connection of water pipes.
- The pipelines should be free of any impurity, and all chilled water pipes must conform to local rules and regulations of pipeline engineering.

12.2.1 Connection requirements of chilled water pipes

a. All chilled water pipelines should be thoroughly flushed, to be free of any impurity, before the unit is operated. Any impurity should not be flushed to or into the heat exchanger.

b. Water must enter the heat exchanger through the inlet; otherwise the performance of the unit will decline.

c. The inlet pipe of the evaporator must be provided with a target flow controller, to realize flow-break protection for the unit. Both ends of the target flow controller must be supplied with horizontal straight pipe sections whose diameter is 5 times that of the inlet pipe. The target flow controller must be installed in strict accordance with “Installation & Regulation Guide for Target Flow Controller”. The wires of the target flow controller should be led to the electric cabinet through shielded cable. The working pressure of the target flow controller is 1.0MPa, and its interface is 1 inch in diameter. After the pipelines are installed, the target flow controller will be set properly according to the rated water flow of the unit.

d. The pump installed in the water pipeline system should be equipped with starter. The pump will directly press water into the heat exchanger of the water system.

e. The pipes and their ports must be independently supported but should not be supported on the unit.

f. The pipes and their ports of the heat exchanger should be easy to disassemble for operation and cleaning, as well as inspection of port pipes of the evaporator.

g. The evaporator should be provided with a filter with more than 40 meshes per inch at site. The filter should be installed near to the inlet port as much as possible, and be under heat preservation.

h. The by-pass pipes and by-pass valves as shown in the figure of “**Connection drawing of pipeline system”** must be mounted for the heat exchanger, to facilitate cleaning of the outside system of water passage before the unit is adjusted. During maintenance, the water passage of the heat exchanger can be cut off without disturbing other heat exchangers.

i. The flexible ports should be adopted between the interface of the heat exchanger and on-site pipeline, to reduce transfer of vibration to the building.

j. To facilitate maintenance, the inlet and outlet pipes should be provided with thermometer or manometer. The unit is not equipped with pressure and temperature instruments, so they need to be purchased by the user.

k. All low positions of the water system should be provided with drainage ports, to drain water in the evaporator and the system completely; and all high positions should be supplied with discharge valves, to facilitate expelling air from the pipeline. The discharge valves and drainage ports should not be under heat preservation, to facilitate maintenance.

l. All possible water pipes in the system to be chilled should be under heat preservation, including inlet pipes and flanges of the heat exchanger.

m. The outdoor chilled water pipelines should be wrapped with an auxiliary heating belt for heat preservation, and the material of the auxiliary heat belt should be PE, EDPM, etc., with thickness of 20mm, to prevent the pipelines from freezing and thus cracking under low temperature. The power supply of the heating belt should be equipped with an independent fuse.

n. When the ambient temperature is lower than 2 C, and the unit will be not used for a long time, water inside the unit should be drained. If the unit is not drained in winter, its power supply should not be cut off, and the fan coils in the water system must be provided with three-way valves, to ensure smooth circulation of the water system when the anti-freezing pump is started up in winter.

o. The common outlet pipelines of combined units should be provided with mixing water temperature sensor.

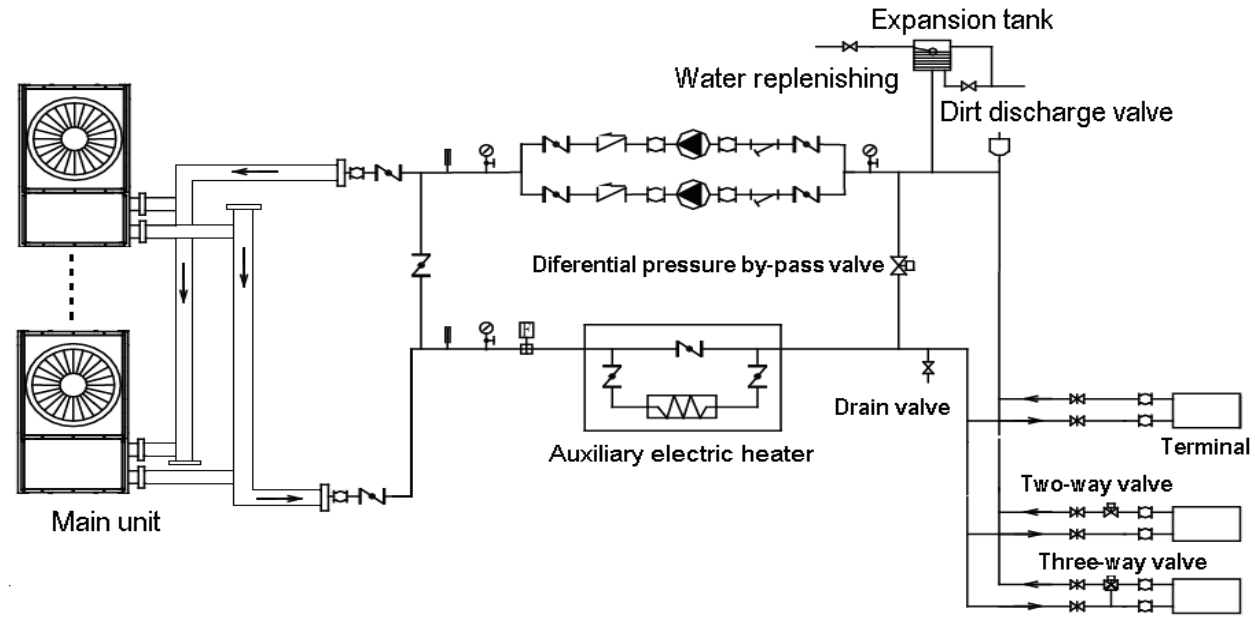
Warning:

● For the water pipeline network including filters and heat exchangers, dreg or dirt may seriously damages the heat exchangers and water pipes.

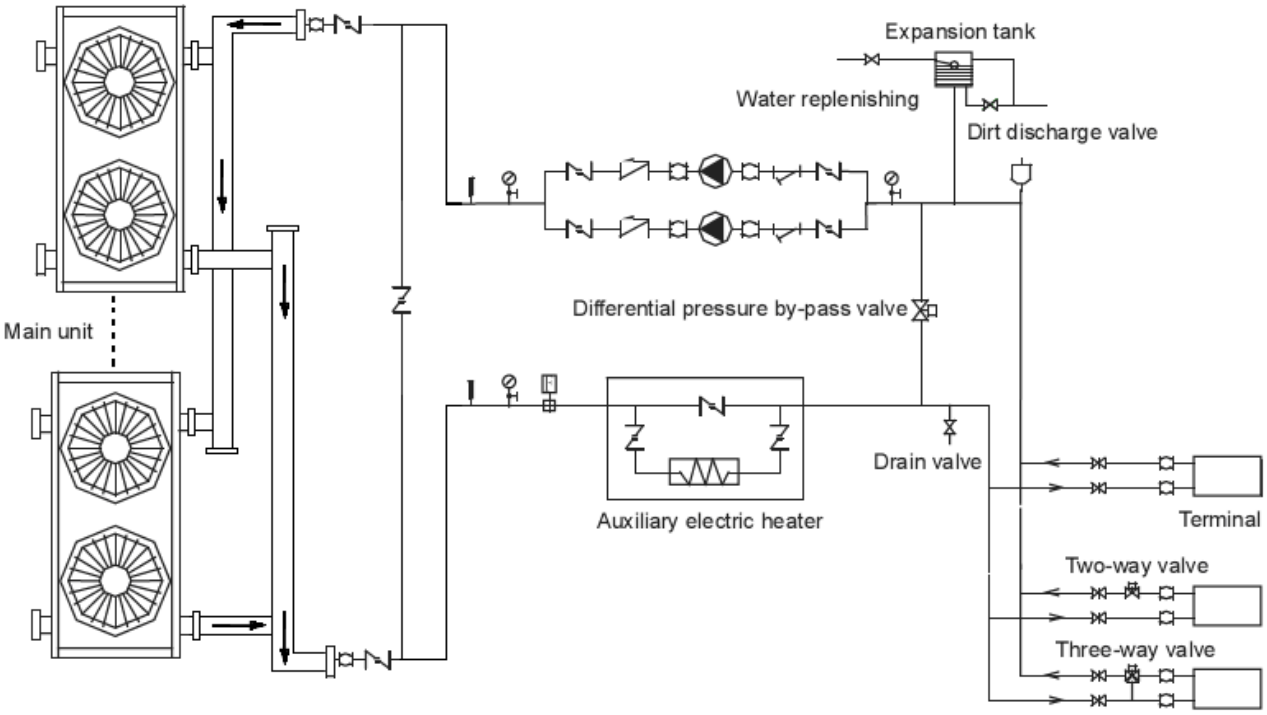
● The installation persons or the users must ensure the quality of chilled water, and de-icing salt mixtures and air should be excluded from the water system, since they may oxidize and corrode steel parts inside the heat exchanger.

12.2.2 Connection drawing of pipeline system

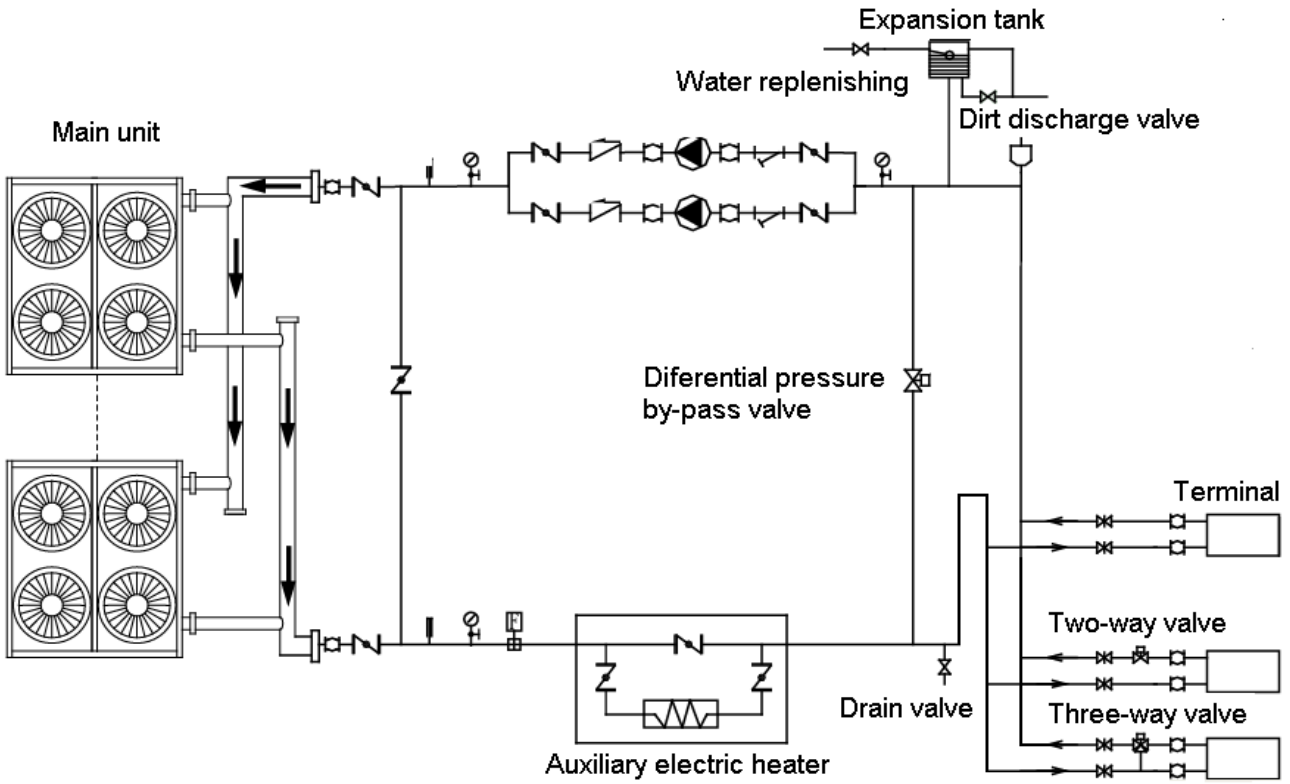
25/30/35 Module



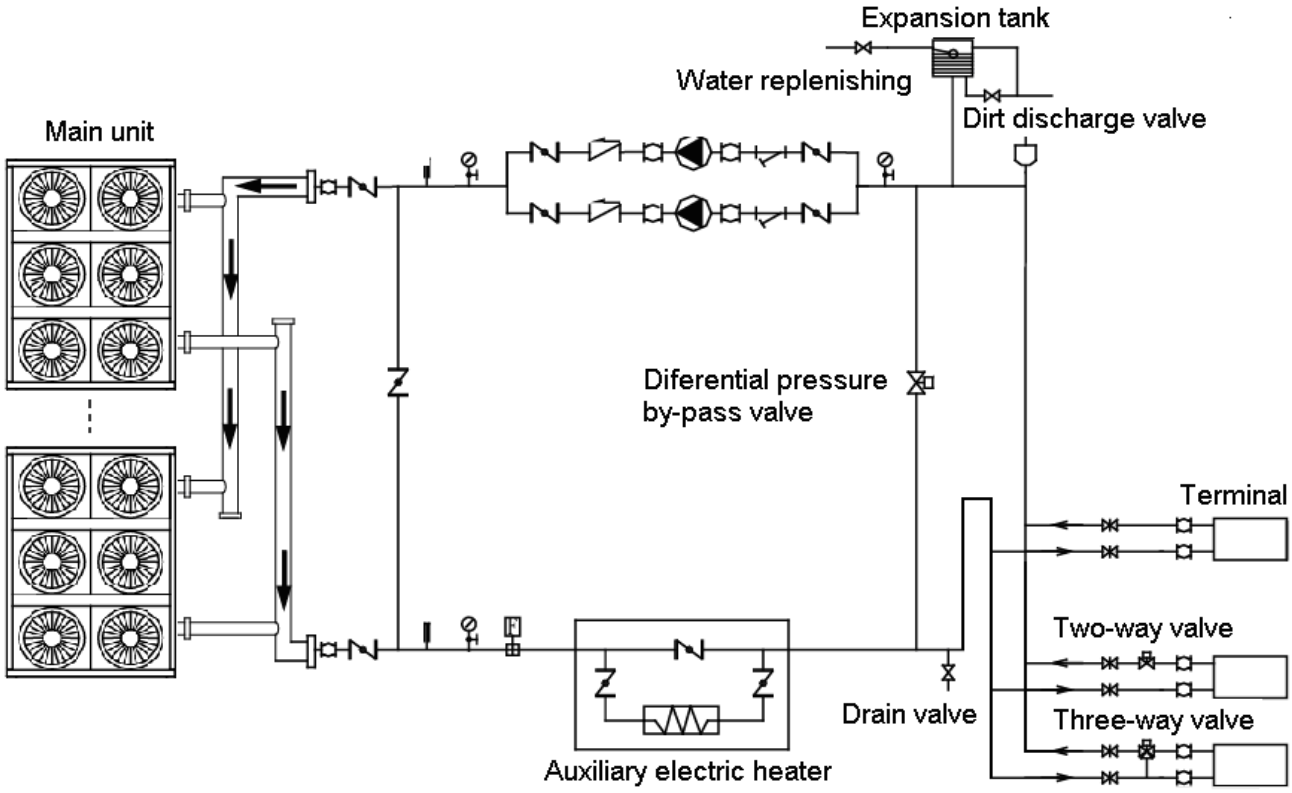
55/60/65 Module



130Module



200 Module



Symbol explanation				
Stop valve	Pressure gauge	Water flow switch	Gate valve	Flexible joint
Y-shaped filter	Thermometer	Circulating pump	Check valve	Automatic discharge valve

12.2.3 Water Quality

※Water quality control

When industrial water is used as chilled water, little furring may occur; however, well water or river water, used as chilled water, may cause much sediment, such as furring, sand, and so on. Therefore, well water or river water must be filtered and softened in softening water equipment before flowing into chilled water system. If sand and clay settle in the evaporator, circulation of chilled water may be blocked, and thus leading to freezing accidents; if hardness of chilled water is too high, furring may occur easily, and the devices may be corroded. Therefore, the quality of chilled water should be analyzed before being used, such as PH value, conductivity, concentration of chloride ion, concentration of sulfide ion, and so on.

※ Applicable standard of water quality for the unit

PH value	Total hardness	Conductivity	Sulfide ion	Chloride ion	Ammonia ion	Sulfate ion	Silicon	Iron content	Sodium ion	Calcium ion
7～8.5	<50ppm	<20μV/cm(25℃)	No	<50ppm	No	<50ppm	<30ppm	<0.3ppm	No requirement	<50ppm

12.2.4 Installation & regulation guide for target flow controller

● Please carefully check flow switches before conducting installation of the target flow controller. Packing should be in good condition, and the appearance should be free of damage and deformation. If any problem, please contact the manufacturer.

● Flow switches can be installed in the horizontal pipeline or the vertical pipeline with upward flowing direction but cannot be mounted in the pipeline with downward flowing direction. The inlet water of gravity should be taken into account when flow switches are installed in the pipeline with upward flowing direction.

● Target flow controller must be installed on a section of straight-line pipeline, and its both ends must be supplied with straight-line pipes whose length is at least 5 times diameter of the pipe. In the meanwhile, the fluid flowing direction in the pipeline must be consistent with the direction of arrow on the controller. The connection terminal should be located where wiring connection can be easily done.

● Pay attention to the following items when conducting installation and wire connection:

a. Collision of the wrench with the soleplate of the flow switch is prohibited, since such collision may cause deformation and failure of the flow switch.

b. To avoid electric shock and damages to the devices, the power supply should be cut off, when wires are connected or adjustment is done.

c. When wiring connection is conducted, adjustment of other screws except connection terminals of micro switches and ground screws is prohibited. In the meanwhile, over great force should not applied when wires of micro switches are connected, otherwise micro switches may suffer displacement, thus leading to failure of flow switches.

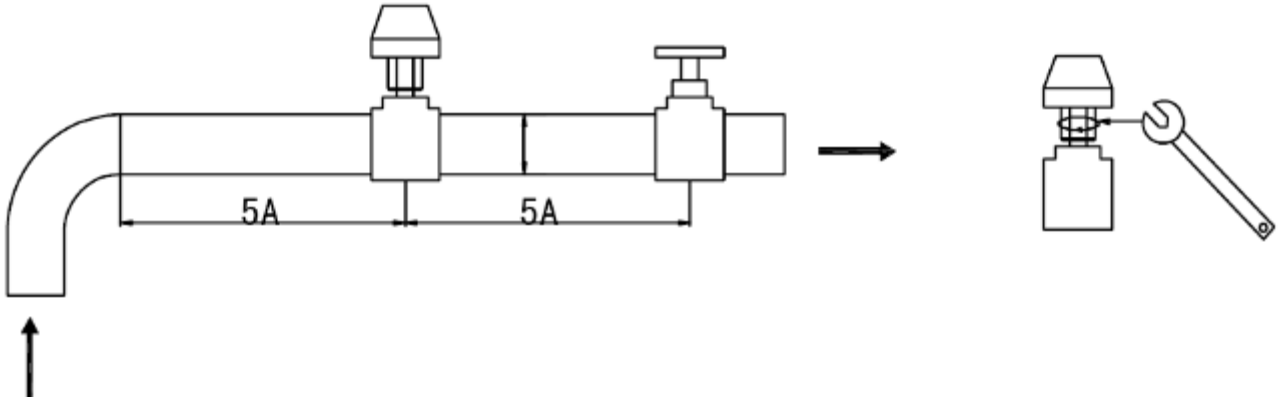
d. Special grounding screws should be used for earth connection. Bolts should not be installed or removed at will; otherwise flow switches may suffer deformation and failure.

e. Flow switches have been set at minimal flow value before leaving the factory. They should not be adjusted below the setting value at the factory, or they may suffer failure. After installing flow switches, please press the flow switch lever several times to check them. When the lever is found not to respond with “clatter”, rotate the screw in a clockwise direction, until “clatter” occurs.

