MULTISTACK®

MSRA-S SERIES

Modular Air Cooled Scroll (Heat Pump) Chiller

We are the creator and advocator of energy efficient chillers and the pioneer of oil-free technology in refrigeration industry.

CHILLER FEATURES

STABLE AND RELIABLE

◎ **Modular Design**

Original modular technology allows for maximum 16 Slave Output modules for a chiller bank.

◎ **Compressor Balance Operation**

A compressor is scheduled to operate based on its accumulated running hours to improve its life span.

◎ **Compressor Anti-slug**

Compressors come with oil heaters to be better lubricated when the chiller is idle in winter, making sure that liquid refrigerant can be separated from refrigeration oil to avoid damage caused by liquid slugging at chiller start-up.

◎ **Intelligent Defrosting**

The use of high-precision temperature sensors enables accurate detection of system pressure and temperature changes at frosting conditions for determination of the best defrosting time, avoiding problems such as incomplete or frequent defrosting.The exclusive defrosting technology together with the 4-way valve ensures complete defrosting and water drainage.

◎ **Forced Defrosting**

When the Chiller runs in heating mode in extreme environment, forced defrosting can be used to thoroughly remove frost or ice formed in high-humidity or low-temperature environment.

INTELLIGENT CONTROL

◎ **Auto Alarm**

The Controller automatically detects Chiller malfunction and displays error codes to help fast troubleshooting.

◎ **Auto Reset**

Faults that are not damaging to the Chiller can be automatically reset and cleared when system data recover.

◎ **ModBus Supported**

Chiller comes with RS485 serial port for connection to Building Management System through ModBus.

◎ **Power Failure Recovery (PFR)**

In the event of power failure, the chiller will automatically resume the last session when power is restored.

◎ **Timer Function**

Timers for days of a week, cycle timer and single timer are available to satisfy users' needs.

MULTIPLE FUNCTIONS

◎ **Cooling Only**

Supply cooling in summer which is particularly ideal for hot climate regions.

◎ **Heat Pump**

Supply cooling in summer and heating in winter.

◎ **Year-round Cooling (Optional)**

Supply year-round cooling to meet cooling load demands for specific environments with great heat dissipation, which requires stable operation even in winter.

◎ **Sensible Heat Recovery (for MSRA065H only)**

Supply domestic hot water by recovering waste heat which would have been emitted into the atmosphere in the process of cooling.

DESIGN FEATURES

High Efficiency Scroll Compressor
features compact structure, low noise & vibration, and high reliability.

"V" Structured Air Side Heat Exchanger
uses rifled tubes to increase heat transfer surface and enhance airflow disturbance, and improve heat transfer efficiency; flat "V"design improves condensed water drainage, reduces risk of frost & ice blockage and increases heat transfer.

High Efficiency Water Side Heat Exchanger
uses shell & tube design and optimized baffle plates,which improve heat exchange between refrigerant and water, with good liquid separation, reliable oil return, high efficiency of heat transfer, stable quality and easy maintenance.

Low-noise Fans
to be axial type with 3 or 5 blades to reduce noise. One-piece air baffle ring is employed to regulate axial direction of airflows and ensure low-noise operation.

Modular Design and Add-on Flexibility
contribute to easy transportation and installation and staged investment.

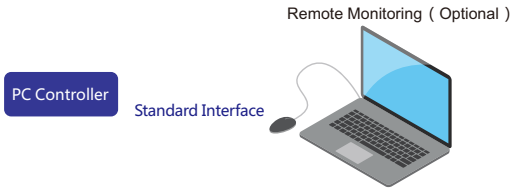
Defrost while chiller is running in heating mode
The controller will balance module defrost time. Defrost cycle is only activated in the module that requires defrosting, which means other modules will remain normal operation, giving you a reliable and uninterrupted system.

Capacity Control
The use of hermetic scroll compressors enables each module to have multiple independent refrigerant systems. Capacity stages (0-25%-50%-75%-100%) are realized by adjusting the number of compressors running.

INTELLIGENT CONTROL SYSTEM

Advanced micro-computer controller system provides full safety protections and powerful self-diagnosis.

