Technical Manual

ACSON International
Air Conditioners

AIR COOLED MODULAR CHILLER

A5MAC 210D
A5MAC 230D
A5MAC 340D
A5MAC 450D

Literature No.: TM-A5MAC-D-201701
Supersedes: -

Contents

Note: Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and experienced with this type of equipment.

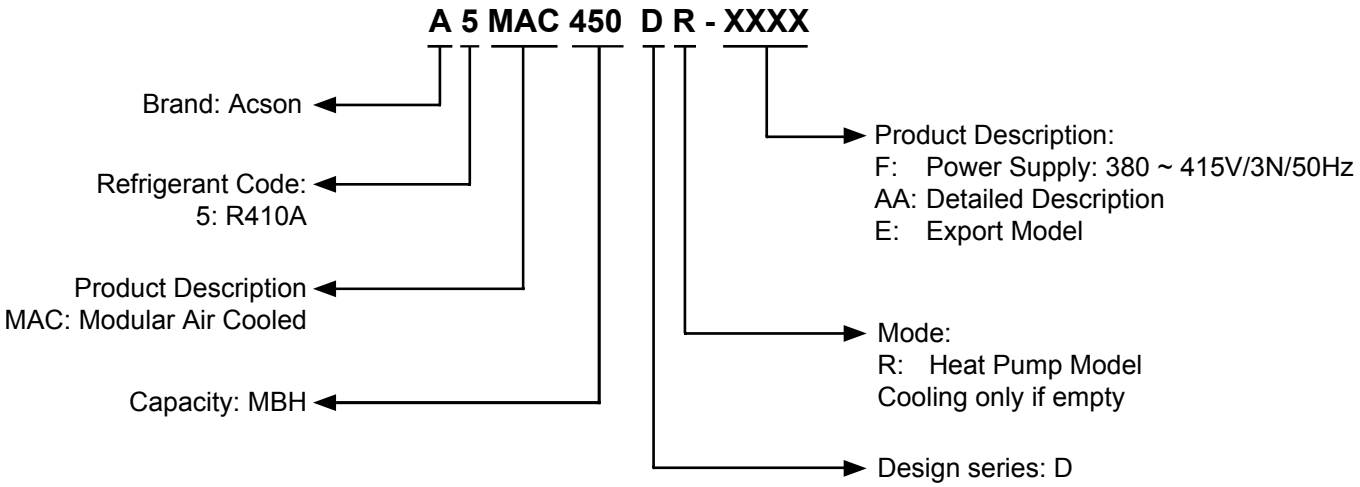
Caution: Sharp edges and coil surfaces are a potential injury hazard. Avoid contact with them.

Warning: Moving machinery and electrical power hazard may cause severe personal injury or death. Disconnect and lock off power before servicing equipment.

Model Series

	Model Name	Max Combination Qty	Capacity Range
Cooling only	A5MAC210D	16	Cooling Capacity: 60kW - 960kW Cooling Capacity: 205MBH - 3280MBH
	A5MAC230D	16	Cooling Capacity: 65kW - 1040kW Cooling Capacity: 222MBH - 3,552MBH
	A5MAC450D	16	Cooling Capacity: 135kW - 2160kW Cooling Capacity: 461MBH - 7378MBH
Heat Pump	A5MAC340DR	16	Cooling Capacity: 100kW - 1600kW Cooling Capacity: 340MBH - 5440MBH

Nomenclature



Overview

ACSON A5MAC-D series is a new generation of air-cooled chillers/heat pumps. They ideally combine the advanced and mature chiller technology. In addition, this series features outstanding performance, high capacity, low sound level easy installation, and flexible system management. Leading the global market

Features

Refrigerant

ACSON is committed to protecting the global ecosystem and has developed air-cooled chiller/heat pump with R410A, a new type of refrigerant. Without chlorine, the R410A causes no harm to the ozonosphere (ODP=0).

Low Sound Level

Thanks to the newly designed spiral blades, the outdoor units feature smooth air flow, significantly reducing the turbulence and lowering the air flow sound level. Unique compressor sound-insulation design and fully hermetic volute compressor minimizes the operation noise. Moreover, unique Night Mode brings down nightly noise greatly and ensures you a sound sleep.

Easy Installation

A5MAC-D series is designed to best facilitate user installation. The refrigerant system is made hermetic in the factory. Customers do not need to connect any copper pipe or refill refrigerant or invest more money for complex water systems.

Multi-grade Modulation

A5MAC-D series features multi-grade modulation which can be transformed to multi-grade modulations in modular combinations. With operation grades controlled electronically, the unit exerts less shock to the power grid and saves more energy.

Flexible module combination

1~16 sets with different capacity can be combined to satisfy the load selection requirements of various applications. When combined with different models,every model can be used as the master unit; the modular design of the unit allows the owner not to have to invest in the equipment at one time. The owner can increase the investment at any time with the development. The number of modular and the corresponding equipment greatly save the initial investment.

Compact Size

Moreover, A5MAC-D series features compact size. Its dimensions and weight are significantly reduced.
A5MAC-D series can be lifted without large lifting tools and located on the roof, balcony or any possible outdoor space.

Reliable Operation

A5MAC-D series have modulating capabilities and controlled starting. The unit also undergo strict QA tests to ensure reliable operation even under extreme condition. There are also multiple sensors and unique algorithm to further enhance the system reliability.

High static pressure fan (50Pa optional, for A5MAC340/450D)

It can meet the exhaust demand of the outdoor unit which shall be connected to the exhaust duct. By doing so, it will minimize chances of air flow short circuited and performance of the unit become more reliable.

Outstanding Performance

A5MAC-D series features leading-edge scroll technology and branded accessories which go through our stringent reliability and compatibility test. Equipped with efficient scroll compressors and precise electronic expansion valves. These units feature high EER and COP, especially at partial loading.

Intelligent Control System

A5MAC-D features user-friendly intelligent control system. Microchip and large-scaled LCD display are used to make the control easy.

- Group control: One single controller can control a group made up by one master unit and maximum 15 slave units.
- BMS: A5MAC-D is standard with Modbus protocol and ports for BMS, can support maximum 100 groups modular units, one group can support one master unit and maximum 15 slave units (optional).

Basic Operating Mode

- Cooling
- Heating

Parameter Setting

- Real time setting
- Weekly timing on/off (two on/off per day)
- Chilled water inlet temperature
- Hot water inlet temperature
- Anti-freezing/defrost temperature setting
- Defrost point A/B temperature setting

Parameter Display

- Running status display
- Setted inlet temperature
- Actual inlet temperature
- Timing point
- Anti-freezing/defrost temperature

Fault Alarm And Protection

- 13 protections and fault alam functions
- Indoor controller lock

Defrost Mode

- Auto defrost
- Mannual defrost

Memory Function

- Backup battery for realtime clock
- Customized parameters preservation after power failure

Other Functions

- Error log inquiry
- Average compressor worn time
- Remote on/off
- Water system two-way valve control
- Auxiliary electric heating

NOTE:

- *THE LENGTH OF COMMUNICATION WIRE BETWEEN THE MASTER UNIT AND THE WIRED CONTROLLER IS 40M. THE LENGTH OF COMMUNICATION WIRE ATTACHED TO THE SLAVE UNIT IS 5M.*

Specifications

General Data - R410A

MODEL			A5MAC210D	A5MAC230D	A5MAC340DR	A5MAC450D
NOMINAL COOLING CAPACITY		Ton	17	18.5	28.3	38.4
		kW	60	65	100	135
NOMINAL HEATING CAPACITY		kW	--	--	100	--
RATED POWER INPUT (COOLING)		kW	18.8	19.2	29.6	40.3
RATED POWER INPUT (HEATING)		kW	--	--	29.9	--
EER		Btu/h/W	10.9	11.5	--	11.4
COP W/W			3.19	3.39	3.38	3.35
RATED RUNNING CURRENT (COOLING)		A	35.5	36.9	54.4	76.1
RATED RUNNING CURRENT (HEATING)		A	--	--	55.8	--
POWER SUPPLY		V/Ph/Hz	380-415V/3N/50Hz			
REFRIGERANT	TYPE		R410A			
	CHARGE	kg/lb	17/37	17.2/37.9	28.2/62	30.6/67.5
WATER FLOW	COOLING	m^3/h	10.3	11.2	17.2	23.2
	HEATING	m^3/h	--	--	17.2	--
WPD (WATER PRESSURE DROP)		kPa	38	44	42	56
UNIT DIMENSION	L × W × H	mm/in	1990 × 840 × 1840/78 × 33 × 72		2100 × 1100 × 2300/83 × 43 × 90	
PACKING DIMENSION	L × W × H	mm/in	2010 × 890 × 2010/79 × 35 × 79		2175 × 1150 × 2430/86 × 45 × 96	
NET WEIGHT		kg/lb	520/1145	520/1145	870/1914	940/2074
GROSS WEIGHT		kg/lb	570/1256	570/1256	890/1958	960/2118
OPERATING WEIGHT		kg/lb	530/1167	530/1167	880/1936	950/2096

NOTES:

1. *THE SPECIFICATIONS GIVEN IN THE TABLE WILL BE SUBJECT TO THE MODIFICATIONS ON PRODUCT DESIGN BY THE MANUFACTURER.*
2. *NOMINAL COOLING CAPACITY CONDITION: LWT 7°C, WATER FLOW 0.172 [M3/(H•KW)], OUTDOOR TEMPERATURE 35°C.*
3. *NOMINAL HEATING CAPACITY CONDITION: LWT 45°C, WATER FLOW 0.172 [M^3/(H•KW)], OUTDOOR DRY-BULB TEMPERATURE 7°C, WET-BULB TEMPERATURE 6°C.*

Components Data - R410A

MODEL			A5MAC210D	A5MAC230D	A5MAC340DR	A5MAC450D
EVAPORATOR	TYPE		BRAZED PLATE HEAT EXCHANGER			
	PLATE MATERIAL		STAINLESS STEEL			
	NOMINAL COOLING WATER FLOW	m^3/h	10.3	11.2	17.2	23.2
	NOMINAL HEATING WATER FLOW	m^3/h	--	--	17.2	--
	WATER VOLUME	L	6.56		10.97	
	PIPING CONNECTION	in	Rc 2		Rc 2 1/2	
	UNIT WATER PRESSURE DROP	kPa/psi	38/5.5	44/6.4	42/6.1	56/8.1
CONDENSER COIL TUBE	MATERIAL		COPPER			
	TYPE		INNER GROOVE			
	OUTER DIAMETER	mm	9.52	9.52	7.94	7.94
FIN	MATERIAL		ALUMINUM			
	TYPE		WHITE	WHITE	BLUE	BLUE
	ROWS		3			
	FIN PER INCH		16	16	14	14
TOTAL FACE AREA		m^2/ft^2	3.43/36.9		7.13/76.7	
CONDENSER FAN	TYPE/DRIVE		BROAD WHEEL AXIAL FANS WITH LOW NOISE			
	QUANTITY		2			
	BLADE MATERIAL		GALVANIZED STEEL			
	MOTOR POLES		6			
	AIR VOLUME	m^3/ft^3	12000/7059		19500/11470	19000/11177
COMPRESSOR	TYPE		HERMETIC SCROLL COMPRESSOR			
	QUANTITY		2		3	4
REFRIGERANT	TYPE		R410A			
	CHARGE	kg	17	17.2	28.2	30.6
FLOW CONTROL	TYPE		EXV			
NUMBERS OF CIRCUITS			2			
OIL	MODEL		POE			
	CHARGE	L	3.25			
CASING	COLOUR		RAL 7032 PEBBLE GREY			
	MATERIAL		EG			
PROTECTION DEVICES			H/L PRESSURE SWITCH/THERMAL AND CURRENT OVERLOAD PROTECTOR			

NOTE: ALL SPECIFICATIONS ARE SUBJECTED TO CHANGE BY THE MANUFACTURER WITHOUT PRIOR NOTICE.

Electrical Data - R410A

MODEL			A5MAC210D	A5MAC230D	A5MAC340DR	A5MAC450D
FAN MOTOR	RATED RUNNING CURRENT H/L	A	2.5/1.7		3.96/2.64	
	MOTOR OUTPUT	W	900		1300	
	POLES (H/L)		6/10		6	
FAN SPEED	H/L	RPM	780/477		920 / 750	
COMPRESSOR	RATED RUNNING CURRENT	A	19.22	20.8	20.8	
	LOCKED ROTOR AMP (LRA)	A	115	124	124	
IP/INSULATION GRADE			IPX4/F			
UNIT OPERATING CURRENT		A	35.5	36.9	54.3	76.1
UNIT MAX RUNNING CURRENT		A	44.5	47	78.1	103.2

NOTES:

1) ALL SPECIFICATIONS ARE SUBJECTED TO CHANGE BY THE MANUFACTURER WITHOUT PRIOR NOTICE.

2) MAX RUNNING CURRENT IS TESTED UNDER BELOW CONDITION: COOLING OUTDOOR DRY-BULB TEMPERATURE 43°C; HEATING DRY-BULB TEMPERATURE 21°C, WET-BULB TEMPERATURE 15.5°C.

3) THE RATED RUNING CURRENT AND POLES ARE TESTED IN THE HIGH SPEED AND LOW SPEED.

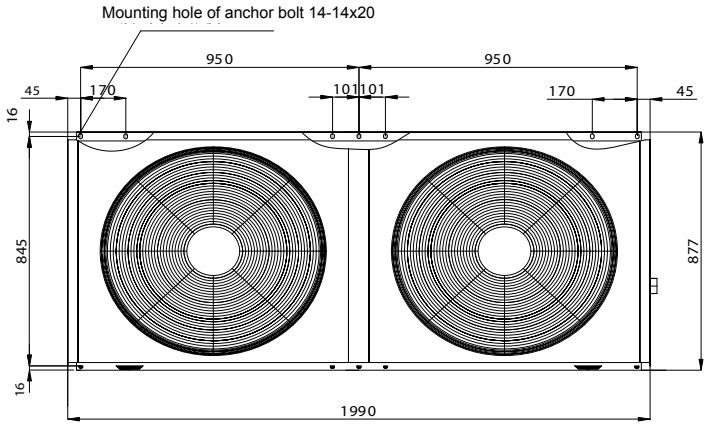
Safety Devices

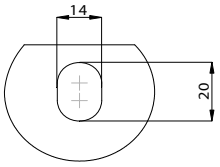
MODEL				A5MAC210D	A5MAC210D	A5MAC350DR	A5MAC450D
SAFETY DEVICE	HIGH PRESSURE SWITCH	TYPE		PSW,H20PS			
		OPEN	MPa	4.15 ± 0.1			
		CLOSE	MPa	3.11 ± 0.1			
	LOW PRESSURE SWITCH	TYPE		N/A			
		OPEN	MPa	N/A			
		CLOSE	MPa	N/A			
	PHASE SEQUENCER			YES			
	DISCHARGE TEMPERATURE SETTING		°C/°F	130/266			

NOTE: ALL SPECIFICATIONS ARE SUBJECTED TO CHANGE BY THE MANUFACTURER WITHOUT PRIOR NOTICE.

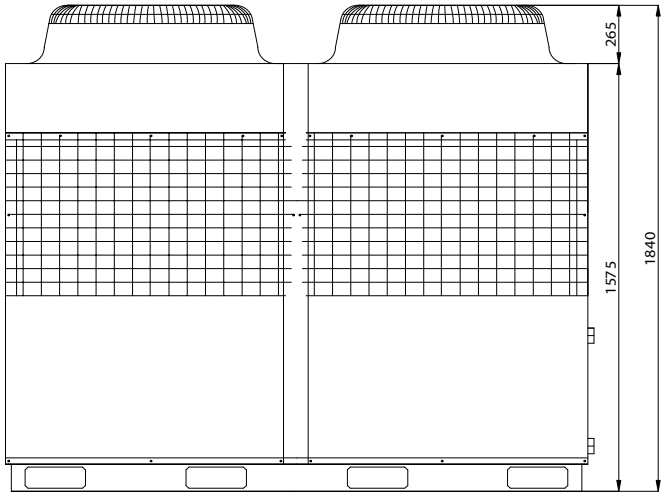
Dimensions

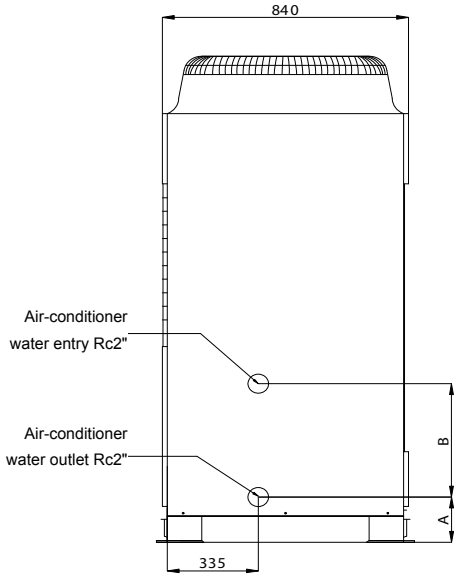
Modular Air Cooled Chiller/Heat Pump
A5MAC210D, A5MAC230D





