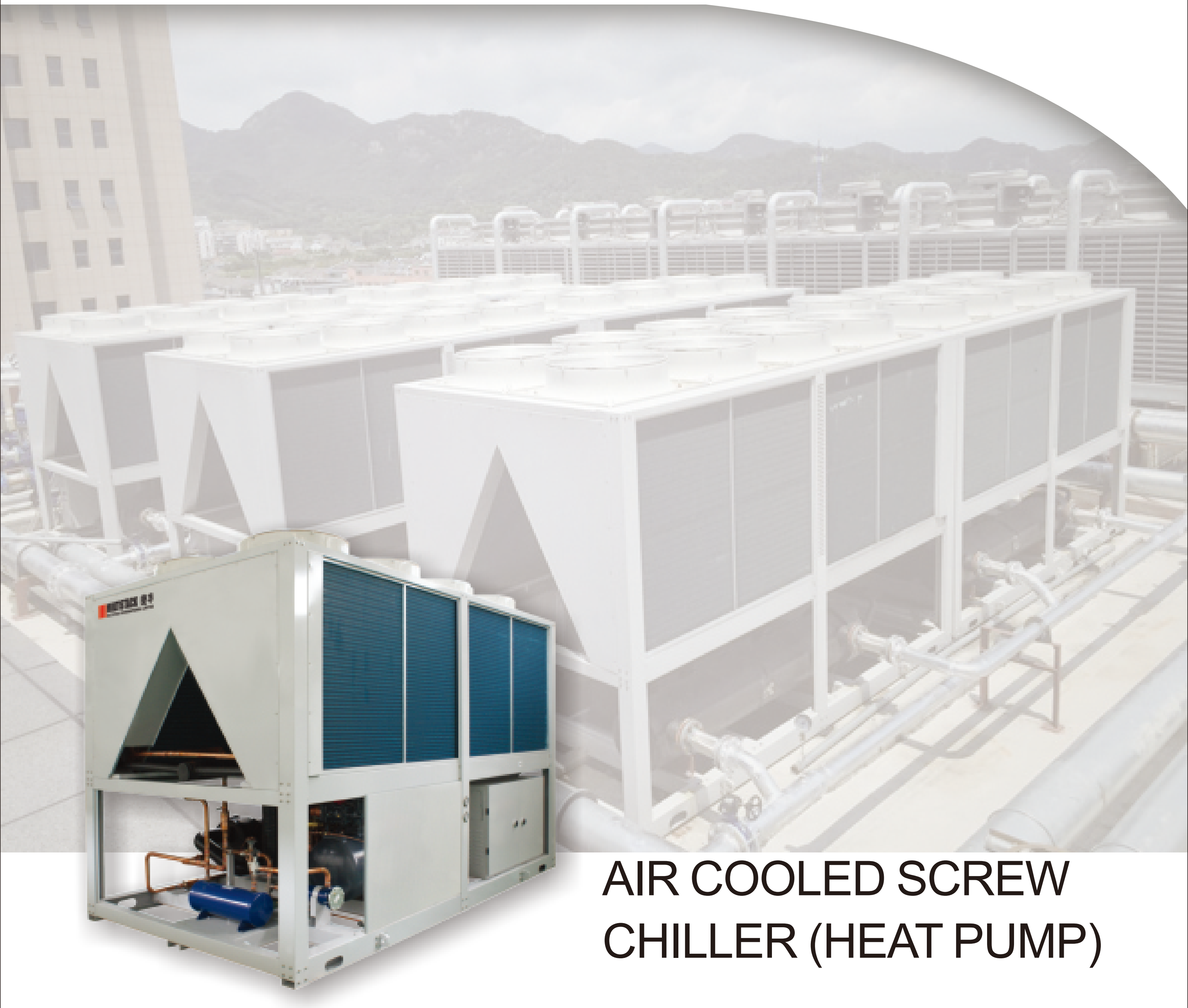
MULTISTACK®

Originators. Innovators. Never the Imitators.



AIR COOLED SCREW CHILLER (HEAT PUMP)

Since 1985
Originate From Australia

4.Controller

Local network is realized via simple connection with communication cables.

All input/output signals and communication data transmission are interference-free to ensure safe and reliable operation of the chiller.

To ensure high efficiency operation, all of the control devices have multiple auto control functions, such as smart defrost, fault diagnosis, capacity control, anti-freezing monitoring and changeover of running modes, etc.

5.Auxiliary Electric Heater (Optional)

Auxiliary Electric Heater is used for preheating water to ensure normal start-up of the unit and preventing time-consuming start-up of compressors due to low circulating water temperature in winter.

Auxiliary Electric Heater is used for improvement of heating capacity at low ambient temperature in winter to ensure working condition gets closer to nominal design condition and increase running efficiency.

Auxiliary Electric Heater is used for compensation of heat loss during defrosting in winter to maintain stable indoor temperature regardless of water temperature fluctuation.

MICROCOMPUTER CONTROL SYSTEM

Advanced Control

A high-performance PLC core is used for precise control over Multistack Air Cooled Screw Chiller (Heat Pump) under various conditions. The controller comes with user-friendly interface. All electrical devices are famous brands. The control system features high automation and reliability.

Perfect Fail Safe

Comp. Motor Overheat Protection
Fan Motor Overheat Protection
High Discharge Temp. Protection
Oil Shortage
Phase Failure/Reversed Phase Protection
High Pressure Protection
Low Pressure Protection
Oil Pressure Drop Protection
Water Flow Rate Protection
Comp. Repeated Startup Protection
Anti-freezing Protection

Display

Discharge Temperature
Ambient Temperature
Fin Temperature
Chiller Loading Capacity
Comp. Status
Real-time Clock
Chiller Running Hours
Water Inlet/Outlet Temperature
Water Pump Status
4-way Valve Status
Fan Status

Alarm

Fan Motor Overload
Comp. Internal Overheat
Low Pressure
High Pressure
Comp. Motor Overload
Water Flow Switch OFF
High LWT
Low LWT
Over-voltage/Under-voltage
Sensor Fault