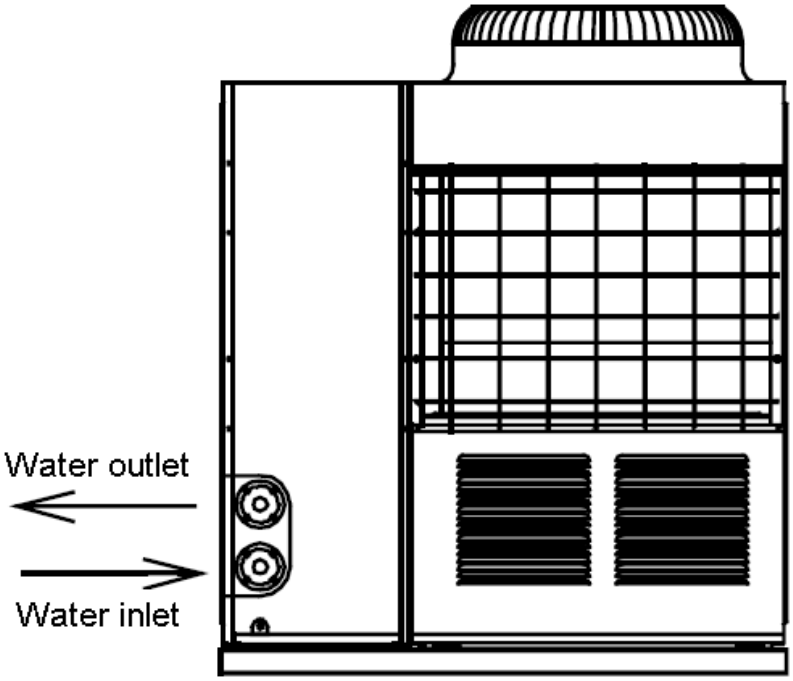
f. Be sure to determine the model of target slice according to the rated flow of the unit, the diameter of the outlet pipe and the adjustment range of the target slice of the flow switch. Besides, the target slice should not contact with other restrictors in the pipeline or on the inner wall of the pipeline, or the flow switch cannot be reset normally.

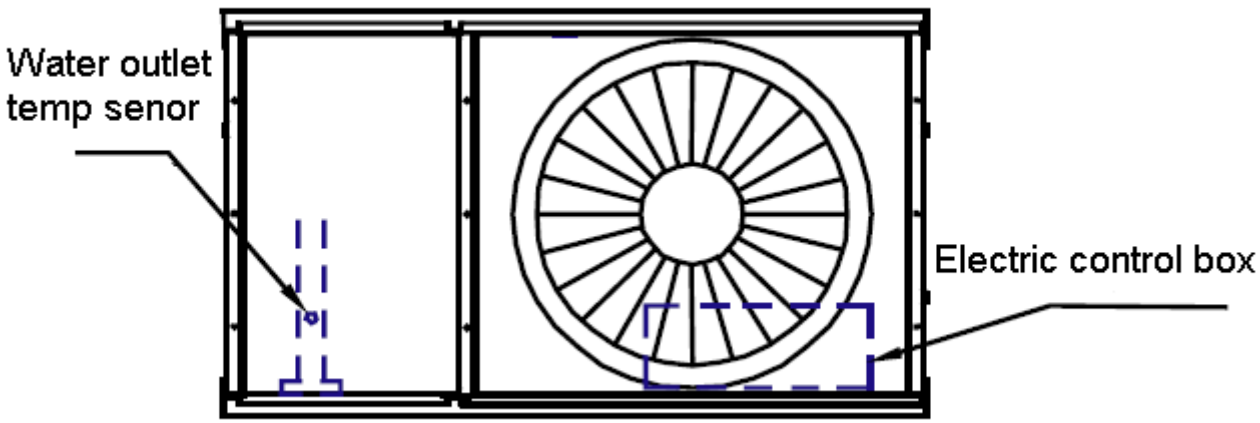
● Determine whether the flow switch and the system connected with it are in good operation according to the measured value by flow meter, namely, when the measured value on flow meter is less than 60% of rated water flow of the unit, the target flow controller should be cut off and observed for 3 working periods, and it should be covered with flow switch shell timely.

Schematic diagram of target flow controller

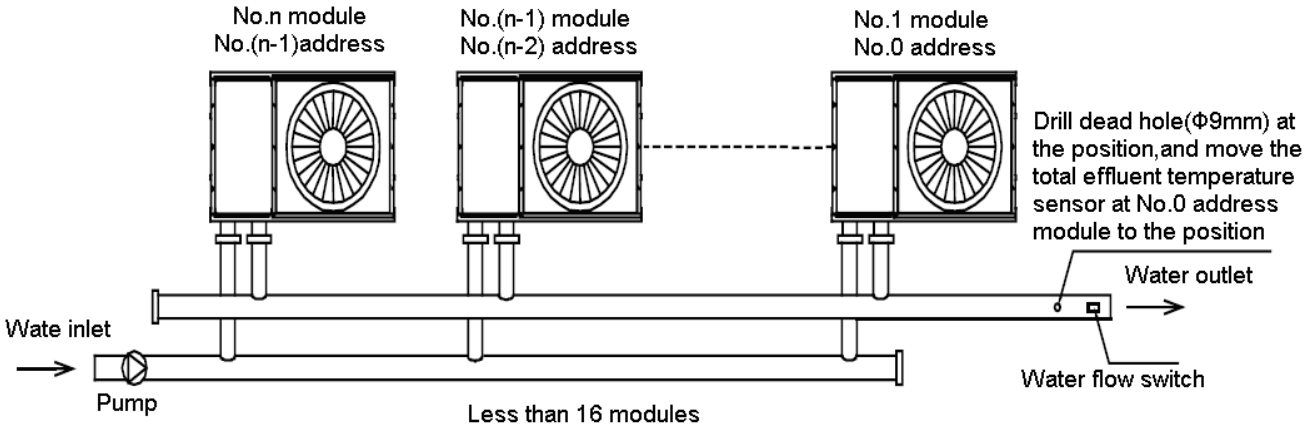


12.2.5 Installation of water system pipeline for 25/30/35module
Installation of single-module water system pipeline

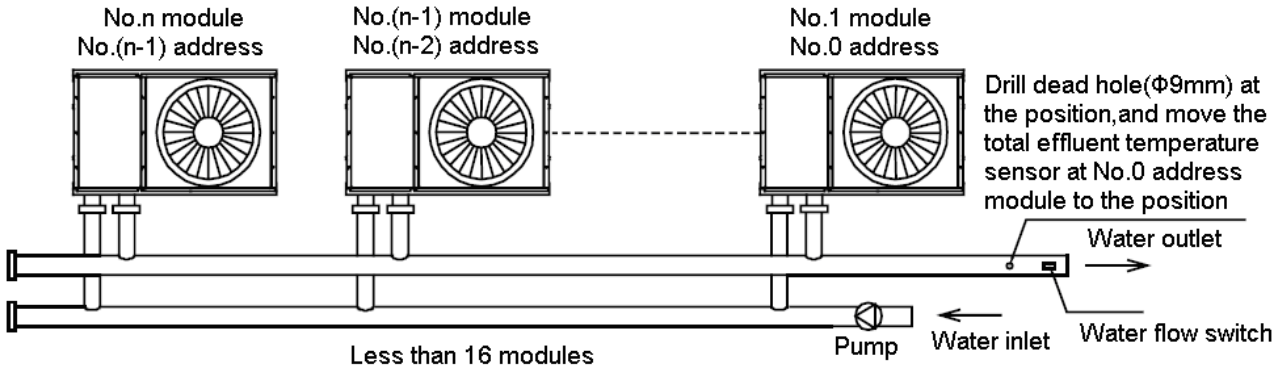




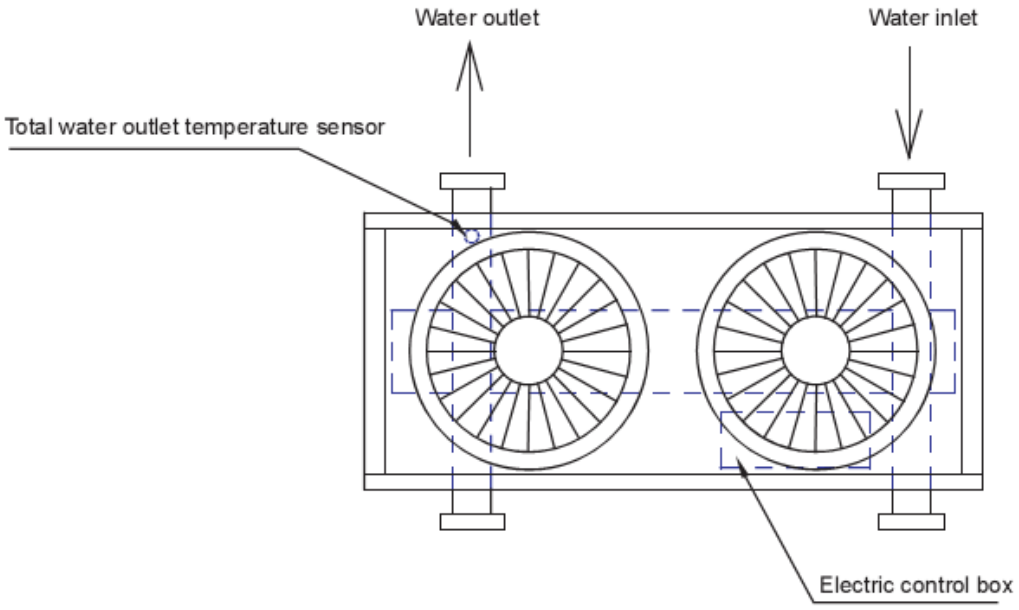
Installation of multi-module water system pipeline
1) Installation mode I (recommended installation mode)



2) Installation mode II

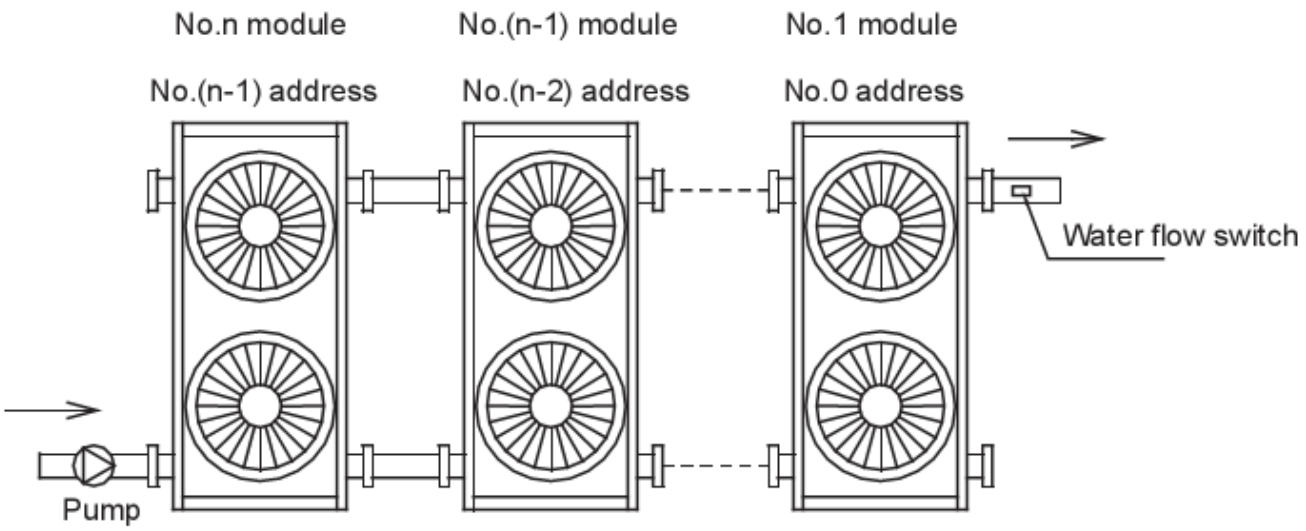


12.2.6 Installation of water system pipeline for 55/60/65module
Installation of single-module water system pipeline



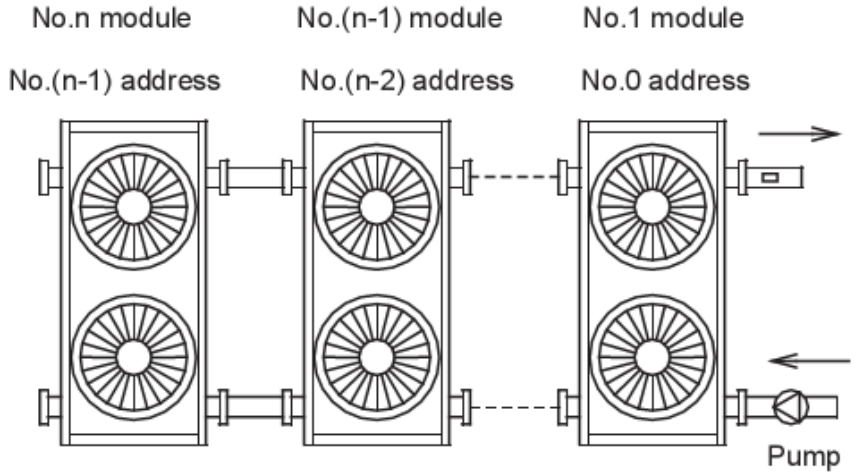
Installation of multi-module water system pipeline

1) Installation mode I (recommended installation mode)



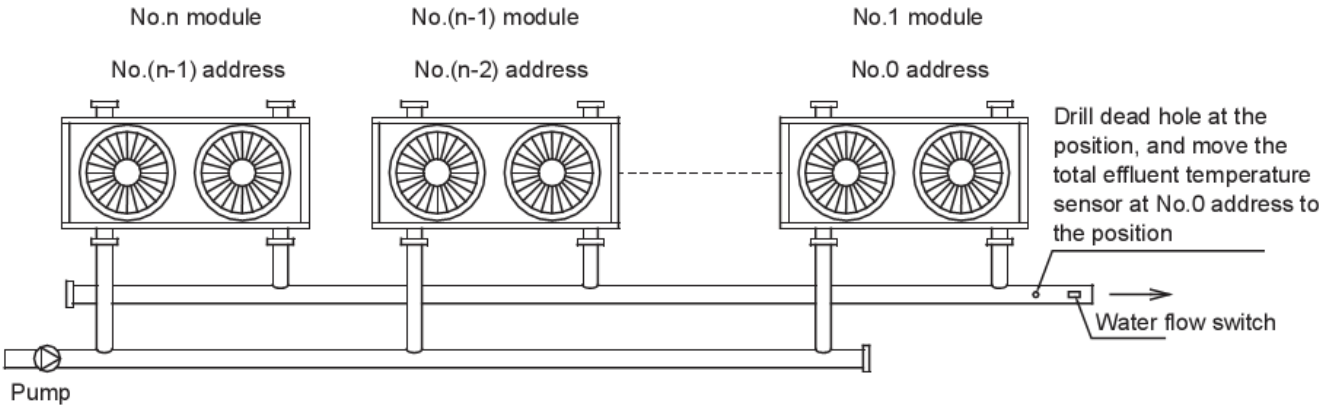
less than 8 modules

2) Installation mode II

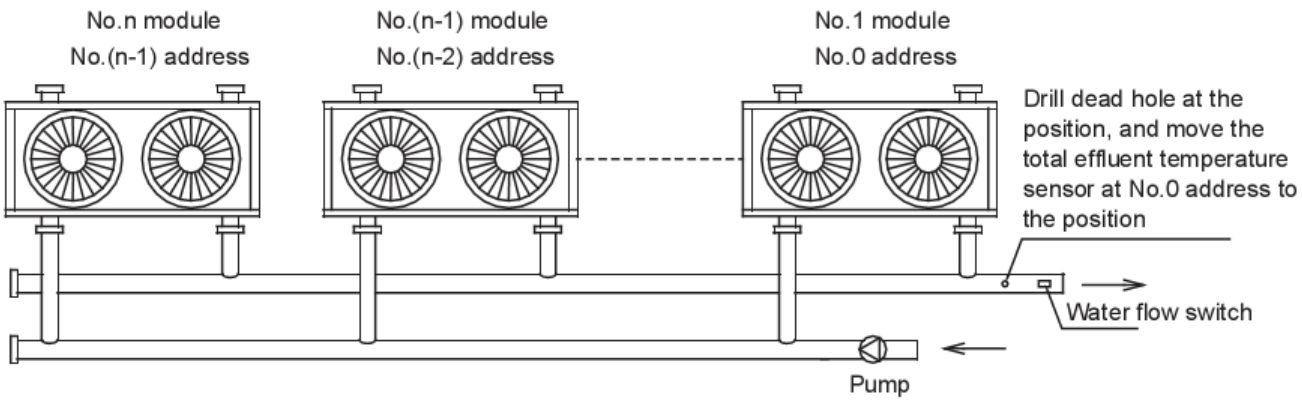


less than 6 modules

3) Installation mode III (recommended installation mode)