14x20 Enlarged drawing for
Mounting hole of anchor bolt

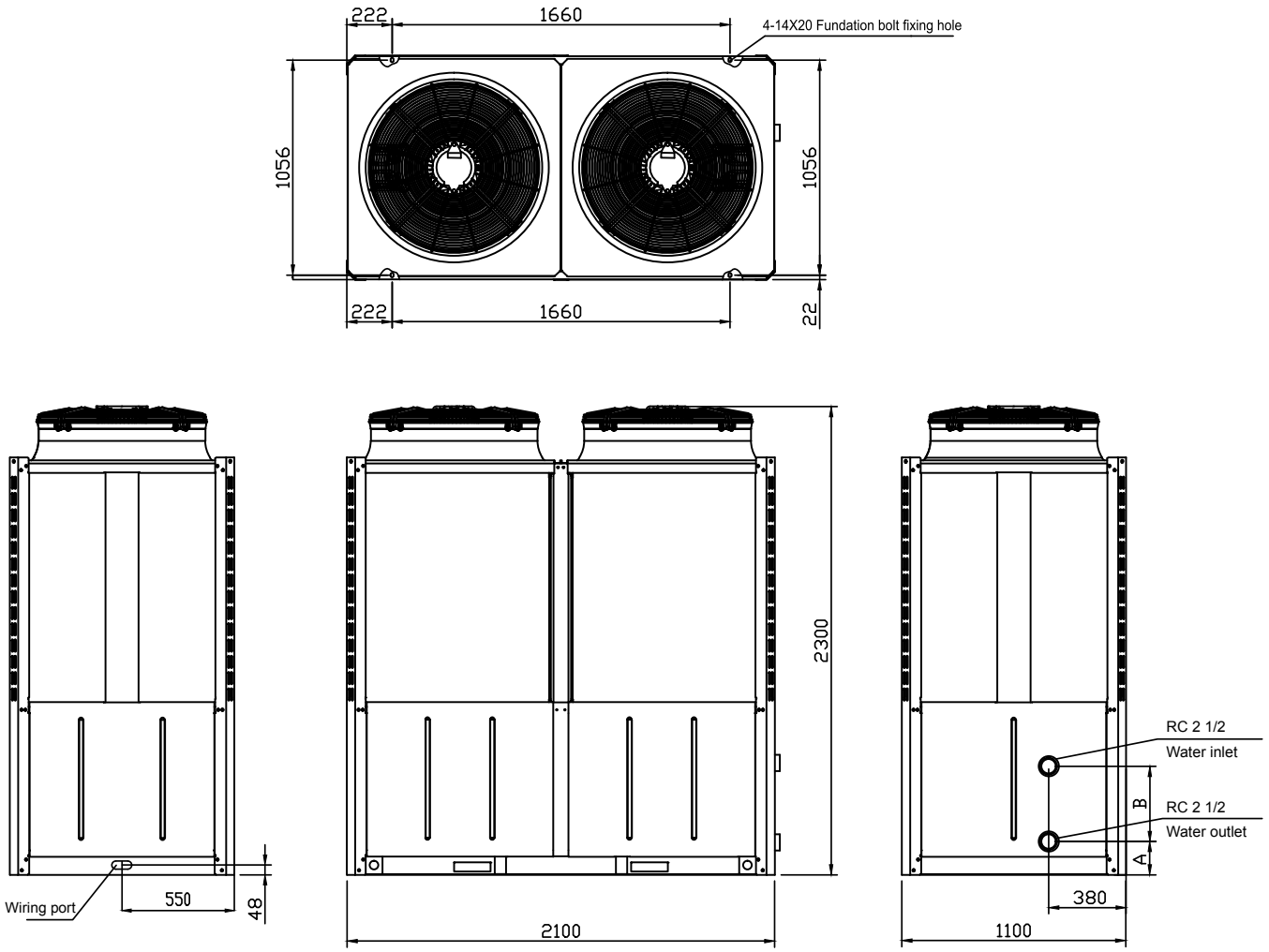




Unit: mm

Model	A (mm)	B (mm)
A5MAC210D	171	369
A5MAC230D		

Modular Air Cooled Chiller/Heat Pump
A5MAC340D
A5MAC450D



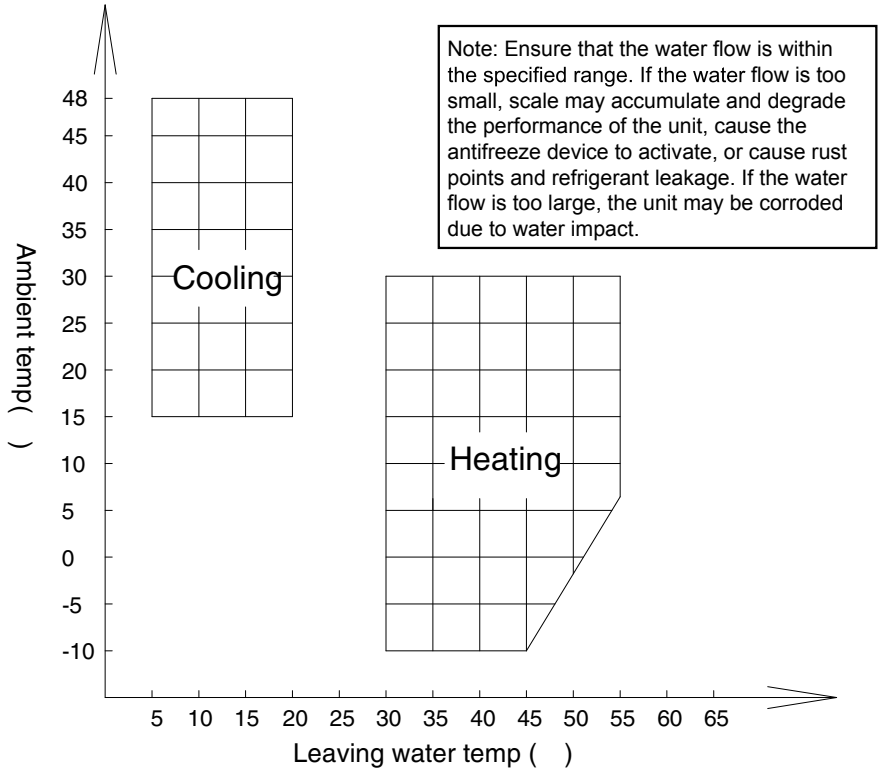
Model	A(mm)	B(mm)
A5MAC340DR	164	369

Unit: mm

Performance Data

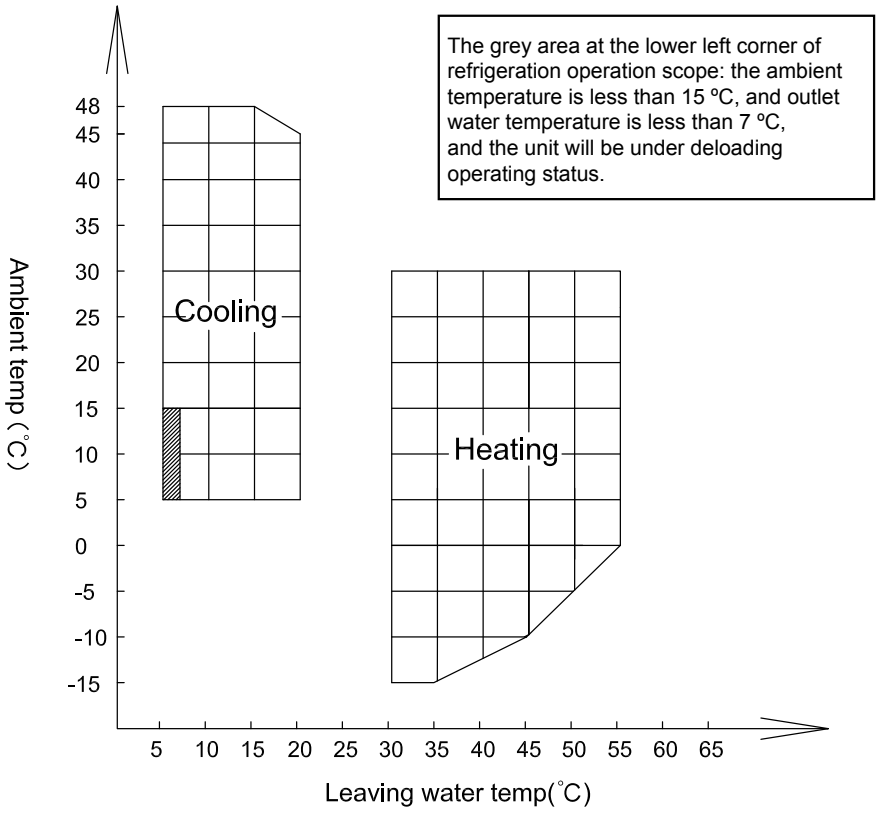
Operating Range

A5MAC210/230D



(Fig 1)

A5MAC340/450D(R)



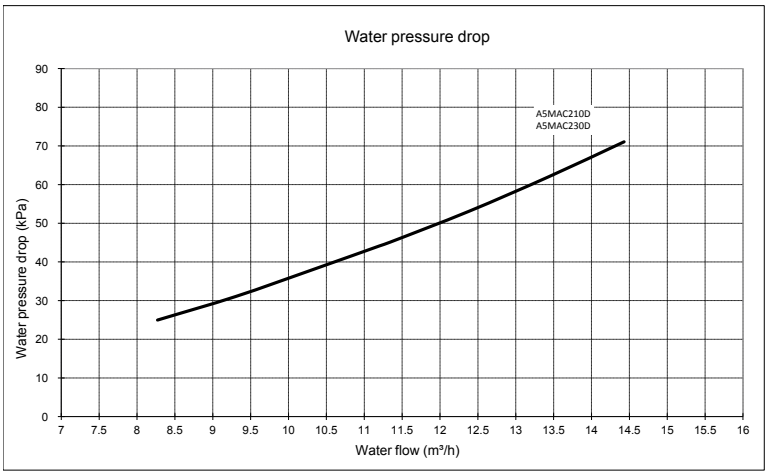
(Fig2)

Cooling Capacity Performance Table

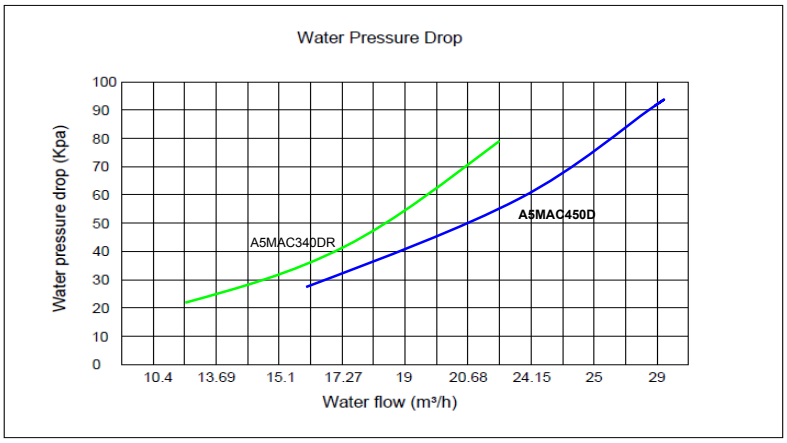
Model	Outlet water temp (°C)	Ambient temp. (°C)															
		15°C		20°C		25°C		30°C		35°C		40°C		45°C		48°C	
		Cooling capacity (kW)	Power Input (kW)	Cooling capacity (kW)	Power Input (kW)	Cooling capacity (kW)	Power Input (kW)	Cooling capacity (kW)	Power Input (kW)	Cooling capacity (kW)	Power Input (kW)	Cooling capacity (kW)	Power Input (kW)	Cooling capacity (kW)	Power Input (kW)	Cooling capacity (kW)	"Power Input (kW)"
A5MAC210D	5	70.6	13.6	66.5	14.7	62.9	16	59.4	17.2	55.3	18.5	50.9	20.1	46.3	21.8	42.4	23.1
	7	75	13.8	71	14.9	66.9	16.3	63.4	17.5	60	18.8	55.6	20.4	50.9	22.1	46.9	23.4
	9	79.8	14.1	75.7	15.2	71.6	16.5	68.4	17.8	64.9	19	60.8	20.7	55.8	22.4	51	23.7
	12	86.7	14.6	82.5	15.7	78.6	17	75	18.3	71.6	19.5	67.2	21.3	61.8	23	56.7	24.1
	15	93	14.9	89.7	16.1	86.5	17.4	82.6	18.7	78.7	20	73.7	21.9	68	23.7	63.5	24.7
	20	103.5	15.4	101.7	16.8	99.7	18.1	95.3	19.4	90.5	20.8	84.5	22.9	78.3	24.9	74.8	25.7
A5MAC230D	5	72.5	14.2	70.3	15.2	68.1	16.2	64.7	17.4	60.9	18.8	56	20.5	51.3	22.2	46.3	23.6
	7	77.2	14.6	75	15.6	72.8	16.6	69.4	17.8	65	19.2	60.4	21	55.1	22.6	50.2	24.1
	9	82	15	79.9	16	77.1	17	73.5	18.1	69.5	19.6	64.7	21.3	59.3	23	54.4	24.3
	12	90.1	15.5	88	16.4	85.3	17.5	81.7	18.5	76.4	20	71.6	21.7	65.8	23.4	60.9	24.8
	15	98.6	16.1	96.7	17.1	93.8	18	89.7	19.1	84.7	20.5	79.1	22.2	73.3	23.9	67.6	25.2
	20	112.8	17.1	111.2	18.3	108	18.8	103	20.1	98.5	21.3	91.6	23	85.8	24.7	78.8	25.9
A5MAC340DR	5	119.9	20.5	113.6	22.1	105.5	25.5	99.4	27.6	94.1	30	86.2	32.7	78.6	35.6	73.8	37.7
	7	126.4	21.4	121.5	23	111.8	26	106.5	28.2	100	29.6	93.6	33.1	86.1	36	81.3	37.9
	9	132.7	22.3	127.1	23.9	118.7	26.8	113.4	28.7	107.5	31	100.8	33.5	93.4	36.3	88.6	38.2
	12	141.5	23.6	136.2	25.1	128.7	27.6	123.2	29.5	116.5	31.7	111	34.1	103.8	36.8	99.1	38.6
	15	150	24.9	145	26.2	137.3	28.7	132.5	30.4	126.9	32.4	120.6	34.7	113.3	37	-	-
	20	163.4	27	158.1	28.1	150.2	29.6	146.5	31.7	142	34.2	135.2	35.7	128.5	38.1	-	-
A5MAC450D	5	157.3	28.6	151.9	30.4	141.9	34.1	135	36.6	126.9	39.6	117.7	43.1	107.3	47	100.4	49.6
	7	168.1	29.4	161.9	31.2	150.8	34.8	143.5	37.3	135	40.3	125.2	43.7	114.3	47.6	107.3	50.2
	9	179.3	30.4	172.1	32	160.1	35.6	152.3	38.1	143.3	41	133.1	44.4	121.8	48.4	114.3	50.8
	12	196.6	31.8	188	33.5	174.6	36.9	166.1	39.4	156.4	42.3	145.5	45.6	133.4	49.4	125.6	52
	15	214.5	33.4	204.4	34.9	189.6	38.3	180.4	40.7	170	43.6	158.5	46.9	145.7	50.6	-	-
	20	245.6	36.3	233.2	37.7	216.1	40.9	205.8	43.3	194.2	46.1	181.4	49.3	167.5	53	-	-

Water Pressure Drop Curve

A5MAC210/230D



A5MAC340/450D(R)



NOTES:

1) *THE WATER PRESSURE DROP OF THE UNIT IS THE TEST RESULT WHEN A PLATE HEAT EXCHANGER AND THE ACCESSORY Y-SHAPED FILTER ARE INSTALLED.*
2) *THE WATER RESISTANCE OF THE PLATE HEAT EXCHANGER AND THE Y-SHAPED FILTER ARE TESTED WITH PURE WATER.IF THE ONSITE WATER QUALITY CHANGES, THE TEST RESULT MAY BE DIFFERENT FROM THAT SHOWN IN THE FIGURE.*

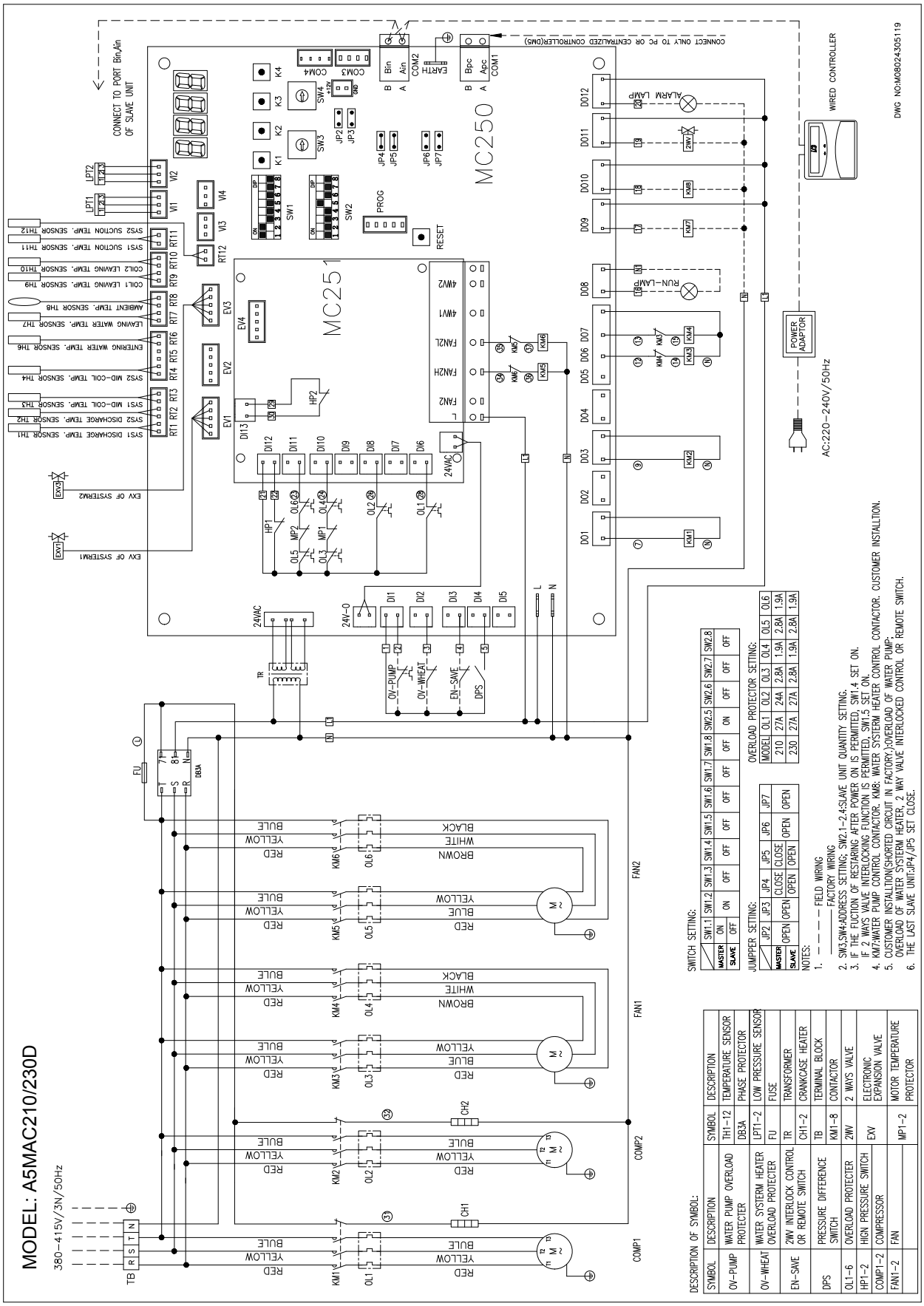
Sound Data

Acoustic Noise

Units	Octave Band Level (dB,ref20μPa)								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall
A5MAC210D	44.9	51.1	56.1	58.7	57.2	55.2	51.5	41.7	63.7
A5MAC230D	45.3	52.6	56	60.6	60.8	58.7	50.2	41.2	65.8
A5MAC340DR	53.4	53.5	59.1	60.0	62.8	58.1	52.6	45.2	67
A5MAC450D	54.3	55.0	60.4	61.2	65.4	60.8	54.0	46.7	69

Test condition: Octave band level noise is tested base on 11.5dB(A) background noise semi-anechoic room.