Model: MCAS			048H	065H	078H	093H	105H	130H
Cooling Capacity		kW	166.5	222.7	277.3	328.3	361.5	454.2
		kcal/h	143200	191500	238400	282400	310900	390600
Heating Capacity		kW	192.1	256	315.2	375	414	516
		kcal/h	165200	220400	271100	322200	355600	444100
Electrical Specification	Power Supply		3Φ−380V−50HZ					
	Total Power Input	kW	55.2	74	86.4	104.6	117	145.1
	Total Operating Current	A	93.8	125.8	146.7	177.8	199	247.1
Compressor	Type		5-6 Asymmetric Rotor Semi-Hermetic Screw Compressor					
	Numbers	N	1	1	1	1	1	1
	Starter							
	Capacity Control							
	Power Input	kW	50.8	67.4	79.8	95.8	106.6	130.7
	Operating Current	A	85.4	113.3	134.2	161.1	179.2	219.7
Evaporator	Type		Shell & Tube High Efficiency Heat Exchanger(Design Pressure:1.5Mpa;Working Pressure:1.4Mpa)					
	Water Flow Rate	m^3/h	28.6	38.3	48.8	56.5	62.2	78.1
	Connection Size	Dn	65	80	80	100	100	100
	Water Pressure Drop	kPa	51.1	53.5	52.1	48.9	50.6	47.9
	Water Side Working Pressure	MPa	1.4					
Condenser	Type							
	Rows & FPI	Rows & FPI	3R12F	3R13F	3R14F	3R12F	3R13F	3R13F
	Windward Face Area	m^2	8.85	11.3	12.2	16.5	16.5	20.2
Axial Fan	Type		Waterproof, Weatherproof, Low Noise & High Efficiency Axial Fan					
	Numbers	N	4.0	6	6	8	8	8
	Motor Power	kW	4.4	6.6	6.6	8.8	10.4	14.4
Refrigerant	Type/Metering Device		R22/External Balancing Thermal Expansion Valve					
	Refrigerant Charge	kg	53	69	76	95	107	130
Physical Dimensions	L	mm	2340	2940	3100	4040	4040	4040
	W	mm	2200	2200	2200	2200	2200	2200
	H	mm	2420	2470	2600	2500	2600	2880
Operating Weight		kg	2250	2850	3050	3900	4000	4500
Sound Level		dB(A)	70	71	72	73	72	75

Notes:
1.Cooling Condition: Leaving chilled water temperature 7℃; chilled water flow rate 0.172m^3/(h • kW); ambient dry bulb temperature 35℃.
2.Heating Condition: Leaving hot water temperature 45℃; hot water flow rate 0.172m^3/(h • kW); ambient dry bulb temperature 7℃; wet bulb temperature 6℃.

TECHNICAL DATA R22

Model: MCAS			156H	186H	210H	260H	315H	390H
Cooling Capacity		kW	554.6	656.6	723.0	908.3	1084.5	1362.6
		kcal/h	476800	564676	621780	781138	932670	1171750
Heating Capacity		kW	630.4	750	828	1032.0	1242	1548
		kcal/h	542200	644312	711220	888294	1067260	1332140
Electrical Specification	Power Supply		3Φ−380V−50HZ					
	Total Power Input	kW	172.8	209.2	234	290.2	351.0	435
	Total Operating Current	A	293.4	355.6	380	494	597	741.2
Compressor	Type		5-6 Asymmetric Rotor Semi-Hermetic Screw Compressor					
	Numbers	N	2	2	2	2	3	3
	Starter		Y−△					
	Capacity Control		25%-100%Staged Control					
	Power Input	kW	159.6	191.6	213.2	261.4	319.8	392.1
	Operating Current	A	268.4	322.2	358.4	439.4	537.6	659.1
Evaporator	Type		Shell & Tube High Efficiency Heat Exchanger(Design Pressure:1.5Mpa;Working Pressure:1.4Mpa)					
	Water Flow Rate	m^3/h	97.6	112.9	124.3	159.9	186.5	234.3
	Connection Size	Dn	100	100	100	100	125	100
	Water Pressure Drop	kPa	52.1	51.1	53.5	52.1	48.9	50.6
	Water Side Working Pressure	MPa	1.4					
Condenser	Type		Rifled Copper Tube/Hydrophilic Fin					
	Rows & FPI	Rows & FPI	3R14F	3R12F	3R13F	3R14F	3R12F	3R13F
	Windward Face Area	m^2	24.4	33	33.0	40.4	49.5	60.6
Axial Fan	Type		Waterproof, Weatherproof, Low Noise & High Efficiency Axial Fan					
	Numbers	N	12	16	16	16	24	24
	Motor Power	kW	13.2	17.6	20.8	28.8	31.2	43.2
Refrigerant	Type/Metering Device		R22/External Balancing Thermal Expansion Valve					
	Refrigerant Charge	kg	152	190	214	260	300	390
Physical Dimensions	L	mm	6200	8080	8080	8080	12120	12120
	W	mm	2200	2200	2200	2200	2200	2200
	H	mm	2600	2500	2600	2880	2600	2880
Operating Weight		kg	6100	7800	8000	9000	10000	13500
Sound Level		dB(A)	72	70	71	72	73	72

Notes:
1.Cooling Condition: Leaving chilled water temperature 7℃; chilled water flow rate 0.172m^3/(h • kW); ambient dry bulb temperature 35℃.
2.Heating Condition: Leaving hot water temperature 45℃; hot water flow rate 0.172m^3/(h • kW); ambient dry bulb temperature 7℃; wet bulb temperature 6℃.