1. Standard Interface allows for DIP control of 12 slave modules running, with water pump controlled by the master panel.
2. RS485 Integrates fully with building management through ModBus and enables communication between modules. Maximum distance can be 1,000 meters.
3. Universal driver board for 12VDC 0.375A/Phase EXV.
4. Auxiliary electric heater provides heat compensation as needed in winter operation.
5. Remote Stop Function (Fan Coils Interlock).
6. User interface comprises an LCD Display and touch buttons. Display range: 4 (line) * 8 (Chinese character) or 4 (line) * 16 (letter);
   COM. Port: RS485;
   Physical Dimensions: 165mm×115mm×30mm
7. Status and Faults display.



Multi-color LCD backlight display features

Cooling and heating mode	Multi-color LCD backlight display
Chilled water temperature display	Fault alarms, fault codes display
Real time display	Keyboard sound (buzzer)
Start / stop timer	Battery-supported & real-time clock in power outage
System status display	Settings Configuration

Controller features

Compressor balance operation	Remote monitoring interface
Multi-stage start/stop timer	Remote control via dry contacts
Self-diagnosis and protection	Remote run/alarm via dry contacts
Fuzzy control of capacity	Group control, plug and play
Leaving water antifreeze protection	Temp/press sensors short/open circuit safety protection
Leaving water superheat protection	PFR in power failure
Restart time delay	Preset maximum number of compressors
Multiple start/stop methods	Comp. timeout restriction and alarm

Safety protections

High pressure	Low water flow
Low pressure	External interlock protection
Compressor overload/coil over heating	Communication failure alarm
Phase failure/high voltage/low voltage	Sensor failure alarm
High discharge temperature	Leaving condenser/chilled water sub-cooling/superheat alarm

MODEL NUMBER DESIGNATION

MSRA	065	H	F	S	A	--	6
1	2	3	4	5	6		7

1 — Modular Scroll Air Cooled

2 — Model Number

3 — Chiller Type H: Heat Pump

4 — Refrigerant Type F: R22 G: R410A

5 — Heat Exchanger Type: Shell and Tube

6 — Electrical Specification A: AC380/415V-3Ph-50Hz B: AC440/460V-3Ph-60Hz

7 — Number of modules per chiller (Max. 16)

Working Conditions & Limits

Leaving Water Temp. Range: Cooling 5~15℃, Heating 40~50℃

Working Conditions: Cooling 13~43℃, Heating -10~21℃

TECHNICAL DATA

Model			MSRA065		MSRA130H	
Refrigerant			R22	R410A	R22	R410A
Nominal Cooling Capacity*		kW	65	64.2	130	128.4
Nominal Heating Capacity*		kW	67	66	134	132
Electrical Specification	Power Supply		380V/3ph/50Hz			
	Power Input	kW	20	21	40	40.13
	Working Current	A	39.2	41	72.8	79
Compressor	Type		Hermetic Scroll Type			
	Number of Comp.	台	4	2	4	4
	Power Input	kW	4x4.75	2x9.75	4x9.1	4×9.1
Refrigerant Charge		kg	4x4	2x7	4x6.5	4×7
Water Side Heat Exchanger	Type		Shell & Tube Type			
	Rated Water Flow	m^3/h	11.2	11.1	22.4	22.1
	Rated Water Pressure Drop	kPa	54	54	68	68
	Working Pressure (Water Side)	Mpa	1			
	Connection Size		DN50	DN50	DN65	DN65
Air Side Heat Exchanger			Hydrophilic Fin Tube Type			
Axial Fan	Type		Low-noise, High-efficiency and Water-proof Axial Fan			
	Number of Fan	N	2	2	2	2
	Airflow	m^3/h	8500	13500	21000	21000
	Power Input	kW	2×0.5	2×0.75	2×1.8	2×1.8
Physical Dimensions	Length	m	1800	1800	2240	2240
	Width	m	900	900	1200	1200
	Height	m	2000	1960	2200	2200
Operating Weight		kg	700	700	1250	1250

Notes: 1. Nominal cooling condition: chilled water entering/leaving temperature 12/7℃; ambient temperature 35℃;