Wiring Diagrams

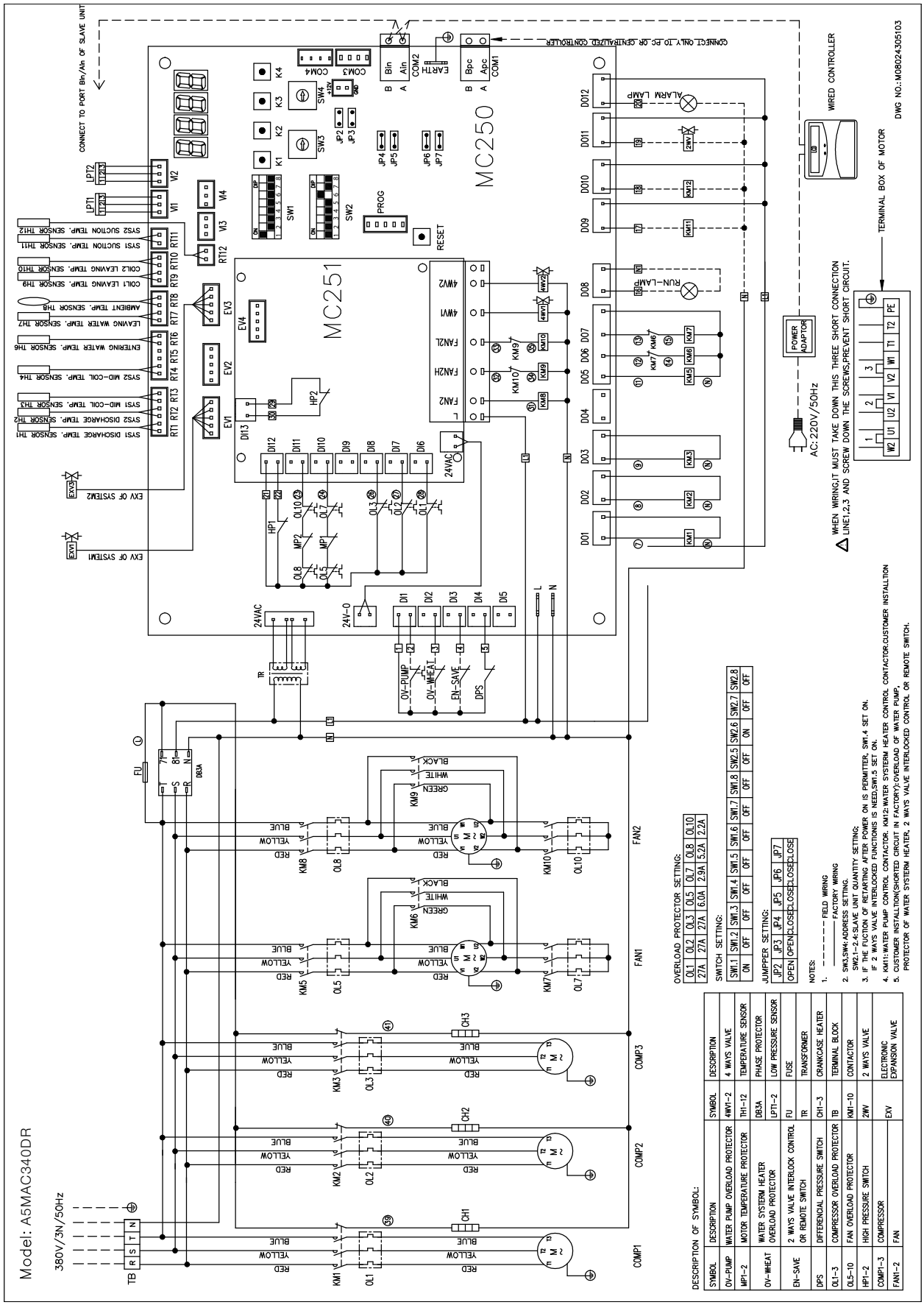


SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
OV-PUMP	WATER PUMP OVERLOAD PROTECTER	TH1~12	TEMPERATURE SENSOR
		DB3A	PHASE PROTECTOR
OV-WHEAT	WATER SYSTERM HEATER OVERLOAD PROTECTER	LPT1~2	LOW PRESSURE SENSOR
		FU	FUSE
EN-SAVE	2WV INTERLOCK CONTROL OR REMOTE SWITCH	TR	TRANSFORMER
		CH1~2	CRANKCASE HEATER
DPS	PRESSURE DIFFERENCE SWITCH	TB	TERMINAL BLOCK
		KM1~8	CONTACTOR
OL1~6	OVERLOAD PROTECTER	2WV	2 WAYS VALVE
HP1~2	HIGN PRESSURE SWITCH	EXV	ELECTRONIC EXPANSION VALVE
COMP1~2	COMPRESSOR		
FAN1~2	FAN	MP1~2	MOTOR TEMPERATURE PROTECTOR

SWITCH SETTING:	SW1.1	SW1.2	SW1.3	SW1.4	SW1.5	SW1.6	SW1.7	SW1.8	SW2.5	SW2.6	SW2.7	SW2.8
MASTER	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
SLAVE	OFF											

JUMPPER SETTING:	JP2	JP3	JP4	JP5	JP6	JP7
MASTER	OPEN	OPEN	CLOSE	CLOSE	OPEN	OPEN
SLAVE	OPEN	OPEN	OPEN	OPEN		

OVERLOAD PROTECTOR SETTING: MODEL	OL1	OL2	OL3	OL4	OL5	OL6
210	27A	24A	2.8A	1.9A	2.8A	1.9A
230	27A	27A	2.8A	1.9A	2.8A	1.9A



DESCRIPTION OF SYMBOL:

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
OV-PUMP	WATER PUMP OVERLOAD PROTECTOR	4WV1-2	4 WAYS VALVE
MP1-2	MOTOR TEMPERATURE PROTECTOR	TH1-12	TEMPERATURE SENSOR
OV-WHEAT	WATER SYSTERM HEATER OVERLOAD PROTECTOR	DB3A	PHASE PROTECTOR
		LPT1-2	LOW PRESSURE SENSOR
EN-SAVE	2 WAYS VALVE INTERLOCK CONTROL OR REMOTE SWITCH	FU	FUSE
		TR	TRANSFORMER
DPS	DIFFERENCIAL PRESSURE SWITCH	CH1-3	CRANKCASE HEATER
OL1-3	COMPRESSOR OVERLOAD PROTECTOR	TB	TERMINAL BLOCK
OL5-10	FAN OVERLOAD PROTECTOR	KM1-10	CONTACTOR
HP1-2	HIGH PRESSURE SWITCH	2WV	2 WAYS VALVE
COMP1-3	COMPRESSOR	EXV	ELECTRONIC EXPANSION VALVE
FAN1-2	FAN		

OVERLOAD PROTECTOR SETTING:

OL1	OL2	OL3	OL5	OL7	OL8	OL10
27A	27A	27A	6.0A	2.9A	5.2A	2.2A

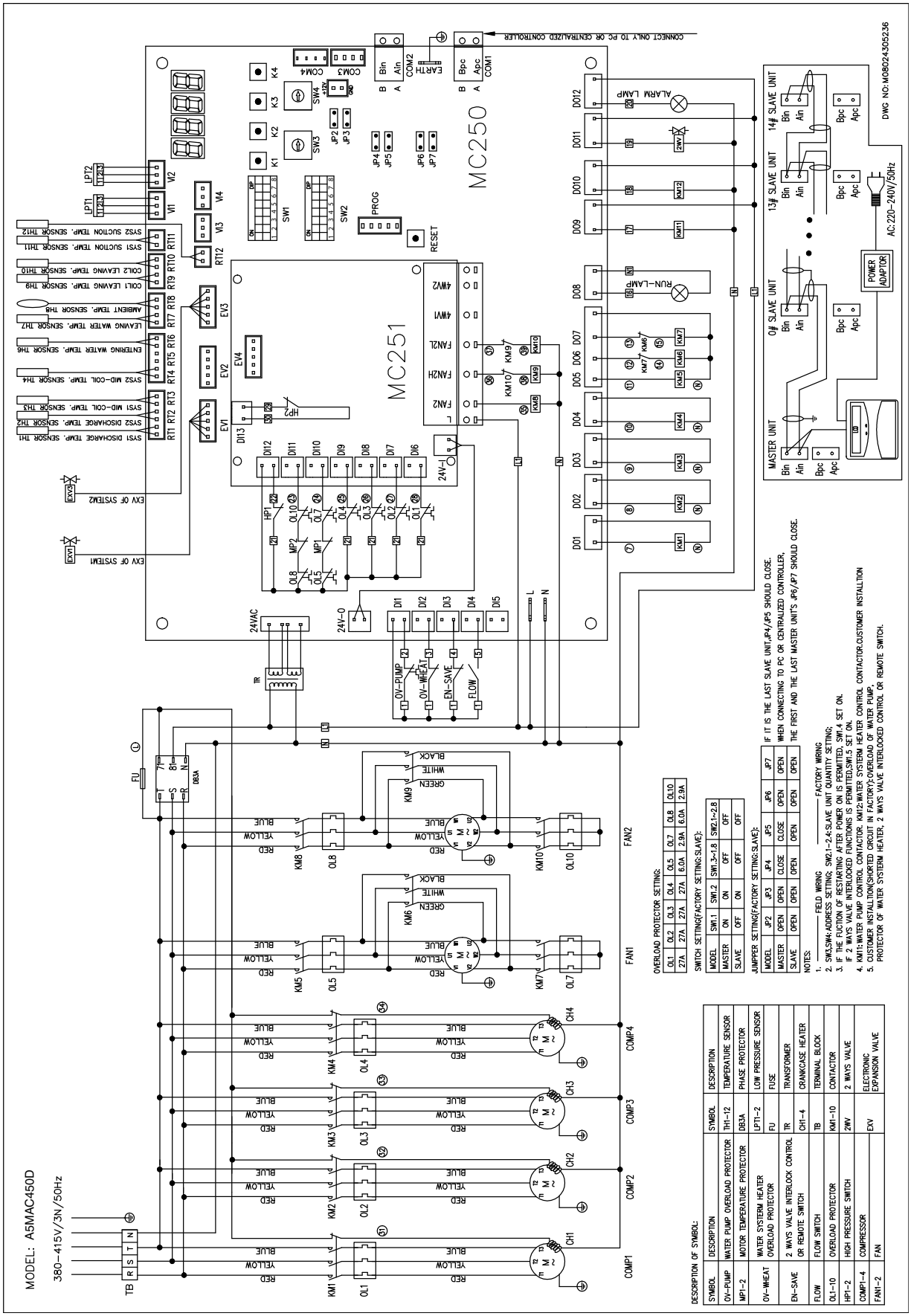
SWITCH SETTING:

	SW1.1	SW1.2	SW1.3	SW1.4	SW1.5	SW1.6	SW1.7	SW1.8	SW2.5	SW2.6	SW2.7	SW2.8
ON												
OFF												

JUMPPER SETTING:

JP2	JP3	JP4	JP5	JP6	JP7
OPEN	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE

NOTES:
1. ---------- FIELD WIRING
   ———— FACTORY WIRING
2. SW3,SW4:ADDRESS SETTING.
   SW2.1-2.4:SLAVE UNIT QUANTITY SETTING;
3. IF THE FUCTION OF RETARTING AFTER POWER ON IS PERMITTER, SW1.4 SET ON.
   IF 2 WAYS VALVE INTERLOCKED FUNCTIONIS IS NEED,SW1.5 SET ON.
4. KM11:WATER PUMP CONTROL CONTACTOR. KM12:WATER SYSTERM HEATER CONTROL CONTACTOR.CUSTOMER INSTALLTION
5. CUSTOMER INSTALLTION(SHORTED CIRCUIT IN FACTORY):OVERLOAD OF WATER PUMP,
   PROTECTOR OF WATER SYSTERM HEATER, 2 WAYS VALVE INTERLOCKED CONTROL OR REMOTE SWITCH.



SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
OV-PUMP	WATER PUMP OVERLOAD PROTECTOR	TH1-12	TEMPERATURE SENSOR
MP1-2	MOTOR TEMPERATURE PROTECTOR	DB3A	PHASE PROTECTOR
OV-WHEAT	WATER SYSTERM HEATER OVERLOAD PROTECTOR	LPT1-2	LOW PRESSURE SENSOR
		FU	FUSE
EN-SAVE	2 WAYS VALVE INTERLOCK CONTROL OR REMOTE SWITCH	TR	TRANSFORMER
		CH1-4	CRANKCASE HEATER
FLOW	FLOW SWITCH	TB	TERMINAL BLOCK
OL1-10	OVERLOAD PROTECTOR	KM1-10	CONTACTOR
HP1-2	HIGH PRESSURE SWITCH	2WV	2 WAYS VALVE
COMP1-4	COMPRESSOR	EXV	ELECTRONIC EXPANSION VALVE
FAN1-2	FAN		

OVERLOAD PROTECTOR SETTING:								
OL1	OL2	OL3	OL4	OL5	OL7	OL8	OL10	
27A	27A	27A	27A	6.0A	2.9A	6.0A	2.9A	

SWITCH SETTING(FACTORY SETTING:SLAVE):			
MODEL	SW1.1	SW1.2	SW1.3~1.8	SW2.1~2.8
MASTER	ON	ON	OFF	OFF
SLAVE	OFF	ON	OFF	OFF

JUMPER SETTING(FACTORY SETTING:SLAVE):						
MODEL	JP2	JP3	JP4	JP5	JP6	JP7
MASTER	OPEN	OPEN	CLOSE	CLOSE	OPEN	OPEN
SLAVE	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN

Installation

Working Condition

Item	Description
Power supply voltage	380 - 415V
Power supply frequency	Rated frequency ± 1%
Variations between phases	Rated voltage ± 2%
Air quality	Must not contain solute that can corrode copper, aluminum or iron.
Flow rate of chilled water	0.5 - 2.0m/s
Pressure of chilled water	< 0.7MPa
Quality of chilled water	Must not contain solute that can corrode copper, iron, or welding material. For details on the water quality requirements, see "Water Quality Requirement."
Installation site	Take anti-snow and ventilation measures as required.
Ambient temp.	Refer to the Performance Data Operating Range.
Relative humidity	< 90%

NOTES:

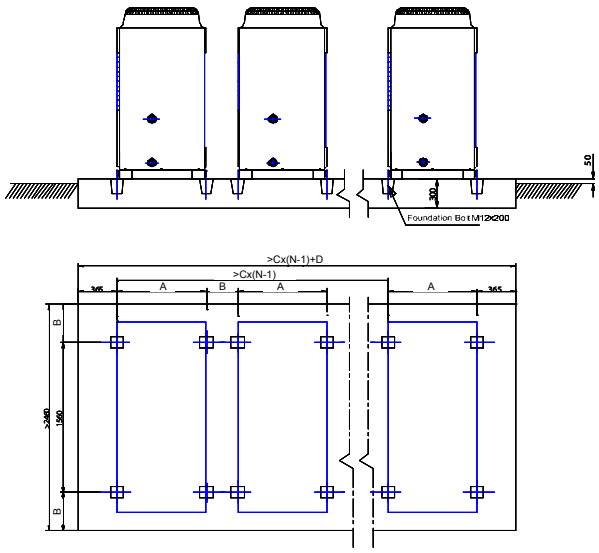
1. *THE UNIT IS UNDERGO STRINGENT QUALITY TESTS BEFORE DELIVERY AND CAN WORK SAFELY IN THE RATED WORKING CONDITIONS.*
2. *FOR THE PERFORMANCE PARAMETERS OF THE UNIT IN DIFFERENT WORKING CONDITIONS, REFERENCE TABLE FOR PERFORMANCE PARAMETERS.*
3. *THIS IS THE NORMAL OPERATING TEMPERATURE RANGE FOR THE UNIT. BEYOND THIS TEMPERATURE RANGE, THE UNIT CAN ONLY OPERATE FOR A SHORT MOMENT BEFORE A FAILURE ALARM IS TRIGGERED.*

Installation Dimensions and Environment Limits

Machine Installation Space

Units must be installed by ACSON service staff or specially trained personnel. Units must installed by following relevant local electric, building and environment protection standards as well as the installation manual.

Assembling Unit Modules



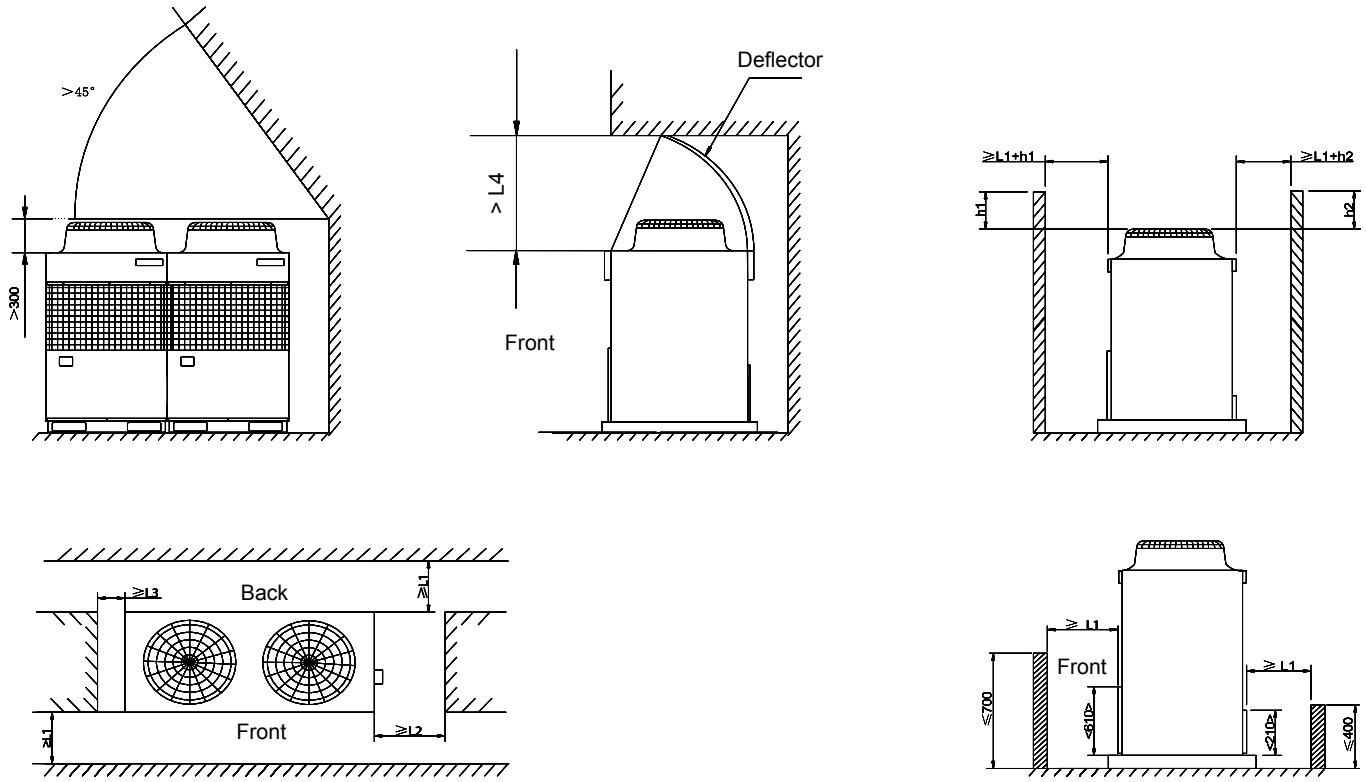
Installation clearance Unit: mm

Model	A	B	C	D
A5MAC210/230D	845	400	1245	1575
A5MAC340/450D(R)	1056	544	1600	1786

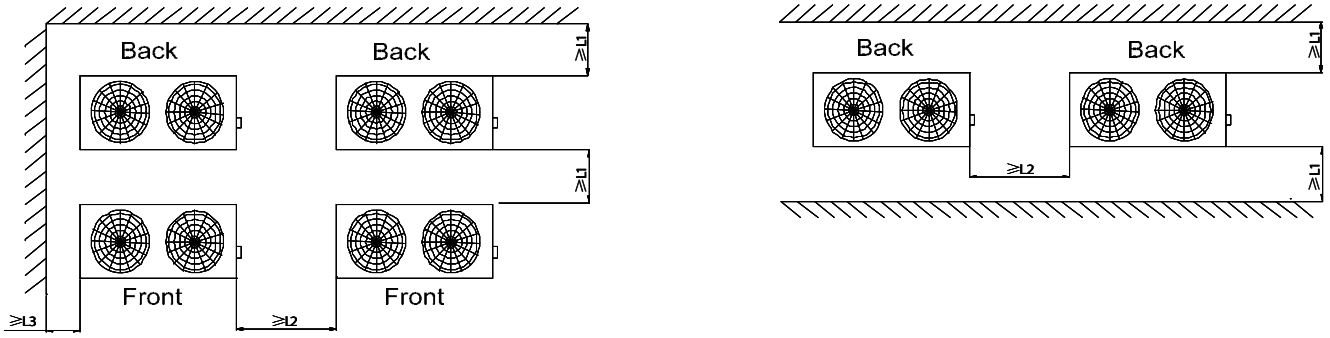
NOTE:

1. *THE GROUNDWORK MUST BE A CONCRETE FLOOR OR A V-IRON STRUCTURE THAT IS STRONG ENOUGH TO BEAR THE OPERATION PRESSURE OF THE UNIT.*
2. *N REPRESENTS THE NUMBER OF MODULES INSTALLED.*
3. *EACH UNIT MUST BE FIXED BY 4 M12 BOLTS;*
   -6 RUBBER CUSHIONS OF 20MM THICK MUST BE INSTALLED BETWEEN THE UNIT AND THE GROUNDWORK.
   -THE GROUNDWORK MUST HAVE DRAINING FACILITIES TO DISCHARGE CONDENSATE WATER AND DEFROSTING WATER.