Model: MCAS			048HC	065HC	078HC	093HC	105HC	130HC
Cooling Capacity		kW	158	220.0	273.0	323.5	356.0	490.0
		kcal/h	135880	189200	233920	278210	306160	421400
Heating Capacity		kW	195	260	320.0	380	419	571
		kcal/h	167700	223600	275200	326800	360340	491060
Electrical Specification	Power Supply		3Φ−380V−50HZ					
	Total Power Input	kW	55.2	73	85.7	103.8	116	154.8
	Total Operating Current	A	93.8	125.8	146.7	177.8	199	247.1
Compressor	Type		5-6 Asymmetric Rotor Semi-Hermetic Screw Compressor					
	Numbers	N	1	1	1	1	1	1
	Starter		Y−△					
	Capacity Control		25%-100%Staged Control					
	Power Input	kW	50.8	66.8	79.1	95.0	105.7	140.4
	Operating Current	A	85.4	113.3	134.2	161.1	179.2	219.7
Evaporator	Type		Shell & Tube High Efficiency Heat Exchanger(Design Pressure:1.5Mpa;Working Pressure:1.4Mpa)					
	Water Flow Rate	m^3/h	27.2	37.8	48.1	55.6	62.2	78.1
	Connection Size	Dn	65	80	80	100	100	100
	Water Pressure Drop	kPa	51.1	53.5	52.1	48.9	50.6	47.9
	Water Side Working Pressure	MPa	1.4					
Condenser	Type		Rifled Copper Tube/Hydrophilic Fin					
	Rows & FPI	Rows & FPI	3R12F	3R13F	3R14F	3R12F	3R13F	3R13F
	Windward Face Area	m^2	8.85	11.3	12.2	16.5	16.5	20.2
Axial Fan	Type		Waterproof, Weatherproof, Low Noise & High Efficiency Axial Fan					
	Numbers	N	4.0	6	6	8	8	8
	Motor Power	kW	4.4	6.6	6.6	8.8	10.4	14.4
Refrigerant	Type/Metering Device		R407C/External Balancing Thermal Expansion Valve					
	Refrigerant Charge	kg	53	69	76	95	107	130
Physical Dimensions	L	mm	2340	2940	3100	4040	4040	4040
	W	mm	2200	2200	2200	2200	2200	2200
	H	mm	2420	2470	2600	2500	2600	2880
Operating Weight		kg	2250	2850	3050	3900	4000	4500
Sound Level		dB(A)	70	71	72	73	72	75

Notes:

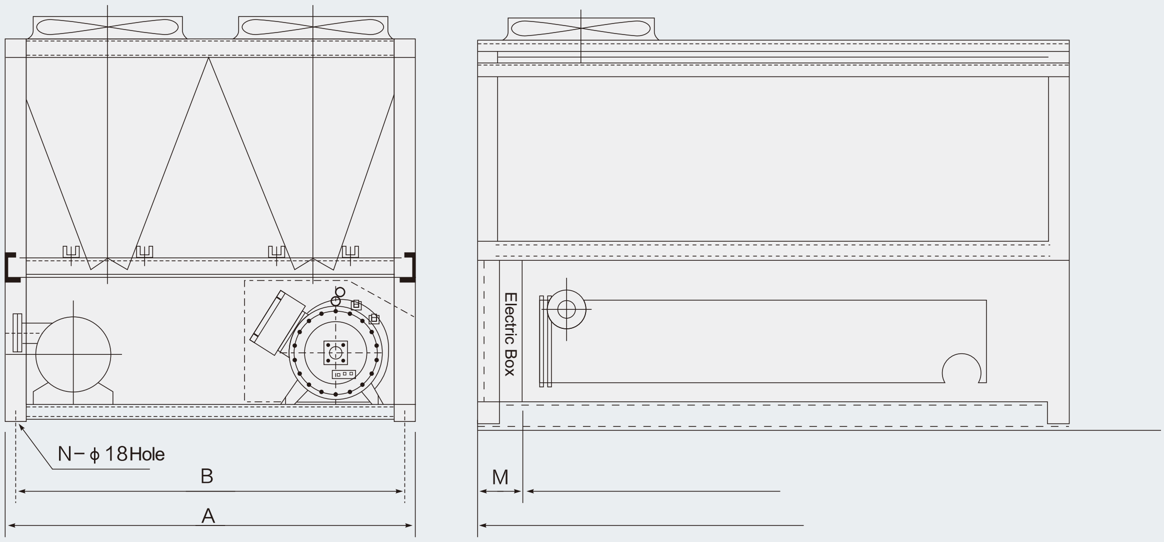
1.Cooling Condition: Leaving chilled water temperature 7℃; chilled water flow rate 0.172m^3/(h • kW); ambient dry bulb temperature 35℃.

2.Heating Condition: Leaving hot water temperature 45℃; hot water flow rate 0.172m^3/(h • kW); ambient dry bulb temperature 7℃; wet bulb temperature 6℃.

