MULTISTACK®

MSRA SERIES

Modular Air Cooled Scroll Chiller

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

INTRODUCTION

MULTISTACK created the first modular chiller in Melbourne, Australia in 1985. This is a great invention riding the wave of industrial design of the 20th century, featuring energy saving, reliability and flexibility. Users all over the world benefit greatly from MULTISTACK's modular air conditioning technology. For decades, MULTISTACK continues to provide reliable products and professional services. We are undoubtedly the inventor and leader of modular oil-free technology.

Features of MULTISTACK modular chillers:

ENERGY SAVING The number of compressors running is based on system demand. Each module can run at its peak efficiency at all loads. This is much more economical when compared to a traditional large single unit running at part load.

RELIABLE Every module works as an independent refrigeration circuit, with adjacent modules operating independently. In the event of a malfunction in the system, the computer controller selects the next available standby module to provide back up. One failed module will not disrupt the other modules or system, enabling troubleshooting or maintenance without stopping the chiller.

EASY INSTALLATION AND ADD-ON FLEXIBILITY Chillers can be field-assembled without the aid of a large lifting machine and dedicated doorways. A large modular chiller can be "knocked down" for easy transportation to the rooftop or basement. When larger cooling capacity is needed, just add on new modules to increase unit capacity. Similarly, user can also purchase and install the chiller by stages to improve capital usage.

INTELLIGENT CONTROL SYSTEM MULTISTACK's original modular control system is based on micro-process control technology, combining modules to form a complete and integrated unit. The control system schedules chiller operation in such a way that each module will run at peak efficiency based on system load demand.

DESIGN FEATURES

STRUCTURE

MULTISTACK's MSRA modular air cooled (heat pump) chillers are designed and constructed with patent modular technology. A chiller bank consists of a number of modules connected in parallel to operate as a large complete unit. Same type or different type of modules can be combined together as an independent refrigeration system, giving you full flexibility to increase the capacity as your needs increase. Each module operates as a completely independent refrigeration circuit, comprising a scroll compressor, evaporator, condenser, and other sophisticated control and safety devices. When system load changes, the controller will regulate the chiller's capacity by adjusting either the number of modules in operation or the capacity of the last start-up compressor. The chiller is enclosed within a pleasant-looking and sturdy frame with removable doors for easy access and convenience for maintenance and service. The doors can be lined with acoustic insulation (optional), which further silences the chiller.

COMPACT AND FLEXIBLE

The compact size of each module means easy access via standard doorways and elevators. You no longer need special access to install the chiller on rooftop.
In comparison to traditional chillers, you can gain up to 40% more space, meaning larger capacity chillers can be easily installed in confined and small places.

ADD-ON FLEXIBILITY

MULTISTACK chiller modules are all built in the same standard structure. When larger cooling capacity is needed, just add on new modules to increase unit capacity without any complicated change to the equipment room, piping system and control system.

SAFE AND RELIABLE

Every module works as an independent refrigeration circuit, with adjacent modules operating independently. In the event of a malfunction in the system, the controller will select the next available standby module to provide backup. One failed module will not disrupt the other modules or system. Such design requires less redundancy when installing the chiller.

PEAK EFFICIENCY AT ALL LOADS

Efficiency of compressors in conventional single circuit chillers will decrease dramatically in part load conditions. However, MSRA series modular chillers can automatically schedule the compressors and ensure each individual module runs at its peak efficiency at all loads.

SCROLL REFRIGERATION COMPRESSOR

Each module contains high efficiency hermetic scroll compressors without internal suction and discharge valves. This design can reduce vapor flow losses, offering much higher efficiency and lower sound level. Two scroll plates are the only moving parts in the scroll compressor. Flexible floating seals are used to seal the scroll plates. There are multiple oil grooves on the top of the cavity for sealing and lubricating. Scroll plates have no direct contact with each other to eliminate friction, which guarantee an unparalleled reliability and pro-long service life. Scroll compressor can run at lower temperature with better heat pump performance.

STAINLESS STEEL PLATE HEAT EXCHANGER

Condenser and evaporator are highly efficient, compact and corrosion resistant MTB brazed plate heat exchangers, which are made from AISI316L stainless steel. The heat exchangers are built to the requirements of cleanliness, dryness and leak tightness.
Special corrugated design of the heat exchanger plates allows for turbulence flowing through the internal channels, improving heat transfer rate and slowing down the formation of scales. Plate heat exchangers are pressure tested and helium leak tested and proved to be able to withstand a working pressure of maximum 3.0 MPa and breakdown pressure of maximum 17.5 MPa.

DESIGN FEATURES

Coil Heat Exchanger

Aluminum fin tubes are utilized for air-refrigerant double-pipe heat exchanger to increase heat transfer surface on the air side, enhance airflow disturbance and improve heat transfer coefficient. Hydrophilic film on the fin surface not only protects the fins but also guarantees for a low contact angle to speed up the draining of condensed water, slow down the formation of water film on the surface of fin tubes and reduce air side pressure drop.
Toothed spiral grooves on the inner wall of copper tubes greatly increase coefficient of heat transfer on the refrigerant side.

Safe Refrigerant

Each module is factory charged and run-tested to ensure qualified performance and eliminate field work, such as system pump-down and refrigerant charege.

R134a or R410a refrigerants are all applicable.

Scroll Refrigeration Compressor

The use of state-of-the-art hermetic scroll refrigeration compressors enables higher efficiency and lower sound level as there are no suction/discharge valve plates in the compressors and thus reducing gas flow loss.