Space Allocated for A Single Chilled Water Unit



Space Allotted for An Array of Chilled Water Units

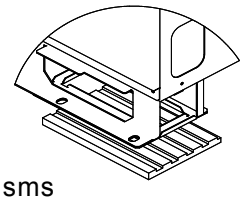


Model	L1	L2	L3	L4
A5MAC210/230D	400	800	100	1000
A5MAC340/450D(R)	500	800	600	1200

Unit: mm

Installing Chiller

- The user manual, warranty card, accessories, and packing list are place at the right side of the unit.
- Reserve sufficient maintenance space if possible.
- If the unit is installed in a place where it snows during winter, proper measures must be taken to protect the unit against snow and ensure that the unit works properly.
- The groundwork should be made of concrete or supporting structures. While designing the groundwork, you must fully consider the strength of the floor, water discharge (the unit discharges water while working), pipelining and wiring. If the foundation is not strong, the unit might fall off and breakdown, even incur bodily injuries.

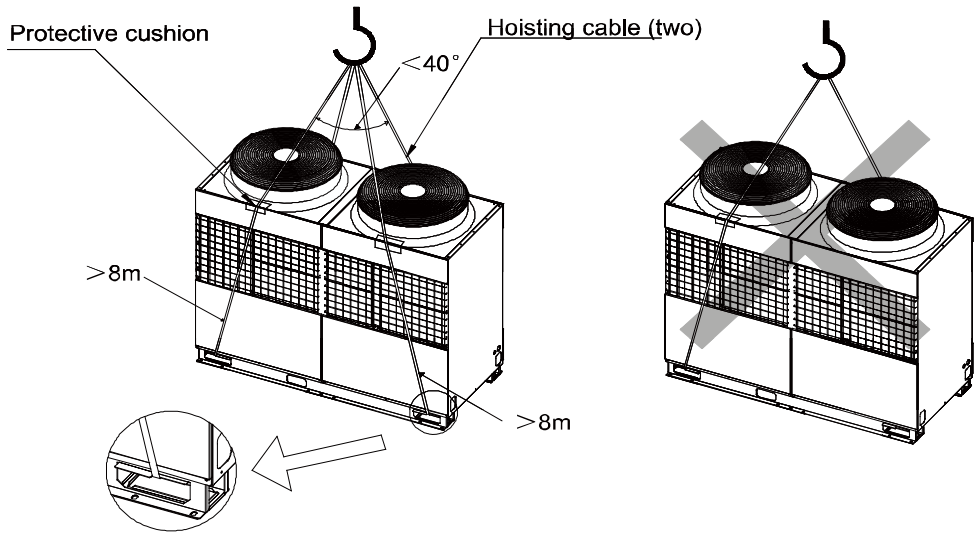


- Screw down the chilled water unit using anchor bolts so that it will not fall off in case of strong wind or earthquakes. In order to minimize damages cause by mother nature, it is advise to installed the unit in places that can minimize weathering effects.
- The unit will vibrate during operation and it might transfer through the groundwork causing noises in the floor or walls. Therefore, proper vibration dampening mechanisms (such as bumper cushion, bumper frame etc.) should be in place.
- Corners and edges should be properly installed. Otherwise, the unit might get unbalanced and cause the grounding pins to bend. The unit might fall off and cause bodily injuries if it is not properly installed.

Keep clear from the heat exchange

Hoisting the Chiller

Please hoist the unit according to the following illustrations. Tie the cables to the four corners of the unit while moving it. If you tie the cables to only two corners of the unit, the unit might get unbalanced and fall off.



NOTES:

- *CHILLED WATER UNITS MUST BE MOVED WITH GREAT CARE.*
- *ACCESSORY STRIPS AND/OR STRAPPING TAPES THAT COME WITH THE UNIT IS NOT FOR HOISTING PURPOSES. ANY ATTEMPT TO USE IT TO MOVE THE UNIT MIGHT BREAK AND CAUSE ACCIDENTS.*
- *KEEP CLEAR FROM THE HEAT EXCHANGER AS IT MIGHT GET DAMAGED AND POTENTIAL HEALTH HAZARD.*
- *DISPOSE ALL PLASTIC BAGS PROPERLY AND KEEP THEM AWAY FROM CHILDREN.*
- *DUE TO THE DIFFERENT APPEARANCE OF THE UNIT, THE ABOVE HOISTING PICTURE IS ONLY FOR REFERENCE.*

Water System Installation

Water Quality Requirements

Water inside the chilled water system must be clean/soft to prevent formation of scale. Scaling/fouling will degrade performance of the chiller and increase resistance. This will eventually affects both the flow rate and performance of the water pumps. The concentration of foreign elements should be kept to minimum, the characteristic of the water should be as follow:

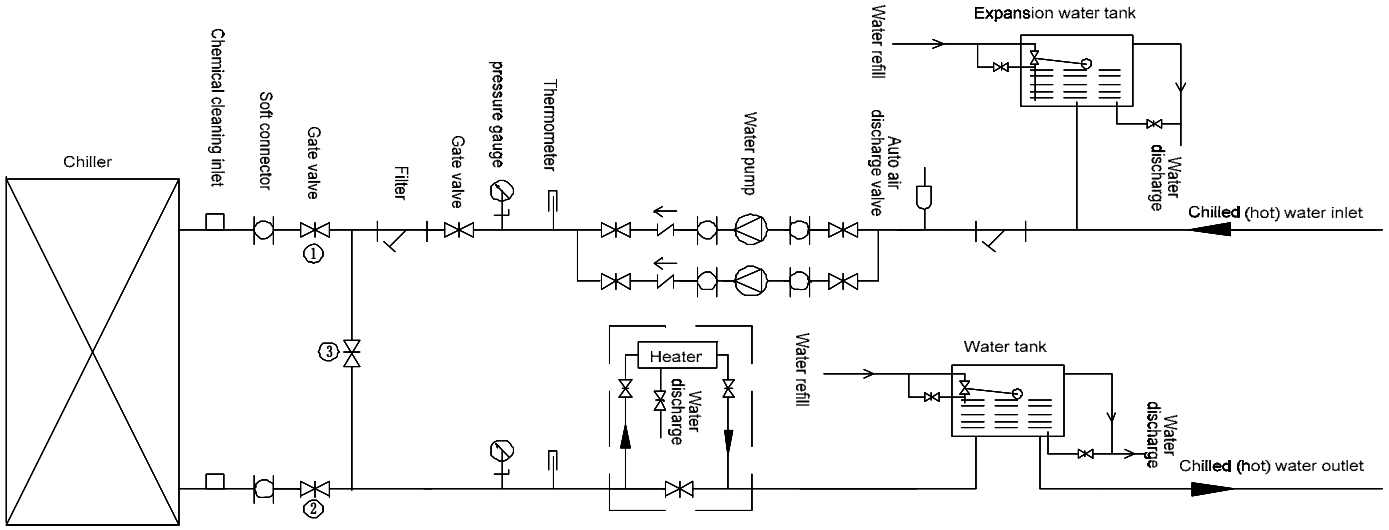
Item			Benchmark value	Tendencies	
				Corrosion	Scaling
Benchmark items	pH (25°C)		7.0 - 9.0	○	○
	Conductivity (25°C)	μS/cm	< 800	○	○
	Cl^-	mg (Cl^-)/L	< 200	○	
	SO_4^{2-}	mg (SO_4^{2-})/L	< 200	○	
	Acid consumption	mg ($CaCO_3$)/L	< 100		○
	(pH = 4.8)				
	Total hardness	mg ($CaCO_3$)/L	< 200		○
Reference items	Fe	mg (Fe)/L	< 1.0	○	○
	S^{2-}	mg (S^{2-})/L	0	○	
	NH_4^+	mg (NH_4^+)/L	< 1.0	○	
	SiO_2	mg (SiO_2)/L	< 50		○
NOTE: ○ REPRESENTS FACTORS THAT MAY CAUSE CORROSION OR SCALING.					

Water System Installation Schematic Diagram

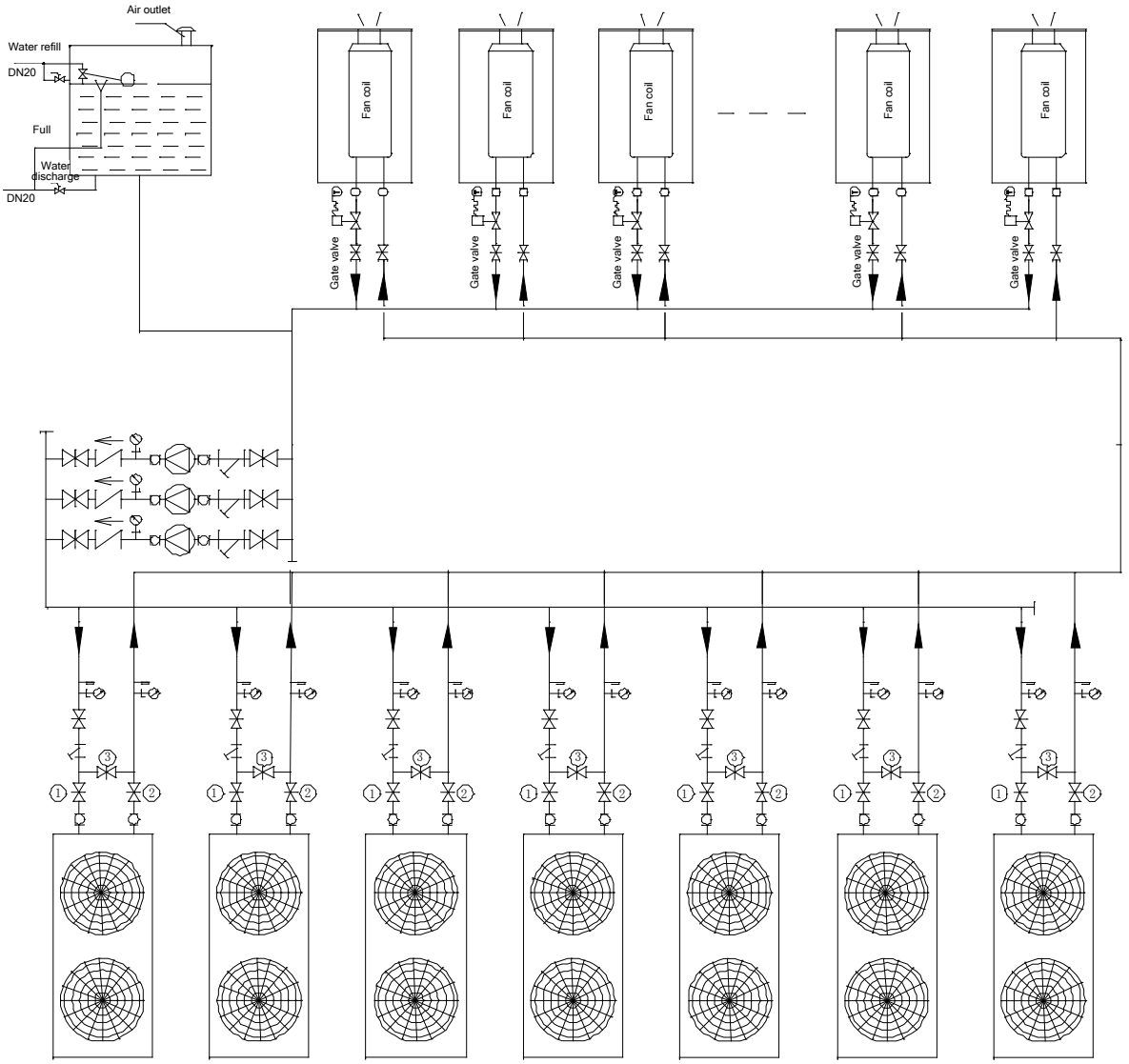
Connecting Water Pipes

- Water pump is field supply. Sizing of the water pump is important to overcome resistance of the water pipes
- Water pressure gauges and thermocouples/thermistor must be installed at the water inlets and outlets to facilitate the reading of unit operation status.
- The heat exchanger at the water side is made of stainless steel. Water scale may accumulate depends on the water quality and must be cleaned using chemicals from time to time. Therefore, a chemical cleaning pipe connector needs to be installed at the water pipes (please refer to the following diagram)

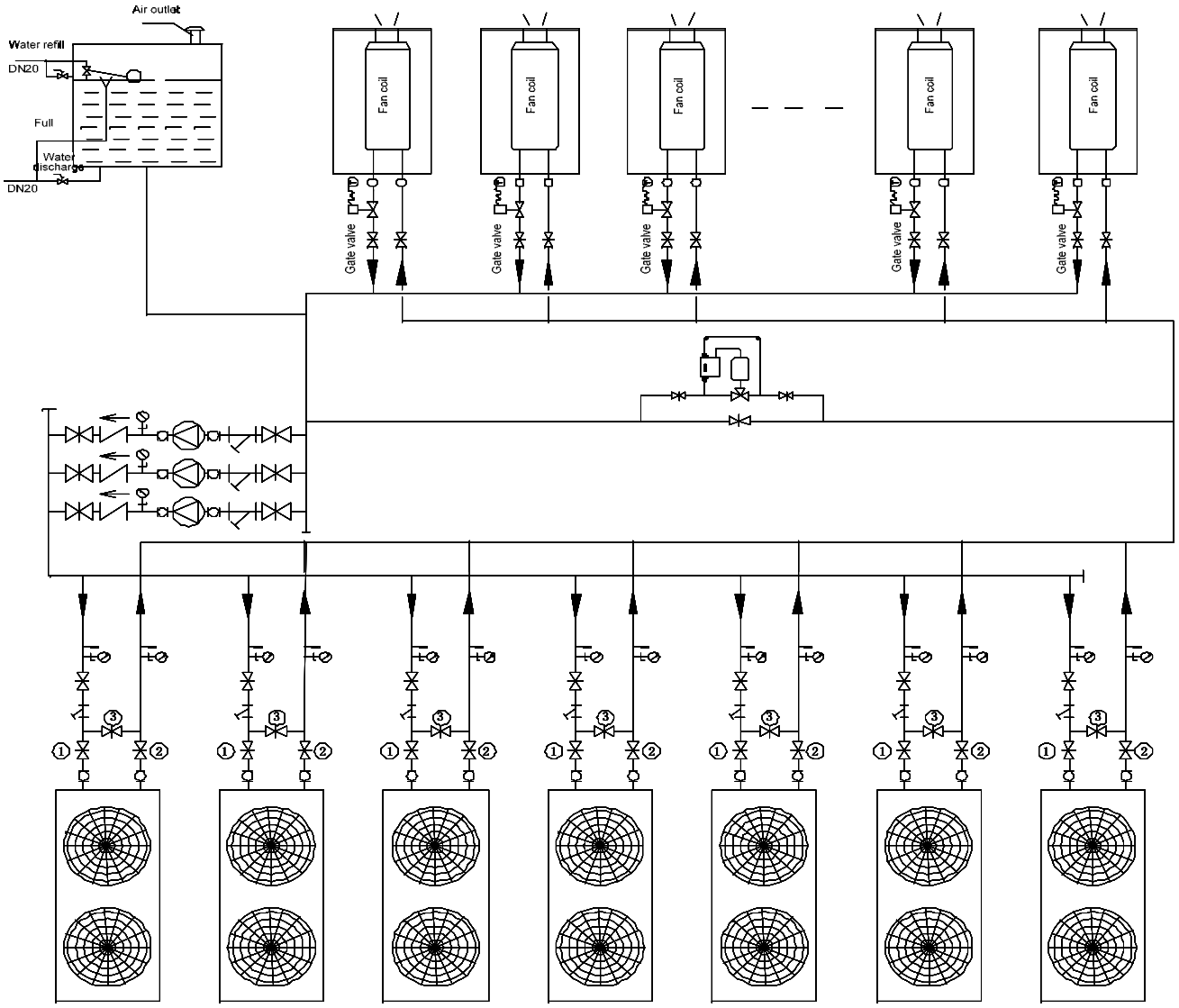
- Ensure the flow rate is in the range. Low flow rate will reduce performance of the unit due to scale formation, triggering anti-freeze sensor, and/or refrigerant leakages which caused by corrosion. While flow rate that is too high will cause erosion corrosion.
- An insulated water tank with a proper volume is recommended to be installed. If the capacity is too small, the unit might frequently restart, which causes wear and tear on the compressor.
- An expansion tank is recommended to be install at the return of the chilled water system. Water inside the chilled water system will experience volume changes due to temperature changes.
- An auto relief valve must be installed at the highest point in the water system. A suitable water discharge valve must be installed at the lowest point in the water system.
- The water pipes must be insulated to avoid heat loss and condensate water.
- Please follow the "Illustration for water system installation" and drawings from the certified personnel while installing the water system.
- Install the strainer on the inlet pipe and rinse the filter screen after commissioning.
- Before supplying water, make sure that no sand, rubble, rust, soldering residue or other impurities exist in the pipe. As these things might damage the heat exchanger.
- While rinsing the water system, please bypass the unit and the terminal heat exchanger using by-pass valves.
- Installation illustration for the water system of a single unit:



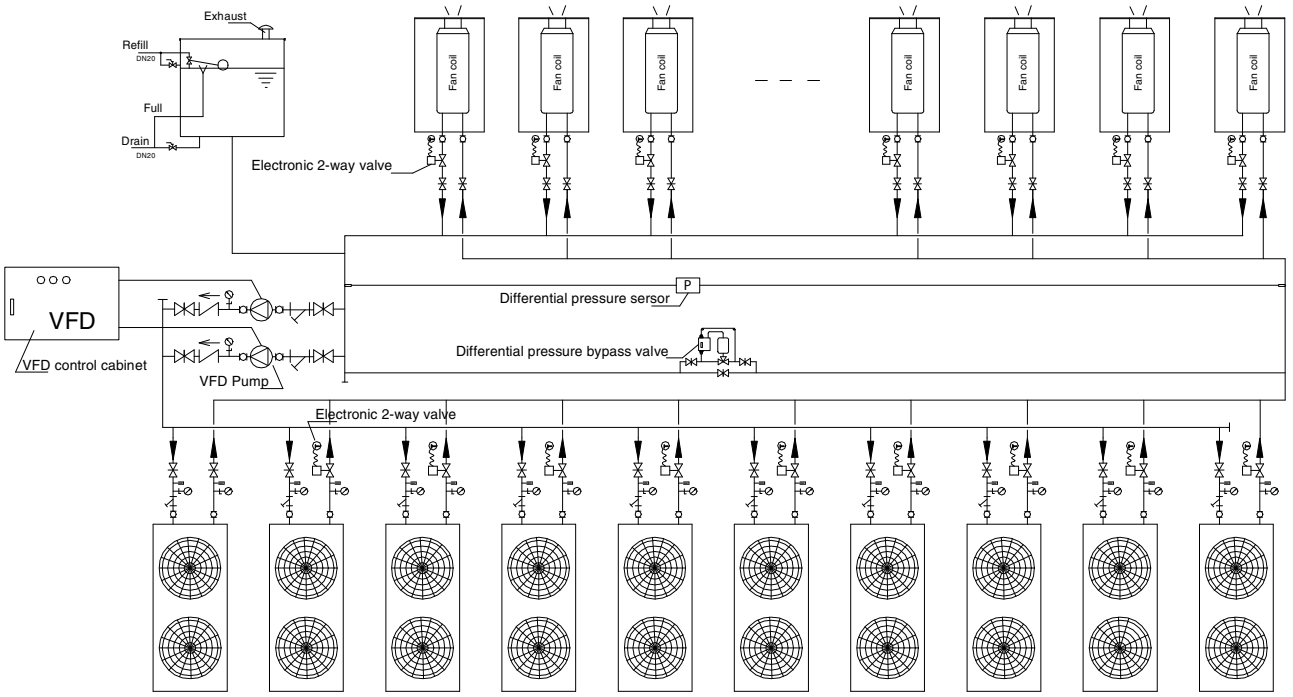
- Illustration for multiple units and constant flow rate chilled water system:



- Illustration for multiple unit and variable flow rate system:



■ Installation illustration for multiple unit and variable flow rate system:



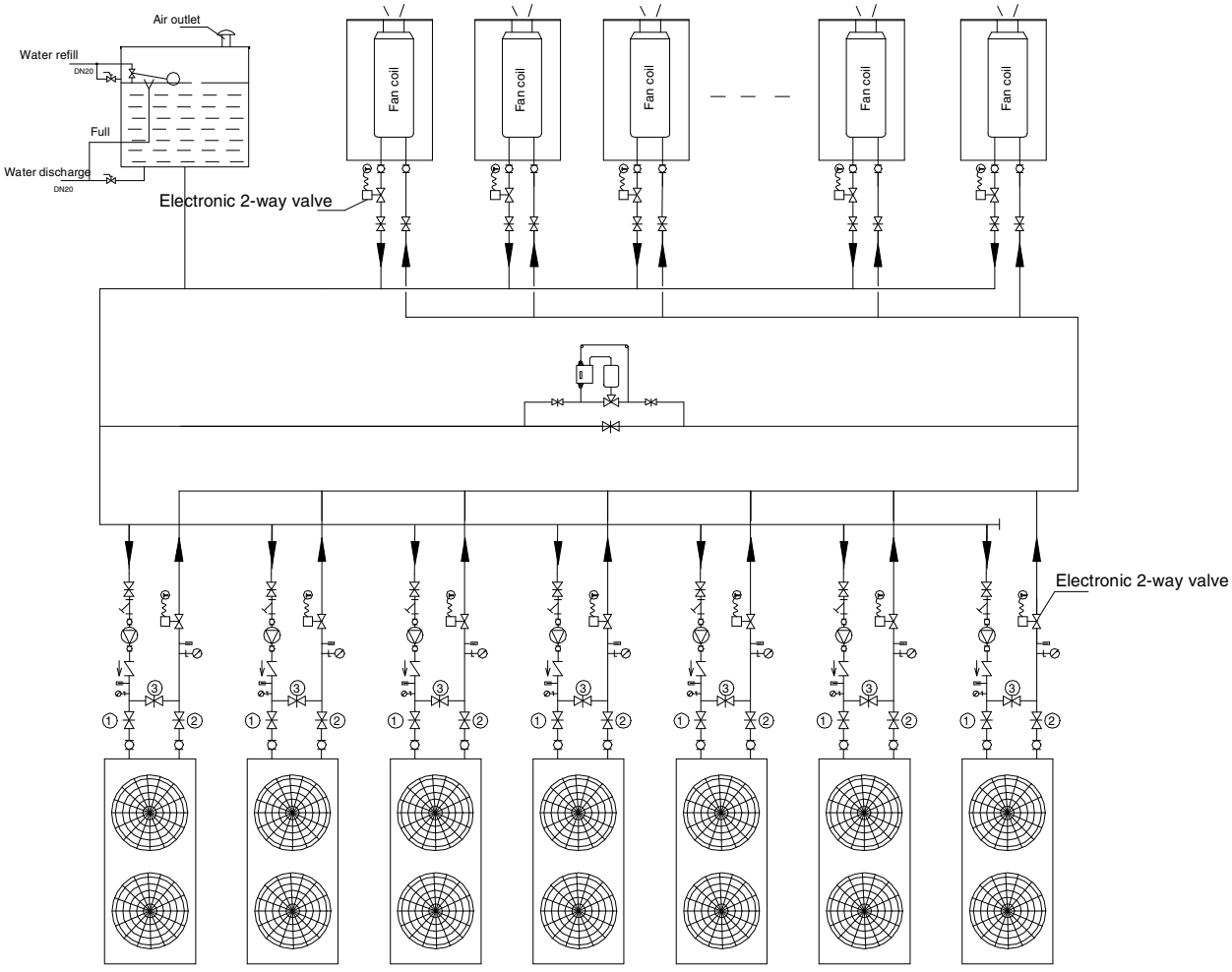
1. By default, the unit is set as constant water flow-rate system. SW1.6 on PCB board indicates the water system, OFF is for constant flow-rate system, ON is for variable flow-rate system. Please refer to “Setting up address using DIP switch” for setting.
2. Install one electric two-way valve at the outlet of each slave unit to implement the inter-locking with the unit.
3. Install one electric two-way valve in each piece of terminal equipment to implement the inter-locking between the valve and the terminal. (Generally, relevant interface is preserved on the terminal fan coil unit. For details about wiring, please refer to the instruction for fan coil unit.)
4. At least one variable-frequency water pump is required to serve as the chilled water pump for the water system (it is recommended to use variable-frequency water pumps only to simplify the control and increase the precision control). Size the pump head based on the system water flow-rate and pressure. Install a variable-speed water pump and transducer to implement variable frequency.
5. Install a differential pressure, ΔP sensor at both the return and supply of the chilled water system. Check the pressure different for both the supply and return. The transmitted signal generated due to the differential pressure should change the speed of the variable frequency water pump and thus the flow rate of the chilled water system.
   5.1 Requirement for minimum water flow-rate adjustment: the variable frequency adjustment range of water pump is 50Hz ~ 35 Hz, the selected minimum water flow-rate for adjustment shall not be lower than 70% of the total designed water flow-rate (ensure that the water flow of a single unit is no less than 70% of the rated water flow). The more fan coil units is used for a particular system, the smaller the minimum flow-rate ratio could be use. Thus, configure and troubleshoot based on actual condition.
   5.2 Requirement for flow rate changes: the rate of which the flow rate is changed cannot be too frequent. Other wise, the stability of outlet temperature and terminal regulating valve will be affected. It is recommended to fix the flow rate changes to 2% ~ 30% per minute, the specific value varies depends on the model, control, and cycle time of water in the system. The optimum rate for flow rate changes shall be determined on site after debugging, and the adjustment rate of 10% per minute could be use as the initial value for system debugging.
6. In the wiring diagram that are shown previously, components such as contactors and terminal block can be seen. It was meant for constant flow rate system, a variable flow rate system will require frequency converter, DDC, differential pressure sensors and other components that might be needed in a variable flow rate system. Core components that make a variable flow rate differ than the constant flow rate system are as follow:

Component	Function
Electric two-way valve	Interworking with the unit
Frequency converter	Implementing water pump variable frequency
Differential pressure sensor	Checking pressure difference between water supply and water return, and controlling water pump adjustment
DDC	Direct digital controller

Interfaces implementing the preceding functions are preserved on the unit. For details about wiring, please refer to "Control System Instruction - PCB Instruction".

NOTE: THE PRECEDING INFORMATION SERVES ONLY AS A REFERENCE FOR THE DESIGN OF PRIMARY PUMP VARIABLE FLOW SYSTEM. IN PRACTICE, THE DESIGN PROVIDED BY A QUALIFIED HVAC INSTALLATION ENGINEERING COMPANY OR AN ARCHITECTURE DESIGN INSTITUTE SHALL PREVAIL.

■ Illustration for system with multiple units (dedicated pump for each unit)



The water system with separate pumps for each unit is applicable only to the scenario where a few units are used (a few units). When the quantity of units is large, it is not recommended to use this type of water system. Because:

1. Dedicated pumps for each unit are not cost-effective when there are many units;
2. The water flow rate in the system might be too low, which can affect the unit performance. For example, for a group of 10 units with 200 terminals connected. In the case of low load, if only one unit and all terminals are in operation. The water flow rate in the system will be too low and performance of the system will be affected.

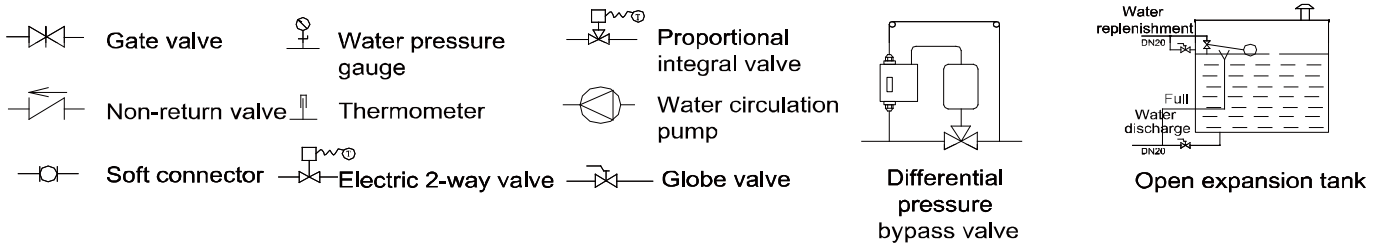
Application instruction:

1. Set master unit water system to variable flow system.
2. Install electric two-way valve on the terminal side to implement the inter-locking between the electric two-way valve and the fan coil unit.
3. Install an independent water pump for each unit, and configure interworking between the water pump and the unit. Install electric two-way valve on each slave unit to implement the inter-locking between the electronic two-way valve and the unit.

Interfaces implementing the preceding functions are preserved on the master unit. For details about wiring, please refer to "Control System Instruction - PCB Instruction".

NOTE: PUMP IS OPTIONAL, PLEASE CONTACT YOUR LOCAL DISTRIBUTOR SHOULD YOU HAVE FURTHER ENQUIRIES.

- Legends for the water system illustration:



Size of the main connecting pipe for modular combinations:

Unit Qty.		1	2~3	4~5	6~10	11~16
Size of main connecting pipe (inch)	A5MAC210/230D	≥2	≥3	≥4	≥5	≥6
	A5MAC340/450D(R)	≥2.5	≥4	≥5	≥7	≥9

NOTE: WHEN CLEANING THE WATER SYSTEM, PLEASE SHUT ① ② GATE VALVE AND OPEN ③ GATE VALVE MARKED IN THE DIAGRAM OF ALL THE UNITS, IN ORDER TO BYPASS THE UNITS, SO THE IMPURITIES CAN BE PREVENTED FROM ENTERING THE PLATE HEAT EXCHANGER AND THE EFFICIENCY AND SERVICE LIFE OF PLATE HEAT EXCHANGER CAN NOT BE AFFECTED.

Hydraulic Calculation and Pipe System

Pipe Design for the Air-Conditioning System

- Please ensure the piping for both condenser and chilled water system is sufficient. For example, the water system must ensure that the water flowing through the air conditioning unit or fan coil reaches the rated flow rate to ensure that the unit work properly
- Deploy pipes properly, use pipes with reverse return if possible. Although the initial investment is increased, the flow rate will be more stable. If pipes have no reverse return design, pressure between branch pipes must be balanced in the design process.
- When determining the diameters of pipes, ensure it is suitable for that flow rate as such the resistance, noise and performance of the unit is optimum. A larger water pipe will require higher initial investment but lower flow resistance and smaller pump could be use, lowering operating cost. It is crucial to find a pipe diameter that balance between investment and operation cost. Avoid a large water flow with small temperature variation to ensure that the pipe system is economical.
- In the design process, calculate water resistance accurately to ensure that water pressures between circuits are well balanced and that the air conditioning system works with the best water and thermal conditions.
- The pipe system of an air conditioning system must meet the adjustment requirements for partial workload.
- The pipe system of an air conditioning system should use energy saving technologies whenever possible.
- Pipes and accessories of the pipe system must meet the related requirements
- The design of the pipe system must facilitate maintenance, operation, and adjustment.

* Determining the diameter of pipes in the air conditioning system

The pipe diameter is determined based on the following:

$$d = \sqrt{\frac{4m_w}{3.14\ v}}$$

In the formula: m_w-------water flow m^3/s
v---------water speed m/s

The water speed should be determined by the recommendations in the first table and design the water pipe diameters accordingly, or you can determine the water pipe diameter based on water flow in the second table.

Table 1: Recommended water speed (m/s)

Diameter (mm)	12	20	25	32	40	50	65	80
Closed water system	0.4 - 0.5	0.5 - 0.6	0.6 - 0.7	0.7 - 0.9	0.8 - 1.0	0.9 - 1.2	1.1 - 1.4	1.2 - 1.6
Open water system	0.3 - 0.4	0.4 - 0.5	0.5 - 0.6	0.6 - 0.8	0.7 - 0.9	0.9 - 1.0	0.9 - 1.2	1.1 - 1.4
Diameter (mm)	100	125	150	200	250	300	350	400
Closed water system	1.3 - 1.8	1.5 - 2.0	1.6 - 2.2	1.8 - 2.5	1.8 - 2.6	1.9 - 2.9	1.6 - 2.5	1.8 - 2.6
Open water system	1.2 - 1.6	1.4 - 1.8	1.5 - 2.0	1.6 - 2.3	1.7 - 2.4	1.7 - 2.4	1.6 - 2.1	1.8 - 2.3

Table 2: Pipe diameter and resistance loss in unit length

Diameter of the steel tube (mm)	Closed water system		Open water system	
	Water flow (m^3/h)	kPa/100m	Water flow (m^3/h)	kPa/100m
15	0 - 0.5	0 - 60	--	--
20	0.5 - 1.0	10 - 60	--	--
25	1 - 2	10 - 60	0 - 1.3	0 - 43
32	2 - 4	10 - 60	1.3 - 2.0	11 - 40
40	4 - 6	10 - 60	2 - 4	10 - 40
50	6 - 11	10 - 60	4 - 8	--
65	11 - 18	10 - 60	8 - 14	--
80	18 - 32	10 - 60	14 - 22	--
100	32 - 65	10 - 60	22 - 45	--
125	65 - 115	10 - 60	45 - 82	10 - 40

NOTE: PARAMETERS IN THE PRECEDING TABLE MAY VARY BASED ON THE DESIGN MANUAL. FOR DETAILS, SEE THE "HVAC DESIGN MANUAL".

Water Storage Tank Volume Calculating

V_{min} is referred to below table

Setting temperature of reture water (°C)	A5MAC 210D	A5MAC 230D	A5MAC 340D	A5MAC 450D
14	198	224	216	193
13	234	265	254	224
12	286	324	309	267
11	367	416	395	331
10	514	583	545	433
9	857	971	882	629

NOTES:

1. *THE TOTAL WATER VOLUME OF THE ENTIRE HYDRAULIC SYSTEM INCLUDES THE WATER IN MAIN PIPE, WATER TANK AND TERMINAL EQUIPMENTS, IN WHICH THE 2-WAY VALVE IS OPEN.*
2. *IF THE WATER VOLUME (V) WHILE THE UNIT IS RUNNING IS LESS THAN VMIN, IT IS RECOMMENDED TO INSTALL A WATER TANK OF (VMIN-V)L, OR IT WILL CAUSE THE UNIT FREQUENT ON/OFF.*
3. *THE VMIN IN THE TABLE IS CALCULATED BASED ON NOMINAL COOLING WATER FLOW RATE AND 5°C ANTI-FREEZE. IF THE THE WATER FLOW RATE AND ANTI-FREEZE TEMPERATURE CHANGE, RELATIVE VMIN WILL CHANGE*
4. *ABOVE TABLE IS VALID FOR NOMINAL OPERATING CONDITION AND NOT MEANT FOR APPLICATION WITH ADDITION OF GLYCOL.*

Example: Calculating system water volume

There are 2 A5MAC230D modular chillers with with return water temperature of 12, main inlet/outlet water pipe size of DN80 and 50m long. The system have 10 fan coil units that will always be operated (each unit has a volume of 1.5L)

Calculation: Volume of main inlet/outlet water pipe = 3.14 * [(80/2)/10] ^{2} * 5000 = 251 L

Volume of terminal fan coils = 10 * 1.5 = 15

According to the table above, V_{min} = 324 L

To avoid frequent unit startup/shutdown and alarms, the volume of the water tank should be no less than V_{min} - V = 324 - 251 - 15 = 58 L

Calculating Volume of Expansion Water Tank

An expansion water tank with a proper volume must be installed to adapt to water volume changes as the temperature change. Thus, an expansion tank must be installed at the inlet of the chilled water pump to avoid freezing burst and/or pressure instability. The expansion water tank can also be used to supplement water and discharge air. Formula for calculating the volume of expansion water tank:

$$V_P = \alpha \times \Delta t \times V_s$$

V_p: effective volume of the expansion water tank (volume of water between the signal pipe and the

^{3}

α:

△t: max. water temperature variation °C.

V_s: water volume in the system (total water volume in the system and pipes) m^3

Selection principles for water pump

- Water flow-rate in the water circulation pump ≥ rated water flow-rate × 1.1
  Closed water circulation system: Water circulation pump lift ≥ (Pipe resistance of the water system + Partial resistance of the water system + Water pressure drop of the unit) × 1.1
- Open water circulation system: Water circulation pump lift ≥ (Static resistance of the water system + Pipe resistance of the water system + Partial resistance of the water system + Water pressure drop of the unit) × 1.1
- In the case that multiple units share the same pump, the pump lift is calculated according to the circuit that has the maximum resistance (usually the unit that is farthest away from the pump).

NOTE: THE WATER FLOW-RATE OF THE UNIT SHALL CALCULATE ACCORDING THE WATER FLOW RANGE.

- Water flow range

Model		A5MAC210D	A5MAC230D	A5MAC340DR	A5MAC450D
Flow range	Max. value (m^3/h)	13.4	14.6	22.36	29.9
	Rated value (m^3/h)	10.3	11.2	17.2	23.2
	Min. value (m^3/h)	7.2	7.8	12.11	16.24

Commissioning and Operation

Items to be confirmed before turning on unit

Note: Before the commissioning, check that the following conditions are met and read the "Safety Precautions" again.

- **Ensure that the water pump and the unit are connected.**
  Use the PCB controller to switch On and off the pump so that it could cut off the system in the event of abnormalities. Otherwise, BPHE may crack due to freezing. The water pump connection point must have no voltage. If a voltage circuit is connected, basic components may be damaged.
- Power on the unit to preheat the crankcase for at least 12 hours before starting up the unit for the first time or after a long time not in use. This ensures that the compressor works properly.
- Before turning on the unit, ensure the water pump is filled with water.
  Before switching on the water pump, open the water supply valve.
  Fill the pump with water, and discharge free air in the system.
- Wiring of the unit: Check that the diameter of the wires meets requirements. The wires are correctly connected and the grounding line is securely connected.
- Before turning on the unit, clean the water system and ensure that pipes are clean and free from contaminants.
- Make sure that the operating conditions do not exceed the rated operating range.