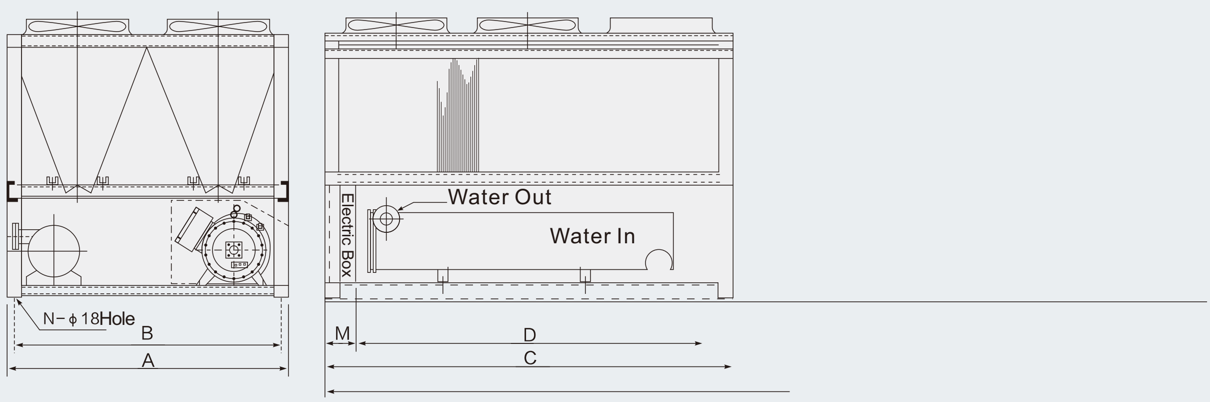
TECHNICAL DATA R407C

Model: MCAS			156HC	186HC	210HC	260HC	315HC	390HC
Cooling Capacity		kW	540	647	713.0	980.0	1068.0	1470.0
		kcal/h	467840	556420	613180	842800	918480	1264200
Heating Capacity		kW	640	760	838	1142.0	1257	1713
		kcal/h	550400	653600	720680	982120	1081020	1473180
Electrical Specification	Power Supply		3Φ−380V−50HZ					
	Total Power Input	kW	171.4	207.6	232	309.6	348.0	464
	Total Operating Current	A	293.4	355.6	380	494	597	741.2
Compressor	Type		5-6 Asymmetric Rotor Semi-Hermetic Screw Compressor					
	Numbers	N	2	2	2	2	3	3
	Starter		Y−△					
	Capacity Control		25%-100%Staged Control					
	Power Input	kW	158.2	190	211.4	280.8	317.1	421.2
	Operating Current	A	268.4	322.2	358.4	439.4	537.6	659.1
Evaporator	Type		Shell & Tube High Efficiency Heat Exchanger(Design Pressure:1.5Mpa;Working Pressure:1.4Mpa)					
	Water Flow Rate	m^3/h	96.2	111.3	122.6	172.5	183.7	234.3
	Connection Size	Dn	100	100	100	100	125	100
	Water Pressure Drop	kPa	52.1	51.1	53.5	52.1	48.9	50.6
	Water Side Working Pressure	MPa	1.4					
Condenser	Type		Rifled Copper Tube/Hydrophilic Fin					
	Rows & FPI	Rows & FPI	3R14F	3R12F	3R13F	3R14F	3R12F	3R13F
	Windward Face Area	m^2	24.4	33	33.0	40.4	49.5	60.6
Axial Fan	Type		Waterproof, Weatherproof, Low Noise & High Efficiency Axial Fan					
	Numbers	N	12	16	16	16	24	24
	Motor Power	kW	13.2	17.6	20.8	28.8	31.2	43.2
Refrigerant	Type/Metering Device		R407C/External Balancing Thermal Expansion Valve					
	Refrigerant Charge	kg	152	190	214	260	300	390
Physical Dimensions	L	mm	6200	8080	8080	8080	12120	12120
	W	mm	2200	2200	2200	2200	2200	2200
	H	mm	2600	2500	2600	2880	2600	2880
Operating Weight		kg	6100	7800	8000	9000	10000	13500
Sound Level		dB(A)	72	70	71	72	73	72

Notes:
1.Cooling Condition: Leaving chilled water temperature 7℃; chilled water flow rate 0.172m^3/(h • kW); ambient dry bulb temperature 35℃.
2.Heating Condition: Leaving hot water temperature 45℃; hot water flow rate 0.172m^3/(h • kW); ambient dry bulb temperature 7℃; wet bulb temperature 6℃.

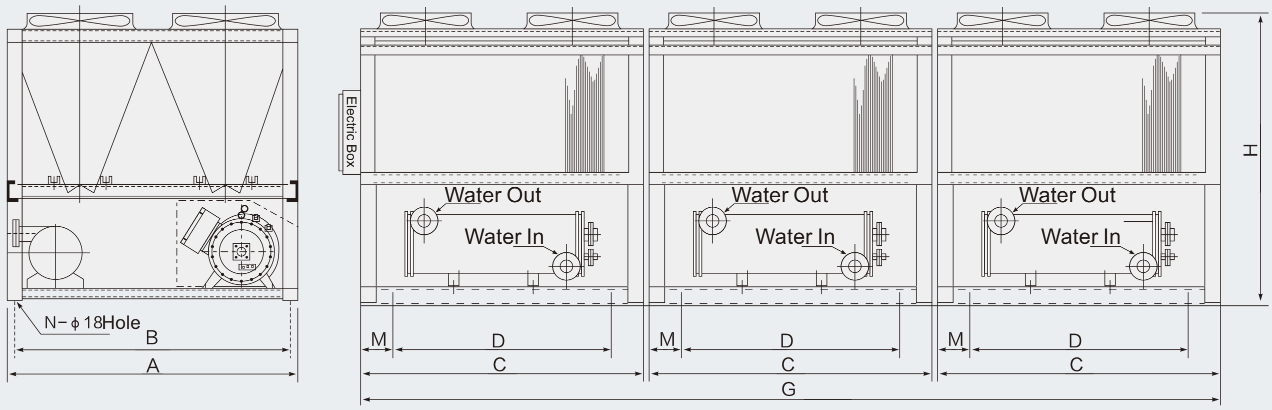


MCAS048(H)~MCAS130(H)



MCAS156(H)~MCAS260(H)

PHYSICAL DIMENSIONS



MCAS315(H)~MCAS390(H)

PHYSICAL DIMENSIONS TABLE

Unit: mm

Model	A	B	C	D	G	H	N	M
MCAS048H	2200	2150	2340	890×2=1780	-	2420	6	280
MCAS065H	2200	2150	2940	840×3=2520	-	2470	8	210
MCAS078H	2200	2150	3100	860×3=2580	-	2600	8	260
MCAS093H	2200	2150	4040	1000×3=3000	-	2500	8	520
MCAS105H	2200	2150	4040	1000×3=3000	-	2600	8	520
MCAS130H	2200	2150	4040	1000×3=3000	-	2880	8	520
MCAS156H	2200	2150	4040	1000×3=3000	6040	2600	16	520
MCAS186H	2200	2150	4040	1000×3=3000	8120	2500	16	520
MCAS210H	2200	2150	4040	1000×3=3000	8120	2600	16	520
MCAS260H	2200	2150	4040	1000×3=3000	8120	2880	16	520
MCAS315H	2200	2150	4040	1000×3=3000	12200	2600	24	520
MCAS390H	2200	2150	4040	1000×3=3000	12200	2880	24	520

COOLING PERFORMANCE CORRECTION FACTOR

Ambient Temp.℃	Cooling Capacity				Power Input			
	Leaving Water Temperature℃				Leaving Water Temperature℃			
	5	7	9	11	5	7	9	11
28	1.03	1.08	1.13	1.18	0.88	0.89	0.91	0.94
32	0.99	1.04	1.09	1.14	0.94	0.95	0.97	1.00
35	0.95	1.00	1.06	1.1	0.97	1.00	1.03	1.05
38	0.92	0.97	1.02	1.06	1.03	1.05	1.08	1.08
40	0.90	0.94	0.99	1.04	1.06	1.08	1.11	1.11