Stainless Steel Brazed Plate Heat Exchanger

The water-refrigerant heat exchangers used by chillers are highly efficient, compact and anti-corrosive MTB brazed plate heat exchangers. The plates used are made of AISI316 stainless steel and brazed in vacuum furnace. The manufacturing process of plate heat exchangers can definitely satisfy the requirements of refrigerant system for cleanness, dryness and leak-tightness.

MV7 COMPUTER CONTROLLER

Mv7 is a powerful 64-bit CPU computer-based control system. With MV7 and fuzzy control technology, MULTISTACK develops an optimal load regulation solution for a safe, precise and stable control of the chiller.

1. Compostinons

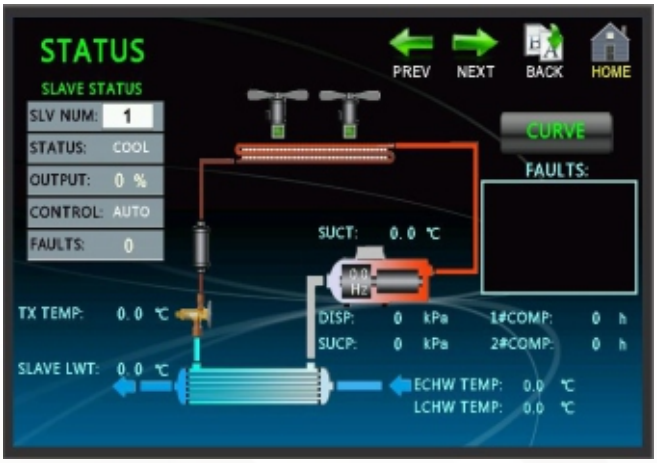
The control system consists of slave control boards and a master control board with a touch screen and on-board 64-bit micro-processor. Slave boards can either operate independently or communicate with the master via RS485 serial port to make up a central control system with a touch screen panel.

2. Display

The controller's 7" (optional 10'' or 15'') touch screen provides you with direct access to different pages. There are 5 sub-menus under the MAIN MENU, displaying operation data and parameter configurations such as running status, history, faults, settings and service information.

3. Temperature Control

For a modular chiller, the compressor load of each module is determined by the system cooling capacity required. MV7 compares the entering and leaving water temperature with its setpoint value and determines the number of compressors running based on the actual demand.

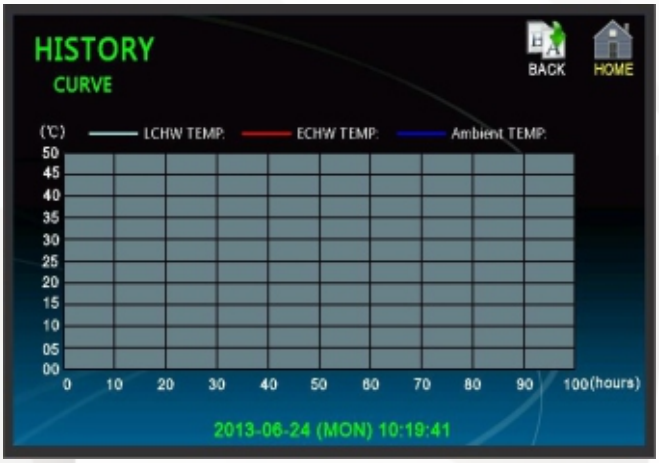


4. Modular Capacity Control

MV7 controller is capable of controlling maximum 56 capacity levels based on actual demand and provides the users with comprehensive and flexible energy-efficient solutions.

5. Safety Protection

MV7 Control System monitors the operation of all modules in the chiller bank. In the event of a slave fault, it will stop the faulty module; in the event of a system fault, it will stop the entire chiller system. System faults include: low chilled/ condenser water flow (for water-cooled chillers only), low leaving chilled water temperature, high leaving hot water temperature and external interlock fault/protection, etc.



MODEL NUMBER DESIGNATION

MSRA	150	V	C	E	A		A	--	6.5
1	2	3	4	5	6		7		8

Model Number Identification:

1—Modular scroll air cooled
2—Model number 150, 340
3—Variable water flow
4—Chiller type H: Heat pump C: Cooling only
5—Refrigerant type
E: R134a
G: R410a
6—Electrical Specifications
A: AC380-420V/50Hz/3Ph B: AC440-480V/60Hz/3Ph
7—Development index
8—Number of modules per chiller 0.5~10

Example:

MSRA150C EA -6.5 means a chiller contains 6.5 modules of MSRA150H with power supply of AC380V/50Hz/3Ph and is charged with R134a refrigerant.

Optional:

1. Feeder box (for MSRA150 series only):
As the number of modules increases in field installation, more power inlets are needed (every half module requires one incoming line). Users can have a junction box (optional, without cables) attached to the outside of the chiller. All modules are pre-wired to the junction box which allows for single point connection to the external power source .

2. Variable water flow (VWF):
As the cooling capacity changes with the system heat load, VWF chiller automatically regulates chilled water flow to match the system operating load so that power consumption of both the chiller and the chilled water pump are greatly reduced.

3. Free cooling module (for MFCD(S) series only):
MFCD(S) modules for chillers with dual refrigeration modes are suitable for the environments where ambient temperature is below 0℃. The chiller runs at compressor cooling mode in summer and at free cooling mode in winter. This design can save up to 15-70% operating costs annually.

4. Free control (for MFCA series only):
Free control application is based on MULTISTACK's modular patent technology, combing with new technology like network communication & separate controls and variable frequency control, which enhance the modular chillers to a higher technical level in energy-saving, flexibility and reliability. Each module has a water pump and other hydraulic parts. In addition, each chiller bank has a module with variable frequency system. Compressor's working frequencies are automatically regulated within the range of 30-90Hz. Minimum cooling capacity output is only 3.5 RT and maximum cooling efficiency is up to EER 18 (COP5.26), which greatly reduce power consumption while meeting the minimum cooling demand.