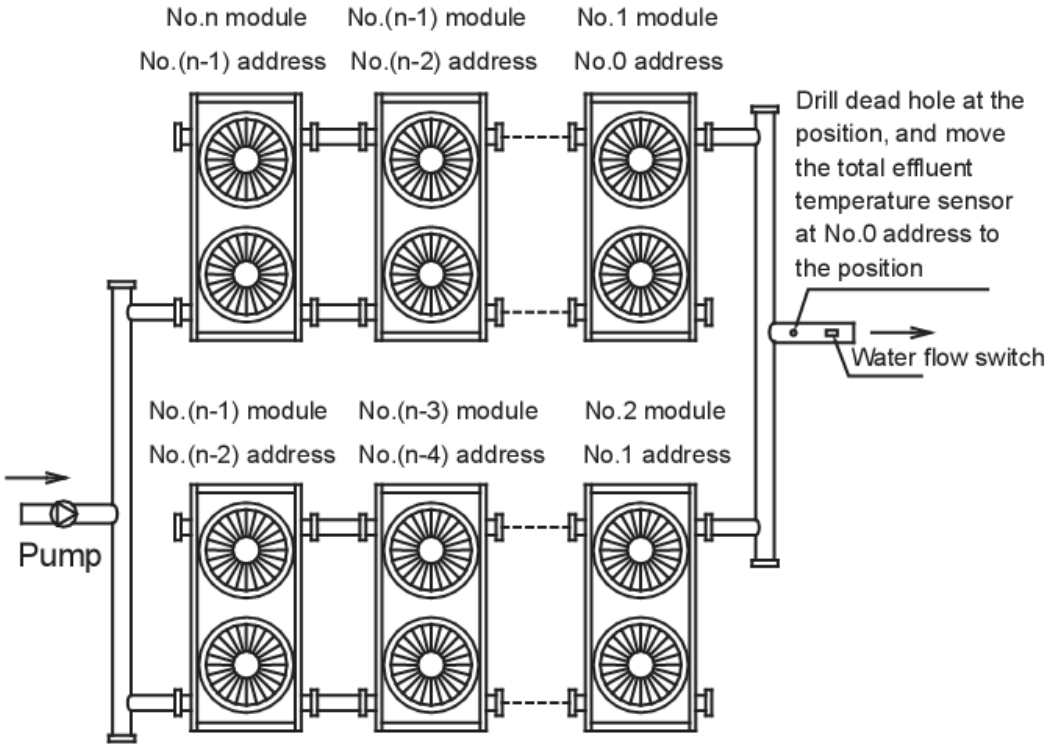


Installation mode A: less than 16 modules

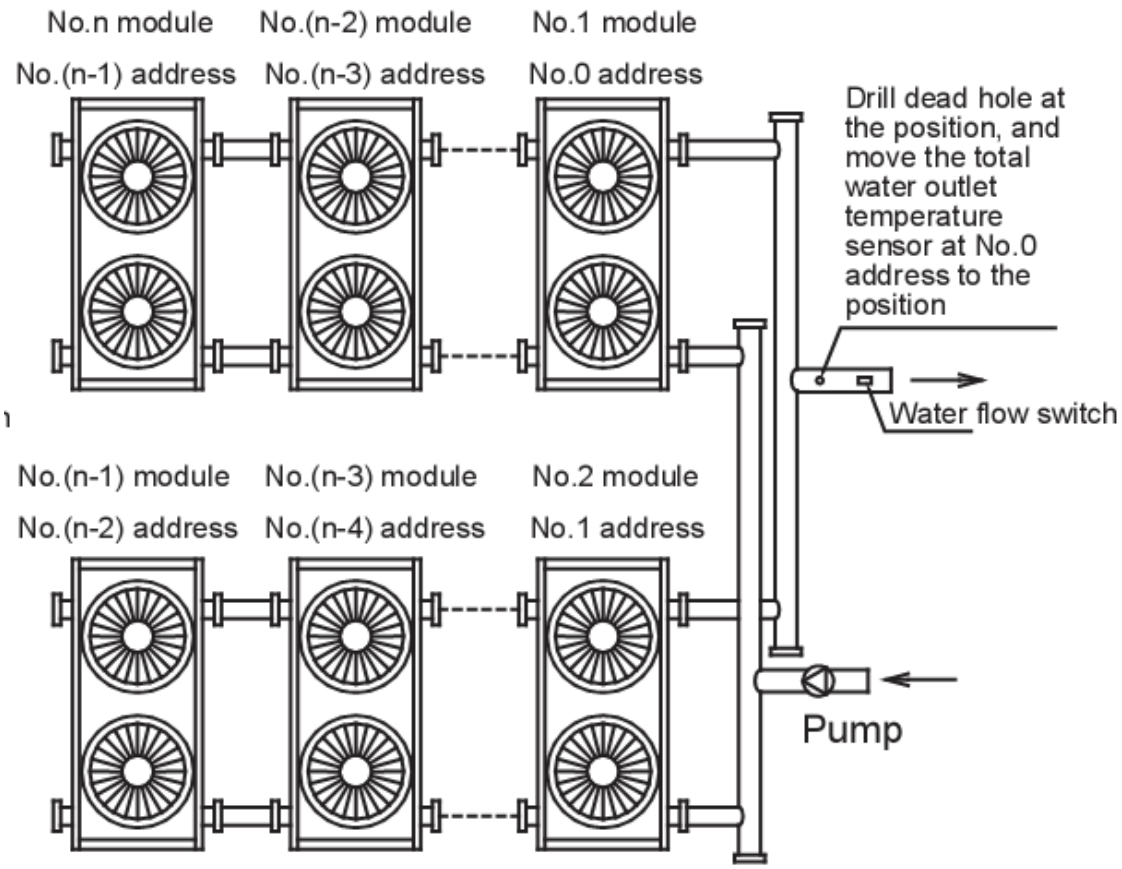


Installation mode B: less than 16 modules

4) Installation mode IV

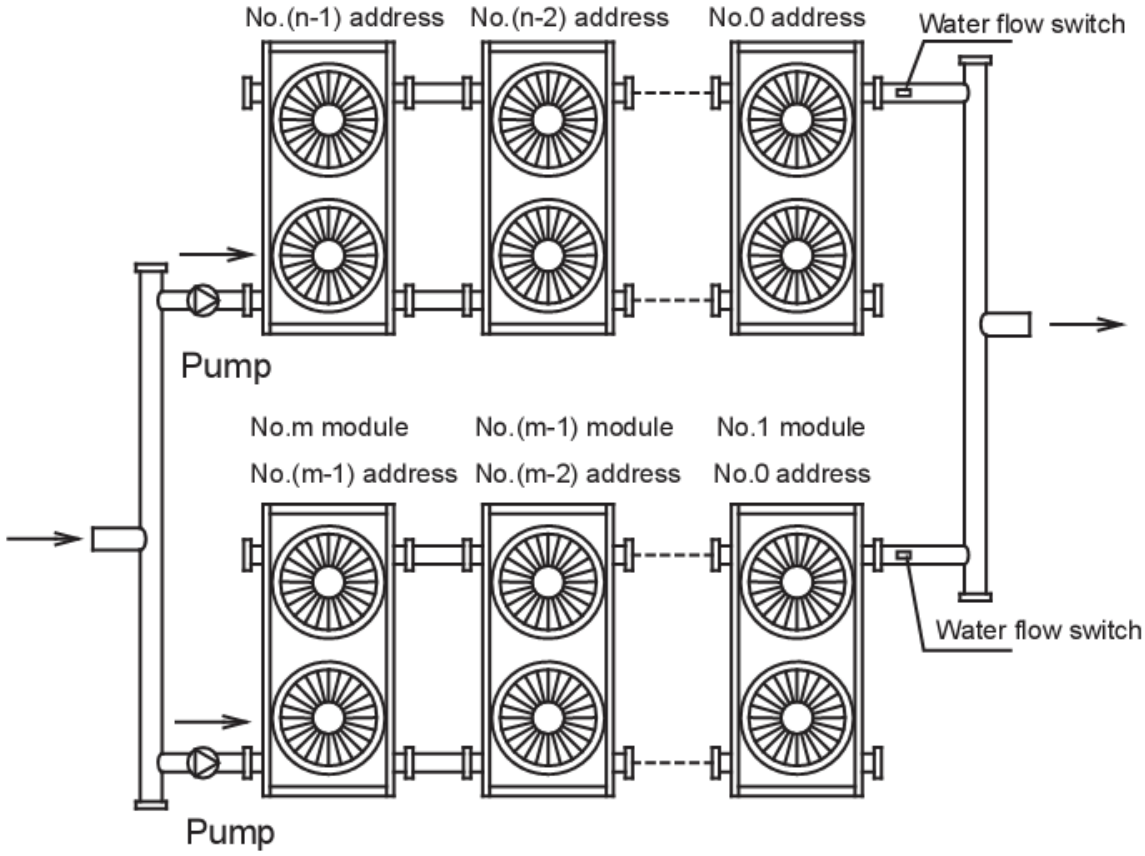


Installation mode A: less than 16 modules

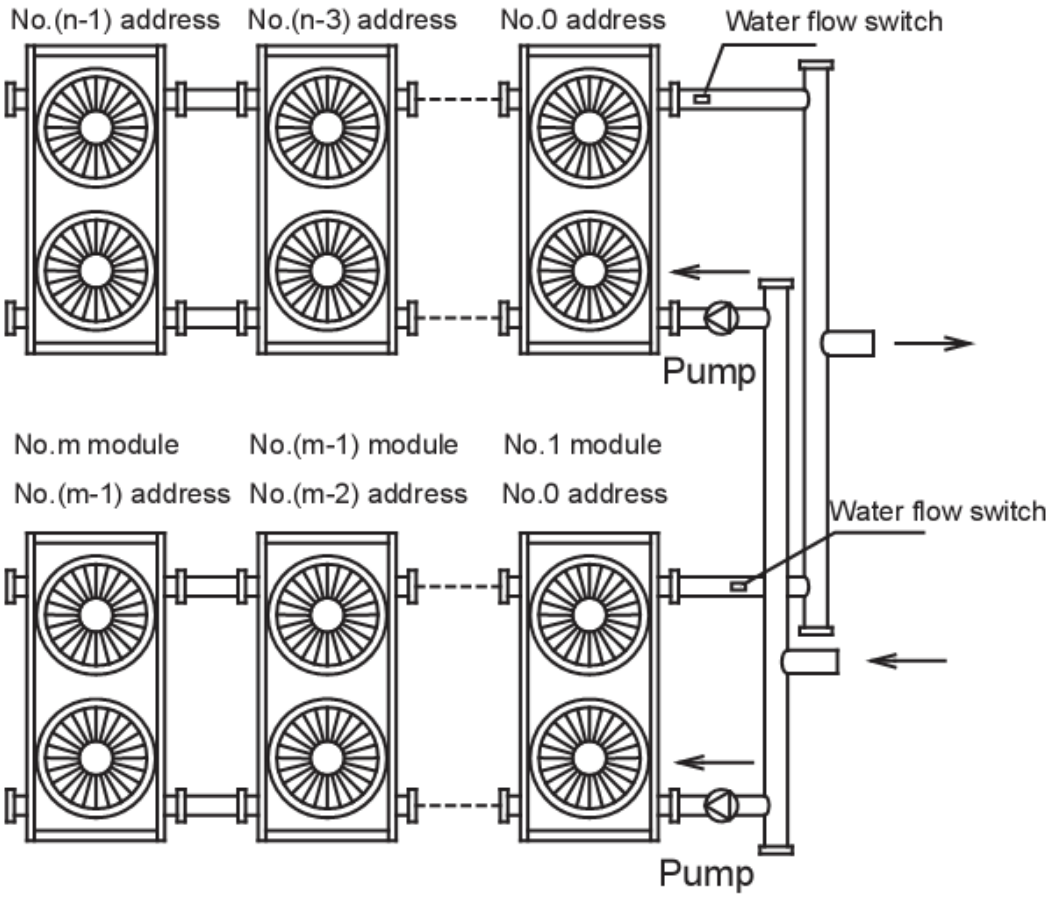


installation mode B: less than 12 modules

5) Installation mode V



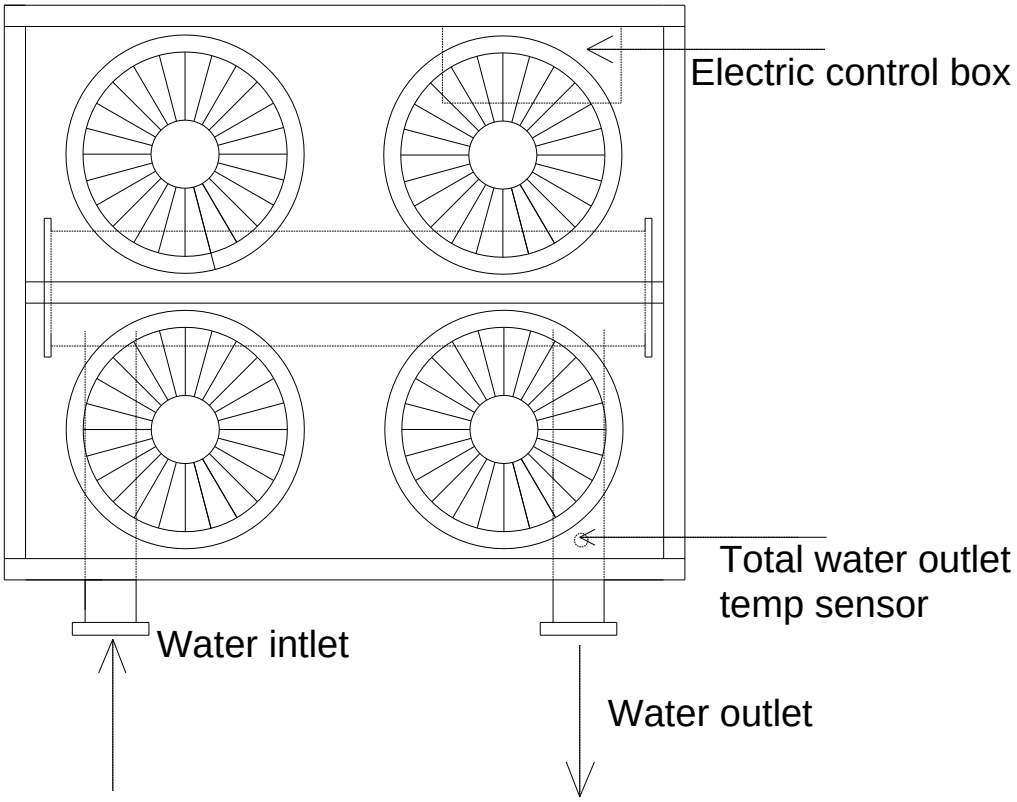
installation mode A: less than 16 modules



installation mode B: less than 12 modules

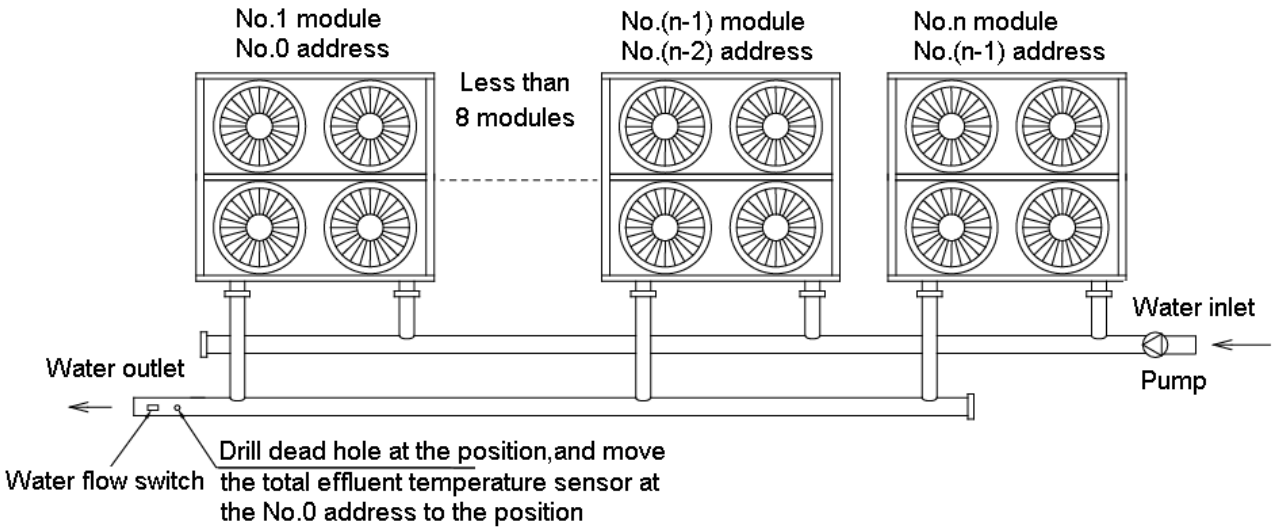
12.2.7 Installation of water system pipeline for 130 module

Installation of single-module water system pipeline

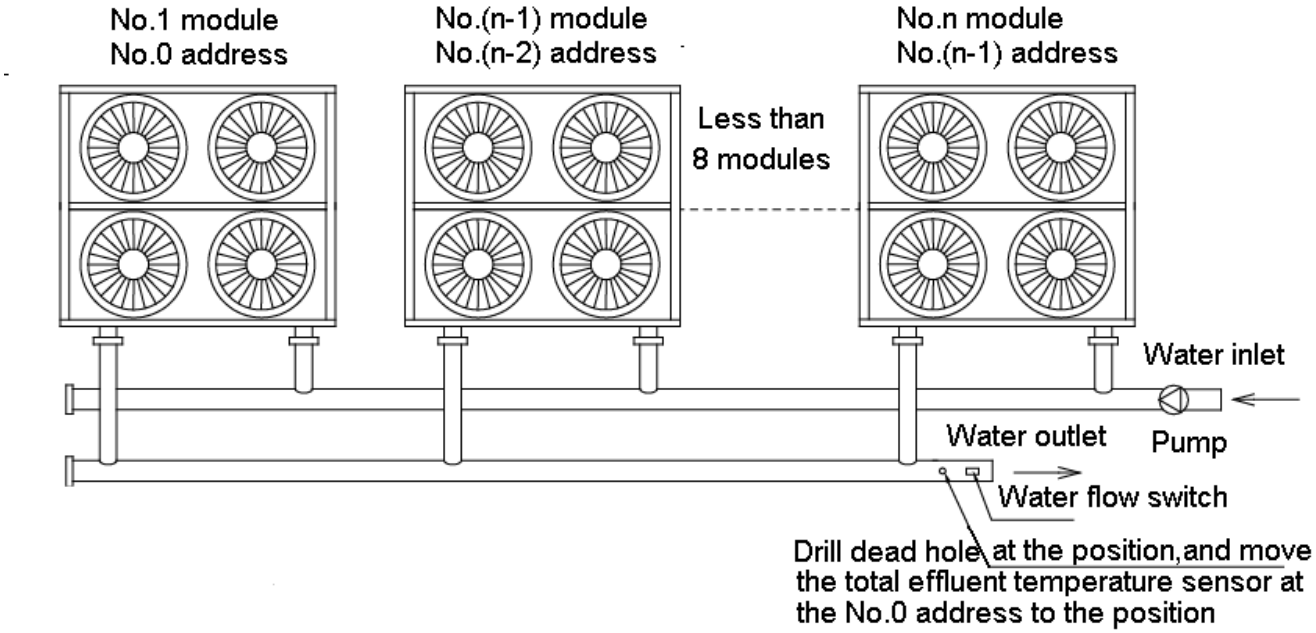


Installation of multi-module water system pipeline

1) Installation mode I (recommended installation mode)



2) Installation mode II



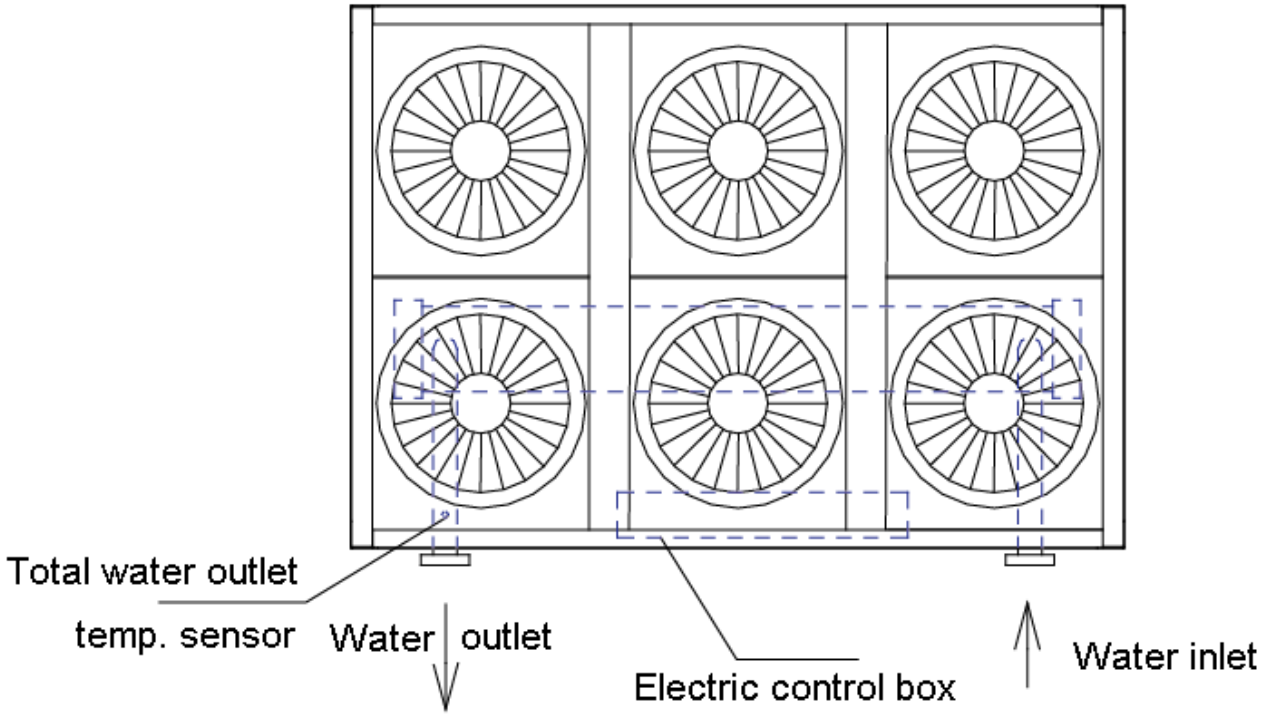
Notices :

1) For installation of multi-module, the most modules should be not more than 8 modular units.