Items to be checked during the commissioning

Check the following items after the unit operation has stabilized for a period of time:

S/N	Item	Checking Method	Reference Standard
1	Power supply voltage	Voltage	Rated voltage ± 10%
2	Working current of a single compressor	Current	13 - 23A
3	Working current of a single fan	Current	2 - 5A
4	Inlet water temperature in cooling operation	Temperature	15- 20°C
5	Outlet water temperature in cooling operation	Temperature	6 -15°C
6	Inlet/outlet water temperature difference	Temperature	2 - 7°C
7	Discharge air temperature of the compressor	Temperature	65 -115°C
8	Low pressure in cooling mode	Pressure	6.5 - 10.0bar
9	High pressure in cooling mode	Pressure	22 - 41.5bar
10	Vibration and operation noise	Listen or touch	No abnormal vibration or noise

NOTE: THE REFERENCE STANDARDS ARE USED TO CHECK WHETHER A UNIT WORKS PROPERLY ON-SITE. REFERENCE STANDARDS ARE DETERMINED BASED ON THE MAXIMUM AND MINIMUM WORKING CONDITIONS. IF THE READINGS OBTAINED FROM SITE EXCEED THE VALUE STATED ABOVE, PLEASE CONTACT ACSON OR ITS AUTHORIZED DEALER.

Maintenance

Repair

Note: Before checking and maintaining the unit, safety precautions need to be adhere.

Note: Although the unit go through stringent quality and performance test. The unit must be maintained from time to time.

- The unit can only be repaired and serviced by specially-trained technicians. After a unit is serviced, safety controls must be checked and analyzed before the unit is turned on.

Items to be checked periodically

- Clean the fins of heat exchanger periodically.
  To optimize heat exchange efficiency of the condenser, check that the external part of the condenser is clean without leaves, cotton fibers, insects or other impurities which might clog up fins of the condenser. Use water or water vapor to clean it.
- Check the status of the chilled water from time to time.
  Discharge water by loosening the air or water discharge plug.
  If the water quality degrades, replace water in the system timely. (for the reference standards, see page 16)
  Contaminated water will affects the performance of the unit, degrade the heat exchanger and water pipes.
- Check whether there are any entrapped air in the chilled water system.
  Air may trapped in the system during air discharging process, check for entrapped air from time to time.
- Clean the strainer water filter in the water system periodically.
- Replenishing refrigerant and lubricant.
  Each unit is pre-charged with refrigerant and lubricant prior of delivery
  If the system operates smoothly, customers neither need nor are allowed to replenish or change the refrigerant or lubricant.
  If replenishment is necessary due to leakage, please refill the quantity specified in the nameplate of the unit.

Maintenance

The unit need to be checked on a routine basis to maintain optimum performance and minimize breakdown maintenance. The following needs to be checked on a routine basis:

Items	Monthly	Quarterly	Once half a year	Once a year	If necessary
1. Compressor					
Performance appraisal; whether there is abnormal sound	●				
Whether wires are securely connected	●				
Whether the working current is abnormal (fluctuation: 10%)		▲			
Discharge air temperature of the compressor		▲			
Check the oil level					▲
Check the color of the lubricant					▲
2. Controller					
Check parameter settings			▲		
Check protective device			▲		
Delay protector			▲		
Phase order protector			▲		
High/low pressure switch					▲
Differential water pressure switch/water flow switch					▲
Overload protector			▲		
Protector against extreme temperature of discharged air			▲		
3. Plate heat exchanger					
Check the water quality	●				
Clean the plate heat exchanger					▲
Seasonal protection measures					▲
(anti-freeze in winter)					
4. Fin heat exchanger					
Clean the fin heat exchanger		▲			
5. Others					
Whether the Y-shaped filter needs to be cleaned or replaced	●				
Whether bolts have loosened		●			

NOTE: THE PRECEDING MAINTENANCE PLAN IS FOR REFERENCE ONLY. THE MAINTENANCE PLAN MAY VARY BASED ON REGION.

● INDICATES ITEMS TO BE CHECKED BY CUSTOMERS; ▲ INDICATES ITEMS TO BE CHECKED BY SERVICE PERSONNEL.

Water Processing Method

To ensure effective operation and durability. Cleaning, washing and chemical processing are very important for water systems. Different types of water circuits need to be cleaned in different ways.

- Close Re-Circulation System
  Water systems of this type generally require no adjustment to subdue scale, and require no chemical to suppress mud and alga. This type of water system is recommended. Closed recycle systems may need anti-corrosion measures, including the following (for reference only):
  $NaNO_2$, borate and inhibitors for organic materials
  a. $NaNO_2$, borate and silicate
  b. High density chromate solution and pH control
  c. pH and sulfite control
  d. Polyphosphate salt and silicate
  e. Alkali, phosphate and sulfite control

Because it is hard to control water quality. For closed circulation chilled water system, we recommend that the total density of copper pipe inhibitors such as NaNO2, borax, silicate and benzothiazole should be no less than 1400 ppm. The inhibitor NaNO2 is soluble in glycol, and can be used in northern areas or in the subsystem of solar power systems.

- Open Circulation System
  This type of water system is generally not recommended. They are exposed to the atmosphere, and are susceptible to scale, corrosion, mud and alga. Therefore, they might degrade the performance and reduce the service life of the unit.

- Once-through System
  Generally, once-through systems are only used for cooling only air conditioners. Water systems of this type use water from taps, lakes, rivers, and wells. Although the once-through system exchanges heat with the closed water circuit, it is not considered as an integral part of the water source heat pump system. Once-through systems may be troubled by either scale or corrosion. This type of water system requires large amount of adjustment water. Therefore, you need to consider the scale coefficient, the equipment used for cleaning work, and necessary anti-corrosion materials.

⚠ Caution

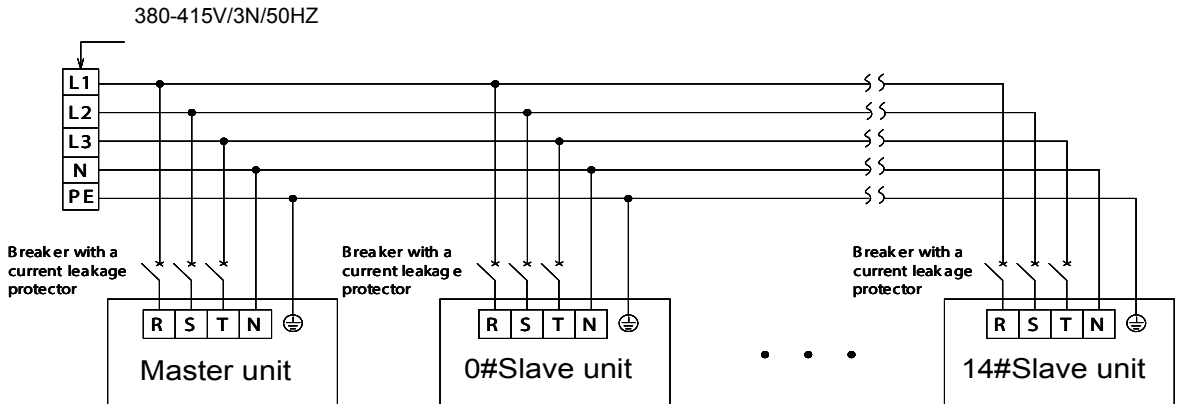
Using water from lake or river is not suitable to the unit due to mud and algae.

Comparison among closed circulation systems, open recycle systems and once-through systems

	Once-through System	Open Recycle System	Closed Circulation System
Scale control	1. Surface activator such as polyphosphate salt 2. Increased acidity 3. pH adjustment 4. Other considerations include: surface temperature, water temperature and system cleaning	1. Discharge 2. Surface activator such as polyphosphate salt 3. Increased acidity 4. pH adjustment 5. Softening (other considerations include: surface temperature, water temperature and system cleaning).	No control is necessary
Corrosion control	1. Low density corrosion inhibitor 2. Anti-$CaCO_2$ plate 3. pH control 4. Proper material	1. High density (200 - 500 ppm) corrosion inhibitor 2. Low density (20 - 30 ppm) corrosion inhibitor 3. pH control 4. Proper material	1. High density corrosion inhibitor 2. Proper material
Mud and alga control	1. Chloridized hydroxybenzene 2. Other chemicals 3. Chlorine formed by hypochlorite and liquid chlorine	1. Chloridized hydroxybenzene 2. Other chemicals 3. Chlorine formed by hypochlorite and liquid chlorine	No control is necessary

Control System Instruction

Power Cable Connection Diagram

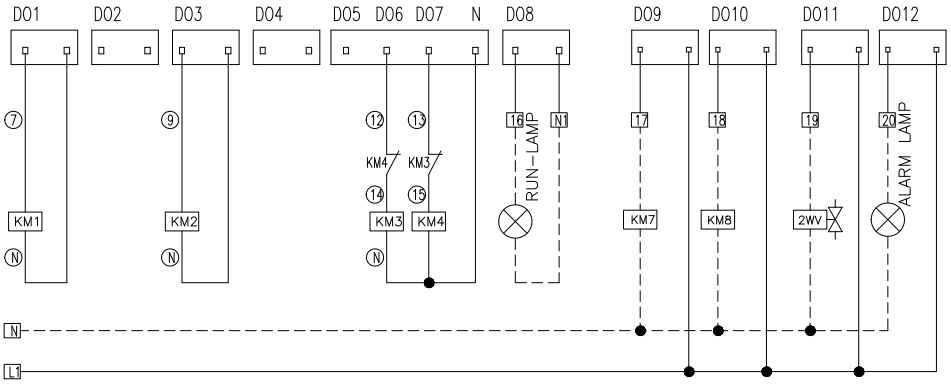


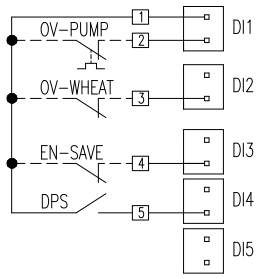
- The dimension of power cable connection refer to electical parameters.
- All wires must be securely connected.
- Wires must not contact the refrigerating pipes or moving parts of the compressor and the fan.

PCB Instruction

■ Connection illustration for pumps and other parts

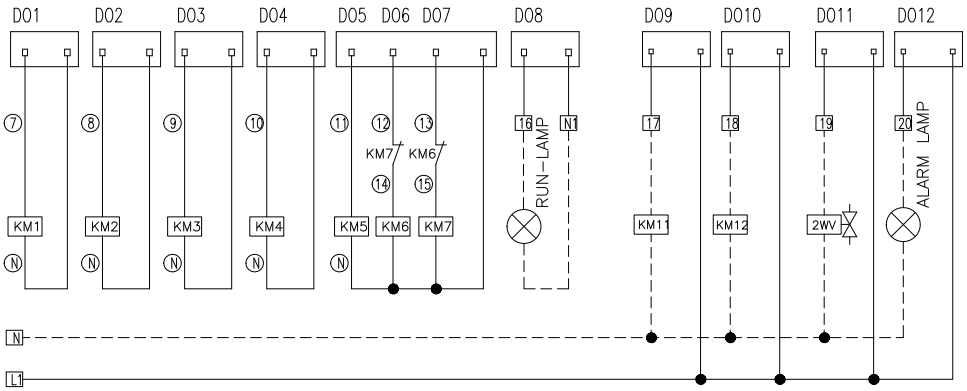
A5MAC210/230D

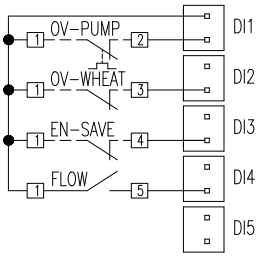




KM7: Water pump congtrol contactor.
KM8: Water system heater control contactor.

A5MAC340/450D(R)





KM11: Water pump congtrol contactor
KM12: Water system heater control contactor

NOTE:

PARTS WITHIN THE DASHED BOX ARE TO BE CONNECTED ONSITE. THE OUTPUT VOLTAGE OF THE MODULE INTERFACE IS 220-240 V.

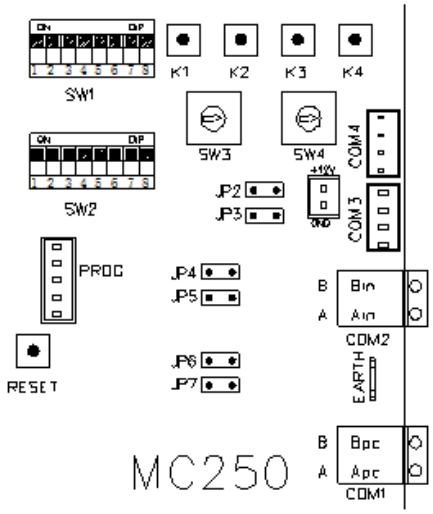
PARTS WITHIN THE REAL-LINE BOX ARE CONNECTED BEFORE DELIVERY.

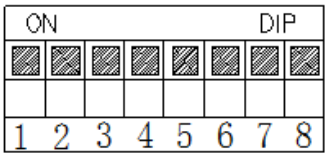
2WV:WATER SYSTEM 2-WAY VALVE, OV-PUMP: PUMP OVERLAOD PROTECTION, OV-WHEAT: WATER SYSTEM HEATER OVERLOAD PROTECTION, EN-SAVE: 2-WAY VALVE INTERLOCKING OR REMOTE CONTROL SWITCH.

IF THE SYSTEM OPERATES WITH WATER SYSTEM OF "ONE PUMP FOR ONE UNIT". FOR WATER PUMP CONTROLS FOR SLAVE UNIT WILL REQUIRE THE PUMP TO BE CONNECTED TO "2WV" POINT OF SLAVE UNITS.

- **Setting up Address Using DIP Switch**

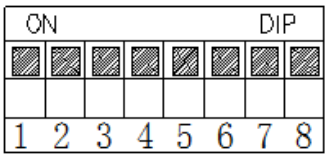
  The controller can be used to set the unit capacity, address and slave unit number. The capacity DIP has been set prior of delivery and cannot be changed. The address DIP and slave number DIP need to be set as required after the unit is installed. Customers need to take down the address number. Location of the unit and keep the record in good condition for maintenance reference.





SW1

Upward represents 1
Downward represents 0



SW2

- The first digit of SW1 indicates the DIP of master/slave unit. It is set to ON for the master unit, and set to OFF for the slave unit.
- The second digit of SW1 indicates the DIP for cooling only or heat pump. Set to 'ON' for cooling only and 'OFF' for heat pumps.
- The third digit of SW1 of this model is reserved.
- The fourth digit of SW1 indicates automatic startup after power restoration. It is set to ON to enable this function.
- The fifth digit of SW1 indicates end 2-way valve interlock function. It is set to ON to enable this function.
- The sixth digit of SW1 indicates the air conditioning water flow rate system. ON: Air conditioning system for variable water flow rate system; OFF: Air conditioning system for constant water flow rate system.
- The seventh digit of SW1 indicates the refrigerant type. ON: R22; OFF: R410A.
- The eighth digit of SW1 indicates the model variations. ON: low-temperature heating unit; OFF: standard unit.

- **The master unit must set the number of slave unit(s) connected. The slave unit does not have to be set (bits 1~4 of SW2):**

Slave unit Qty.	1	2	3	4	Slave unit Qty.	1	2	3	4
0	0	0	0	0	8	1	0	0	0
1	0	0	0	1	9	1	0	0	1
2	0	0	1	0	10	1	0	1	0
3	0	0	1	1	11	1	0	1	1
4	0	1	0	0	12	1	1	0	0
5	0	1	0	1	13	1	1	0	1
6	0	1	1	0	14	1	1	1	0
7	0	1	1	1	15	1	1	1	1

■ **The master unit must set the number of slave unit(s) connected. The slave unit does not have to be set (bits 1~4 of SW2):**

Address of the outdoor unit	SW3	SW4	Address of the outdoor unit	SW3	SW4	Address of the outdoor unit	SW3	SW4	Address of the outdoor unit	SW3	SW4
0#	0	0	8#	0	8	16#	1	6	24#	2	4
1#	0	1	9#	0	9	17#	1	7	25#	2	5
2#	0	2	10#	1	0	18#	1	8	26#	2	6
3#	0	3	11#	1	1	19#	1	9	27#	2	7
4#	0	4	12#	1	2	20#	2	0	28#	2	8
5#	0	5	13#	1	3	21#	2	1	29#	2	9
6#	0	6	14#	1	4	22#	2	2	30#	3	0
7#	0	7	15#	1	5	23#	2	3	31#	3	1

NOTE:

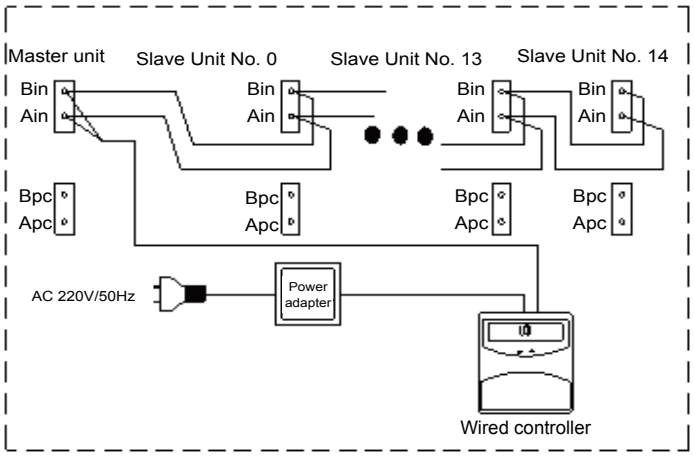
ADDRESS NUMBERS MUST BE UNIQUE IN THE SAME SYSTEM.

THE UNIT CAN ONLY BE POWERED ON AND COMMISSIONED AFTER THE ADDRESS NUMBERS ARE CONFIGURED.

THE INNER SIDE OF THE CONTROL BOX COVER OF THE UNIT IS ATTACHED WITH AN ELECTRICAL WIRING DIAGRAM OF THE UNIT, WHICH PROVIDES DETAILED DESCRIPTION FOR DIP SETTINGS. PLEASE KEEP IT PROPERLY.

■ **Communication between master and slave unit**

Control (Communication) Wire Connection



A) conductor (WTC pair with cross section area of at least 0.5mm^2 or 20AWG); B) insulator; C) Screen layer (twisted WTC with a screening factor no less than 95%); D) Outer jacket (PVC);

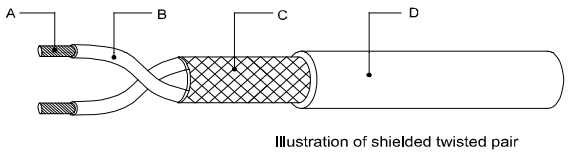


Illustration of shielded twisted pair

NOTE:

RCOMMENDED TO CHOOSE NETWORK CABLES WITH A BRAID SHIELD LAYER AND SMALLER TWISTING DISTANCE.