5. Remote control:
MV7 is fitted with standard RS485 & RS232 COM. ports, Ethernet and USB ports, which enable remote control and monitoring via any of the following ways:
(1) Connect the control system to a supervisory PC and install the software (Windows-compatible) and away you go. MULTISTACK's software gives you full access to the chillers controls and settings.
(2) The MV7 is open to the ASCII and Modbus communication protocol and communicates with BAS.
(3) MV7 control system has a 10M/100M Ethernet port for data transmission. Just connect it to an Ethernet-card and with an IP address you can access the chiller over the Internet or local area network (LAN) established by the user, giving you absolute flexibility.

6. Water pump antifreeze:
MV7 control system is provided with the function of water pump antifreeze for winterization. With the MV7 controller, water pump automatically runs at low ambient temperature and keeps constant water flows. In addition, the control system is equipped with electric heater and relevant interfaces. When water temperature reaches level II antifreeze point, electric heater is activated to prevent water freezing in water pipes; for air cooled heat pump application, heating mode will be activated in level II antifreeze.

7. Water pump and cooling tower control:
MV7 control system is also provided with functions of system chilled water pump start/stop, system condenser water pump start/stop and cooling tower fan start/stop for overall energy-saving control.

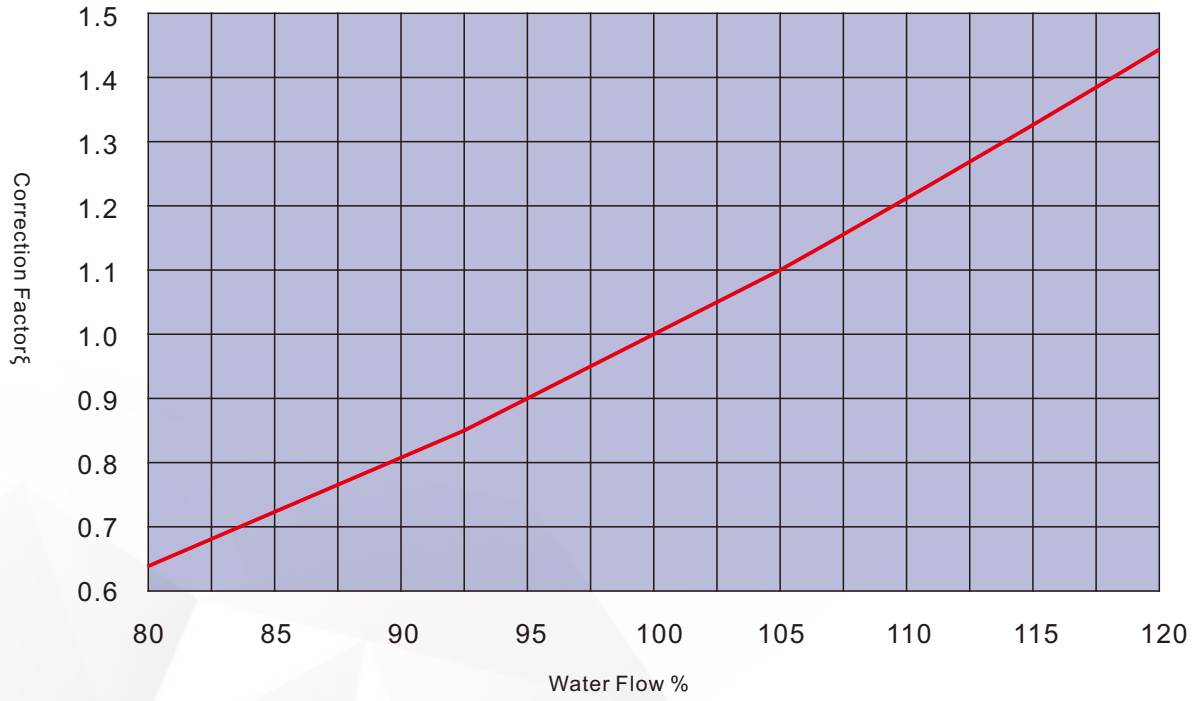
TECHNICAL DATA PER MODULE

Chiller Model			MSRA065C		MSRA130C		MSRA150C		MSRA340C
			R134A	R410A	R134A	R410A	R134a	R410A	R410A
General	Nominal Cooling Capacity	KW	43.8	63.0	91.4	128.4	96.9	125.2	282.4
	Nominal Power Input	KW	15.6	21.0	32.6	42.0	32.5	40.0	92.6
	COP at Full Load	KW/KW	2.81	3.00	2.80	3.06	2.98	3.13	3.05
Compressor	Type		Hermetic Scroll						
	No. Of Comressors		2	2	4	4	4	4	4
	Power Supply		AC380V/50Hz/3Ph, AC400V/50Hz/3Ph						
	Startup Current per Comp.	A	96	124	96	124	145	147	260
	Full Load Ampere per Comp.	A	17.3	20.8	17.3	20.8	22.9	22.5	44.3
Control Stages			0,50%,100%		0,25%,50%,75%,100%		0,50%,100%	0,25%,50%, 75%,100%	0,25%,50%, 75%,100%
No. of Refeigerating Circuit			2		4		2	4	4
Refrigerant Charge		Kg/Circuit	6.3	7.0	6.5	7.5	13.0	7.5	16.3
Evaporator	Type		Shell and tube		Shell and tube		Plate type HX		Plate type HX
	Rated Water Flow	L/S	2.1	3.0	4.4	6.1	4.6	6.0	13.5
	Pressure Drop	kPa	54		68		52		55
	Fouling Factor	m^2▪K/kW	0.018						
	Max Working Pressure Water Side	MPa	1		1		2		2
Condenser	Condenser Type		Fin Tube Heat Exchanger						
	Type of Fan		Axial Flow						
	No. of Fan		2		2		4		4
	Power Input per Fan	kW	0.75		2.2		0.86	0.95	2.6
	Air Flow	m^3/h	13500X2		25000X2		14000X4	13000X4	27200X4
Physical Data	Connection Size		DN50		DN65		DN150		DN150
	Operating Weight	Kg	700		1250		1560	1600	2630
	Shipping Weight	kg	660		1210		1480	1520	2520
	Dimension length	mm	1800		2240		1800	2000	2680
	Dimension Width	mm	900		1200		1800	2000	2246
	Dimension Height	mm	1960		2234		2050	2180	2200
No. of Modules per Chiller		N	-		-		0.5 -10.0	0.5 -7.0	0.5 -4.0