HEATING PERFORMANCE CORRECTION FACTOR

Ambient Temp.℃	Heating Capacity					Power Input				
	Leaving Water Temperature℃					Leaving Water Temperature℃				
	39	42	45	48	50	39	42	45	48	50
13	1.23	1.21	1.19	1.15	1.13	0.96	1.00	1.05	1.10	1.14
10	1.15	1.13	1.11	1.08	1.05	0.94	0.98	1.02	1.07	1.11
7	1.06	1.03	1.00	0.98	0.95	0.92	0.96	1.00	1.05	1.09
2	0.92	0.89	0.86	0.83	0.80	0.90	0.94	0.98	1.02	1.05
−2	0.80	0.77	0.74	0.71	0.69	0.87	0.91	0.96	1.00	1.04
−6	0.68	0.65	0.61	–	–	0.82	0.86	0.91	–	–
−10	0.57	0.55	–	–	–	0.78	0.81	–	–	–

FUNCTIONAL FEATURES

(1) Smart Defrost

The controller calculates differential temperature between coil temperature in cooling mode (or evaporating temperature in heating mode) and outdoor air temperature and compares this temperature difference with its set point. When the temperature difference exceeds set point, defrosting will automatically starts after defrosting time interval expires. Defrosting conditions can be automatically corrected based on the last defrosting time. Defrosting time is only 60% of that of traditional control mode. Therefore, chiller has less water temperature fluctuation and heat loss while giving greater heating capacity.

For units with multiple compressors, if one of the compressors is defrosting, other compressors will not defrost. This is to avoid water temperature fluctuation.

(2) Manual Defrost

After user has chosen the number of compressor to be defrosted, the refrigerant system of the chosen compressor will automatically start defrosting.

(3) Anti-freezing Monitoring

Monitoring system will automatically run the water pump and give an alarm when water temperature is below 4℃ during downtime in winter or when anti-freezing switch operates. When water temperature is below 2℃, compressor will run in heating mode until water temperature goes up.

(4) Self-diagnosis of Fault and Fail Safe

Faulty module will stop running in the event of faults such as compressor high / low pressure, overload, internal protection, short supply of water, oil temperature fault, over-voltage and under-voltage. The control system will give alarms and record the faults. These faults can fall into two categories: common faults and critical faults. If the same common fault occurs within 30 minutes, it is identified to be the critical fault which requires manual start-up.

(5) Running and Capacity Control

Accumulated running hours of compressors are reviewed every 24 hours. The compressor with least running hours will start in priority. When at low load condition, the compressor with most running hours will unload first in order to balance compressor operation and increase useful life.

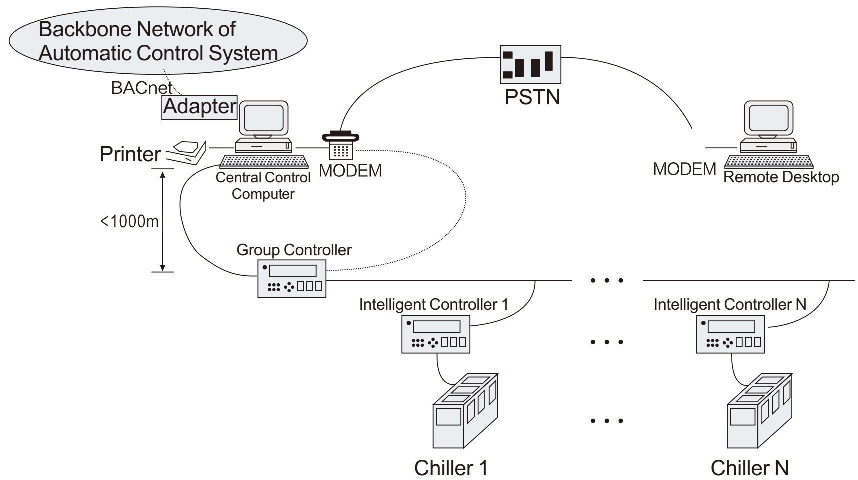
Chiller loads can be adjusted based on water temperature and its change rate. Fuzzy control technology is used to regulate compressor capacity to reduce power consumption and increase economical efficiency.

(6) Three Levels of Security Access

There are three level of access for parameter settings: user, service and factory levels. Users can access to the following functions: on/off timer, entering/leaving water temperature and presetting for unattended days. Service personnel can access to the following functions: alarm time delay, anti-freezing monitoring, air flow control stage, compressor start-up delay and defrosting control, etc.

(7) Communication Port, Remote Control & Monitoring

Chiller comes with remote switch, ON LED and fault LED ports. Micro-computer controller has two standard RS-485 ports, one of which for connection with the display panel and another to the system network. The display panel can be placed in the room 1000 meters away from the PCB board. The display panel comes with a RS-232 port for connection to the printer or PC computer to enable distributed control within 1000 meters. Chiller controller is also equipped with communication module in PROFIBUS protocol for communication with building central control system. See the illustration below for related configurations:



Distributed Control System

RIGGING AND LAYOUT

1.Hand pallet truck or fork lift can be used to lift up the chiller.
2.Be careful to handle the chiller when using a crane. Wide lift slings or wire ropes can be used to bind the chiller through the lift points at the corners of the base of the chiller and corner protectors (Fig. a) should be applied between the wire ropes and the chiller for protection or channel steel or square steel can be used to isolate the ropes from the chiller (Fig. b).