2) For installation of multi-module, please drill a dead hole(Φ9mm) at the total water outlet pipeline, and move the total water effluent temperature sensor at No.0 address to the hole.

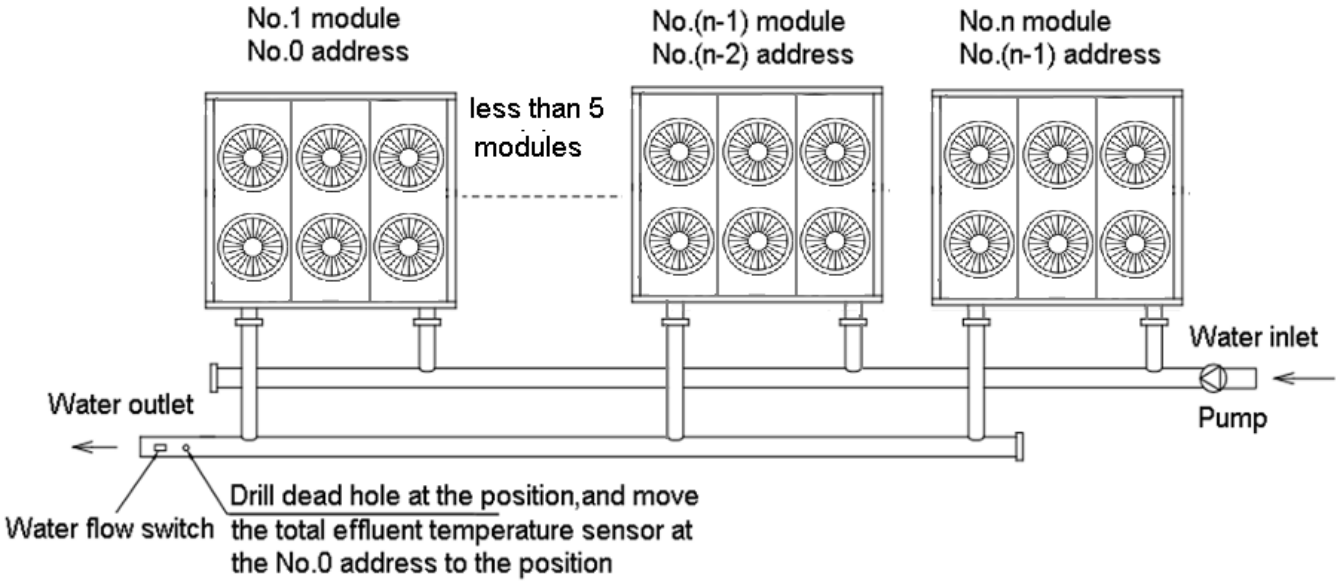
12.2.8 Installation of water system pipeline for 200 module

Installation of single-module water system pipeline

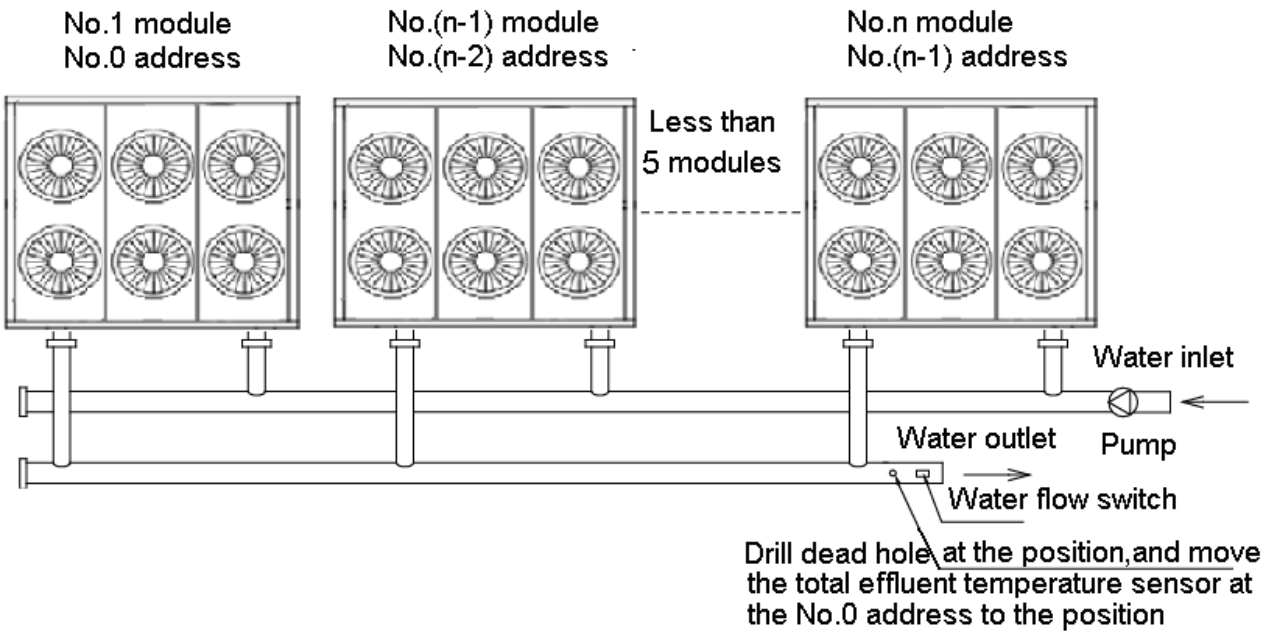


Installation of multi-module water system pipeline

1) Installation mode I (recommended installation mode)



2) Installation mode II



Notices :

1) For installation of multi-module,the most modules should be not more than 5 modular units.

2) For installation of multi-module, please drill a dead hole(Φ9mm) at the total water outlet pipeline, and move the total water effluent temperature sensor at No.0 address to the hole.

Table of diameter parameters of main inlet and outlet pipes for 25/30/35 module

Unit model x quantity	Total inlet and outlet water pipe diameter	Unit model x quantity	Total inlet and outlet water pipe diameter
25×1	DN40	25×9	DN100
30×1		30×9	
35×1		35×9	
25×2		25×10	
30×2		30×10	
35×2		35×10	
25×3	DN65	25×11	
30×3		30×11	
35×3		35×11	
25×4		25×12	DN125
30×4		30×12	
35×4		35×12	
25×5		25×13	
30×5		30×13	
35×5		35×13	
25×6	DN80	25×14	
30×6		30×14	
35×6		35×14	
25×7		25×15	
30×7		30×15	
35×7		35×15	
25×8		25×16	
30×8		30×16	
35×8		35×16	

Table of diameter parameters of main inlet and outlet pipes for 55/60/65 module

Unit model x quantity	Total inlet and outlet water pipe diameter	Unit model x quantity	Total inlet and outlet water pipe diameter
55×1	DN65	55×9	DN125
60×1		60×9	
65×1		65×9	
55×2		55×10	
60×2		60×10	
65×2		65×10	
55×3		55×11	
60×3		60×11	
65×3		65×11	
55×4	DN80	55×12	DN150
60×4		60×12	
65×4		65×12	
55×5		55×13	
60×5		60×13	
65×5		65×13	
55×6	DN100	55×14	
60×6		60×14	
65×6		65×14	
55×7		55×15	DN200
60×7		60×15	
65×7		65×15	
55×8	DN125	55×16	
60×8		60×16	
65×8		65×16	

Table of diameter parameters of main inlet and outlet pipes for 130 module

Unit model x quantity	Total inlet and outlet water pipe diameter	Unit model x quantity	Total inlet and outlet water pipe diameter
130×1	DN65	130×5	DN125
130×2	DN100	130×6	DN150
130×3	DN100	130×7	DN150
130×4	DN125	130×8	DN200

Table of diameter parameters of main inlet and outlet pipes for 200 module

Unit model x quantity	Total inlet and outlet water pipe diameter	Unit model x quantity	Total inlet and outlet water pipe diameter
200×1	DN80	200×4	DN150
200×2	DN100	200×5	DN200
200×3	DN125		

Please pay attention to the following items when installing multiple modules:
● Each module corresponds to an address code which cannot be repeated.
● Main water outlet temperature sensing bulb, target flow controller and auxiliary electric heater are under control of the main module.
● One wired controller and one target flow controller are required and connected on the main module.
● The unit can be started up through the wired controller only after all addresses are set and the aforementioned items are determined. The wired controller is ≤50m away from the outdoor unit.

12.3 Wiring Installation

All wiring installation should be done by qualified person.

12.3.1 Precautions:

1. The air-conditioner should apply special power supply, whose voltage should conform to rated voltage.

2. Wiring construction must be conducted by the professional technicians according to the labeling on the circuit diagram.

3. Only use the electric components specified by our company, and require installation and technical services from the manufacturer or authorized dealer. If wiring connection fails to conform to electric installation norm, failure of the controller, electronic shock, and so on may be caused.

4. The connected fixed wires must be equipped with full switching-off devices with at least 3mm contact separation.

5. Set leakage protective devices according to the requirements of national technical standard about electric equipment.

6. After completing all wiring construction, conduct careful check before connecting the power supply.

7. Please carefully read the labels on the electric cabinet.

8. The user's attempt to repair the controller is prohibited, since improper repair may cause electric shock, damages to the controller, and so on. If the user has any requirement of repair, please contact the maintenance center.

12.3.2 Power supply specification

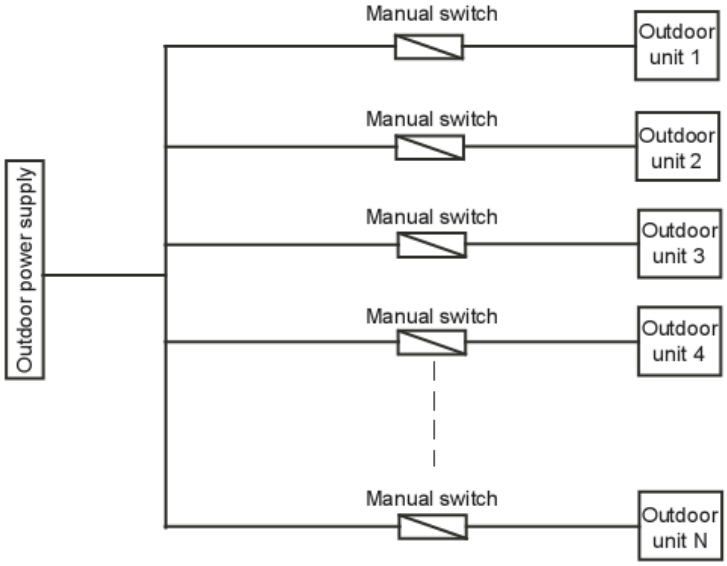
Items / Model	Outdoor power supply			Wiring
	Power supply	Manual switch	Fuse	
MGB-F25W/S(R) MGB-F30W/S(R) MGB-F35W/S(R)	380~415V 3N～50Hz	50A	36A	$10mm^2$ (<30m)
MGB-D25W/S(R) MGB-D30W/S(R) MGB-D35W/S(R)	380~415V 3N～50Hz	50A	36A	$10mm^2$ (<30m)
MGB-F55W/S(R) MGB-F60W/S(R) MGB-F65W/S(R)	380~415V 3N～50Hz	125A	100A	$16mm^2$ (<20m)
MGB-F130W/S(R)	380~415V 3N～50Hz	250A	200A	Base on the actual distance of the wire, more than 35 mm^2 for each module
MGB-F130W/R	380~415V 3N～50Hz	250A	200A	Base on the actual distance of the wire, more than 35 mm^2 for each module

12.3.3 Requirements of wiring connection

- No additional control components are required in the electric cabinet (such as relay, and so on), and the power supply and control wires not connected with the electric cabinet are not allowed to go through the electric box. Otherwise, electromagnetic interference may cause failure of the unit and control components and even damages to them, which thus lead to protective failure.
- All cables led to the electric box should be supported independently but by the electric box.
- The strong current wires generally pass the electric box, and 220V alternating current may also pass the control board, so wiring connection should conform to the principle of separation of strong current and weak current, and the wires of power supply should be kept more than 100 mm away from the control wires.
- Only use 380-415V 3N~ 50Hz rated power supply for the unit, and the maximum allowable range of voltage is 342V-418V.
- All electric wires must conform to local wiring connection norm. The suitable cables should be connected to power supply terminal through wiring connection holes at the bottom of the electric cabinet. According to Chinese standard, the user is responsible for providing voltage and current protection for the input power supply of the unit.
- All power supplies connected to the unit must pass one manual switch, to ensure that the voltages on all nodes of electric circuit of the unit are released when the switch is cut off.
- The cables of correct specification must be used to supply power for the unit. The unit should use independent power supply, and the unit is not allowed to use the same power supply together with other electric devices, to avoid over-load danger. The fuse or manual switch of the power supply should be compatible with working voltage and current of the unit. In case of parallel connection of multiple modules, the requirements of wiring connection mode and configuration parameters for the unit are shown in the following figure.
- Some connection ports in the electric box are switch signals, for which the user needs to provide power, and the rate voltage of the power should be 220-230V AC. The user must be aware that all power supplies they provided should be obtained through power circuit breakers (provided by the user), to

ensure that all voltages on the nodes of the provided power supply circuit are released when the circuit breakers are cut off.

- All inductive components provided by the user (such as coils of contactor, relay, and so on) must be suppressed with standard resistance-capacitance suppressors, to avoid electromagnetic interference, thus leading to failure of the unit and its controller and even damages to them.
- All weak current wires led to the electric box must apply shielded wires, which must be provided with grounding wires. The shield wires and power supply wires should be laid separately, to avoid electromagnetic interference.
- The unit must be provided with grounding wires, which are not allowed to be connected with the grounding wires of gas fuel pipelines, water pipelines, lightning conductors or telephones. Improper earth connection may cause electric shock, so please check whether earth connection of the unit is firm or not frequently.



Note:

1) 25/30/35 module only 16 modular units can be combined at most.
2) 55/60/65 module only 16 modular units can be combined at most.
3) 130 module only 8 modular units can be combined at most.
4) 200 module only 5 modular units can be combined at most.

12.3.4 Wiring steps

Step 1. Check the unit and ensure that it is connected with grounding wires correctly, to avoid leakage, and the grounding devices should be mounted in strict accordance with the requirements of electrical engineering rules. The grounding wires can prevent electric shock.

Step 2. The control box of the main power switch must be mounted in a proper position.

Step 3. Wiring connection holes of the main power should be provided with glue cushion.

Step 4. The main power and neutral wires and grounding wires of power supply are led into the electric box of the unit.

Step 5. The wires of the main power must pass the bonding clamp.

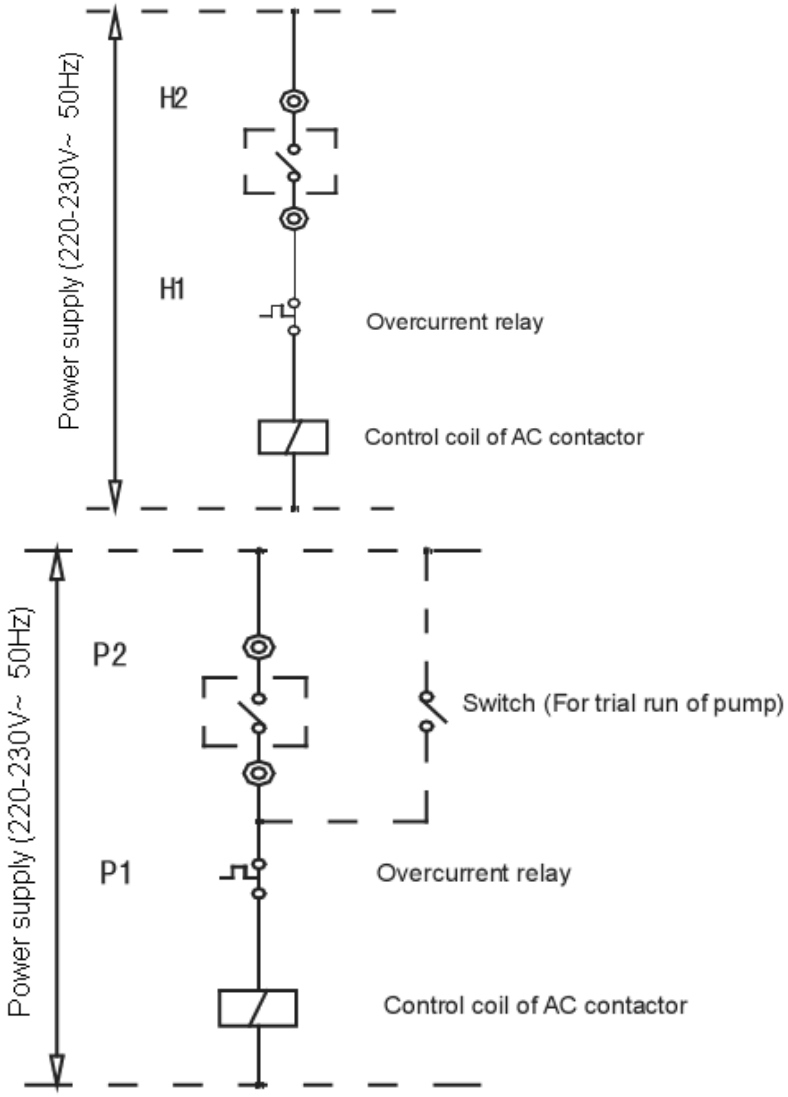
Step 6. Wires should be connected firmly to the connection terminals A, B, C and D.

Step 7. Phase sequences must be consistent when the wires of the main power.

Step 8. The main power should be located out of easy reach of non-professional maintenance personnel, to avoid mal-operation and improve safety.

Step 9. Connection of control wires of water flow switches: the wire leads (prepared by the user) of water flow switches are connected to the connection terminals W1 and W2 of the main unit.

Step 10. Connection of control wires of auxiliary electric heaters: the control wires of AC contactor of the auxiliary electric heater must pass the connection terminals H1 and H2 of the main unit, as shown in figure below.


Power supply (220-230V~ 50Hz)
H2
H1
Overcurrent relay
Control coil of AC contactor
Power supply (220-230V~ 50Hz)
P2
P1
Switch (For trial run of pump)
Overcurrent relay
Control coil of AC contactor

Commissioning

1. Preparation

● After the water system pipeline is flushed several times, please make sure that the purity of water meets the requirements; the system is re-filled with water and drained, and the pump is started up, then make sure that water flow and the pressure at the outlet meet the requirements.

● The unit is connected to the main power 12 hours before being started up, to supply power to the heating belt and pre-heat the compressor. Inadequate pre-heating may cause damages to the compressor.

● Setting of the wired controller. See details of the manual concerning setting contents of the controller, including such basic settings as refrigerating and heating mode, manual adjustment and automatic adjustment mode and pump mode. Under normal circumstances, the parameters are set around standard operating conditions for trial run, and extreme working conditions should be prevented as much as possible.