2. Nominal heating condition: hot water entering/leaving temperature 40/45℃; ambient temperature 7℃ (DB) 6℃ (WB) ;

3. Both MSRA065H and MSRA130H can provide cooling all year round as required.

CORRECTION FACTORS

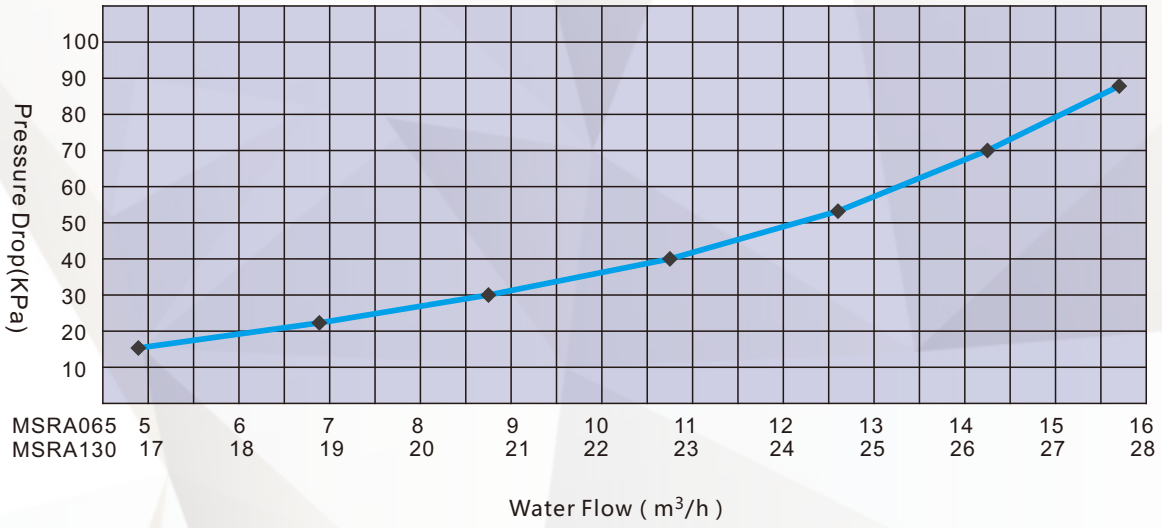
COOLING CAPACITY CORRECTION FACTOR

Ambient (℃)	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	1.10	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	1.1

HEATING CAPACITY CORRECTION FACTOR

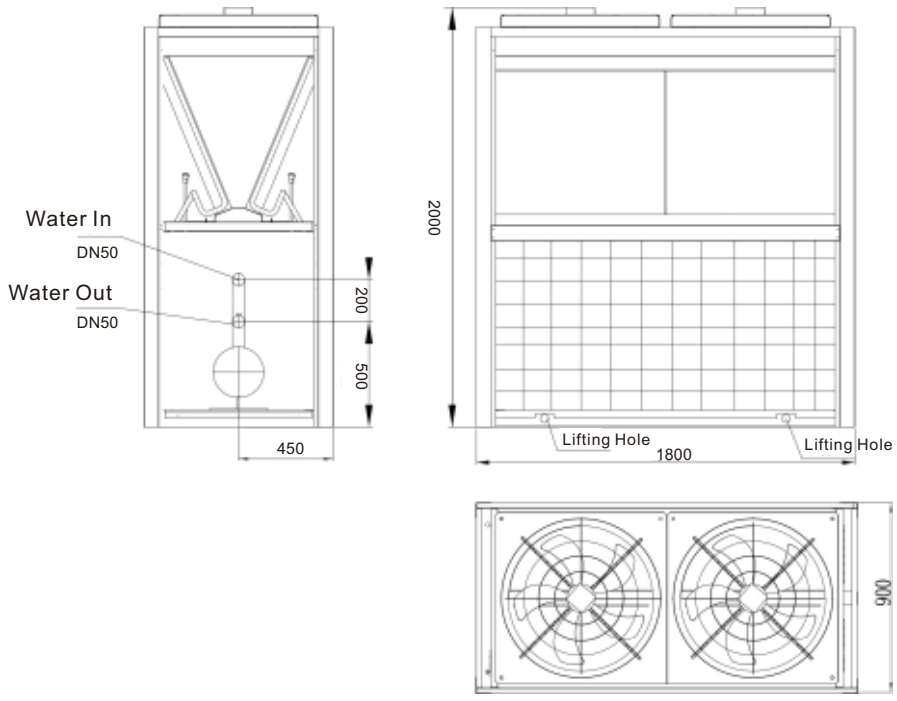
Ambient (℃)	Heating Capacity					Power Input				
	Leaving Water Temperature(℃)					Leaving Water Temperature(℃)				
	39	42	45	48	50	39	42	45	48	50
13	1.23	1.21	1.19	1.15	1.13	0.96	1.00	1.05	1.10	1.14
10	1.15	1.13	1.11	1.08	1.05	0.94	0.98	1.02	1.07	1.11
7	1.06	1.03	1.00	0.98	0.95	0.92	0.96	1.00	1.05	1.09
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	—	—	—