*Based on standard conditions:
12-7°C Evaporator entering and leaving temperature
35°C Ambient Temperature (For Air cooled Chiller Only)
**Apply for sizing main cables.
Since Multistack has a policy of continuous product improvement, it reserves the right to change design and specification without notice

WATER PRESSURE DROP CORRECTION

Water Pressure Drop Correction Curve for heat exchanger at various water flow



Water Pressure Drop Correction Factor (K) in regard to the total number of modules (N) per chiller

N	0.5~3.0	3.5~4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
MSRA150	1.00	1.01	1.02	1.02	1.03	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.11	1.11
MSRA340	1.00	1.02	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

1.Calculation of water pressure drop:

$$\text{Water flow \%} = \frac{\text{Actual water flow}}{\text{Rated water flow}} \times 100\%$$

Actual water pressure drop (heat exchanger) per module = Rated water pressure drop (heat exchanger) × ξ

Chiller's total water pressure drop = Actual water pressure drop (heat exchanger) per module × K

2.Minimum water flow of chiller:

(1) Constant Water Flow System: ≥ 80% of total rated water flow

LOW-TEMPERATURE COOLING PERFORMANCE CORRECTION

MSRA series modular air cooled scroll (heat pump) chillers can work at minimum -10℃ leaving water temperature, which are suitable for ice-making operation or manufacturing process control in industrial production. When operating at low temperature, glycol or other solutions with low freezing points should be used to carry refrigerant. Brine or other solutions which are corrosive to copper or stainless steel must not be used as secondary refrigerants in case they will damage the plate heat exchangers. For low temperature application, corrections should be applied to the cooling capacity, operating power input and heat exchanger water pressure drop.

(1) Actual cooling capacity = Nominal cooling capacity×C1×C2

(2) Actual operating power input = Nominal operating power input ×C3×C4

(3) Actual evaporator water pressure drop = Water pressure drop (0% concentration) x C5

Glycol Concentration Table

Glycol weight concentration %	0	5	10	15	20	25	30	35
Freezing point temperature ℃	0	-1.4	-3.2	-5.4	-7.8	-10.7	-14.1	-17.9
Minimum working temperature ℃	5.0	4.0	2.0	0.0	-2.0	-5.0	-8.0	-12.0
Cooling performance correction factor C1	1.000	0.997	0.992	0.988	0.985	0.982	0.980	0.978
Operating power input correction factor C3	1.000	0.999	0.997	0.996	0.995	0.994	0.993	0.993
Evaporator water pressure drop correction factor C5	1.00	1.050	1.102	1.220	1.305	1.423	1.536	1.740

Cooling Capacity Correction Factor C2 and Operating Power Input Correction Factor C4

Leaving Condenser Water Temp. ℃	Leaving chilled water temperature℃							
	-10	-8	-6	-4	-2	0	2	4
	Cooling capacity correction factor C2							
9	0.521	0.566	0.614	0.663	0.726	0.794	0.883	0.962
15.5	0.484	0.531	0.580	0.632	0.688	0.732	0.861	0.916
28.5	0.462	0.505	0.553	0.607	0.658	0.714	0.791	0.869
35	0.433	0.480	0.528	0.577	0.624	0.672	0.732	0.822
	Operating Power Input Correction Factor C4							
9	0.727	0.754	0.781	0.805	0.833	0.852	0.876	0.902
15.5	0.778	0.805	0.831	0.858	0.884	0.903	0.932	0.992
28.5	0.820	0.851	0.892	0.923	0.954	0.987	1.107	1.112
35	0.866	0.879	0.936	0.980	1.011	1.196	1.204	1.231

PERFORMANCE CORRECTION TABLE

MSRA150C Cooling Performance

Refrigerant: R134a

Leaving Cond. water Temp.℃	Leaving chilled water temperature℃									
	6		7		8		10		10	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
25	107.5	27.9	109.9	27.9	113.5	27.9	120.9	27.9	128.5	27.9
30	101.1	30.1	103.4	30.1	106.8	30.1	113.8	30.1	121.0	30.2
35	94.7	32.5	96.9	32.5	100.1	32.5	106.7	32.5	113.5	32.6
40	88.4	35.1	90.5	35.1	93.5	35.2	99.7	35.2	106.2	35.2
45	82.1	38.0	84.1	38.1	86.9	38.1	92.8	38.1	98.8	38.2