● Carefully adjust the target flow controller on the water system or the inlet stop valve of the unit, to make the water flow of the system accord with the water flow in specification table.

2. Test run

6.3.1 Start up the controller and check whether the unit displays a fault code. If a fault occurs, remove the fault first, and start the unit according to the operating method in the “unit control instruction”, after determining that there is no fault existing in the unit.

6.3.2 Conduct trial run for 30 min. When the influent and effluent temperature becomes stabilized, adjust the water flow to nominal value, to ensure normal operation of the unit.

6.3.3 After the unit is shut down, it should be put into operation 10 min later, to avoid frequent start-up of the unit. In the end, check whether the unit meets the requirements in specification table.

Notices:

● The unit can control start-up and shut-down of the unit, so when the water system is flushed, the operation of the pump should not be controlled by the unit.

● Do not start up the unit before draining the water system completely.

● The target flow controller must be installed correctly. The wires of the target flow controller must be connected according to electric control schematic diagram, or the faults caused by water breaking while the unit is in operation should be the user’s responsibility.

● Do not re-start the unit within 10 min after the unit is shut down during trial run.

● When the unit is used frequently, do not cut off the power supply after the unit is shut down; otherwise the compressor cannot be heated, thus leading to its damages.

● If the unit is not in service for a long time, and the power supply needs to be cut off, the unit should be connected to the power supply 12 hours prior to re-starting of the unit, to pre-heat the compressor.

Maintenance

Maintenance for main components：

● Close attention should be paid to the discharge and suction pressure during the running process. Find out reasons and eliminate the failure if abnormality is found.

● Control and protect the equipment. See to it that no random adjustment be made on the set points on site.

● Regularly check whether the electric connection is loose, and whether there is bad contact at the contact point caused by oxidation and debris etc., and take timely measures if necessary. Frequently check the work voltage, current and phase balance.

● Check the reliability of the electric elements in time. Ineffective and unreliable elements should be replaced in time.

Removing scale

After long-time operation, calcium oxide or other minerals will be settled in the heat transfer surface of the water-side heat exchanger. These substances will affect the heat transfer performance when there is too much scale in the heat transfer surface and sequentially cause that electricity consumption increases and the discharge pressure is too high (or suction pressure too low). Organic acids such as formic acid, citric acid and acetic acid may be used to clean the scale. But in no way should cleaning agent containing chlorine acid or fluoride should be used as the water-side heat exchange is made from stainless steel and is easy to be eroded to cause refrigerant leakage. Pay attention to the following aspects during the cleaning and scale-removing process:

● Water-side heat exchanger should be done be professionals.

● Clean the pipe and heat exchanger with clean water after cleaning agent is used. Conduct water treatment to prevent water system from being eroded or re-absorption of scale.

● In case of using cleaning agent, adjust the density of the agent, cleaning time and temperature according to the scale settlement condition.

● After pickling is completed, neutralization treatment needs to be done on the waste liquid. Contact relevant company for treating the treated waste liquid.

● Protection equipments (such as goggles, gloves, mask and shoes) must be used during the cleaning process to avoid breathing in or contacting the agent as the cleaning agent and neutralization agent is corrosive to eyes, skins and nasal mucosa.

Winter shutdown

For shutdown in winter, the surface of the unit outside and inside should be cleaned and dried. Cover the unit to prevent dust. Open discharge water valve to discharge the stored water in the clean water system to prevent freezing accident (it is preferable to inject antifreeze in the pipe).

Replacing parts

Parts to be replaced should be the ones provided by our company. Never replace any part with different part.

First startup after shutdown

The following preparations should be made for re-startup of unit after long-time shutdown:

1) Thoroughly check and clean the unit.

2) Clean water pipe system.

3) Check pump, control valve and other equipments of water pipe system.

4) Fix connections of all wires.

5) It is a must to electrify the machine before startup.

Refrigeration system

Determine whether refrigerant is needed by checking the value of suction and discharge pressure and check whether there is a leakage. Air tight test must be made if there is a leakage or parts of refrigerating system is to be replaced. Take different measures in the following two different conditions from refrigerant injection.

1) Total leakage of refrigerant. In case of such situation, leakage detection must be made on the pressurized nitrogen used for the system. If repair welding is needed, welding cannot be made until all the gas in the system is discharged. Before injecting refrigerant, the whole refrigeration system must be completely dry and of vacuum pumping.

- Connect vacuum pumping pipe at the fluoride nozzle at low-pressure side.
- Remove air from the system pipe with vacuum pump. The vacuum pumping lasts for above 3 hours. Confirm that the indication pressure in dial gauge is within the specified scope.

● When the degree of vacuum is reached, inject refrigerant into the refrigeration system with refrigerant bottle. Appropriate amount of refrigerant for injection has been indicated on the nameplate and the table of main technical parameters. Refrigerant must be injected from the low pressure side of system.

● The injection amount of refrigerant will be affected by the ambient temperature. If the required amount has not been reached but no more injection can be done, make the chilled water circulate and start up the unit for injection. Make the low pressure switch temporarily short circuit if necessary.

2) Refrigerant supplement. Connect refrigerant injection bottle on the fluoride nozzle at low-pressure side and connect pressure gauge at low pressure side.

● Make chilled water circulate and start up unit, and make the low pressure control switch short circuit if necessary.

● Slowly inject refrigerant into the system and check suction and discharge pressure.

Disassembling compressor

Follow the following procedures if compressor needs to be disassembled:

1) Cut off the power supply of unit.

2) Remove power source connection wire of compressor.

3) Remove suction and discharge pipes of compressor.

4) Remove fastening screw of compressor.

5) Move the compressor.

Auxiliary electric heater

When the ambient temperature is lower than 2 ˚C, the heating efficiency decreases with the decline of the outdoor temperature. In order to make the air-cooled heat pump stably run in a relatively cold region and supplement some heat lost due to de-frosting. When the lowest ambient temperature in the user's region in winter is within 0 C~10 C, the user may consider to use auxiliary electric heater. Please refer to relevant professionals for the power of auxiliary electric heater.

System antifreezing

In case of freezing at the water-side heat exchanger interval channel, severe damage may be caused, i.e. heat exchange may be broken and appears leakage. This damage of frost crack is not within the warranty scope, so attention must be paid to antifreezing.

1) If the unit that is shutdown for standby is placed in an environment where the outdoor temperature is lower than 0 C, the water in the water system should be drained.

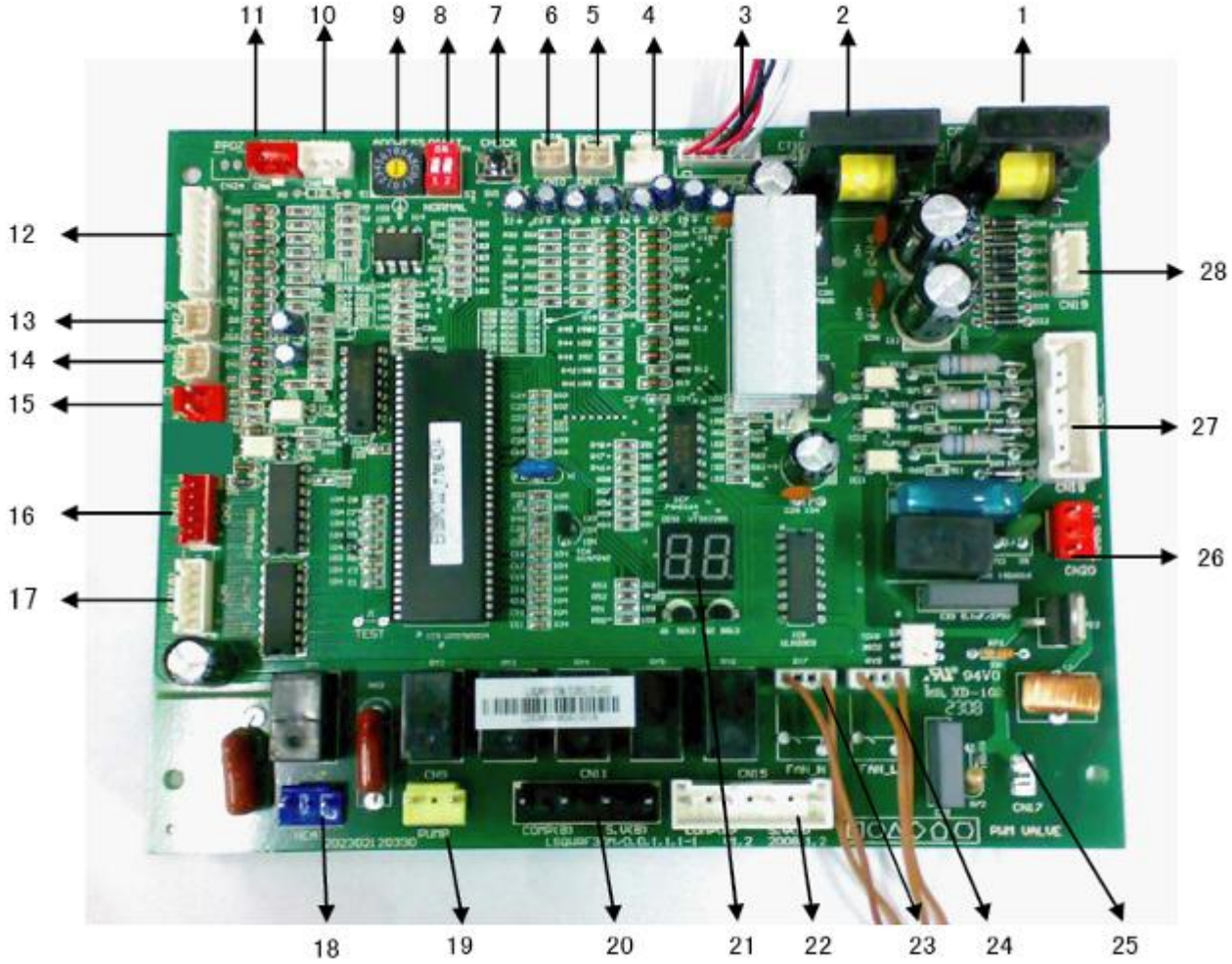
2) Water pipe may be frozen when the chilled water target flow controller and anti-freezing temperature senor become ineffective at running, therefore, the target flow controller must be connected in accordance with the connection diagram.

3) Frost crack may happen to water-side heat exchanger at maintenance when refrigerant is injected to the unit or is discharged for repair. Pipe freezing is likely to happen any time when the pressure of refrigerant is below 0.4Mpa. Therefore, the water in the heat exchanger must be kept flowing or be thoroughly discharged.

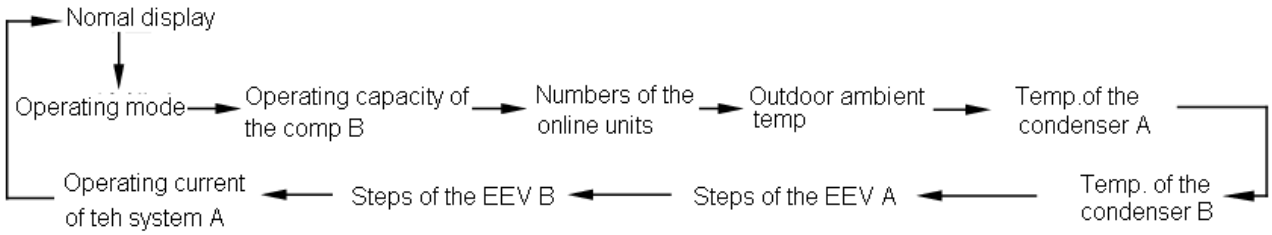
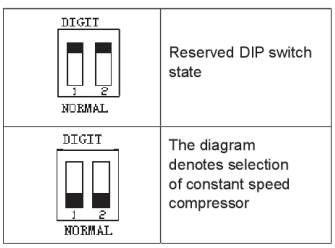
Control System

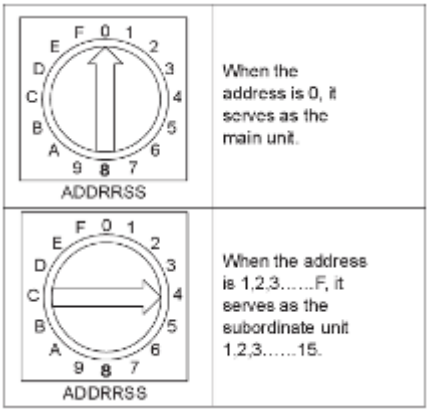
15.1 PCB Outline and Description

15.1.1 25/30/35 module PCB, outlook view



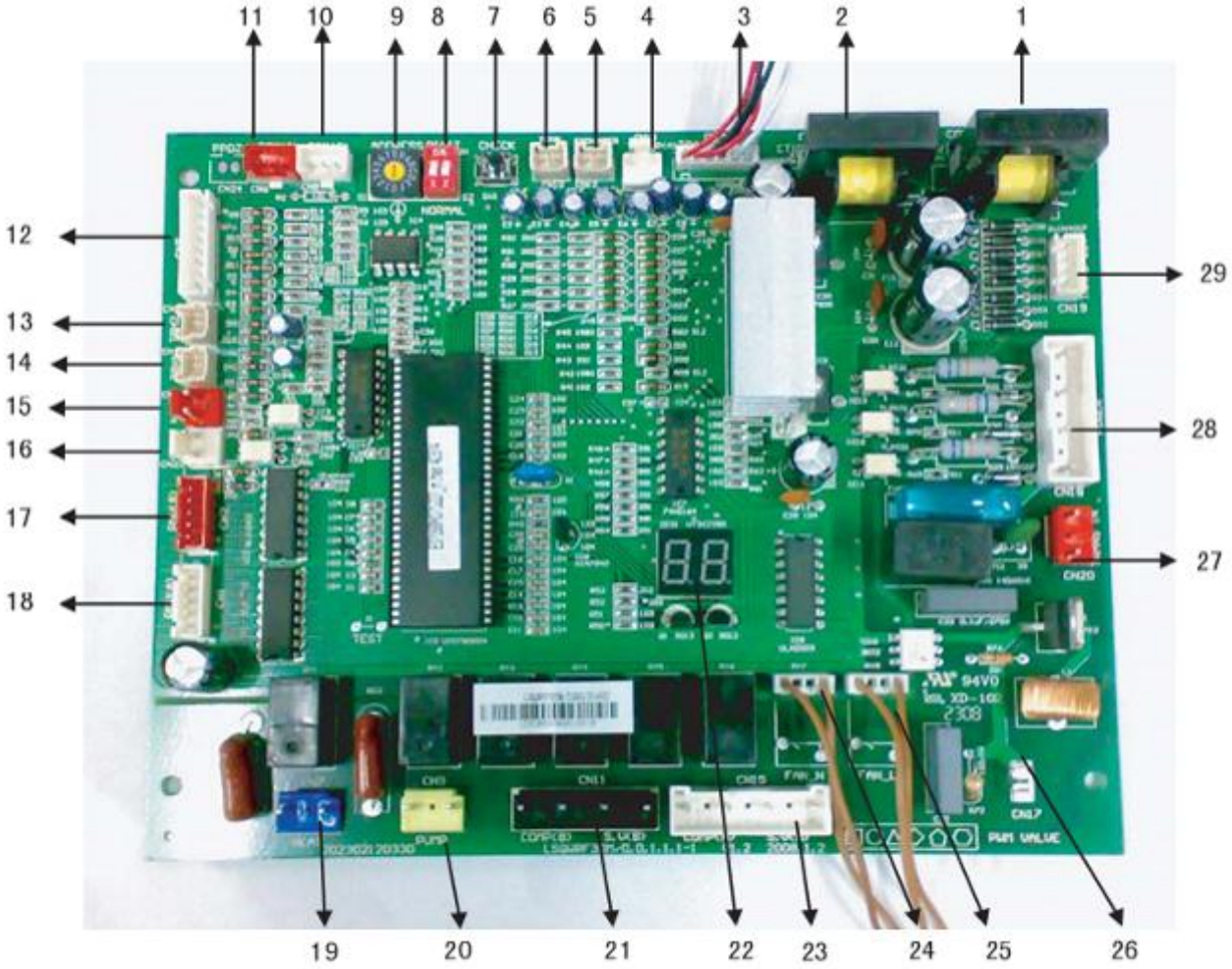
15.1.2 25/30/35 module components description

No.	Detail information
1	Detection of current of the compressor B (protection code P5)
2	Detection of current of the compressor A (protection code P4) Current is not detected within the initial 5 seconds after the compressor is started up. When the current of the compressor is detected to exceed protective value set (33A for constant speed compressor), it will be shut down and re-started after 3 min.
3	T4: outdoor ambient temperature sensor (fault code E7) T3B: pipe temperature sensor of the condenser B (fault code E6 and protection code P7) T3A: pipe temperature sensor of the condenser A (fault code E5 and protection code P6) 1) T4: if there is one system that requires starting outdoor fans, the fans are started through electric control of the unit. Start outdoor fan A only, start A and B gears, and control the unit through T4. 2) T3B and T3A: when the electric control of the modular unit detects the temperature of the outdoor pipe T3A or T3B of the system exceeds the protective temperature 65 C, the corresponding system will be shut down. And it will be re-started up, after the temperature drops below the recovery temperature 60 C. Another system will be not affected. 3) T4, T3B and T3A: when the temperature sensor is detected to suffer open circuit or short circuit, fault alarm will occur. ● When the main unit suffer fault of temperature sensor: the main unit and slave units will be shut down. ● When the slave unit suffer fault of temperature sensor: the unit will be shut down, but other slave units will not be affected.
4	Discharge temperature sensor of the digital compressor of the system A (fault code E8,protection code P8),only the digital unit is valid, and the fixed speed unit is invalid.
5	Unit outlet water temperature sensor (fault code E4) Under cooling mode and heating mode, conduct adjustment according to the double-pipe heat exchanger outlet water temperature. Adjustment range of constant speed capability: ON and OFF.
6	Total outlet water temperature sensor (fault code E3) Only the main unit is valid, and the slave units are invalid. Under cooling mode and heating mode, conduct adjustment according to the magnitude of total outlet water temperature. Adjustment range: shut-down, 40%, 60%, 80% and 100%.
7	Spot check. The operating status of outdoor system can be observed through spot check, and specific display contents are as shown in the following figure:  ● Display contents of “operating mode”: 1. cooling; 2. heating; 4. pump; 8. Stand-by ● Display contents of “number of online units”: the main unit can display the number of online units, and the slave unit displays 0.
8	Selection code of the compressor 