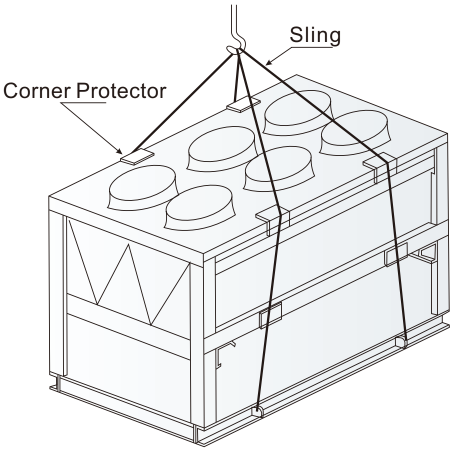


Fig.a

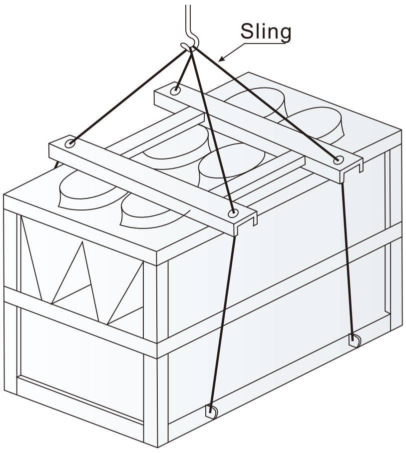


Fig.b

LAYOUT

1.The chiller should be installed in clean and well-lit places with good ventilation, drainage and piping, such as the rooftop, balcony or courtyard, where there is no oil fume, steam or other heat sources and will not be adversely affected by the noise and cooling/heating air from the chiller.
2.Top blowing unit should have a shelter for protection against rain and snow and for easy maintenance during rainy days.
3.Plant room should be sized as Fig. d to ensure ample space for maintenance and ventilation. No obstructions are allowed in the service clearance. Surrounding walls must not be higher than the bottom of the fan coils. Overhead of chiller should be minimum 2 meters to avoid short air circuit (Fig. c).
4.In parallel installation of more than one unit, service clearances are reserved assuming that there are obstructions (such as walls) in between.
5.Air inlet of the chiller should, as possible, avoid paralleling with monsoon (mainly winter monsoon).

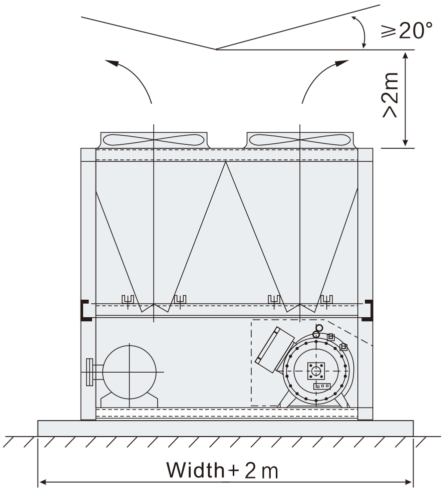


Fig.c

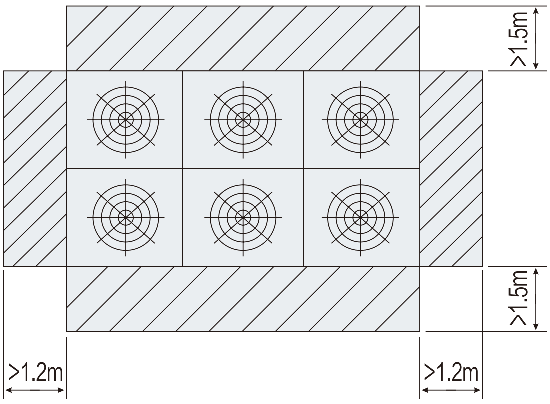


Fig.d

MOUNTING BASE

1.Chiller should be installed on solid and smooth concrete base or metal steel frame which can bear the weight of chiller. If the mounting base is not strong enough, it can easily result in vibration and noise.
2.Concrete base should be surface treated with plaster and be waterproofed. Drainage ditches (slope > 0.5%) are arranged around the base.
3.Vibration isolators should be added between the chiller footing and the concrete base to avoid bad effect on the floors under the chiller due to transmission of vibration and noise. The chiller should be horizontally installed. Shock pad can be used if necessary.
4.Chiller should be securely fixed to avoid header damage due to earthquake, typhoon or long-time running.
5.See the drawing below for information of the base and mounting of chiller.