WATER PRESSURE DROP CORRECTION

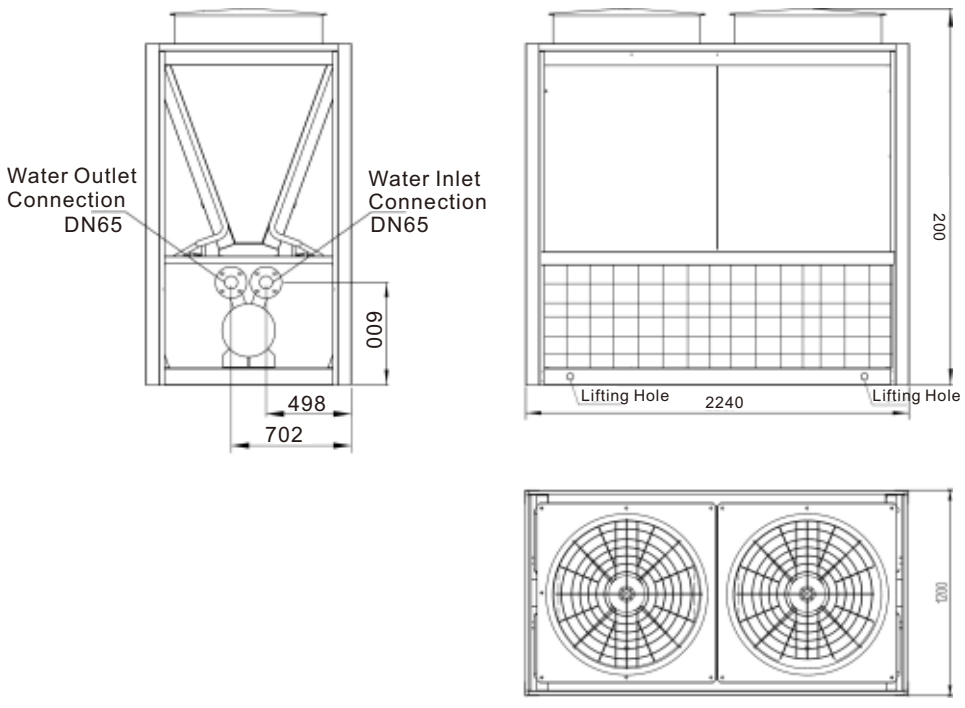


PHYSICAL DIMENSIONS

MSRA065H

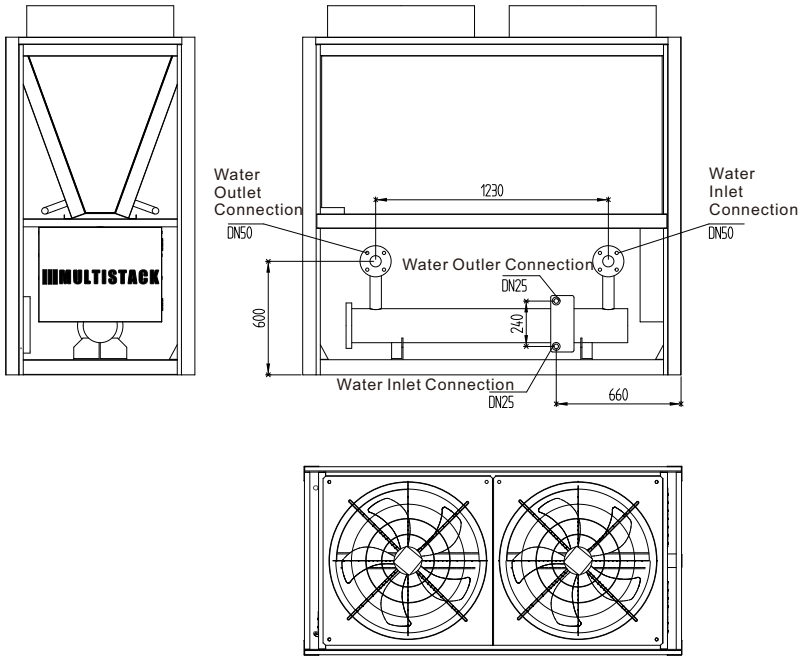


MSRA130H



HEAT RECOVERY WATER CONNECTION DIMENTIONS

MSRA065H - HEAT RECOVERY WATER CONNECTION DIMENTIONS

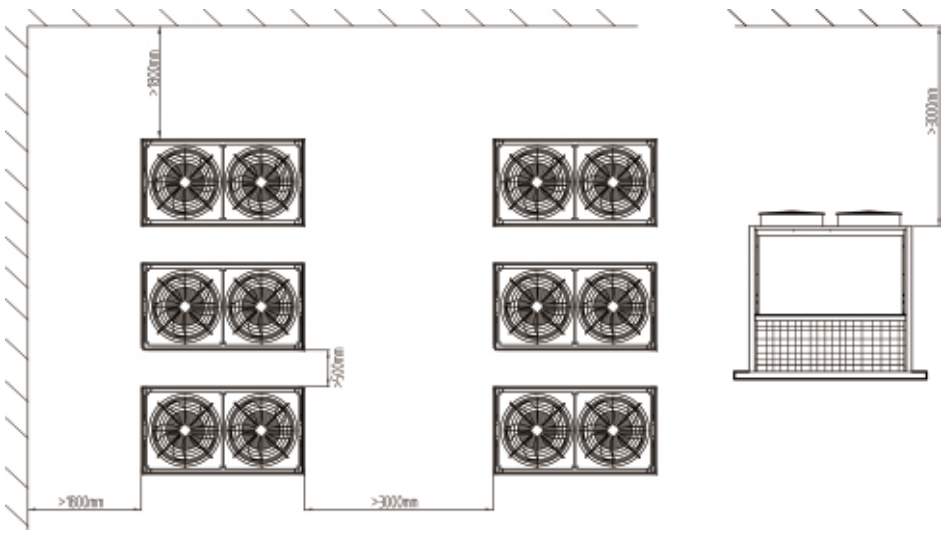


CHILLER LAYOUT

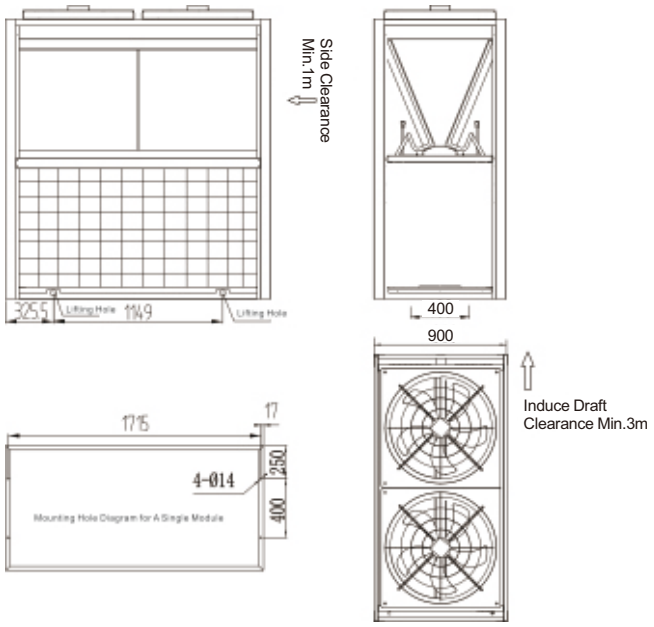
1 . The chiller should be installed in clean and well-lit places with good ventilation, drainage and piping, such as the rooftop, balcony or courtyard, where there is no oil fume, steam or other heat sources and will not be adversely affected by the noise and cooling/heating air from the chiller.

2 . Plant room should size as below to ensure ample space for maintenance and ventilation. No obstructions are allowed in the service clearances. Surrounding walls must not be higher than the bottom of the fan coils. Overhead of chiller should be minimum 3 meters to avoid short air circuit.