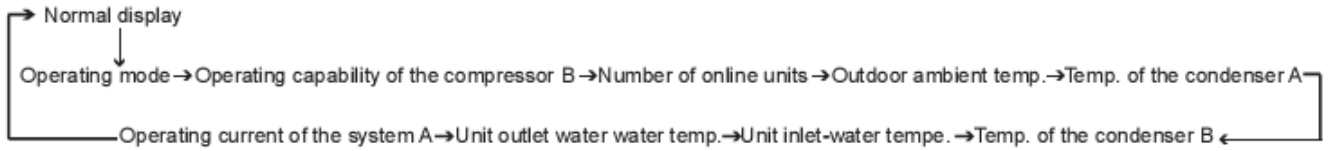
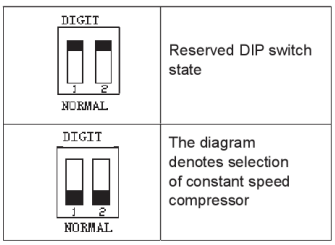
9	 Each modular part of modular unit has the same electric control function, and the main unit and slave units can be set through address code on the electric control board. The address code 0 # is provided as the main unit. The priority of being the main unit is given to the unit with digital compressor, and other addresses are slave units. Only the unit is chosen as the main unit, its electric control can activate such functions as direct communication with the wired controller, refrigerating and heating capability adjustment, pump control, auxiliary electric heater control, total effluent temperature detection and water flow switch detection.
10	COM (O) 485 communication port (fault code E2)
11	COM (I) 485 communication port (fault code E2) COM (O) is interconnected with P, Q and E of COM (I), used for RS-485 communication. 1) If faults occur between the wired controller and the main unit module, all modules will be shut down. 2) If faults occur between the main unit and slave units, the slave unit module suffering communication fault will be shut down. Less units will be detected by the wired controller, which may display EA, and in the meanwhile, the indicator lamp of the wired controller will flash.
12	high-pressure protection of the system A and discharge temperature switch protection (protection code P0); high-pressure protection of the system B and discharge temperature switch protection (protection code P2); low-pressure protection of the system A (protection code P1); low-pressure protection of the system B (protection code P3); 1）Constant speed compressor: connection of discharge temperature switch and high-pressure switch of the system in series. 2）Digital compressor: there are discharge temperature switch and discharge temperature sensor for double protection, connection of discharge temperature switch and high-pressure switch of the system in series, there is a special interface for discharge temperature sensor. Discharge temperature sensor of digital compressor: (it is not checked with constant speed compressor)the compressor is protected basing on the value of the comp discharge temp(DLT).If the DLT is normal(there is not malfunction of discharge temperature sensor, otherwise show fault code E8),the control rule is conducted with protection of three temperature ranges: safety(green area),warning(yellow area) and danger(red area).If the DLT is less than 125℃,the compressor has not protection. If the DLT is more than 125℃ and keep running for 10 minutes, the system enter yellow area to control, the output capacity of the digital compressor will reduce to 40%,then if the DLT drops to 100℃,the system returns safety area. If the DLT is up to 140℃,the compressor stops running, and the system will restart after 3 minutes after the malfunction is eliminated.
13	Double-pipe low-temperature ant-freeze sensor T62 (TBH2) (fault code EF)
14	Double-pipe low-temperature ant-freeze sensor T61 (TBH1) (fault code Eb)
15	Water flow detection (fault code of the main unit E0) is only valid for the main unit but invalid for subordinate units. 1) Main unit: if abnormal water flow occurs for the first and second time, the main unit board will display fault code E9. If abnormal water flow occurs the third time, the main unit board will display fault code E0 (off-power recovery is needed), and the wired controller will display fault code E0 (fault is displayed only after 3 detection). 2) Slave unit: (water flow detection will not be done).
16	Electronic expansion valve of the system B

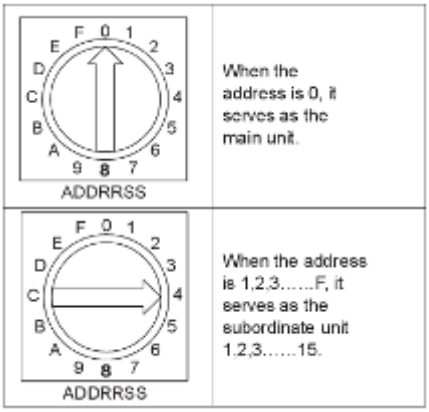
17	Electronic expansion valve of the system A Electronic expansion valve is used to control refrigerant flow under different operating modes and different loads.
18	Auxiliary electric heater Attention: the control port value of auxiliary electric heater actually detected is ON/OFF but not 220V control power supply, so special attention should be paid when installing the auxiliary electric heater. Attention! Under heating mode, when the main unit board detects total water outlet temperature to be lower than 45 C, the switch will be closed, and the auxiliary electric heater will begin to work; when the total water outlet temperature is higher than 50 C, the switch will be opened, and the auxiliary electric heater will stop working.
19	PUMP Attention: the control port value of the pump actually detected is ON/OFF but not 220V control power supply, so special attention should be paid when installing the pump. 1) After receiving start-up instruction, the pump will be started up instantly, and will maintain start-up state always in the process of operation. 2) In case of refrigerating or heating shutdown, the pump will be shut down 2 minutes after all modules stop operating. 3) In case of shutdown under the pump mode, the pump can be directly shut down.
20	Compressor of the system B; Neutral line Four-way valve of the system B; Neutral line
21	LED display 1) In case of stand-by, the address of the module is displayed; 2) In case of normal operation, 10. is displayed (10 is followed by dot). 3) In case of fault or protection, fault code or protection code is displayed.
22	Compressor of the system A; Neutral line Four-way valve of the system A; Neutral line
23	High fan speed of outdoor fan controlled by T4.
24	Low fan speed of outdoor fan, controlled by T4.
25	PWM,use for adjusting of the digital compressor's capacity
26	Input of transformer, 220-230V AC current.
27	Input of three-phase four-wire power supply (fault code E1) Three phases A, B and C of power supply should exist simultaneously, and the difference of phase angle should be 120^{o} among them. If the conditions are not met, fault of phase sequence or phase lack may occur, and fault code will be displayed. When the power supply returns to normal condition, fault is removed. Attention: phase lace and phase dislocation of power supply are detected only in the early period after the power supply is connected, and they are not detected while the unit is in operation.
28	Output of transformer

15.1.3 55/60/65 module PCB, outlook view



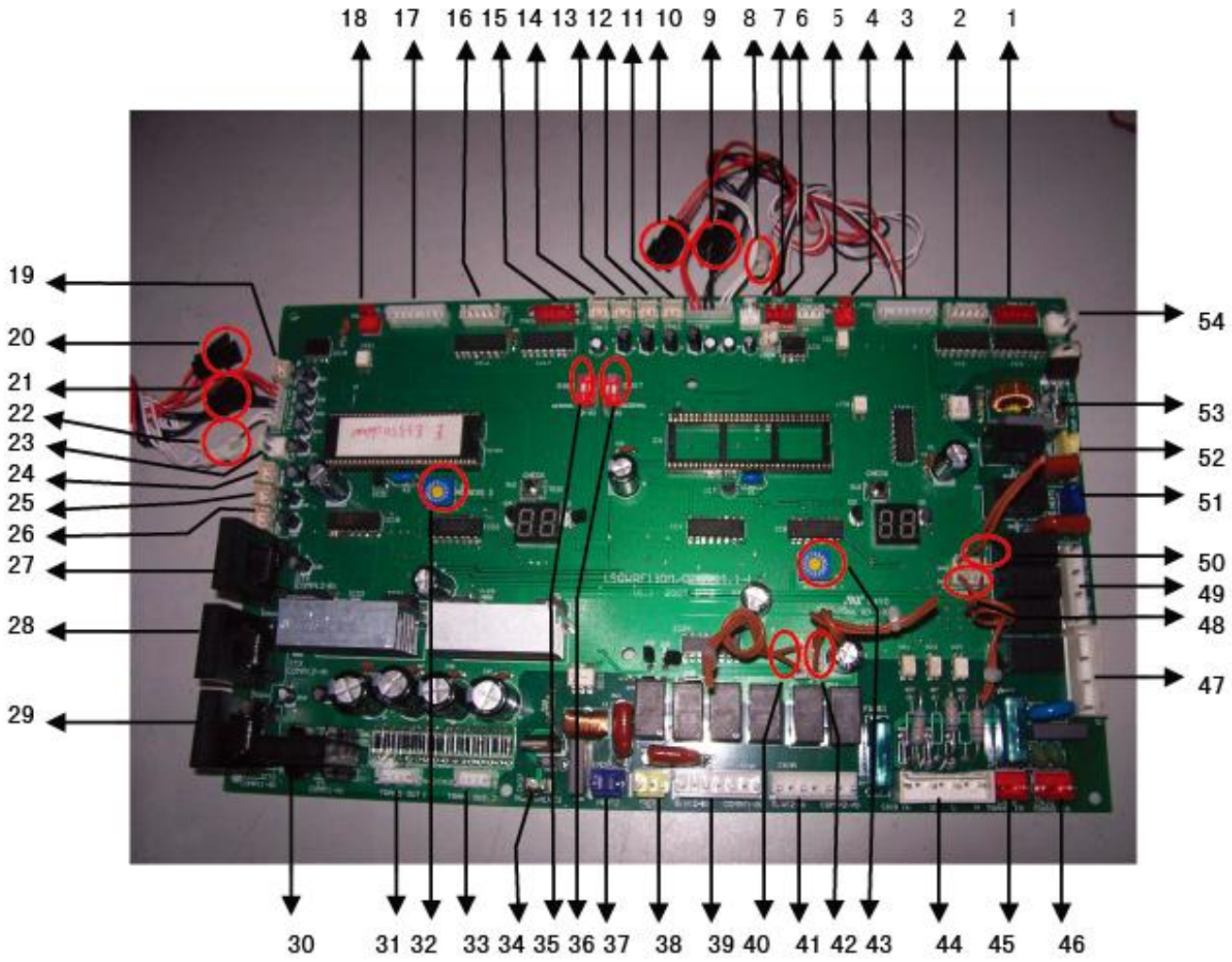
15.1.4 55/60/65 module components description

No.	Detail information
1	Detection of current of the compressor B (protection code P5)
2	Detection of current of the compressor A (protection code P4) Current is not detected within the initial 5 seconds after the compressor is started up. When the current of the compressor is detected to exceed protective value set (33A for constant speed compressor), it will be shut down and re-started after 3 min.
3	T4: outdoor ambient temperature sensor (fault code E7) T3B: pipe temperature sensor of the condenser B (fault code E6 and protection code P7) T3A: pipe temperature sensor of the condenser A (fault code E5 and protection code P6) 1) T4: if there is one system that requires starting outdoor fans, the fans are started through electric control of the unit. Start outdoor fan A only, start A and B gears, and control the unit through T4. 2) T3B and T3A: when the electric control of the modular unit detects the temperature of the outdoor pipe T3A or T3B of the system exceeds the protective temperature 65 C, the corresponding system will be shut down. And it will be re-started up, after the temperature drops below the recovery temperature 60 C. Another system will be not affected. 3) T4, T3B and T3A: when the temperature sensor is detected to suffer open circuit or short circuit, fault alarm will occur. ● When the main unit suffer fault of temperature sensor: the main unit and slave units will be shut down. ● When the slave unit suffer fault of temperature sensor: the unit will be shut down, but other slave units will not be affected.
4	(reserved)
5	Unit outlet water temperature sensor (fault code E4) Under cooling mode and heating mode, conduct adjustment according to the magnitude of unit outlet water temperature. Adjustment range of constant speed capability: ON and OFF.
6	Total outlet water temperature sensor (fault code E3) Only the main unit is valid, and the slave units are invalid. Under cooling mode and heating mode, conduct adjustment according to the magnitude of total outlet water temperature. Adjustment range: shut-down, 40%, 60%, 80% and 100%.
7	Spot check. The operating status of outdoor system can be observed through spot check, and specific display contents are as shown in the following figure:  ● Display contents of “operating mode”: 1. cooling; 2. heating; 4. pump; 8. Stand-by ● Display contents of “number of online units”: the main unit can display the number of online units, and the slave unit displays 0.
8	Selection code of the compressor 

9	 Each modular part of modular unit has the same electric control function, and the main unit and slave units can be set through address code on the electric control board. The address code 0 # is provided as the main unit. The priority of being the main unit is given to the unit with digital compressor, and other addresses are slave units. Only the unit is chosen as the main unit, its electric control can activate such functions as direct communication with the wired controller, refrigerating and heating capability adjustment, pump control, auxiliary electric heater control, total effluent temperature detection and water flow switch detection.
10	COM (O) 485 communication port (fault code E2)
11	COM (I) 485 communication port (fault code E2) COM (O) is interconnected with P, Q and E of COM (I), used for RS-485 communication. 1) If faults occur between the wired controller and the main unit module, all modules will be shut down. 2) If faults occur between the main unit and slave units, the slave unit module suffering communication fault will be shut down. Less units will be detected by the wired controller, which may display EA, and in the meanwhile, the indicator lamp of the wired controller will flash.
12	high-pressure protection of the system A and discharge temperature switch protection (protection code P0); high-pressure protection of the system B and discharge temperature switch protection (protection code P2); low-pressure protection of the system A (protection code P1); low-pressure protection of the system B (protection code P3); Constant speed compressor: connection of discharge temperature switch and high-pressure switch of the system in series.
13	Inlet water temperature sensor T62 (TBH2) (fault code EF)
14	Shell and tube low-temperature ant-freeze sensor T61 (TBH1) (fault code Eb)
15	Water flow detection (fault code of the main unit E0) is only valid for the main unit but invalid for subordinate units. 1) Main unit: if abnormal water flow occurs for the first and second time, the main unit board will display fault code E9. If abnormal water flow occurs the third time, the main unit board will display fault code E0 (off-power recovery is needed), and the wired controller will display fault code E0 (fault is displayed only after 3 detection). 2) Slave unit: (water flow detection will not be done).
16	Control port (reserved)
17	Electronic expansion valve of the system B
18	Electronic expansion valve of the system A Electronic expansion valve is used to control refrigerant flow under different operating modes and different loads.
19	Auxiliary electric heater Attention: the control port value of auxiliary electric heater actually detected is ON/OFF but not 220V control power supply, so special attention should be paid when installing the auxiliary electric heater. Attention! Under heating mode, when the main unit board detects total water outlet temperature to be lower than 45 C, the switch will be closed, and the auxiliary electric heater will begin to work; when the total water outlet temperature is higher than 50 C, the switch will be opened, and the auxiliary electric heater will stop working.
20	PUMP

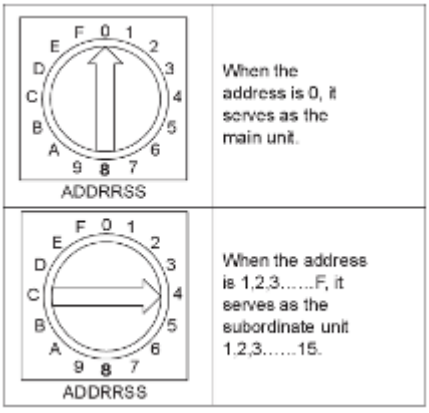
	Attention: the control port value of the pump actually detected is ON/OFF but not 220V control power supply, so special attention should be paid when installing the pump. 1) After receiving start-up instruction, the pump will be started up instantly, and will maintain start-up state always in the process of operation. 2) In case of refrigerating or heating shutdown, the pump will be shut down 2 minutes after all modules stop operating. 3) In case of shutdown under the pump mode, the pump can be directly shut down.
21	Compressor of the system B; Neutral line Four-way valve of the system B; Neutral line
22	LED display. 1) In case of stand-by, the address of the module is displayed; 2) In case of normal operation, 10. is displayed (10 is followed by dot). 3) In case of fault or protection, fault code or protection code is displayed.
23	Compressor of the system A; Neutral line Four-way valve of the system A; Neutral line
24	Outdoor fan A, controlled by T4.
25	Outdoor fan B, controlled by T4.
26	(reserved port)
27	Input of transformer, 220V AC current. (only valid for the main unit)
28	Input of three-phase four-wire power supply (fault code E1) Three phases A, B and C of power supply should exist simultaneously, and the difference of phase angle should be 120^{o} among them. If the conditions are not met, fault of phase sequence or phase lack may occur, and fault code will be displayed. When the power supply returns to normal condition, fault is removed. Attention: phase lace and phase dislocation of power supply are detected only in the early period after the power supply is connected, and they are not detected while the unit is in operation.
29	Output of transformer

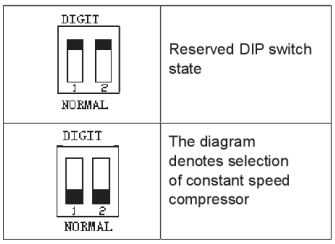
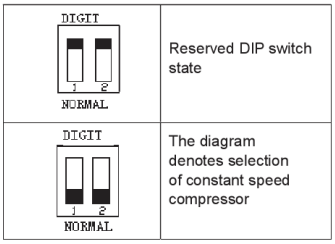
15.1.4 130 module PCB, outlook view

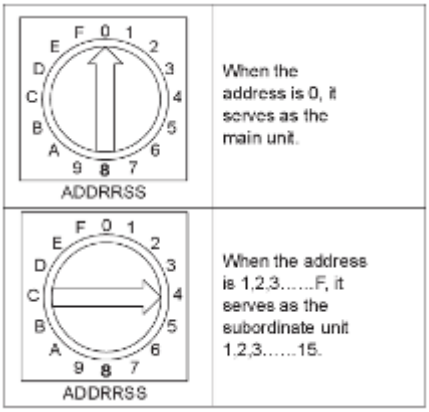


15.1.6 130 module components description

No.	Detail information
1	EEV B of No.1 unit
2	EEV A of No.1 unit
3	high-pressure protection and discharge temperature switch protection of the system A of No.1 unit (protection code P0); high-pressure protection and discharge temperature switch protection of the system B of No.1 unit (protection code P2); low-pressure protection of the system A of No.1 unit (protection code P1); low-pressure protection of the system B of No.1 unit (protection code P3); Constant speed compressor: connection of discharge temperature switch and high-pressure switch of the system in series.
4	Water flow detection of No.1 unit (fault code of the main unit E0) is only valid for the main unit but invalid for subordinate units. 1) Main unit: if abnormal water flow occurs for the first and second time, the main unit board will display fault code E9. If abnormal water flow occurs the third time, the main unit board will display fault code E0 (off-power recovery is needed), and the wired controller will display fault code E0 (fault is displayed only after 3 detection).
5	COM (O) 485 communication port of No.1 unit (fault code E2)
6	COM (I) 485 communication port of No.1 unit (fault code E2) COM (O) is interconnected with P, Q and E of COM (I), used for RS-485 communication. 1) If faults occur between the wired controller and the main unit module, all modules will be shut down. 2) If faults occur between the main unit and slave units, the slave unit module suffering communication fault will be shut down. Less units will be detected by the wired controller, which may display EA, and in the meanwhile, the indicator lamp of the wired controller will flash.
7	(reserved)
8	No.1 unit T41 :outdoor ambient temperature sensor(malfunction code E7) As long as one system has requirement to run outdoor fan,the unit controller sent the signal to restart outdoor fan.whether the system runs one fan or two fans is controlled by T41
9	No.1 unit T3-1B :pipe temperature sensor of condenser B (malfunction code E6,protection code P7)
10	● No.1 unit T3-1A :pipe temperature sensor of condenser A (malfunction code E5,protection code P6) 1)T3-1A,T3-1B when the electric control of the modular unit detects the temperature of the outdoor pipe T3-1A or T3-1B of the system exceeds the protective temperature 65 C, the corresponding system will be shut down. And it will be re-started up, after the temperature drops below the recovery temperature 60 C. Another system will be not affected. 2) T41,T3-1B,T3-1A when the temperature sensor is detected to suffer open circuit or short circuit, fault alarm will occur. ● When the main unit suffer fault of temperature sensor: the main unit and slave units will be shut down. ● When the slave unit suffer fault of temperature sensor: the unit will be shut down, but other slave units will not be affected.
11	No.1 unit Total outlet water temperature sensor (fault code E3) Only the main unit is valid, and the slave units are invalid. Under cooling mode and heating mode, conduct adjustment according to the magnitude of total outlet water temperature. Auto-load and auto-unload units of the modular.
12	No.1 unit low-temperature ant-freeze sensor TBH1-A
13	No.1 unit Inlet water temperature sensor TBH1-B
14	No.1 unit outlet water temperature sensor (fault code E4) Under cooling mode and heating mode, conduct adjustment according to the magnitude of unit outlet water temperature. Adjustment range of constant speed capability: ON and OFF.
15	No.2 unit electronic expansion valve of the system B
16	No.2 unit electronic expansion valve of the system B
17	high-pressure protection and discharge temperature switch protection of the system A of No.2 unit (protection code P0); high-pressure protection and discharge temperature switch protection of the system B of No.2 unit (protection code P2); low-pressure protection of the system A of No.2 unit (protection code P1); low-pressure protection of the system B of No.2 unit (protection code P3);