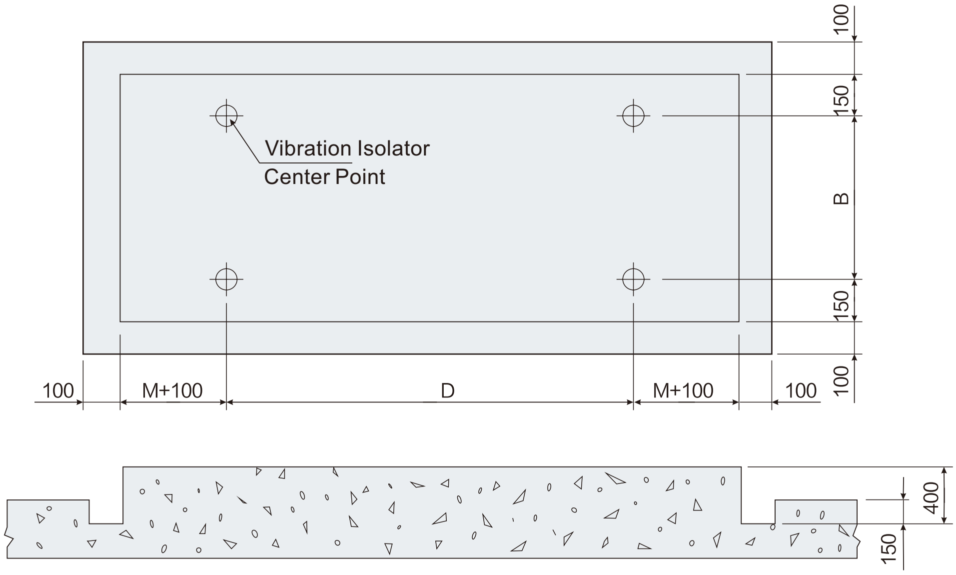


Fig.e Mounting Base for A Single Chiller

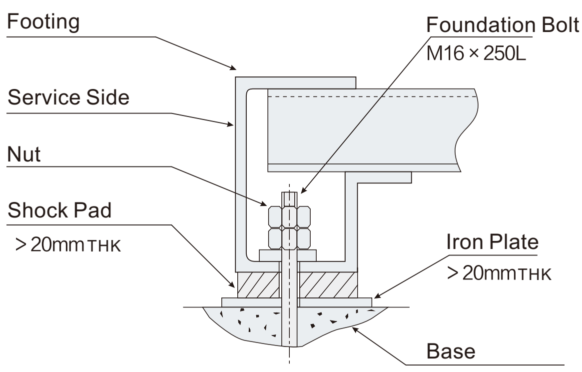


Fig.f

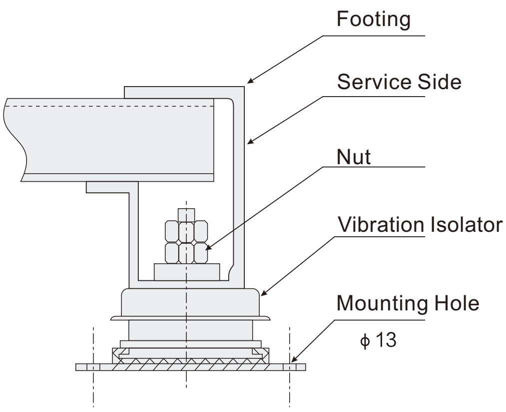
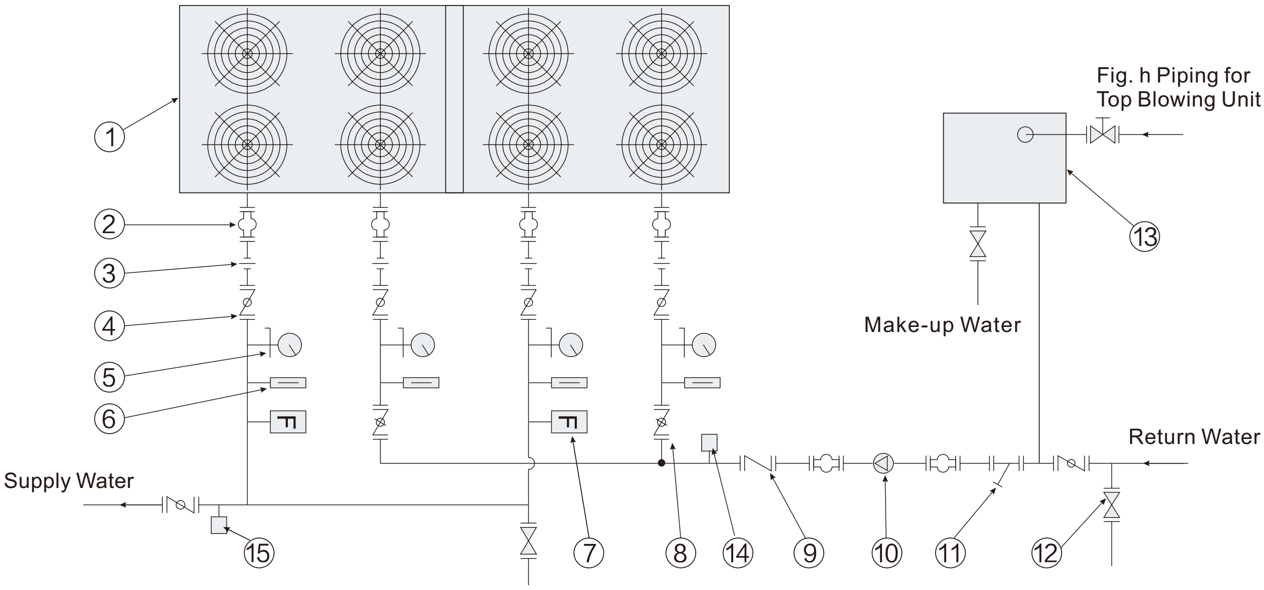


Fig.g

Notes:
(1) Refer to physical dimensions of specific chiller for the mounting hole size in Fig. e. "D" refers to the maximum distance between mounting holes along the width. Please note the actual locations of mounting holes along the width.
(2) When chiller is mounted as per Fig. f, mounting holes on the base should be reserved for foundation bolts according to the mounting locations in Fig. e.
(3) When chiller is mounted as per Fig. g, special mounting holes on the base for vibration isolators should be reserved. Vibration isolators (optional) can be supplied by Multistack.

1.Water inlet/outlet headers and valves should be properly insulated to avoid damage to the structure of the building caused by cooling/heating energy loss and condensation and prevent chilled water from freezing in winter.
2.A flow switch should be installed in water outlet and interlocked with the compressor to ensure sufficient water flow in the heat exchanger and piping system to prevent the chilled water from freezing due to water shortage when running in cooling mode and avoid compressor damage or even burnout resulted from abnormal high pressure when running in heating mode.
3.Expansion tank for water return should be installed for the closed-loop water system to absorb impacts on the piping system caused by water expansion/contraction. Water level of the expansion tank must be at least one meter higher than the highest point of the pipelines. Do not install check valve in the outlet of the expansion tank in case of pipe leakage or burst.
4.Water pump should be installed on the inlet side of the evaporator. If the chiller and the auxiliary electric heater are in serial connection, water pump should be installed on the inlet side of the auxiliary electric heater.
5.Automatic air vents should be installed on the local high points of the piping system to eliminate entrapped air in water lines. Horizontal piping should have a slope of 1/250 upwards.
6.Unions, flange joints and service cut-off valves should be installed in piping system for for easy maintenance in the future.
7.The weight of water pipes should not bear on the chiller. Flexible or rubber connections should be employed when the water pumps are connected to the water inlet/outlet of the chiller in case of vibration and noise transmission and interferences.
8.Piping for two or more modules must be arranged in equal distance to ensure the same water flow rate in each module and avoid different pressure drop.
9.Temperature and pressure sensors should be installed in water inlet/outlet for regular operation check.
10.For multi-compressor top blowing unit, balancing valve should be installed on the inlet side of the heat exchanger to balance water flow rate.
11.Underground water, hard water or other waste water should not be used in the circulating water system of the chiller. PH-level of circulating water should be within 6.8~8.0 and GH number should not exceed 70. Regular water quality tests are required to ensure water quality.
12.Top blowing type air cooled heat pump is recommended to use the following piping (Fig. h):



1.Heat Pump 2.Rubber Flexible Union 3.Flange Joint 4.Butterfly Valve 5.Pressure Gauge
6.Temp. Gauge 7.Water Flow Switch 8.Load Balancing Valve 9.Check Valve 10.Water Pump
11.Y-strainer 12.Drain Valve 13.Expansion Water Tank
14.Temp Probe at Water Header Inlet 15.Temp Probe at Water Header Outlet

Fig.h Fig. h Piping for Top Blowing Unit

Notes:
1. For single-compressor unit there is no load balancing valve; for dual compressor unit, refer to Fig. h.
2. All waterline fittings are supplied by the user.