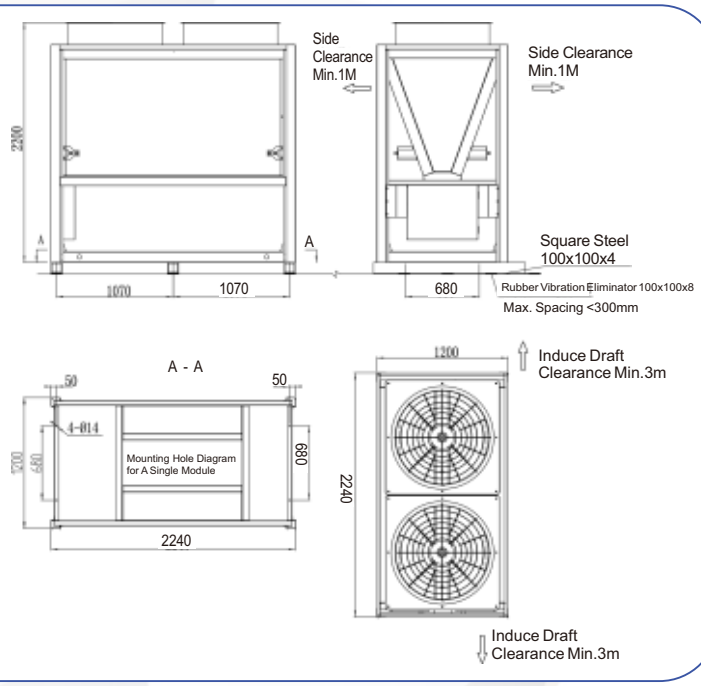
3 . Air inlet of the chiller should, as possible, avoid paralleling with monsoon (mainly winter monsoon).



MSRA065H



MSRA130H



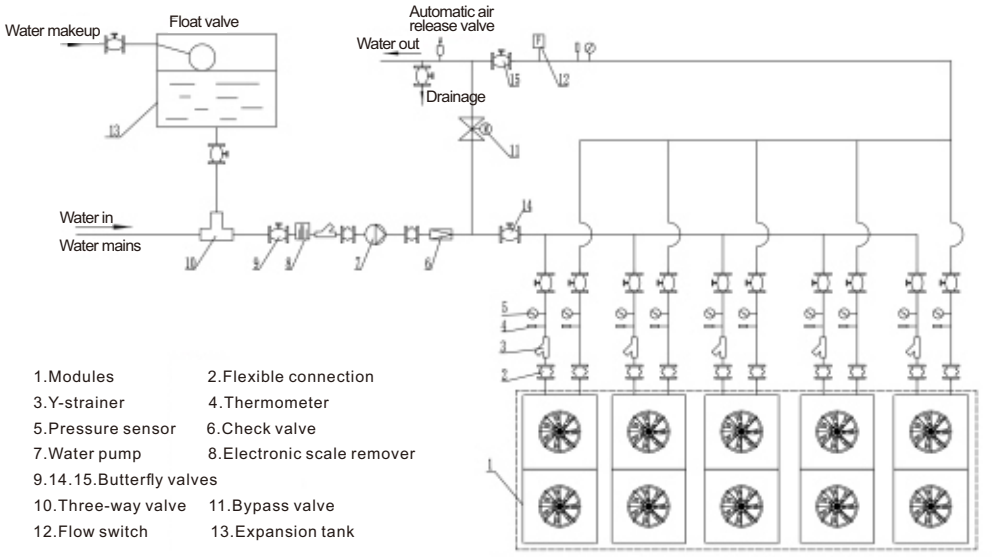
Rigging

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 should be applied between the wire ropes and the chiller for protection. The wire ropes should wind around the hook to secure the chiller in case of turnover.