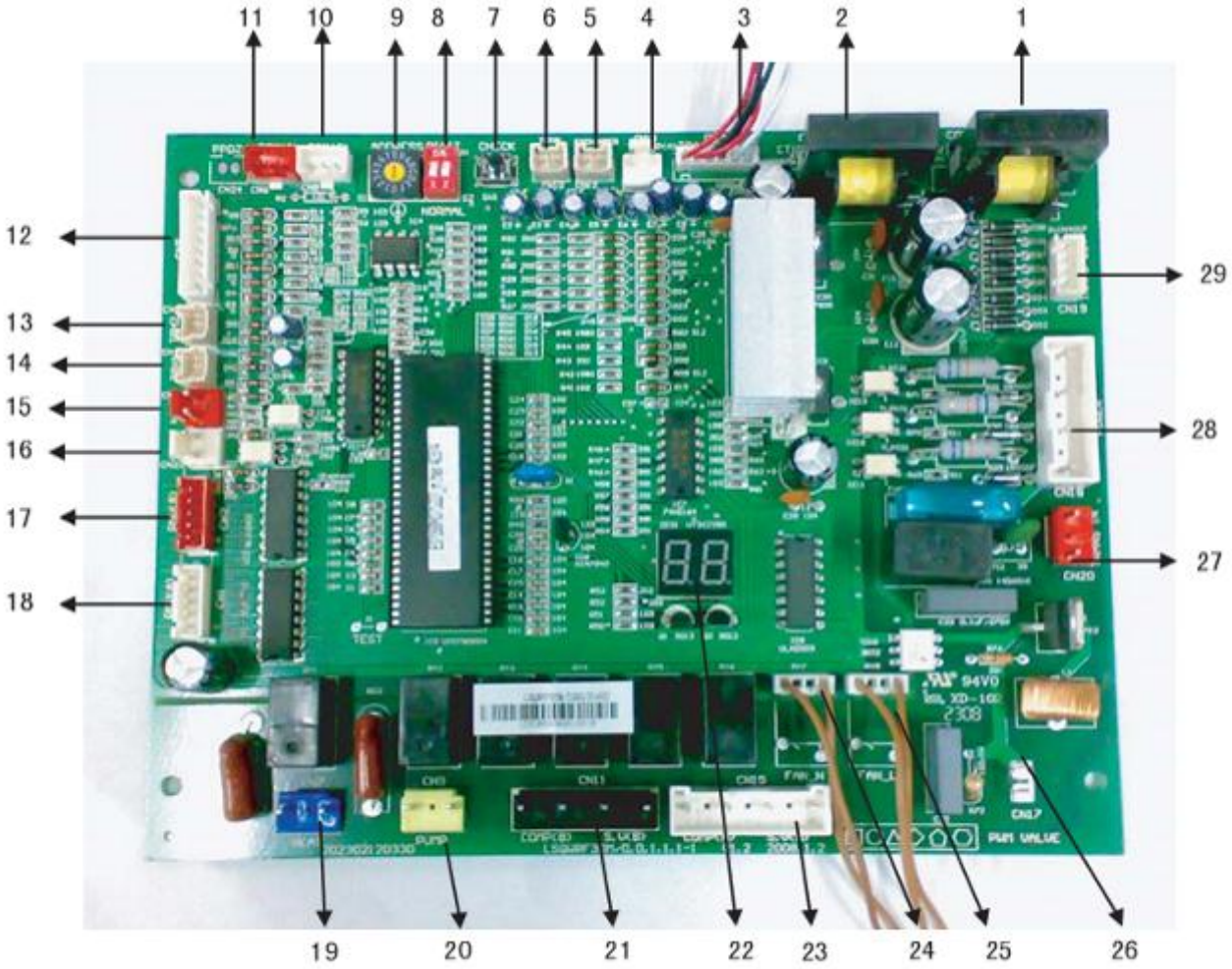
	Constant speed compressor: connection of discharge temperature switch and high-pressure switch of the system in series.
18	Water flow detection of No.2 unit (fault code of the main unit E0) is only valid for the main unit but invalid for subordinate units. 1) Main unit: if abnormal water flow occurs for the first and second time, the main unit board will display fault code E9. If abnormal water flow occurs the third time, the main unit board will display fault code E0 (off-power recovery is needed), and the wired controller will display fault code E0 (fault is displayed only after 3 detection).
19	No.2 unit Total outlet water temperature sensor (fault code E3) Only the main unit is valid, and the slave units are invalid. Under cooling mode and heating mode, conduct adjustment according to the magnitude of total outlet water temperature. Auto-load and auto-unload units of the modular.
20	No.2 unit T3-2A :pipe temperature sensor of condenser A (malfunction code E5,protection code P6)
21	● No.1 unit T3-2B :pipe temperature sensor of condenser B (malfunction code E6,protection code P7) 1)T3-2A,T3-2B when the electric control of the modular unit detects the temperature of the outdoor pipe T3-2A or T3-2B of the system exceeds the protective temperature 65 C, the corresponding system will be shut down. And it will be re-started up, after the temperature drops below the recovery temperature 60 C. Another system will be not affected. 2) T42,T3-2B,T3-2A when the temperature sensor is detected to suffer open circuit or short circuit, fault alarm will occur. ● When the main unit suffer fault of temperature sensor: the main unit and slave units will be shut down. ● When the slave unit suffer fault of temperature sensor: the unit will be shut down, but other slave units will not be affected.
22	No.2 unit T42 :outdoor ambient temperature sensor(malfunction code E7) As long as one system has requirement to run outdoor fan,the unit controller sent the signal to restart outdoor fan.whether the system runs one fan or two fans is controlled by T42
23	(reserved)
24	No.2 unit low-temperature ant-freeze sensor TBH2-A
25	No.2 unit Inlet water temperature sensor TBH2-B
26	No.2 unit outlet water temperature sensor (fault code E4) Under cooling mode and heating mode, conduct adjustment according to the magnitude of unit outlet water temperature. Adjustment range of constant speed capability: ON and OFF.
27	Detection of current of the compressor B of No.2 unit (protection code P5)
28	Detection of current of the compressor A of No.2 unit (protection code P4)
29	Detection of current of the compressor B of No.1 unit (protection code P5)
30	Detection of current of the compressor A of No.1 unit (protection code P4)
31	No.1Transformer output
32	No.2 unit ADDRESS2 address code  Each modular part of modular unit has the same electric control function, and the main unit and slave units can be set through address code on the electric control board. The address code 0 # is provided as the main unit. The priority of being the main unit is given to the unit with digital compressor, and other addresses are slave units. Only the unit is chosen as the main unit, its electric control can activate such functions as direct communication with the wired controller, refrigerating and heating

	capability adjustment, pump control, auxiliary electric heater control, total effluent temperature detection and water flow switch detection.
33	No.2Transformer output
34	(reserved)
35	No.2 unit selection code of the compressor 
36	No.1 unit selection code of the digital compressor 
37	1) No.2 unit auxiliary electric heater(only the main unit is valid) Attention: the control port value of auxiliary electric heater actually detected is ON/OFF but not 220-230V control power supply, so special attention should be paid when installing the auxiliary electric heater. Attention! 2)Under heating mode, when the main unit board detects total water outlet temperature to be lower than 45 C, the switch will be closed, and the auxiliary electric heater will begin to work; when the total water outlet temperature is higher than 50 C, the switch will be opened, and the auxiliary electric heater will stop working.
38	No.2 unit pump (only the main unit is valid) Attention: the control port value of the pump actually detected is ON/OFF but not 220-230V control power supply, so special attention should be paid when installing the pump. 1) After receiving start-up instruction, the pump will be started up instantly, and will maintain start-up state always in the process of operation. 2) In case of refrigerating or heating shutdown, the pump will be shut down after 2 minutes after all modules stop operating. 3) In case of shutdown under the pump mode, the pump can be directly shut down.
39	Compressor of the system B of No.2 unit; Neutral line Four-way valve of the system B of No.2 unit; Neutral line
40	No.2 unit outdoor fan B, controlled by T42
41	Compressor of the system A of No.2 unit; Neutral line Four-way valve of the system A of No.2 unit; Neutral line
42	No.2 unit outdoor fan A, controlled by T42
43	No.1 unit ADDRESS1 address code

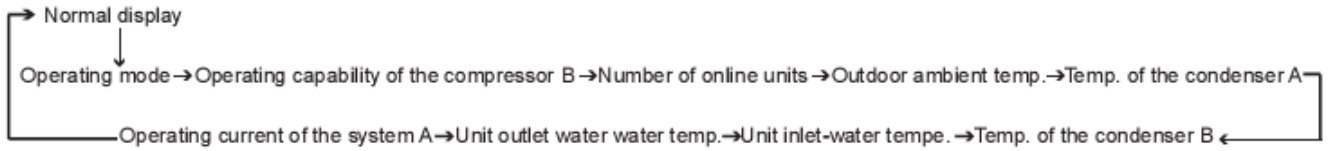
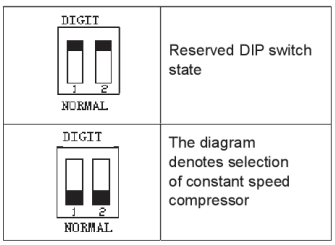
	 Each modular part of modular unit has the same electric control function, and the main unit and slave units can be set through address code on the electric control board. The address code 0 # is provided as the main unit. The priority of being the main unit is given to the unit with digital compressor, and other addresses are slave units. Only the unit is chosen as the main unit, its electric control can activate such functions as direct communication with the wired controller, refrigerating and heating capability adjustment, pump control, auxiliary electric heater control, total effluent temperature detection and water flow switch detection.
44	Input of three-phase four-wire power supply (fault code E1) Three phases A, B and C of power supply should exist simultaneously, and the difference of phase angle should be 120^{o} among them. If the conditions are not met, fault of phase sequence or phase lack may occur, and fault code will be displayed. When the power supply returns to normal condition, fault is removed. Attention: phase lace and phase dislocation of power supply are detected only in the early period after the power supply is connected, and they are not detected while the unit is in operation.
45	No.1Transformer output,220-230V AC
46	No.2Transformer output,220-230V AC
47	Compressor of the system B of No.1 unit; Neutral line Four-way valve of the system B of No.1 unit; Neutral line
48	No.1 unit outdoor fan B, controlled by T41
49	Compressor of the system A of No.1 unit; Neutral line Four-way valve of the system A of No.1 unit; Neutral line
50	No.1 unit outdoor fan A, controlled by T41
51	1) No.1 unit auxiliary electric heater(only the main unit is valid) Attention: the control port value of auxiliary electric heater actually detected is ON/OFF but not 220-230V control power supply, so special attention should be paid when installing the auxiliary electric heater. Attention! 2)Under heating mode, when the main unit board detects total water outlet temperature to be lower than 45 C, the switch will be closed, and the auxiliary electric heater will begin to work; when the total water outlet temperature is higher than 50 C, the switch will be opened, and the auxiliary electric heater will stop working.
52	No.1 unit pump (only the main unit is valid) Attention: the control port value of the pump actually detected is ON/OFF but not 220-230V control power supply, so special attention should be paid when installing the pump. 1) After receiving start-up instruction, the pump will be started up instantly, and will maintain start-up state always in the process of operation. 2) In case of refrigerating or heating shutdown, the pump will be shut down after 2 minutes after all modules stop operating.

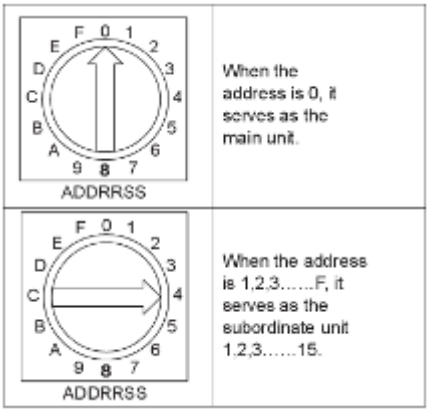
	3) In case of shutdown under the pump mode, the pump can be directly shut down.
53	(reserved)
54	(reserved)

15.1.7 200 module PCB, outlook view



15.1.8 200 module components description

No.	Detail information
1	Detection of current of the compressor B (protection code P5)
2	Detection of current of the compressor A (protection code P4) Current is not detected within the initial 5 seconds after the compressor is started up. When the current of the compressor is detected to exceed protective value set (33A for constant speed compressor), it will be shut down and re-started after 3 min.
3	T4: outdoor ambient temperature sensor (fault code E7) T3B: pipe temperature sensor of the condenser B (fault code E6 and protection code P7) T3A: pipe temperature sensor of the condenser A (fault code E5 and protection code P6) 1) T4: if there is one system that requires starting outdoor fans, the fans are started through electric control of the unit. Start outdoor fan A only, start A and B gears, and control the unit through T4. 2) T3B and T3A: when the electric control of the modular unit detects the temperature of the outdoor pipe T3A or T3B of the system exceeds the protective temperature 65 C, the corresponding system will be shut down. And it will be re-started up, after the temperature drops below the recovery temperature 60 C. Another system will be not affected. 3) T4, T3B and T3A: when the temperature sensor is detected to suffer open circuit or short circuit, fault alarm will occur. ● When the main unit suffer fault of temperature sensor: the main unit and slave units will be shut down. ● When the slave unit suffer fault of temperature sensor: the unit will be shut down, but other slave units will not be affected.
4	(reserved)
5	Unit outlet water temperature sensor (fault code E4) Under cooling mode and heating mode, conduct adjustment according to the magnitude of unit outlet water temperature. Adjustment range of constant speed capability: ON and OFF.
6	Total outlet water temperature sensor (fault code E3) Only the main unit is valid, and the slave units are invalid. Under cooling mode and heating mode, conduct adjustment according to the magnitude of total outlet water temperature. Adjustment range: shut-down, 40%, 60%, 80% and 100%.
7	Spot check. The operating status of outdoor system can be observed through spot check, and specific display contents are as shown in the following figure:  ● Display contents of “operating mode”: 1. cooling; 2. heating; 4. pump; 8. Stand-by ● Display contents of “number of online units”: the main unit can display the number of online units, and the slave unit displays 0.
8	Selection code of the compressor 

9	 Each modular part of modular unit has the same electric control function, and the main unit and slave units can be set through address code on the electric control board. The address code 0 # is provided as the main unit. The priority of being the main unit is given to the unit with digital compressor, and other addresses are slave units. Only the unit is chosen as the main unit, its electric control can activate such functions as direct communication with the wired controller, refrigerating and heating capability adjustment, pump control, auxiliary electric heater control, total effluent temperature detection and water flow switch detection.
10	COM (O) 485 communication port (fault code E2)
11	COM (I) 485 communication port (fault code E2) COM (O) is interconnected with P, Q and E of COM (I), used for RS-485 communication. 1) If faults occur between the wired controller and the main unit module, all modules will be shut down. 2) If faults occur between the main unit and slave units, the slave unit module suffering communication fault will be shut down. Less units will be detected by the wired controller, which may display EA, and in the meanwhile, the indicator lamp of the wired controller will flash.
12	high-pressure protection of the system A and discharge temperature switch protection (protection code P0); high-pressure protection of the system B and discharge temperature switch protection (protection code P2); low-pressure protection of the system A (protection code P1); low-pressure protection of the system B (protection code P3); Constant speed compressor: connection of discharge temperature switch and high-pressure switch of the system in series.
13	Inlet water temperature sensor T62 (TBH2) (fault code EF)
14	Shell and tube low-temperature ant-freeze sensor T61 (TBH1) (fault code Eb)
15	Water flow detection (fault code of the main unit E0) is only valid for the main unit but invalid for subordinate units. 1) Main unit: if abnormal water flow occurs for the first and second time, the main unit board will display fault code E9. If abnormal water flow occurs the third time, the main unit board will display fault code E0 (off-power recovery is needed), and the wired controller will display fault code E0 (fault is displayed only after 3 detection). 2) Slave unit: (water flow detection will not be done).
16	Control port (reserved)
17	Electronic expansion valve of the system B
18	Electronic expansion valve of the system A Electronic expansion valve is used to control refrigerant flow under different operating modes and different loads.
19	Auxiliary electric heater Attention: the control port value of auxiliary electric heater actually detected is ON/OFF but not 220V control power supply, so special attention should be paid when installing the auxiliary electric heater. Attention! Under heating mode, when the main unit board detects total water outlet temperature to be lower than 45 C, the switch will be closed, and the auxiliary electric heater will begin to work; when the total water outlet temperature is higher than 50 C, the switch will be opened, and the auxiliary electric heater will stop working.
20	PUMP

	Attention: the control port value of the pump actually detected is ON/OFF but not 220V control power supply, so special attention should be paid when installing the pump. 1) After receiving start-up instruction, the pump will be started up instantly, and will maintain start-up state always in the process of operation. 2) In case of refrigerating or heating shutdown, the pump will be shut down 2 minutes after all modules stop operating. 3) In case of shutdown under the pump mode, the pump can be directly shut down.
21	Compressor of the system B; Neutral line Four-way valve of the system B; Neutral line
22	LED display. 1) In case of stand-by, the address of the module is displayed; 2) In case of normal operation, 10. is displayed (10 is followed by dot). 3) In case of fault or protection, fault code or protection code is displayed.
23	Compressor of the system A; Neutral line Four-way valve of the system A; Neutral line
24	Outdoor fan A, controlled by T4.
25	Outdoor fan B, controlled by T4.
26	(reserved port)
27	Input of transformer, 220V AC current. (only valid for the main unit)
28	Input of three-phase four-wire power supply (fault code E1) Three phases A, B and C of power supply should exist simultaneously, and the difference of phase angle should be 120^{o} among them. If the conditions are not met, fault of phase sequence or phase lack may occur, and fault code will be displayed. When the power supply returns to normal condition, fault is removed. Attention: phase lace and phase dislocation of power supply are detected only in the early period after the power supply is connected, and they are not detected while the unit is in operation.
29	Output of transformer

CAUTION

1. Faults

When the main unit suffers faults, the main unit stops operating, and all other units also stop running;

When the slave unit suffers faults, only the unit stops operating, and other units are not affected.

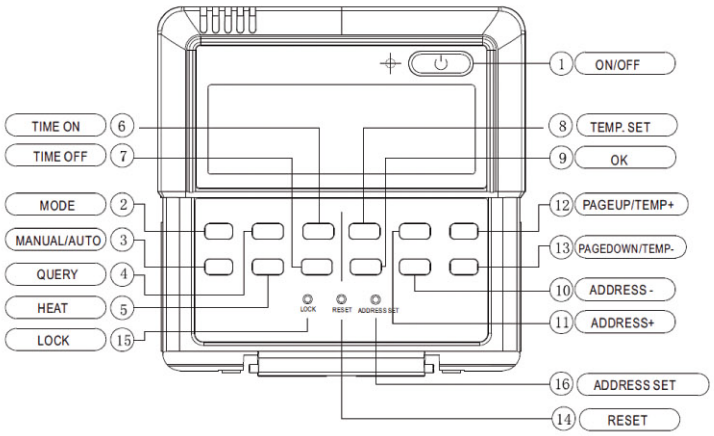
2. Protection

When the main unit is under protection, only the unit stops operating, and other units keep running;

When the slave unit is under protection, only the unit stops operating, and other units are not affected.

15.2 Wired Controller:

KJR-08B/BE:



Notice：Wired controller is not standard accessory，It needs to order from factory.