Refrigerant: R410A

Leaving Cond. water Temp.℃	Leaving chilled water temperature℃									
	6		7		8		10		10	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
25	140.5	33.8	142.9	33.8	146.6	33.8	154.2	33.9	161.9	33.9
30	132.1	36.8	134.4	36.8	138.0	36.7	145.3	36.7	152.7	36.7
35	123.0	40.0	125.2	40.0	128.6	40.0	135.6	39.9	142.6	39.9
40	113.2	43.6	115.3	43.6	118.5	43.6	125.1	43.5	131.8	43.4
45	102.7	47.5	104.7	47.5	107.7	47.4	113.9	47.4	120.2	47.3

MSRA340C Cooling Performance

Refrigerant: R410A

Ambient Temp.℃	Leaving chilled water temperature ℃									
	6		7		8		10		12	
	CAPC	PI	CAPC	PI	CAPC	PI	CAPC	PI	CAPC	PI
25	313.8	79.7	321.8	79.8	329.9	80.0	346.3	80.3	362.9	80.7
30	294.9	85.8	302.6	85.9	310.3	86.0	325.9	86.3	341.7	86.6
35	275.2	92.5	282.4	92.6	289.7	92.7	304.5	92.9	319.6	93.1
40	254.4	99.9	261.2	99.9	268.2	100.0	282.2	100.2	296.4	100.4
45	232.8	107.9	239.3	108.0	245.8	108.1	259.0	108.2	272.5	108.3

CAPC——Cooling Capacity (kW) PI——Power Input (kW)

Select air cooled chillers according to the following conditions:

1. Required Cooling Capacity.....1050 kW
2. Entering Chilled Water Temperature (ECHW)..... 12 °C
3. Leaving Chilled water Temperature (LCHW)..... 7 °C
4. Ambient Temperature..... 35.0 °C
5. Refrigerant..... R410A

Calculation

1. Determine Water Flow (CHWF) (L/s)
   Chilled Water Flow (CHWF)
   CHWF = (Required Cooling CAP)/(4.187 ×(ECHW-LCHW)
   =1050/(4.187×(12-7))
   =50 L/s
   Note: Flow rate must not be less than Required Nominal Flow

2. From capacity chart above,
   module at stated conditions will achieve;
   (1) Cooling CAP= 282.4 kW per MSRA 340CG module
   Required Number of Modules (N) = (Required Cooling Capacity)/(CAP per Module)
   = (1050 kW)/(282.4 kW)=3.7
   Select 4 modules

   The total cooling capacity of the chiller is:
   Number of Modules x CAP = 4 × 282.4
   = 1129.6 kW
   The capacity residue =((1129.6 - 1050))/1050×100%
   = 7.6%
   The calculation result is acceptable

3. Chilled water pressure drop calculation
   (1) Nominal Water Flow = N x Evaporator Water Flow
   = 4 x 13.5
   = 54 L/s

   (2) Evaporator water pressure drop for nominal water flow per module is 55 KPa.
   Refer to “Pressure Drop Correction Factor (K)”, K is 1.02 when MSRA340 module number is 4.
   Actual Evaporator water pressure drop is = 55 × 1.02 =56.1 KPa

ELECTRICAL PERFORMANCE DATA

1. MSRA150、MSRA340 Electrical Performance

Model		MSRA150C		MSRA340C
Refrigerant		R134a	R410a	R410a
Power Supply		AC380±10%V/3Ph/50Hz		
Compressor	MCC (A)	32	31.5	52.5
	MRC (A)	25.9	27	44.3
	LRA (A)	145	145	270
	RLA (A)	19.8	18.0	36.15
Fan (Each)	RLA (A)	2.74		4.59
	Startup Current (A)	10.2		15.2
	MSC	(4×N-1) ×MRC+LRA		

Notes:

1. The selection of main cables should base on the MRC, supply voltage, allowable voltage drop, ambient temperature and local electrical codes.
2. Each power circuit must have its own protection device with instruction label.
3. Ground wire of each module in the power supply cabinet must be earthed.
4. Codes explanation:

N——Number of modules

MCC——Maximum Continuous Current. When compressor load amperage exceeds this value, safety device in compressor motor will be activated.

MRC——Maximum Rated Current, which occurs in the initial operation period or when the chiller operation condition exceeds rated condition.

LRA ——Locked Rotor Amperage, which occurs when compressor motor is in locked-rotor condition for 4 seconds.

RLA ——Rated Load Amperage. Compressor load amperage in rated condition.

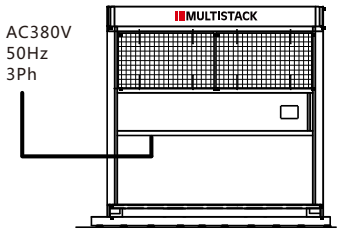
MSC——Maximum Startup Current. Chiller's starting current is always equal to the total current of all running compressors plus startup current of the next start up compressor.

POWER MAINS CONNECTION

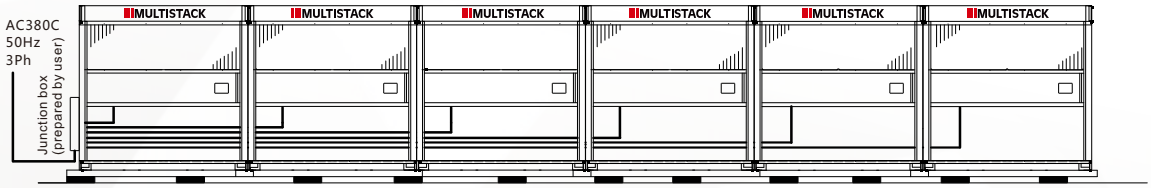
MSRA150 & MSRA340 Power mains connection

Model	No. of Modules	Mains Connection	
		Location	Description
MSRA150-N	0.5~1.0	Half module electrical box	Connect to the main circuit breaker of each half module respectively
MSRA150-N	1.5~10.0	Junction box on the end module	Branch from junction box and connect to the main circuit breaker of each half module respectively
MSRA340-N	0.5~ 4.0	Electrical box	Branch power circuits from junction box and connect to the main circuit breaker of each module respectively. The number of power circuits is based on the number of modules, each module having two circuits.