WATER PIPING SYSTEM

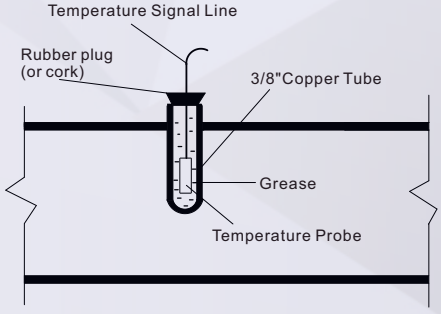
1. Water inlet/outlet headers and valves should be properly insulated. Outdoor part should be protected with enclosure to avoid damage to the structure of the building caused by cooling/heating energy loss and condensation and prevent chilled water from freezing in winter.
2. A flow switch should be installed in water outlet to ensure sufficient water flow in the heat exchangers and piping system. The flow switch should also interlock with the water pump and compressor to prevent the evaporator from freezing due to water shortage.
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. If the water pump discharge pressure exceeds the pressure limit of the chiller, water pump should be installed on the outlet side of the chiller; if the chiller and the auxiliary 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. 20~50 meshes strainer should be installed in water inlet. The water lines should be cleaned of impurities such as rust and welding slag prior to installation. And the chiller should also maintain clean before operation.
6. 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.
7. Temperature and pressure sensors should be installed in water inlet/outlet for regular operation check.
8. 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.
9. Piping for two or more modules must be arranged in equal distance.
10. Diagram below is for reference only. Construction must be carried out by qualified personnel as per relevant standards and design requirements.



Reference diagram for standard unit (modules to be supplied by Multistack)

Notes:

1. Temperature sensor wells are required on the water inlet/outlet headers.
2. The sensor well must be made by the installing company using a 3/8'' copper tube. Punch a hole on the water header and insert the tube to the hole (recommended insert depth: 2/3 diameter of the water header) and weld it to the water header. The tube end inside the water header must be sealed and watertight. Location of the sensor well should be as close to the master module as possible.
3. Grease should be applied into the sensor well to protect the temperature probe. See diagram on the right.

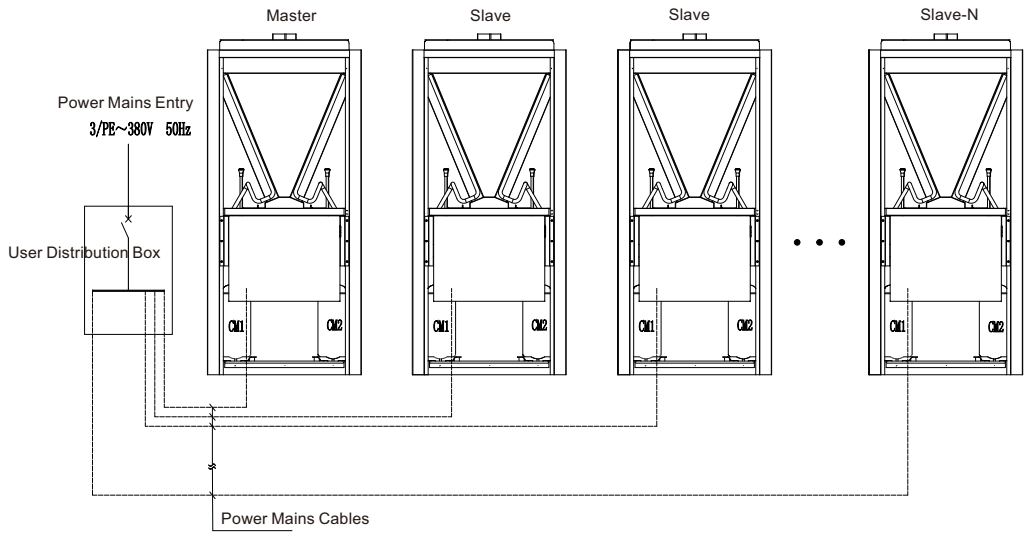


ELECTRIC WIRING

1 .Electric Connection Table

Model	Full Load Amperage	Mains Wire (mm^2)	Wires for Each Module
	A	BCR (PVF flexible conduit)	
MSRA065H	49.5	16	Phase Conductors: 3 wires ($16mm^2$) for MSRA065H 3 wires ($35mm^2$) for MSRA130H 1 ground wire ($10mm^2$)
MSRA130H	98.6	35	