ELECTRICAL CONNECTION

1.Chiller must run with stable power supply. All voltage-drop-related factors should be taken into account. Operating voltage of the chiller should be maintained within rated value±10%. Overvoltage or undervoltage can adversely affect normal operation of the chiller.
2.Voltage difference between phases should not exceed rated value±2% and current difference between maximum and minimum phases should below 3% of rated value to avoid overheat of compressor.
3.Mains frequency should maintain within rated value±2%.
4.Minimum starting voltage of the chiller should maintain at least 85% of rated value.
5.If the power line is too long, it can result in compressor start-up failure. Proper length should be supplied in such a way that the operating voltage difference between both ends of the power line does not exceed 2% of rated value. If power line cannot be shortened, it should be wider in diameter.
6.Wiring between power source and chiller should strictly comply with electrical codes. Wires and cables should be well insulated. Insulation resistance between electrical terminals and the chiller should be measured with a 500V megohmmeter after wiring is completed. IR value should be at least 3 MΩ.
7.Each group of power line fed to the chiller should be equipped with a non-fuse breaker (NFB) with appropriate capacity to reduce damages to the electrical devices (such as transformers, wires and alike) in the event of short circuit. Each compressor should have a separate group of incoming power line, which is helpful for independent on/off control over the compressors. See Fig. i, j & k for detailed wiring:

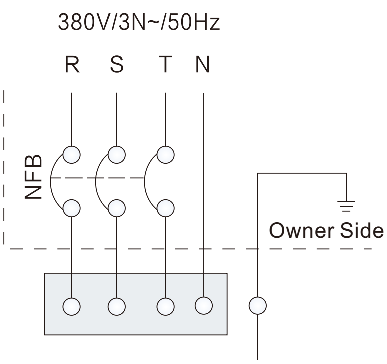


Fig.i Wiring Diagram for Single Compressor Top Blowing Unit

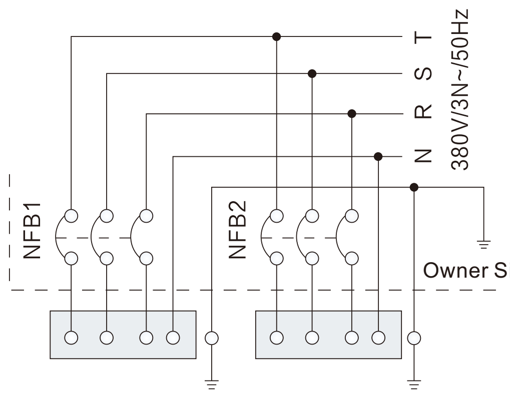


Fig.j Wiring Diagram for Double Compressor Top Blowing Unit

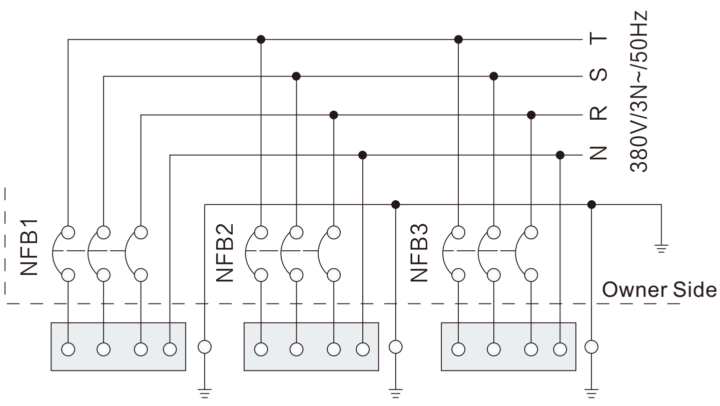


Fig.k Wiring Diagram for Three Compressor Top Blowing Unit

8.Chiller should have a good and reliable grounding device to prevent electrical hazards in the event of electric leakage. Construction should be carried out in strict compliance with electrical codes.
9.Operating current, power input and other data specified in the Technical Data Table are test values at nominal conditions. Actual values may have great differences based on system actual loads and outdoor ambient temperatures. When outdoor temperature and chiller load are relatively high, operating current and power input will increase accordingly. As a result, power supply, transformers, NFBs and wire capacity should be selected at 1.6 times rated values.

1.OPERATING PRINCIPLES

As the outdoor air temperature drops, evaporating temperature, heating capacity and energy efficiency of the air cooled heat pump unit will decline when running in heating mode. Thermal load, however, increases in the air conditioned area, which means that there is a dynamic balance between chiller heating capacity and room thermal load. Room thermal load equals chiller heating capacity at the balance point. When outdoor temperature falls below the balance-point temperature, room thermal load will be greater than chiller heating capacity. At this time, the chiller should have large design capacity in order to meet the building heating load requirement, which is very uneconomical. Therefore, it is useful to have an auxiliary electric heater added to increase chiller heating capacity and ensure room temperature reaches design temperature.

2.FUNCTIONS AND FEATURES

Auxiliary electric heater, interlocked with micro-processor controller, is employed to assist with heating facility in winter. Its functions and features are as follows:

a.Auxiliary electric heater can make up for the heating deficiency of the air cooled heat pump in low-temperature environment to ensure working condition of the unit gets closer to nominal design condition and increase chiller operating efficiency and useful life.

b.As circulating water temperature gets lower in winter, it is difficult for the compressor to start quickly. The compressor will have to go through a poor working condition for a long time before it finally functions well. The use of an auxiliary electric heater for preheating water temperature enables normal start-up of the compressor.

c.Heat transfer efficiency of the fin coils and heating capacity of the chiller can be reduced if fin coil surface temperature drops below 0℃ and gets frosted when running in heating mode in winter. If the frost on the coil surface gets thick, system low pressure will become too low, resulting in reduced cooling effect of the motor, excessively high oil temperature and increased risk of compressor oil loss, which will require defrosting. Auxiliary electric heater can compensate part of the heat loss during defrosting and maintain relatively stable water temperature as well as indoor temperature.

d.When the chiller stops running in the night time in winter, water system can be easily frozen up, resulting in water pipe burst and even system damage if it has not been properly insulated. The micro-computer controller at this time will carry out anti-freezing detection and make use of the auxiliary electric heater to maintain normal water temperature while hot water are circulating in the piping system without freezing.