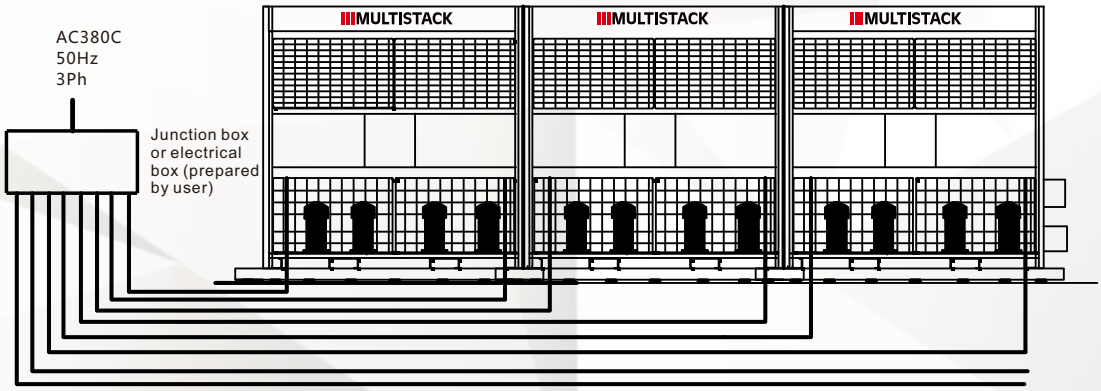
MSRA150-N No. of modules N=0.5-1



MSRA150-N No. of modules 1 < N≤10

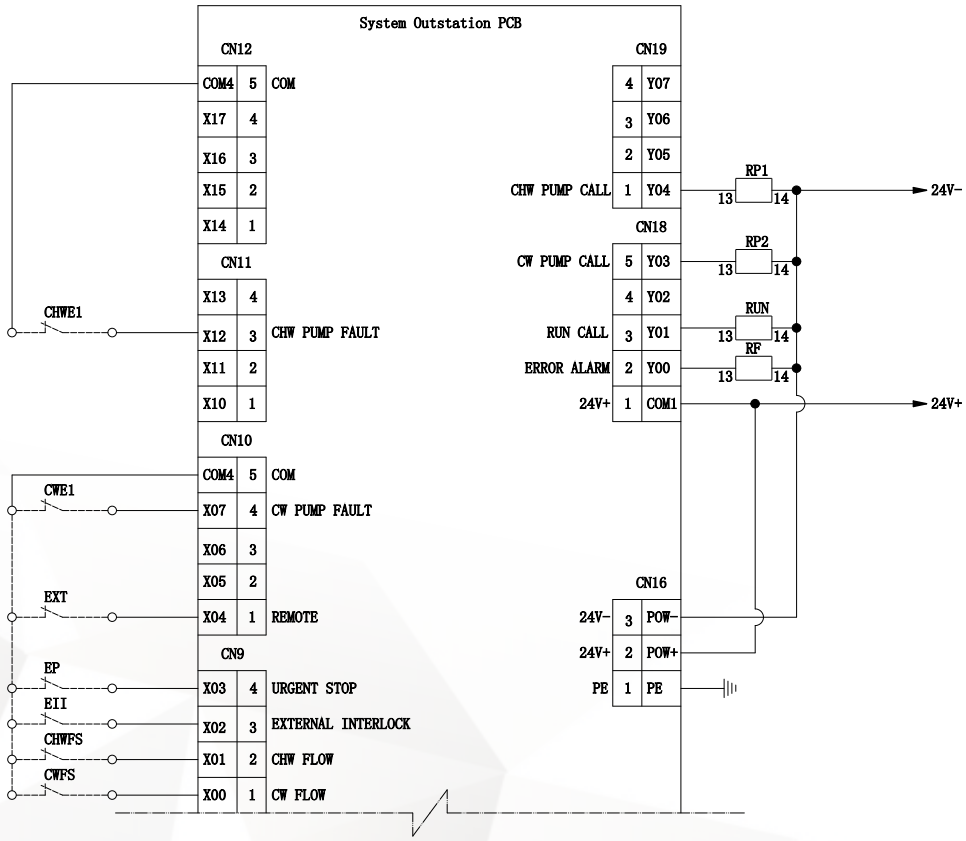


MSRA340-N No. of modules N=0.5-4.0



FIELD WIRING DIAGRAM

Diagram of external interlock contacts connecting to system outstation PCB



External Interlock Devices:

CHWFS Chilled water flow switch, verifying water flow;
CWFS Condenser water flow switch, verifying water flow (for water cooled chiller only);
CHWE1 Chilled water pump fault signal;
CWE1 Condenser water pump fault signal (for water cooled chiller only);
EII External interlock signal;
EP External emergency stop input;
EXT External remote start/stop input;

Volt-free Output Contacts:

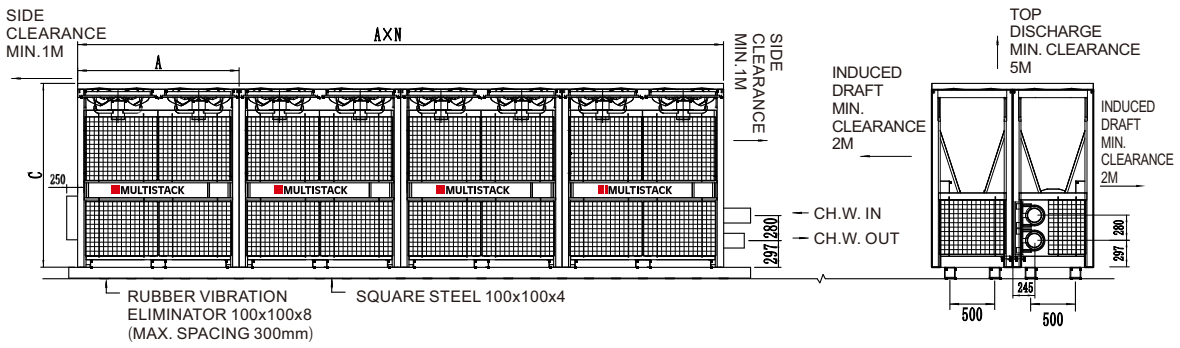
System control board provides 4 volt-free output contacts.
RF Chiller fault status output;
RUN Chiller running status output;
PR1 Chilled water pump running signal output;
PR2 Condenser water pump running signal output;

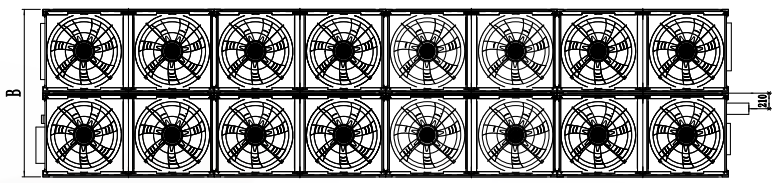
Field Wiring:

—— Control wiring to be at least 1mm 2 ;
—— Over bridge the input signal terminals X02, X03 and X04 to common terminal COM3 as per wiring diagram if EII, EP and EXT are not used;
—— Free contacts have a maximum current rating of 5A;
—— Flow switch and external interlock devices are supplied by users or bought from MULTISTACK;
— — Solid lines indicate factory wiring and dotted lines for field wiring.

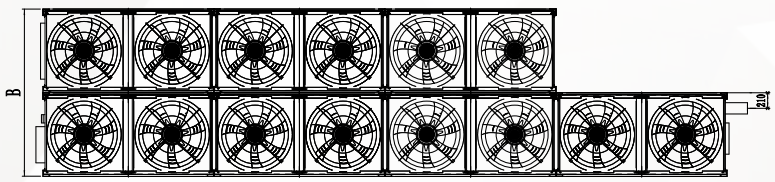
PHYSICAL DIMENSIONS

1. MSRA150 STANDARD CONFIGURATION





For
MSRA150-1.0/2.0/3.0/4.0/5.0/6.0/7.0



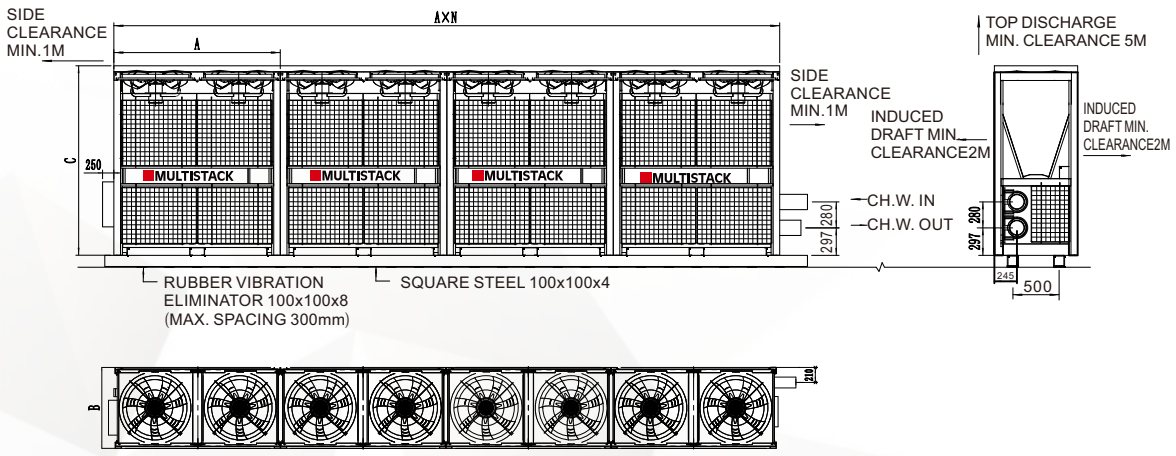
For
MSRA150-1.5/2.5/3.5/4.5/5.5/6.5

Note: If two or more chillers are installed with induced drafts facing one another, minimum 3 meters spacing is required between the induced drafts.

Model	Refrigerant	A(mm)	B(mm)	C(mm)
MSRA150	R134a	1800	1800	2050
	R410A	2000	2000	2180