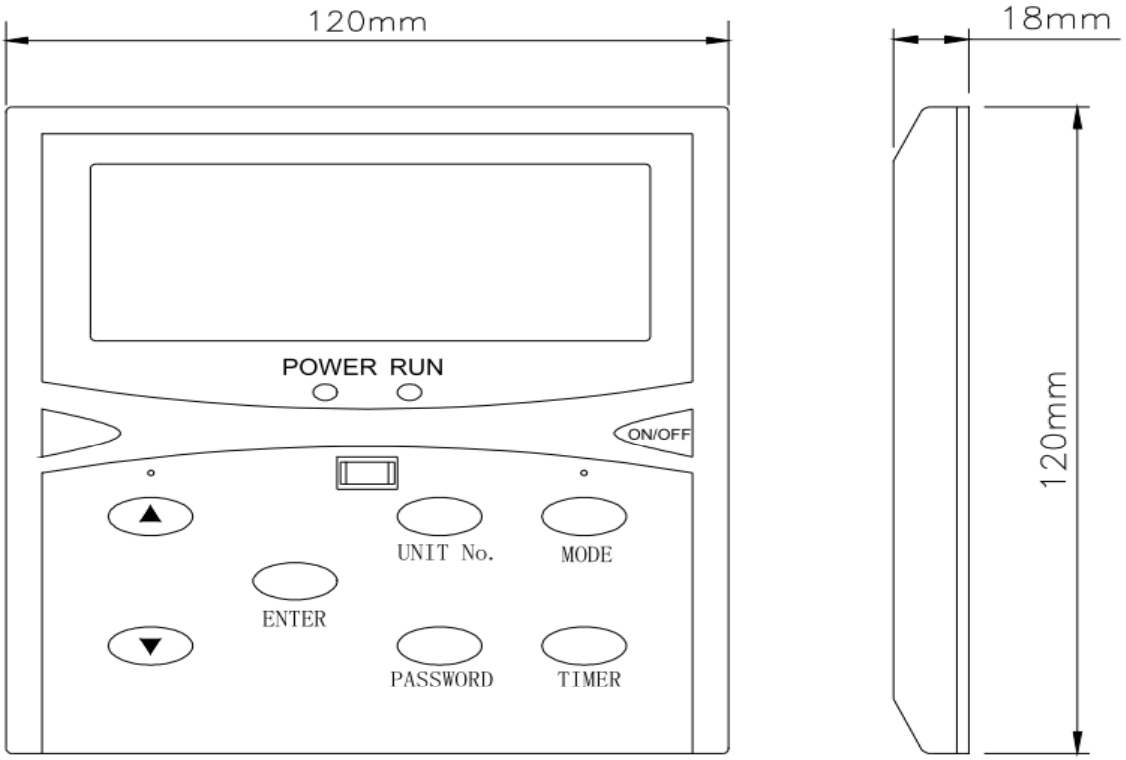
PLEASE REFER TO THE UL2547 OR UL2791 WIRE SPECIFICATION.

THE CONTROL WIRE MUST NOT BE LONGER THAN 1000 METERS.

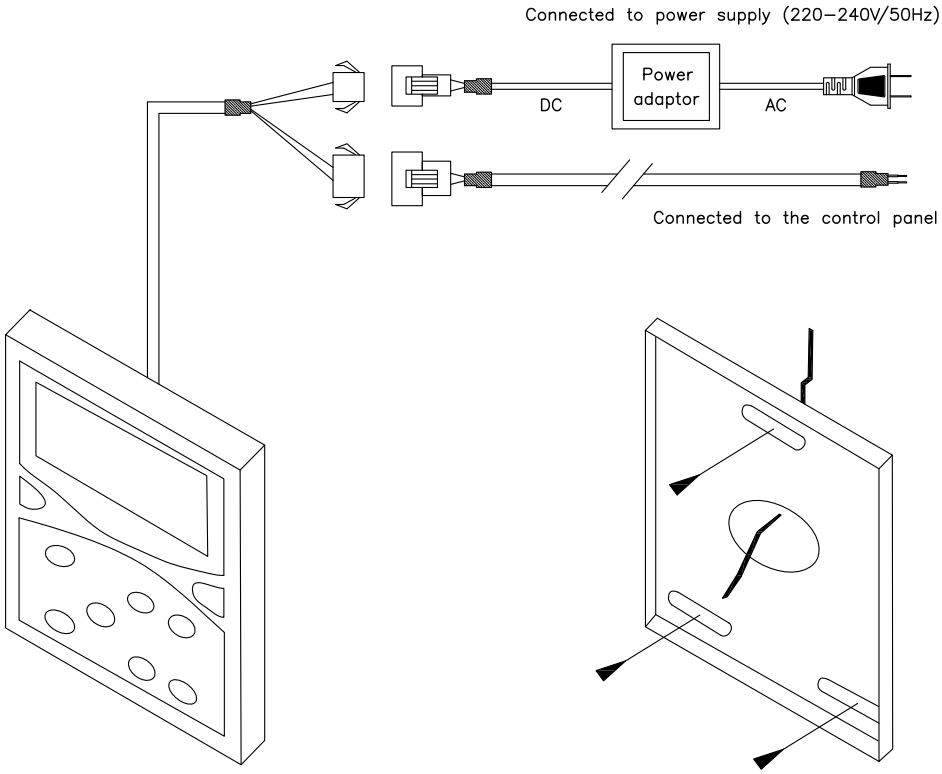
THE CONTROL WIRE MUST BE AT LEAST 20CM AWAY FROM MAJOR CURRENT WIRE.

Wired Controller Instruction

Dimensions



Controller Installation



Functions

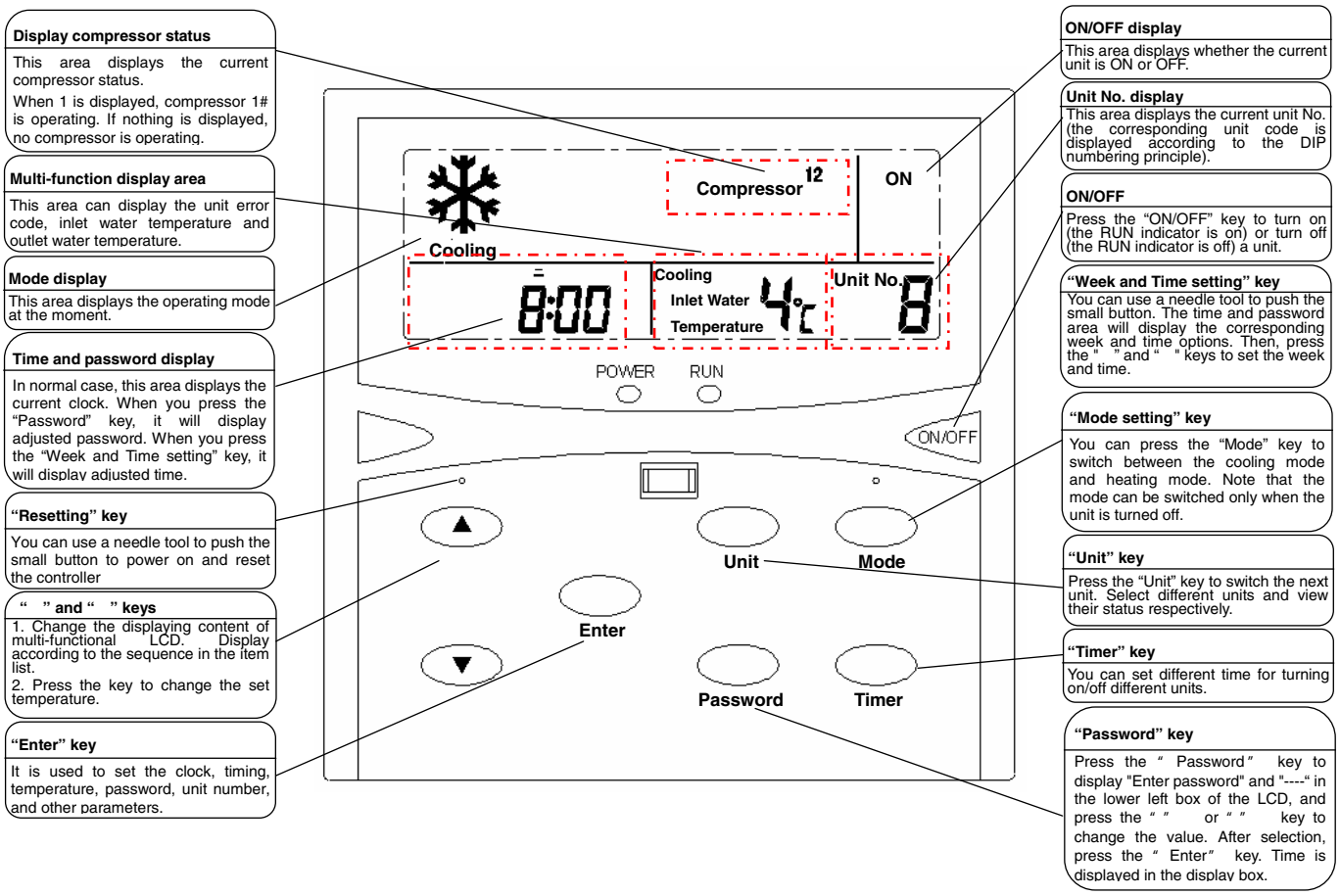
AC305 is a wall-mounted LCD controller which directly controls air conditioners through keys on its panel.

1) Features

Two operation modes: heating/cooling (note: operation modes can only be switched when the unit is off)
For air cooled chiller, temperature setting range for inlet water: cooling 10°C - 25°C; heating 25°C - 50°C; For water cooled chiller, temperature setting range for inlet water: cooling 10°C - 25°C (-10°C - 10°C for low water temperature unit); heating 25°C - 50°C.

- Temperature setting range for anti-freeze: 2°C - 5°C.
- A LED is used to indicate the status of the unit (ON/OFF).
- Timed ON/OFF: a timing schedule can be set for a maximum of 7 days with up to 4 timed actions each day.
- Real-time clock.
- Error code display speeds up diagnosis.
- Blue back light will shine 8 second if any key is pressed, it makes sure that we can browse or modify parameters even in dark.

2) Use Specification



The control system has the following functions:

S/N	Function	S/N	Function
1	Controlling the 2-way valve of the water system (relevant accessories need to be purchase separately);	11	Timing
2	Anti-freeze protection for plate heat exchanger	12	Protection for Compressors in Operation
3	Alternative defrosting	13	Averaging Workload among Compressors
4	Manual defrosting	14	Failure alarm, viewing and output
5	2-way Valve Interlock Control	15	Memorizing parameters in the case of a power failure
6	Week Setting	16	Setting and resetting the operating parameters of the unit
7	Status display	17	Electric heater
8	Auto-startup at power on	18	Setting the clock of the system
9	Setting the serial number of a unit	19	Displaying the indoor and inlet water temperatures
10	Memorizing the clock settings in the case of a power failure		

Settings

1) Parameter Viewing

The controller can be used to view the operation status and parameters of any unit connected to it.
Parameters can be view include operation status of the compressor, inlet/outlet water temperature, timer setting, cooling antifreeze temperature setting, antifreeze temperature setting in winter, defrosting temperature, and so on.
After pressing the "UNIT" key, you can increase/decrease the blinking unit No. and view the parameters of the current unit by pressing "▲" or "▼". To view more working parameters of a unit, you can press "OK" and "▲" or "▼" after reaching the unit No.

2) Setting Parameters (parameters can be set only when the unit is turned off)

① Upon pressing the "PASSWORD", bottom of the LCD will display "Input password" and "___". Use the "▲" or "▼" to key in the number. Press "OK" after key in the correct password (factory default password is "0055"). If the password key in is correct, the led will blinks parameters that can be set.

② How to change password:
After key in the correct password, press the "PASSWORD" button once more. The LED should display "__" and new password can set using the "▲" or "▼" key. Upon reaching the number which you desire, press the "OK" button to confirm.

③ How to set the parameter:
Press the "UNIT" button then "▲" or "▼" to browse through the units within the system (Depends on system).
Press "OK" once confirm.
Press "▲" or "▼" to browse through the parameters that can be set (including the inlet/outlet water temperature).
Press "OK" once confirm to view and change the parameter by using the "▲" or "▼".
Press "OK" once again to confirm.
Repeat this step to change other parameters.
(Note: The controller will prompt for password again if no key is pressed within 60 seconds.)
(Note: Parameter can only be set when the unit is in standby mode)

3) Real Time Setting

1 To set week and time, press the small hole above the "Mode" key using a needle-like tool (the LCD displays " Weekday Setting" indicating access to the weekday adjustment phase).
2 Press the "▲" or "▼" key to set the weekday of the current time.
3 Press the small button again to save the weekday setting. Meanwhile, the "Time Setting" text will be displayed and blinks on the LCD indicating access to the time adjustment phase.
4 Press the "▲" key to change hour, and the "▼" key to change minute.
5 Press the small button again to save the set time. Note: If the "Unit", "Password", "Timer" or "Enter" key is pressed or no key is pressed within 5s during setting process, time setting will exit without saving the set time.

4) Timer Setting

1 After the “Timer” key is pressed, “Weekday Setting” and “Timer Setting” are displayed at the same time on the LCD, indicating access to the weekday adjustment phase.
2 Press the “▲” or “▼” key to select the weekday of the timer time to be set.
3 After selection, press the “Enter” key. “Timer Setting” is displayed on the LCD, indicating that timing weekday has been selected and setting of timing times is being accessed.
4 Upon entering the timing times, press the “▲” or “▼” key to set specific timing point of the current day (four timing times can be set each day, and the timing No. is displayed on the left of the on/off status).
5 Press the “Enter” key to select a timing point and access selection of timed ON or OFF.
6 Press the “▲” key or “▼” key to select “Timed ON” or “Timed OFF”.
7 Press the “Enter” key to select timer ON or OFF and enter into setting of timer time mode. Now the LCD will displays “Timer Setting” and “Time Setting” and the time blinks.
8 Press the “▲” key to change hour, and press the “▼” key to change minute. After setting time, press the “Enter” key to complete all settings of this timing and go to step 3 . The number of timer times should increase in order (if the previous timer times are 4, the system automatically goes to the first time of timer next day). Timing of one week can be set cyclically until timing setting exits.
9 To cancel a timer set, set the time of the timer to 00:00 for that particular set.
10 To cancel all timed actions, press and hold “Mode” + “Unit” until you hear a long beep sound.
11 After the timer mode exits, the time display area displays the next timing action time every 2s (it is not displayed if the unit has been powered on/off manually).

Note:
Timed ON/OFF actions are triggered when the time of the wire controller reaches the set time. Therefore, if the time of the wire controller is inaccurate, the actual ON/OFF time will be inaccurate. If you press the “Unit”, “Mode” or “Password” key or press nothing within 5s during setting process, the controller will exit timer setting automatically without saving settings but the previous settings will not be affected. Unit by default is without any timer setting.

5) Manual Defrost

When the unit works in heating mode, press "▲" or "▼" until "Manual Defrosting" appears, and then press "OK" to enter Manual Defrosting mode.

6) Reset

The controller can be reset by pressing the small hole above the "▲" key using a needle-like tool.

7) Locking the wire controller

You can lock up the wire controller by holding “Enter” for 5s. The lockup icon will be displayed on the upper right corner. When the controller is locked up, only off and on function can be carry out by the controller. To unlock the controller, hold "Enter" key for 5s again. The lockup icon will be cleared.

Error Code

Controller Stoppage Code

Code	Symptoms	Code	Symptoms
00-14	0#...14# communication failure of slave units	44	Main pipe outlet water temperature sensor malfunctioned
16	Compressor no.1 of system no.1 overloaded	45	Inlet water temperature sensor failed
17	Compressor no.1 of system no.2 overloaded	46	Outlet water temperature sensor failed
18	Water pump overload	47	Ambient temperature sensor failed
19	Insufficient water flow rate failure	48	System 1 heat exchanger outlet temperature sensor failed
20	System 1 high pressure	49	System 2 heat exchanger outlet temperature sensor failed
21	System 1 low pressure	50	System 1 suction temperature sensor failed
24	System 2 high pressure	51	System 2 suction temperature sensor failed
25	Anti-freezing protection failure	52	System 2 low pressure sensor failed
26	Electric heater for water system overloaded	53	System 1 low pressure sensor failed
27	Ambient temperature too high/low	54	Memory failure
29	Suction superheat for system 1 too low	60	No system to startup
31	Communication failure between master and slave units	63	System 1 fan motor overloaded
32	Suction temperature for system 1 too high	64	System 2 fan motor overloaded
33	Discharge temperature for system 1 is too high	65	Temperature difference between water inlet and outlet is too large
34	Suction temperature for system 2 is too high	66	Reverse connection of the water inlet temperature sensor and water outlet temperature sensor
35	Discharge temperature of system 2 is too high	67	Master unit inlet water temperature sensor failed
36	System 2 low pressure	68	Compressor no.2 of system no.1 overloaded
37	Suction superheat for system 2 is too low	69	Compressor no.2 of system no.2 overloaded
38	System 1 leaking refrigerant	70	System 1 discharge temperature is abnormal
39	System 2 leaking refrigerant	71	System 2 discharge temperature is abnormal
40	System 1 discharge temperature sensor malfunctioned	78	Communication failure for all slave units
41	System 2 discharge temperature sensor malfunctioned	F6	Communication failure between wired controller and master unit
42	System 1 middle heat exchanger sensor malfunctioned	ERRO	DIP setting error
43	System 2 middle heat exchanger sensor malfunctioned		

Codes Displayed by the LED Indicator and Explanations

Code	Symptoms	Code	Symptoms
ECXX-14	Slave unit 0# ~ 14# communication failure	ER43	System 2 middle heat exchanger sensor malfunctioned
ER16	Compressor no.1 of system no.1 overloaded	ER44	Main pipe outlet water temperature sensor malfunctioned
ER17	Compressor no.1 of system no.2 overloaded	ER45	Inlet water temperature sensor failed
ER18	Water pump overloaded	ER46	Outlet water temperature sensor failed
ER19	Insufficient water flow rate failure	ER47	Ambient temperature sensor failed
ER20	System 1 high pressure	ER48	System 1 heat exchanger outlet temperature sensor failed
ER21	System 1 low pressure	ER49	System 2 heat exchanger outlet temperature sensor failed

Code	Symptoms	Code	Symptoms
ER24	System 2 high pressure	ER50	System 1 suction temperature sensor failed
ER25	Anti-freezing protection failure	ER51	System 2 suction temperature sensor failed
ER26	Electric heater for water system overloaded	ER52	System 2 low pressure sensor failed
ER27	Ambient temperature too high/low	ER53	System 1 low pressure sensor failed
ER29	Suction superheat for system 1 too low	ER54	Memory failure
ER31	Communication failure between master and slave units	ER60	No system to startup
ER32	Suction temperature for system 1 too high	ER63	System 1 fan motor overloaded
ER33	Discharge temperature for system 1 is too high	ER64	System 2 fan motor overloaded
ER34	Suction temperature for system 2 is too high	ER65	Temperature difference between water inlet and outlet is too large
ER35	Discharge temperature of system 2 is too high	ER66	Inlet water temperature sensor is switched with outlet water temperature sensor
ER36	System 2 low pressure	ER67	Master unit inlet water temperature sensor failed
ER37	Suction superheat for system 2 is too low	ER68	Compressor no.2 of system no.1 overloaded
ER38	System 1 leaking refrigerant	ER69	Compressor no.2 of system no.2 overloaded
ER39	System 2 leaking refrigerant	ER70	System 1 discharge temperature is abnormal
ER40	System 1 discharge temperature sensor malfunctioned	ER71	System 2 discharge temperature is abnormal
ER41	System 2 discharge temperature sensor malfunctioned	EC78	Communication failure for all slave units
ER42	System 1 middle heat exchanger sensor malfunctioned	ERRO	DIP setting error

Error Code and Running Status

■ Characters displayed by the LED indicator are explained in the following table

Character	Meaning	Character	Meaning	Character	Meaning	Character	Meaning	Character	Meaning	Character	Meaning
0	0/O	2	2	4	4	6	6	8	8	A	A
1	1	3	3	5	5	7	7	9	9	b	B

Character	Meaning	Character	Meaning	Character	Meaning	Character	Meaning	Character	Meaning	Character	Meaning
C	C	E	E	H	H	n	N	r	R	U	U
d	D	F	F	L	L	P	P	t	T	y	Y