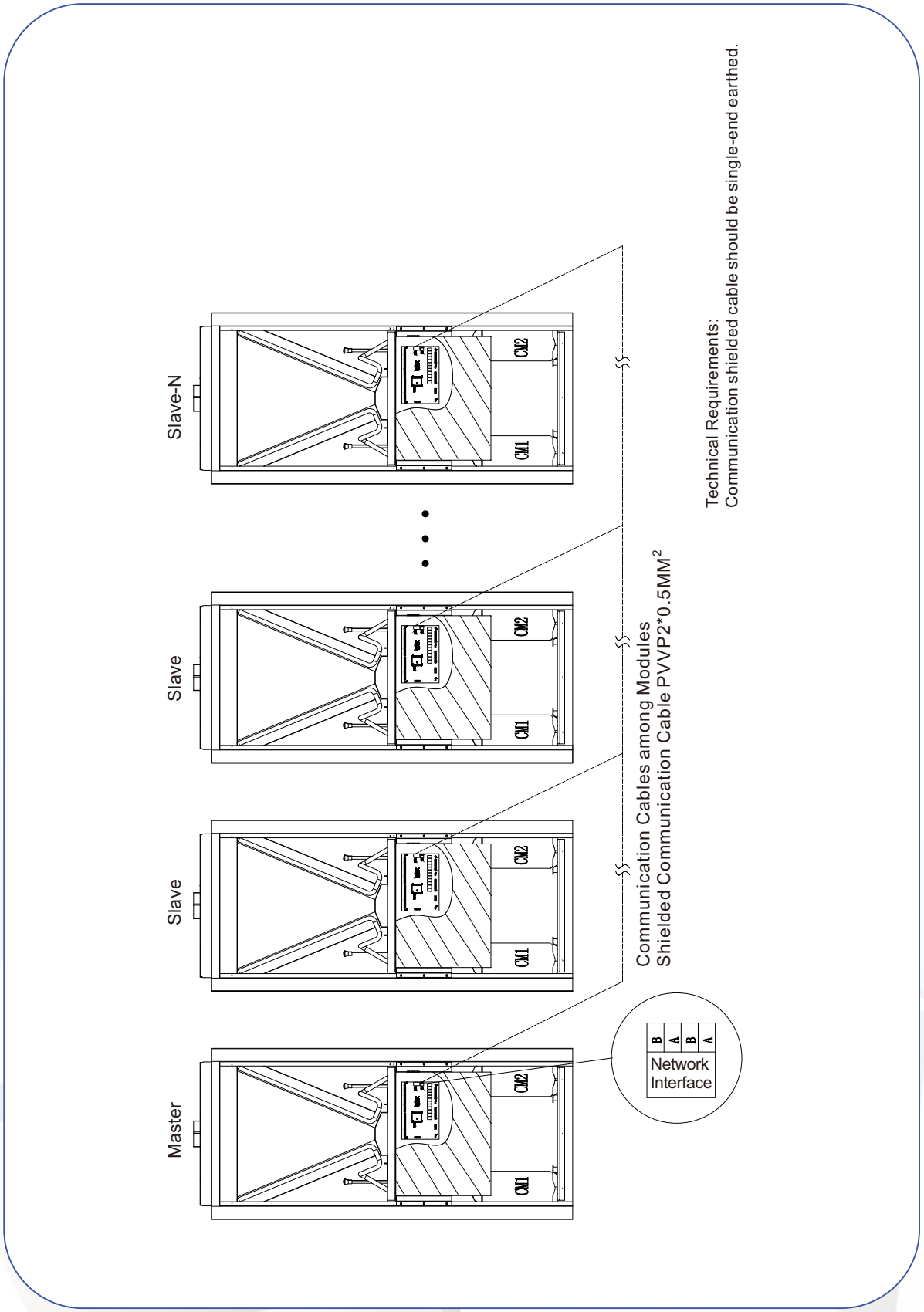
2 .Power Cable Connection for Each Module



Technical Requirements

1. Please connect power mains in strict accordance with correct phase sequence since incorrect connection will lead to compressor damage;
2. Full Load Amperage per module is 98.6A. See "TECHNICAL PERFORMANCE DATA" above for power input of the chiller;
3. Dotted lines stand for power mains cables, which are supplied by user for field installation;
4. Maximum 16 modules in parallel per chiller bank;
5. Power mains cable is distributed via the distribution box, running through cable ducts or conduits, entering electric box from the bottom via conduit gland, and finally to the terminal block of each module;
6. The distribution box is supplied by user.

FIELD WIRING OF CONTROL CIRCUITS



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