PHYSICAL DIMENSIONS

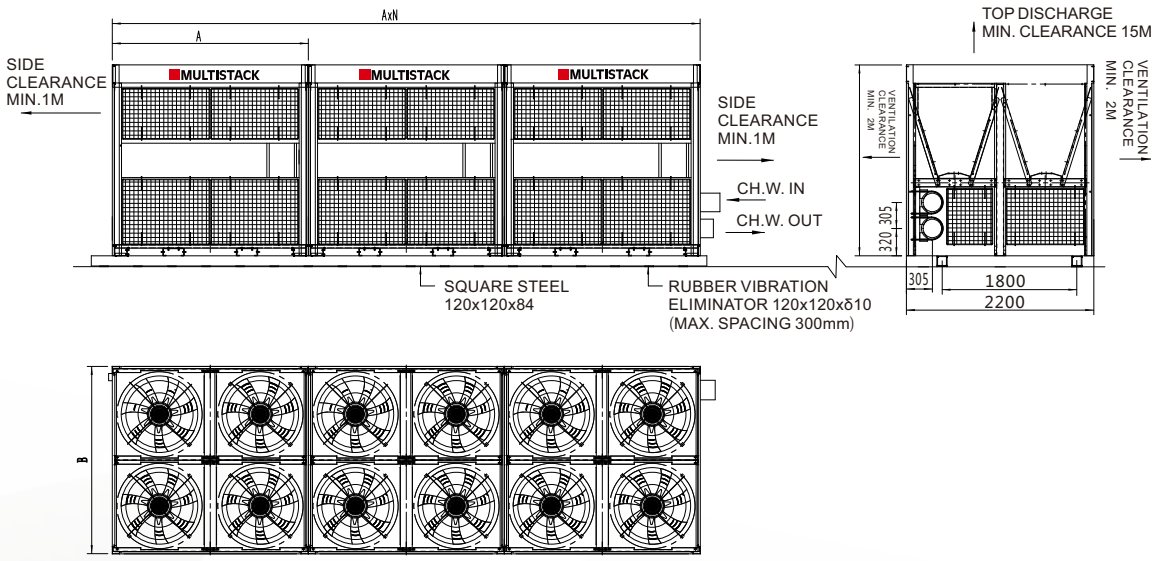
2. MSRA150 SIDE-BY-SIDE CONFIGURATION



Note: If two or more chillers are installed with induced drafts facing one another, minimum 3 meters spacing is required between the induced drafts.

Model	Refrigerant	A(mm)	B(mm)	C(mm)
MSRA150	R134a	1800	1800	2050
	R410A	2000	2000	2180

3. MSRA340 CONFIGURATION

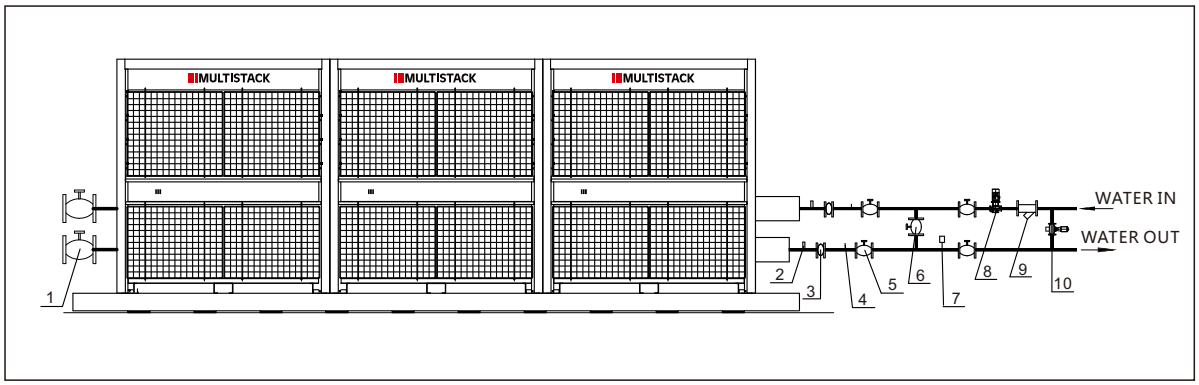


Note: If two or more chillers are installed with induced drafts facing one another, minimum 3 meters spacing is required between the induced drafts.

Model	Refrigerant	A L (mm)	B W(mm)	C H(mm)
MSRA340	R410A	2680	2246	2200

WATER PIPING SYSTEM

1. WATER PIPING



No.	Item	Qty
1	Drain valve DN50	2
2	Temperature sensor well 3/8”	2
3	Flexible connector	2
4	Pressure gauge	2
5	Isolationg valve	4
6	By-pass valve	1
7	Flow switch	1
8	Water pump	
9	Water strainer, 25 meshes/inch	1
10	Differential pressure by-pass valve	1

2. Notes

(1) MULTISTACK modular air cooled chillers can be installed in places with sufficient ventilation, such as rooftop, balcony or on the ground, to keep good convection heat transfer. If two or more chillers are installed with induced drafts facing one another, minimum 3 meters spacing is required between the induced drafts;

(2) If the chiller has multiple modules, water header of each module should be aligned to the same center line;

(3) The flow switch must be installed on the horizontal straight pipe section at least 5 times pipe diameters away from the downstream/upstream valve to prevent damage to the chiller in the event of insufficient water flow. Flow switch is irreplaceable by differential pressure switch/transducer on the water headers;

(4) Required setting of the flow switch: open when water flow ≤ 80% of rated flow;

(5) External pipes and valves shall have proper support so that their weights are not bear on the chiller to guarantee good sealing of pipe joints;

(6) The strainer in the inlet pipe should be of minimum 40 mesh per inch. The strainer should be stainless steel and sturdy enough in case that too much water pressure caused by partial blockage may damage the strainer;

(7) After the temperature sensors are inserted to the sensor wells, grease should be applied into the sensor wells to protect temperature probes from being damaged by water accumulation inside the sensor well;

(8) During the installation of chiller and leak check, all isolating valves should be closed. They are not allowed to open until the installing, leak check and cleaning are completed;

(9) Prior to chiller operation, the whole piping system must be thoroughly cleaned and removed of mechanical impurities. Close the isolating valves in the process of cleaning and open the bypass valve to avoid water circulating within the chiller;

(10) All piping components are not supplied by MULTISTACK.

MULTISTACK MSRA 01.2018 V03