Name of keys on the wired controller and the keypad operation description:

1. ON/OFF button:

In the power off status, press this key and the startup indicator comes on, and the wire controller enters the startup status and keeps the current set information such as temperature value, timing. In the startup status, press this button once, and the startup indicator goes off and transmits the shutdown information.

2. Operation mode button:

In the power off status, press this button to select the operation mode. This function is invalid at power on status.

Modes shifted sequence as follows:

3. MANUAL/AUTO button

Press this button; you could select [MANUAL/AUTO] these 2 modes. When select Manual mode, you could increase or decrease the online units via [PAGEUP/TEMP+] and [PAGEDOWN/TEMP-].

4. QUERY button

Press this button to query the status information of outdoor units 0~15(Outdoor unit 0 by default). After entering the query status, use [ADDRESS+] and [ADDRESS-] keys to query information of the previous or next outdoor unit. After selecting to query a specific outdoor unit, use the [PAGEDOWN/TEMP+] and [PAGEDOWN/TEMP-] keys to query the status information of this outdoor unit. The query sequence is: Outlet water temperature T1->Outdoor pipe temperature T3->Outdoor environment temperature T4->Setting temperature Ts->Current of compressor A and Current of compressor B -> Fault->Protection->Outlet water temperature T1.since there are many fault protection codes for the outdoor unit, the wire controller only displays the two fault protection messages with the highest priority when you check the fault protection information.

5. Heat button

This button has no effect to KJR-08B/BE.

6 & 7 TIME ON/OFF button

Every time when you press [TIME ON] button, the HOUR and MINUTE of timing startup blink at a frequency of 2Hz. They stop blinking when you adjust the hour and minute; and continue blinking 2 seconds after you stop adjustment. Press [TIME ON] key to select the timing HOUR for adjusting, and the timing hour blinks at frequency of 2Hz. Use the [PAGEUP/TEMP+] and [PAGEDOWN/TEMP-] keys to adjust the MINUTE. If you keep idle without adjustment operation within 8 seconds after entering the timing setup status, the system will confirm the time setup and exit the timing setup status. Press [TIME OFF] key, as per the above method to set close time.

Long press [TIME ON] button, you could cancel this function. Long press [TIME OFF] button, you could cancel this function.

8. TEMP SET button

Setup the total water outlet temperature in cooling and heating mode. Setup tank or pool temperature in water heating mode.

9. OK button

Once finished upon, press OK key, wire controller will delivery order to main unit.

10. ADDRESS+ button

Press this button at Check mode; when select the next modular, the operation status of the next modular will display; if the current modular is 15# and the next one is 0#.

Press this button for add address at wire address setting mode. If the wire controller address is 15, press this key will display the next address is 0.

11. ADDRESS- button

Press this button at query mode; when select the previous modular, the operation status of the previous modular will display; if the current modular is 0# and the previous one is 15#.

Press this button for minus address at wire address setting mode. If the wire controller address is 0, press this key will display the next address is 15.

12 & 13 PAGEUP/DOWN (TEMP+/-) button

In manual mode, press these keys could add or minus the unit quantity.

In the main page, press these keys could check the operation parameter of the unit.

In temperature setting page, add or minus the temperature setting.

In timing ON/OFF setting, press these keys to adjust the time of startup or closedown.

14. RESET button (Hidden)

Use a 1mm-diameter round stick to press this button, and the current setting will be cancelled and the wire controller enters the reset status.

15. LOCK button (Hidden)

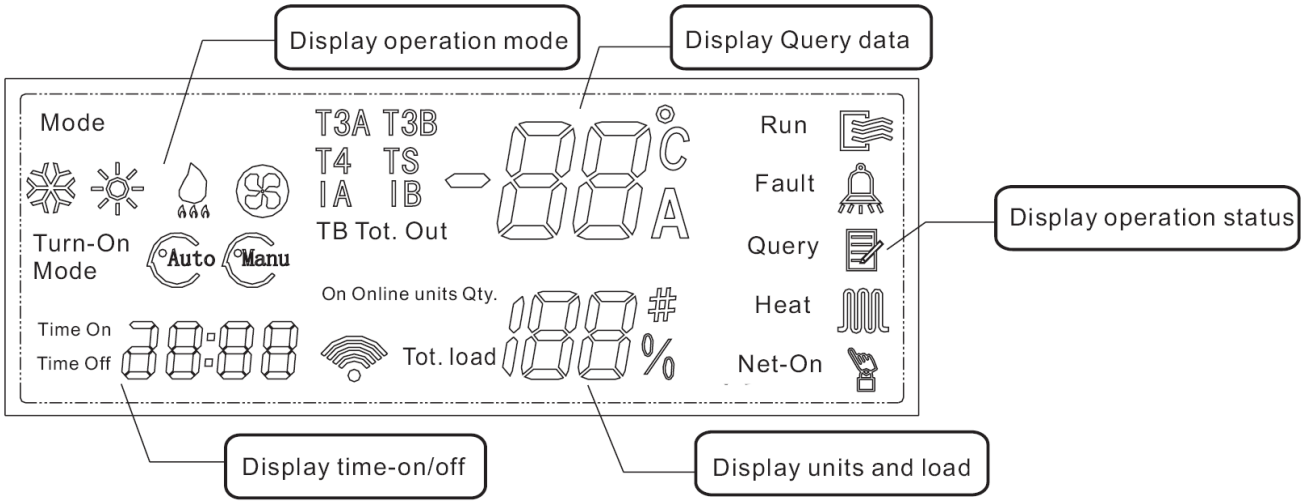
Use a 1mm-diameter round bar to lock the current setting. Press this button again to unlock.

16. ADDRESS SET button (Hidden)

The address of wire controller is set by press this button. The address range 0~15, therefore, 16 wire controller could be parallel at most.

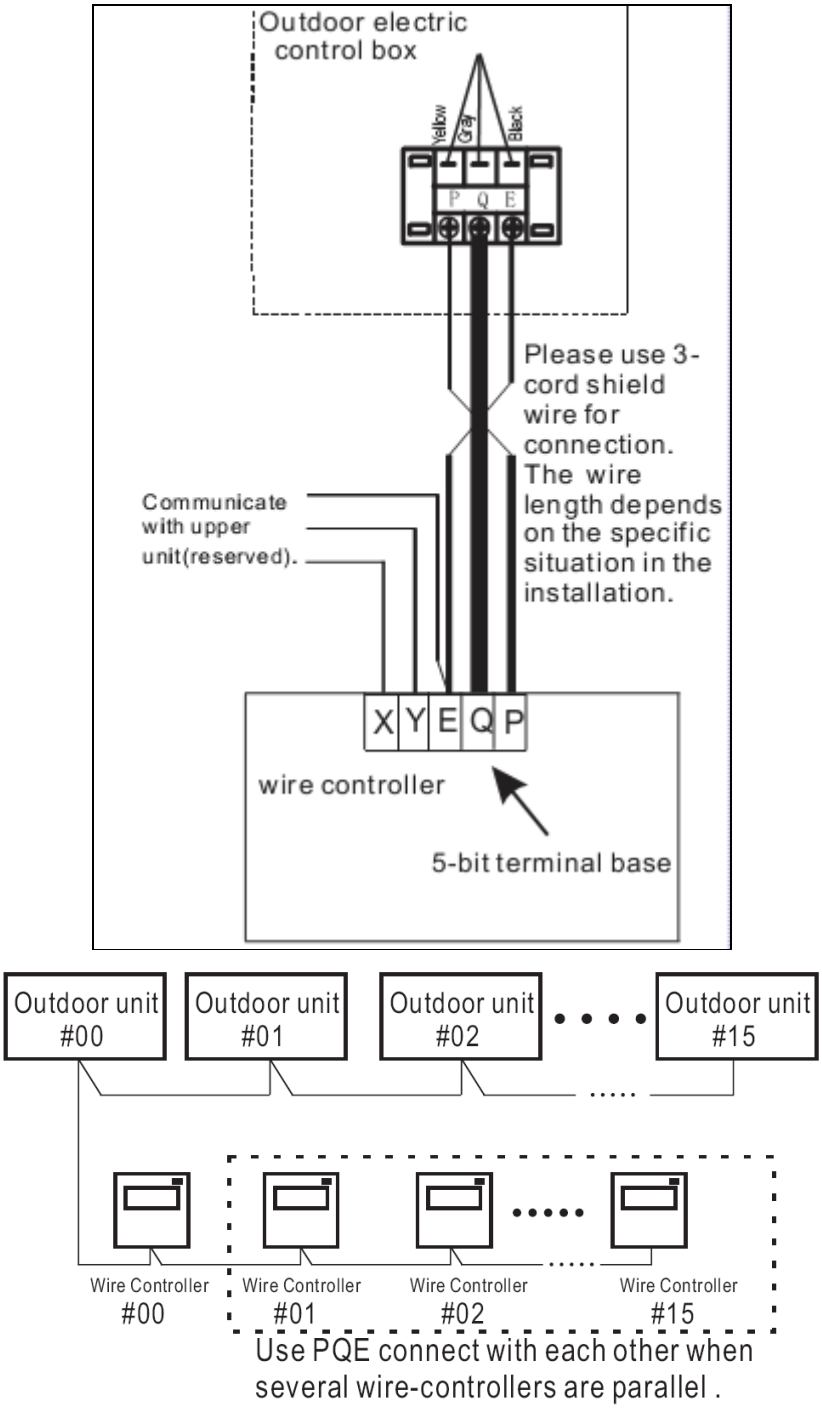
When there is only one wire controller, it is no necessary to execute this setting, because the address of wire controller has been set to '0'(main wire controller) in the factory.

Name and function description of LCD screen of wired controller:



Installation procedure:

The wiring procedure and principles are shown in the figure:



Note: Please connect the attached shorted wires to the corresponding communication port COM(I) or COM(O) in the main control board of the last parallel unit (dial code). Directly connect to the last parallel unit if only one unit is connected.

Operation procedure of wired controller:

1. Press AUTO/MANUAL mode at shutdown status, you could select MANUAL or AUTO turn-on mode as you want. The function is invalid at startup status.

   In Manual mode, press [PAGEUP/TEMP+] or [PAGEDOWN/TEMP-] button for select your require online unit quantity.

2. Press [TEMP SET], [PAGEUP/TEMP +], [PAGEDOWN/TEMP -] button, for select your require temperature.

   For KJR-08B/BE: Cooling range: 5~17℃ ;Heating range :45~50℃ .

3. Press [ON/OFF] button, running indicator of wire controller is light, unit is start to run, and display running status at wire controller. Press this button once again, unit will stop running.

- Operation procedure of Time ON

1. Press [TIME ON] button adjust your require time by [PAGEUP/TEMP+] or [PAGEDOWN/TEMP-] (MINUTE and HOUR could be shifted by this button). Use the same method to set Time off.

   (Note: Time ON/OFF is relative time.)

- Operation procedure of disable the function of Time ON/OFF.

1. Long press [TIME ON] button, you could cancel this function. Long press [TIME OFF] button, you could cancel this function.

- Operation procedure of units information querying

1. Press [QUERY] entering Check status.
2. Press [ADDRESS+] or [ADDRESS-] button, select the unit you are wanted to query.
3. Press [PAGEUP/TEMP+)] or [PAGEDOWN/TEMP-] button to query the units information, which includes outdoor ambient temperature T4, pipe temperature T3, setting temperature Ts, CEB out water temp. TB, online quantity and compressor current, etc.

- Operation procedure of system information querying

1. Press [PAGEUP/TEMP+] or [PAGEDOWN/TEMP-] button in the main page, system information could be queried.

- Operation procedure of water temperature setting

1. Press [TEMP SET] button of wire controller when background light is on.
2. Press [PAGEUP/TEMP+] or [PAGEDOWN/TEMP-] button select your require water temperature. Once selected upon, temperature value will blinks a couple of seconds then confirm it.
3. KJR-08B/BE temperature range:

   Cooling: 5~17℃

   Heating: 45~50℃

- Fault alarm handing

When unit fails or the wire controller detects failure of communication with the outdoor units, the indicator blinks. After all faults of the system and the wire controller are eliminated, the indicator stops blinking. The fault indicator and the operation indicator share the same LCD.

Appendix

1.Temperature-Resistance characteristic sheet for pipe temperature sensor，ambient temperature sensor，inlet water temperature sensor and outlet water temperature sensor.

Sensor characteristic sheet **Unit：** Temp:℃--K, Ratio:KΩ

Temp.	Ratio	Temp.	Ratio	Temp.	Ratio	Temp.	Ratio
-20	115.266	20	12.6431	60	2.35774	100	0.62973
-19	108.146	21	12.0561	61	2.27249	101	0.61148
-18	101.517	22	11.5	62	2.19073	102	0.59386
-17	96.3423	23	10.9731	63	2.11241	103	0.57683
-16	89.5865	24	10.4736	64	2.03732	104	0.56038
-15	84.219	25	10	65	1.96532	105	0.54448
-14	79.311	26	9.55074	66	1.89627	106	0.52912
-13	74.536	27	9.12445	67	1.83003	107	0.51426
-12	70.1698	28	8.71983	68	1.76647	108	0.49989
-11	66.0898	29	8.33566	69	1.70547	109	0.486
-10	62.2756	30	7.97078	70	1.64691	110	0.47256
-9	58.7079	31	7.62411	71	1.59068	111	0.45957
-8	56.3694	32	7.29464	72	1.53668	112	0.44699
-7	52.2438	33	6.98142	73	1.48481	113	0.43482
-6	49.3161	34	6.68355	74	1.43498	114	0.42304
-5	46.5725	35	6.40021	75	1.38703	115	0.41164
-4	44	36	6.13059	76	1.34105	116	0.4006
-3	41.5878	37	5.87359	77	1.29078	117	0.38991
-2	39.8239	38	5.62961	78	1.25423	118	0.37956
-1	37.1988	39	5.39689	79	1.2133	119	0.36954
0	35.2024	40	5.17519	80	1.17393	120	0.35982
1	33.3269	41	4.96392	81	1.13604	121	0.35042
2	31.5635	42	4.76253	82	1.09958	122	0.3413
3	29.9058	43	4.5705	83	1.06448	123	0.33246
4	28.3459	44	4.38736	84	1.03069	124	0.3239
5	26.8778	45	4.21263	85	0.99815	125	0.31559
6	25.4954	46	4.04589	86	0.96681	126	0.30754
7	24.1932	47	3.88673	87	0.93662	127	0.29974
8	22.5662	48	3.73476	88	0.90753	128	0.29216
9	21.8094	49	3.58962	89	0.8795	129	0.28482
10	20.7184	50	3.45097	90	0.85248	130	0.2777
11	19.6891	51	3.31847	91	0.82643	131	0.27078
12	18.7177	52	3.19183	92	0.80132	132	0.26408
13	17.8005	53	3.07075	93	0.77709	133	0.25757
14	16.9341	54	2.95896	94	0.75373	134	0.25125
15	16.1156	55	2.84421	95	0.73119	135	0.24512
16	15.3418	56	2.73823	96	0.70944	136	0.23916
17	14.6181	57	2.63682	97	0.68844	137	0.23338
18	13.918	58	2.53973	98	0.66818	138	0.22776
19	13.2631	59	2.44677	99	0.64862	139	0.22231

2.Temperature-Resistance characteristic sheet for discharge temperature sensor of digital compressor.

Sensor characteristic sheet **Unit:** temp:℃--K, Ratio:KΩ

Temp.	Ratio	Temp.	Ratio	Temp.	Ratio	Temp.	Ratio	Temp.	Ratio
-40	2889.60000	13	148.39300	66	17.29460	119	3.45032	172	0.97524
-39	2704.61400	14	141.59040	67	16.70980	120	3.35400	173	0.95632
-38	2532.87200	15	135.14040	68	16.13360	121	3.26198	174	0.93826
-37	2373.34200	16	129.00000	69	15.59180	122	3.17340	175	0.92020
-36	2225.07800	17	123.17780	70	15.06720	123	3.08740	176	0.90214
-35	2087.22000	18	117.65660	71	14.55980	124	3.00484	177	0.88494
-34	1957.44600	19	112.41060	72	14.07820	125	2.92400	178	0.86774
-33	1836.70200	20	107.43980	73	13.60520	126	2.85090	179	0.85054
-32	1724.38600	21	102.70120	74	13.15800	127	2.78038	180	0.83420
-31	1619.72400	22	98.19480	75	12.72800	128	2.71158	181	0.81614
-30	1522.20000	23	93.92060	76	12.30660	129	2.64450	182	0.79808
-29	1430.54120	24	89.86140	77	11.91100	130	2.58000	183	0.78088
-28	1345.07440	25	86.00000	78	11.52400	131	2.51636	184	0.76454
-27	1265.35240	26	82.31060	79	11.15420	132	2.45444	185	0.74820
-26	1190.94520	27	78.81040	80	10.79300	133	2.39424	186	0.73358
-25	1121.45720	28	75.47360	81	10.44900	134	2.33576	187	0.71982
-24	1056.14020	29	72.30020	82	10.12220	135	2.27900	188	0.70606
-23	995.10600	30	69.28160	83	9.80400	136	2.22396	189	0.69230
-22	938.04500	31	66.39200	84	9.49440	137	2.17150	190	0.67940
-21	884.66480	32	63.64860	85	9.20200	138	2.11990		
-20	834.71600	33	61.02560	86	8.91820	139	2.07002		
-19	787.65680	34	58.53160	87	8.64300	140	2.02100		
-18	743.58180	35	56.15800	88	8.37640	141	1.97370		
-17	702.29320	36	53.88760	89	8.11840	142	1.92812		
-16	663.59320	37	51.72040	90	7.86900	143	1.88340		
-15	627.28400	38	49.65640	91	7.64110	144	1.83954		
-14	593.03020	39	47.69560	92	7.40460	145	1.79740		
-13	560.88340	40	45.81220	93	7.18530	146	1.75354		
-12	530.71460	41	44.00620	94	6.97288	147	1.71140		
-11	502.36900	42	42.29480	95	6.76820	148	1.67012		
-10	475.74340	43	40.65220	96	6.57126	149	1.62970		
-9	450.57120	44	39.07840	97	6.38120	150	1.59100		
-8	426.90400	45	37.58200	98	6.19716	151	1.54886		
-7	404.64720	46	36.14580	99	6.02000	152	1.50844		
-6	383.70620	47	34.76120	100	5.84800	153	1.46888		
-5	363.98640	48	33.44540	101	5.68632	154	1.43018		
-4	345.31580	49	32.18980	102	5.52980	155	1.39320		
-3	327.73740	50	30.98580	103	5.37930	156	1.36224		
-2	311.16520	51	29.83340	104	5.23310	157	1.33214		
-1	295.55620	52	28.72400	105	5.09120	158	1.30290		
0	280.82440	53	27.66620	106	4.95360	159	1.27452		
1	266.85800	54	26.65140	107	4.82030	160	1.24700		
2	253.68280	55	25.67960	108	4.69216	161	1.21948		
3	241.24720	56	24.75080	109	4.56660	162	1.19368		
4	229.49960	57	23.85640	110	4.44620	163	1.16788		
5	218.40560	58	23.00500	111	4.32322	164	1.14208		
6	207.87060	59	22.17940	112	4.20454	165	1.11800		
7	197.91180	60	21.39680	113	4.08930	166	1.09650		
8	188.49480	61	20.64000	114	3.97750	167	1.07500		
9	179.59380	62	19.90900	115	3.87000	168	1.05436		
10	171.16580	63	19.22100	116	3.75992	169	1.03458		
11	163.15920	64	18.55020	117	3.65328	170	1.01480		
12	155.57400	65	17.91380	118	3.55008	171	0.99502		

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