■ Codes representing normal operation statuses are explained in the following table

Code	State Description	Code	State Description	Code	State Description
NULL	NULL: the unit is in standby state.	CSP	CSP: The unit is in cooling -off process.	HEAt	HEAT: The unit is in heating state.
rESt	REST: The unit is in reset state.	dEF	DEF: The unit is in defrosting state.	HSP	HSP: The unit is in heating-off process.
COOL	COOL: The unit is in cooling state.	toFS	ToFS: Fixed water flow system	toUS	ToUS: Variable water flow system
PrEH	PREH: The unit is in preheating state(in 30 minutes)				

Failure Causes and Solutions

S/N	Failure Code	Symptom	Possible Cause	Solution
1	Wired controller F6 alarm	Communication failure between wired controller and master unit	1. A/B communication lines of the wired controller and master unit are incorrectly connected.	Check and troubleshoot the communication lines.
			2. The communication line has broken off.	
			3. Communication wires between the wired controller and the master unit cross over strong-current cables.	Rewire the unit, use shielded communication lines or keep the communication lines away from strong current cables.
			4. Control panel of the master unit is not powered on.	Check and troubleshoot the control panel
			5. The communication line between the master unit and the wired controller is too long.	1. Use shielding cables 2. Short the JP7 jumper on the control panel
			6. Can communicate with the monitoring software while the wired controller sends out the alarm F6.	Remove resistance R44 on the wire controller, or Replace the wire controller.
			7. Failure of communication ports on the control panel of the master unit.	Replace the control module.
			8. Failure of communication ports on the wired controller.	Replace the control module.
			9. Incorrect address setting for the master unit.	Check S2 DIP setting for master unit is as specified in the specifications.
2	The LED indicator of the unit displays ECXX and the wired controller displays XX (XX represents 00 ~ 14)	Communication failure of slave unit No. XX	1. Communication line of slave Unit No. XX has broken off	Check and troubleshoot the communication lines
			2. The control panel of slave Unit No. XX is not powered on.	Check and troubleshoot the control panel.
			3. Incorrect DIP address setting for the slave unit.	Reset the addresses of all slave units and check that there is no duplicate address.
			4. The number of slave unit is set incorrectly for the master unit.	Reset the number of slave units and check that the number match with all the addresses.
			5. PC communication port of the slave unit is damaged.	1. Exchange positions of the two 485 interfaces on the control panel of xx slave unit.
				2. Replace the control panel.
			6. The communication line of Slave Unit No. XX is incorrectly connected.	Connect the communication line of slave Unit No. XX to Apc/Bpc port.
3	The LED indicator of the unit displays ER78 and the wired controller displays 78	Communication failure for all slave units	1. Bin/Ain port communication cables of the master unit are dropped.	Re-connect communication cables to Bin/Ain port and tighten the thread.
			2. One A/B line is connected reversely.	Check communication cables.
			3. Bin/Ain port of the master unit is damaged.	Replace the control panel of the master unit.
4	The LED indicator of the unit displays ER16 and the wired controller displays 16	Compressor no.1 of system no.1 overloaded	Operating current for compressor is too high.	1. Check whether the set value of the correspondent overload protector current is correct according to the wiring diagram 2. Check whether resistance of the correspondent compressor is abnormal.
5	The LED indicator of the unit displays ER17 and the wired controller displays 17	Compressor no.1 of system no.2 overloaded	Operating current for compressor is too high	1. Check whether the set value of the correspondent overload protector current is correct according to the wiring diagram 2. Check whether resistance of the correspondent fan is abnormal.

S/N	Failure Code	Symptom	Possible Cause	Solution
6	The LED indicator of the unit displays ER18 and the wired controller displays 18	Water pump motor overloaded	Operating current of the water pump motor is too high	1. Check whether the set value of the overload protector current of the water pump is correct according to the wiring diagram 2. Check whether resistance of the water pump is abnormal.
7	The LED indicator of the unit displays ER19 and the wired controller displays 19	Alarm for insufficient water flow rate	1. A smaller water pump is used.	Replace the pump.
			2. The water filter is clogged.	Clean the water filter.
			3. There is air trapped within the system.	Continue operate the water pump to clear trapped air within the system.
			4. The differential pressure switch is blocked.	Overhaul or replace the differential pressure switch.
			5. The differential pressure switch is damaged.	Replace the differential pressure switch.
			6. The water system pressure is too high or not balanced.	Optimize the water system.
			7. Blockage within the water system.	Check and troubleshoot accordingly.
8	The LED indicator of the unit displays ER20 and the wired controller displays 20	System 1 high pressure	1. The motor is damaged (cooling).	Check and troubleshoot accordingly.
			2. Air circulation is short circuited (cooling)	
			3. Heat exchanger is dirty (cooling).	
			4. The fluorine-side filter is clogged.	Check and replace if needed.
			5. Water temperature is too high (heating).	Lower the water temperature setting.
			6. Insufficient water flow rate (heating)	Check and troubleshoot accordingly..
			7. The water filter is clogged (heating).	Clean the water filter.
			8. Ambient temperature is too high. (cooling)	Shut down the unit.
			9. Excessive refrigerant is charged into system	Recover and recharge according to the nameplate.
			10. Module high pressure port faulty.	Replace the module.
			11. The unit pressure switch is damaged.	Replace the pressure switch.
9	The LED indicator of the unit displays ER21 and the wired controller displays 21	System 1 low pressure	1. Poor heat exchanging performance (heating).	Check the outdoor unit and troubleshoot accordingly.
			2. Outdoor fan motor have abnormality (heating).	Check and troubleshoot accordingly.
			3. System is leaking refrigerant or insufficient.	Check for leakages. Recover and recharge if needed.
			4. Low pressure input port faulty.	Replace the module.
			5. Low pressure sensor damaged.	Replace the pressure sensor.
10	The LED indicator of the unit displays ER24 and the wired controller displays 24	System 2 high pressure	1. Fan motor is damaged (cooling).	Check and troubleshoot accordingly.
			2. Air circulation short circuited (cooling)	
			3. Heat exchanger is dirty (cooling).	
			4. The fluorine-side filter is clogged.	Check and replace if needed.
			5. Water temperature is too high (heating).	Lower the water temperature setting.
			6. Insufficient water flow rate (heating).	Check and troubleshoot accordingly.
			7. The water filter is clogged (heating).	Clean the water filter.
			8. Ambient temperature is too high (cooling).	Shut down the unit.
			9. Refrigerant system is over charged.	Recover and recharge the system according to the nameplate.
			10. High pressure output port faulty.	Replace the module.
			11. The unit pressure switch is damaged.	Replace the pressure switch.

S/N	Failure Code	Symptom	Possible Cause	Solution
11	The LED indicator of the unit displays ER25 and the wired controller displays 25	Anti-freezing protection failed	1. Return water temperature is set too low.	Modify the set temperature of the return water.
			2. Insufficient water flow rate causing temperature difference too high.	Check the water system (refer to item 7).
12	The LED indicator of the unit displays ER26 and the wired controller displays 26	Electric heater for water system is overloaded	1. Check whether the unit is supplied with an electric heater.	If the unit is confirmed without heater, bypass the switch
			2. Electric heater wire is short-circuited.	Check and replace if needed.
13	The LED indicator of the unit displays ER27 and the wired controller displays 27	Ambient temperature is too high or low	1. Ambient temperature sensor faulty	Check and replace if needed.
			2. Ambient temperature is too high/low	Shut down the unit.
14	The LED indicator of the unit displays ER29 and the wired controller displays 29	System 1 suction superheat is too low	1. Low pressure or temperature sensor is faulty	Check and replace if needed.
			2. Electronic expansion valve control algorithm malfunctioned.	Update the module
15	The LED indicator of the unit displays ER31 and the wired controller displays 31	Communication failure between master and slave units	1. Communication line of the slave unit has loosen.	Check the communication cables and troubleshoot accordingly.
			2. Incorrect DIP address setting for the slave unit.	Reset the addresses of all slave units and ensure that there is no duplicate address.
			3. The number of slave unit is set for the master unit is incorrect.	Reset the number of slave units and check that the number match with all the addresses.
			4. Slave unit PC communication port is damaged	1. Exchange positions of the two 485 interfaces on the control panel of the slave unit.
				2. Replace the control panel of the unit.
			5. Communication line of the slave unit connected to wrong port.	Connect communication cables of the slave unit to Apc/Bpc port.
16	The LED indicator of the unit displays ER32 and the wired controller displays 32	System 1 suction temperature is too high (40°C)	1. Four-way valve jammed.	Gently knock the sides of the four-way valve and restart the system. Should the alarm persist, replace the four-way valve.
			2. Incorrect coil operation of the four-way valve.	Replace the coil.
			3. Compressor idle protection due to air discharge temperature is too high.	Refer to item 17 in the table.
17	The LED indicator of the unit displays ER33 and the wired controller displays 33	System 1 discharge temperature is too high	1. Damaged fan motor (cooling).	Check and troubleshoot accordingly.
			2. Air circulation short circuited (cooling).	
			3. Heat exchanger is dirty (cooling).	
			4. The electronic expansion valve is not opened as expected (heating).	Check the electronic expansion valve and troubleshoot accordingly.
			5. Water temperature is too high.	Change the setting for return water temperature to be performed by service personnel.
			6. Insufficient refrigerant or leakages.	Recover and recharge accordingly.
			7. Incomplete defrosting.	Change the defrosting parameter to be performed by service personnel

S/N	Failure Code	Symptom	Possible Cause	Solution
18	The LED indicator of the unit displays ER34 and the wired controller displays 34	System 2 suction temperature is too high (40°C)	1. Four-way valve jammed.	Gently knock the sides of the four-way valve and restart the system. Should the alarm persist, replace the four-way valve.
			2. Incorrect coil operation of the four-way valve.	Replace the coil.
			3. Compressor idle protection due to air discharge temperature is too high.	Refer to item 19 in the table.
19	The LED indicator of the unit displays ER35 and the wired controller displays 35	System 2 discharge temperature is too high	1. Damaged fan motor (cooling).	Check and troubleshoot accordingly.
			2. Air circulation short circuited (cooling).	
			3. Heat exchanger is dirty (cooling).	
			4. The electronic expansion valve is not opened as expected (heating).	Check the electronic expansion valve and troubleshoot accordingly.
			5. Water temperature is too high.	Change the setting for return water temperature (to be performed by service personnel).
			6. Insufficient refrigerant or leakages.	Recover and recharge accordingly.
			7. Incomplete defrosting.	Change the defrosting parameter to be performed by service personnel
20	The LED indicator of the unit displays ER36 and the wired controller displays 36	System 1 low pressure	1. Poor heat exchanging performance (heating).	Check the outdoor unit and troubleshoot accordingly.
			2. Outdoor fan motor have abnormality (heating).	Check and troubleshoot accordingly.
			3. System is leaking refrigerant or insufficient.	Check for leakages. Recover and recharge if needed.
			4. Low pressure input port faulty.	Replace the module.
			5. Low pressure sensor damaged.	Replace the pressure sensor.
21	The LED indicator of the unit displays ER37 and the wired controller displays 37	System 1 suction superheat is too low	1. Low pressure or temperature sensor is faulty	Check and replace if needed.
			2. Electronic expansion valve control algorithm malfunctioned.	Update the module
22	The LED indicator of the unit displays ER38 and the wired controller displays 38	System 1 leaking refrigerant	1. Low pressure sensor failed.	Check and replace the sensor if needed.
			2. Insufficient refrigerant charged.	Recover and recharge accordingly.
23	The LED indicator of the unit displays ER39 and the wired controller displays 39	System 2 leaking refrigerant	1. Low pressure sensor failed.	Check and replace the sensor if needed.
			2. Insufficient refrigerant charged.	Recover and recharge accordingly.
24	The LED indicator of the unit displays ER40 and the wired controller displays 40	System 1 discharge temperature sensor failed	1. TH1 temperature sensor is loosen or broken off.	Check the control module and ensure the sensor is securely connected.
			2. TH1 temperature sensor is shorted/ open.	Check whether the resistance of TH1 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
25	The LED indicator of the unit displays ER41 and the wired controller displays 41	System 2 discharge temperature sensor failed	1. TH2 temperature sensor is loosen or broken off.	Check the control module and replug the temperature sensor.
			2. TH2 temperature sensor is shorted/ open.	Check whether the resistance of TH1 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.

S/N	Failure Code	Symptom	Possible Cause	Solution
26	The LED indicator of the unit displays ER42 and the wired controller displays 42	System 1 middle heat exchanger sensor failed	1. TH3 temperature sensor is loosen or broken off.	Check the control module and replug the temperature sensor.
			2. TH3 temperature sensor is shorted/ open.	Check whether the resistance of TH3 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
27	The LED indicator of the unit displays ER43 and the wired controller displays 43	System 2 middle heat exchanger sensor failed	1. TH4 temperature sensor is loosen or broken off.	Check the control module and replug the temperature sensor.
			2. TH4 temperature sensor is shorted/ open.	Check whether the resistance of TH4 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
28	The LED indicator of the unit displays ER44 and the wired controller displays 44	Main pipe leaving water temperature sensor malfunction	1. TH5 temperature sensor is loosen or broken off.	Check the control module and replug the temperature sensor.
			2. TH5 temperature sensor is shorted/ open.	Check whether the resistance of TH5 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
29	The LED indicator of the unit displays ER45 and the wired controller displays 45	Entering water temperature sensor failed	1. TH6 temperature sensor is loosen or broken off.	Check the control module and replug the temperature sensor.
			2. TH6 temperature sensor is shorted/ open.	Check whether the resistance of TH6 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
30	The LED indicator of the unit displays ER46 and the wired controller displays 46	Leaving water temperature failed	1. TH7 temperature sensor is loosen or broken off.	Check the control module and ensure the temperature sensor is securely connected.
			2. TH7 temperature sensor is shorted/ open.	Check whether the resistance of TH7 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
31	The LED indicator of the unit displays ER47 and the wired controller displays 47	Ambient temperature sensor failed	1. TH8 temperature sensor is loosen or broken off.	Check the control module and replug the temperature sensor.
			2. TH8 temperature sensor is shorted/ open.	Check whether the resistance of TH8 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.

S/N	Failure Code	Symptom	Possible Cause	Solution
32	The LED indicator of the unit displays ER48 and the wired controller displays 48	System 1 heat exchanger outlet temperature sensor faileds	1. TH9 temperature sensor is loosen or broken off.	Check the control module and replug the temperature sensor.
			2. TH9 temperature sensor is shorted/ open.	Check whether the resistance of TH9 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
33	The LED indicator of the unit displays ER49 and the wired controller displays 49	System 2 heat exchanger outlet temperature sensor failed	1. TH10 temperature sensor is loosen or broken off.	Check the control module and ensure the temperature sensor is securely connected.
			2. TH10 temperature sensor is shorted/ open.	Check whether the resistance of TH10 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
34	The LED indicator of the unit displays ER50 and the wired controller displays 50	System 1 suction temperature sensor failed	1. TH11 temperature sensor dropped or not inserted well.	Check the control module and properly insert the temperature.
			2. Short-circuit or disconnected TH11 temperature sensor.	Use the measuring resistance step of a multimeter to measure and check whether resistances at two ends of TH11 sensor are normal/ replaced.
			3. Detection circuit problem in the temperature sensor of the control module.	Replace the control module.
35	ER51 (unit nixie tube); 51 (wire controller)	Suction temperature sensor failure of system 2	1. TH12 temperature sensor is loosen or broken off.	Check the control module and ensure the temperature sensor is securely connected.
			2. TH12 temperature sensor is shorted/ open.	Check whether the resistance of TH12 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
36	The LED indicator of the unit displays ER52 and the wired controller displays 52	System 2 low pressure sensor failed	1. Three cables of low pressure sensor is connected incorrectly.	Check and reconnect if needed.
			2. Low pressure sensor is short circuited or disconnected.	Repair or replace the low pressure sensor cables.
			3. Low pressure sensor faulty.	Replace the low pressure sensor.
			4. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
37	The LED indicator of the unit displays ER53 and the wired controller displays 53	System 1 low pressure sensor failed	1. Three cables of low pressure sensor is connected incorrectly.	Check and reconnect if needed.
			2. Low pressure sensor is short circuited or disconnected.	Repair or replace the low pressure sensor cables.
			3. Low pressure sensor faulty.	Repair or replace the low pressure sensor cables.
			4. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
38	The LED indicator of the unit displays ER54 and the wired controller displays 54	Memory failure	The memory is damaged.	Replace the control module.

S/N	Failure Code	Symptom	Possible Cause	Solution
39	The LED indicator of the unit displays ER60 and the wired controller displays 60	No system to startup	Both SYS1 and SYS2 have failures that cannot be recovered automatically.	Query failures to recover SYS1 and SYS2.
40	The LED indicator of the unit displays ER63 and the wired controller displays 63	System 1 fan motor overloaded	Fan motor operating current is too high.	1. Check whether the set value of the correspondent overload protector current is correct according to the wiring diagram. 2. Check whether resistance of the correspondent fan motor is abnormal.
41	The LED indicator of the unit displays ER64 and the wired controller displays 64	System 2 fan motor overloaded	Fan motor operating current is too high.	1. Check whether the set value of the correspondent overload protector current is correct according to the wiring diagram. 2. Check whether resistance of the correspondent fan motor is abnormal.
42	The LED indicator of the unit displays ER65 and the wired controller displays 65	Large temperature difference between entering and leaving water temperature	1. Water flow rate is too low.	Check whether the water flow rate for water system is normal.
			2. TH6 and TH7 fall off.	Check whether TH6 and TH7 are switched or fall off.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
43	The LED indicator of the unit displays ER66 and the wired controller displays 66	Entering and leaving water temperature sensor is switched	1. TH6 and TH7 are switched or fall off.	Check whether TH6 and TH7 are switched or fall off.
			2. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
44	The LED indicator of the unit displays ER67 and the wired controller displays 67	Master unit entering water temperature sensor failed	1. TH6 temperature sensor falls off or is not properly connected.	Check the control module and ensure the temperature sensor is securely connected.
			2. The TH6 temperature sensor is shorted or disconnected.	Check whether the resistance of TH9 sensor meets specification requirements/ replace if not.
			3. Detection circuit for the temperature sensor in the control module has malfunctioned.	Replace the control module.
45	The LED indicator of the unit displays ER68 and the wired controller displays 68	Compressor no.2 of system no.1 overloaded	Operating current for compressor is too high.	1. Check whether the set value of the correspondent overload protector current is correct according to the wiring diagram. 2. Check whether resistance of the corresponding compressor is abnormal.
46	The LED indicator of the unit displays ER69 and the wired controller displays 69	Compressor no.2 of]system no.2 overloaded	Operating current for compressor is too high.	1. Check whether the set value of the correspondent overload protector current is correct according to the wiring diagram. 2. Check whether resistance of the corresponding compressor is abnormal.
47	The LED indicator of the unit displays ER70 and the wired controller displays 70	System 1 discharge temperature is abnormal	Exhaust temperature of the compressor is too high.	The alarm can only be cleared by powering off or manually resetting the unit.
48	The LED indicator of the unit displays ER71 and the wired controller displays 71	System 2 discharge temperature is abnormal	Exhaust temperature of the compressor is too high.	The alarm can only be cleared by powering off or manually resetting the unit.
49	The LED indicator of the unit displays ERRO and the wired controller displays ERRO	DIP setting error	There is a DIP setting error on the module.	Perform DIP settings again according to the circuit diagram.

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