MULTISTACK®

MSRA SERIES

Modular Air Cooled Scroll Heat Pump Chiller

MSRA131 | MSRA290

Nominal Capacity 64 to 2780 kW(R)

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CONTENTS

Features

STRUCTURE

MULTISTACK Air Cooled Chillers are designed and constructed under the modular technology patent. A chiller bank consists of multiple individual chiller modules connected in parallel to operate as a single machine, with cooling or heating capacity to match the load demand by varying the number of operating modules. The chiller modules start from a small half module, and expandable to fifteen full modules for SRA131 and SRA150 and ten for SRA290 and SRA340, giving you full flexibility to increase the capacity as your needs increase.

Each full module consists of two tandem scroll compressor sets (4 compressors), evaporator, condenser, and sophisticated control and protection equipments. Each module operates as a completely independent refrigeration circuit, and varying to the total load demand. The controller will change the chiller's capacity by either controlling the number of modules in operation or by adjusting the capacity of the last start up compressor.

The Multistack Air Cooled lineup is available in cooling only or heat pump version for duel operation.

COMPACT AND SPACE-SAVING

The compact size of each module means easy access via standard doorways and lifts. You no longer need special access to install the chiller.

LOWER INSTALLATION COST

Connection of the modules has never been simpler – only two pipes to connect then the communication connections and you're in business.

ADD-ON FLEXIBILITY

Each module in the Multistack system delivers both, cooling and heating. As many as 10 full modules can be connected together as a chiller bank. Multistack chillers has inbuilt flexibility, which useful in tenancy changes and strata title applications.

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 computer selects the next available standby module to provide back up. One failed module will not disrupt the other chillers or system, giving you total piece of mind.

PEAK ECONOMY AT ALL LOADS

Automatic scheduling of the compressors allows the chiller to match the fluctuating cooling/heating loads and conserve energy with each individual unit running at its peak efficiency. This is much more economical when compared to a large single unit running at part load.

UNPARALLELED RELIABILITY

Every Multistack slave module is identical to each other, so in the event of a malfunction in the system, the computer automatically selects the next available standby circuit to provide back up. For critical air conditioning and industrial process cooling a Multistack modular Chiller inherently provides economical standby capacity and unparalleled dependability.

HIGH EFFICIENCY, QUIET OPERATING SCROLL COMPRESSOR

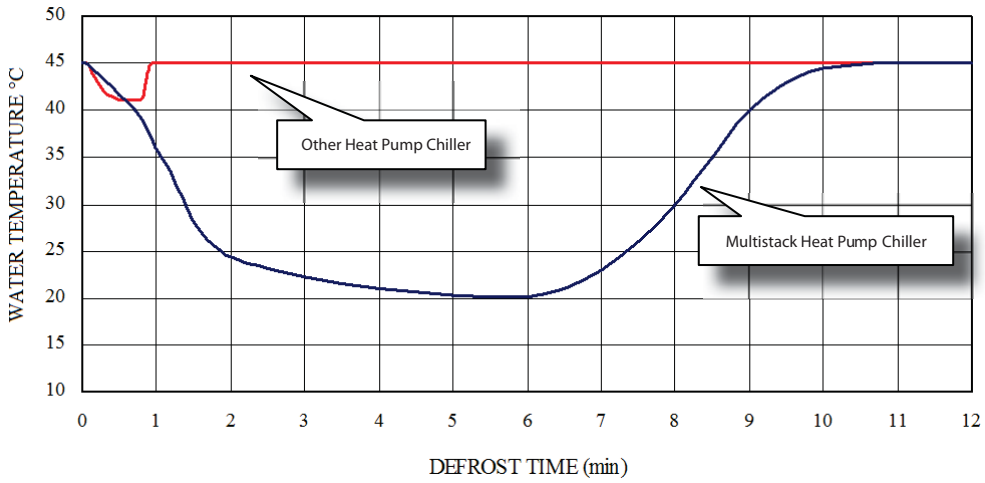
Our compressors have a high coefficient of performance (COP) – (approximately 9% higher than that of a reciprocating compressor), resulting in outstanding reliability due to fewer moving parts, lower starting toque, and tolerance for flood-back and a rigid internal construction. All this is achieved through high volumetric efficiency, minimized pressure losses due to the absence of valve plates, and reduced heat transfer loss due to better separation of suction and discharge gases. In addition, scroll compressors produce less vibrations and quieter than that of its hermetic counterpart (due to absence of dynamic suction and discharge valves and a much smoother compression process).

"GIVING YOU OUTSTANDING RELIABILITY & PERFORMANCE"

EXCLUSIVE DEFROSTING TECHNOLOGY

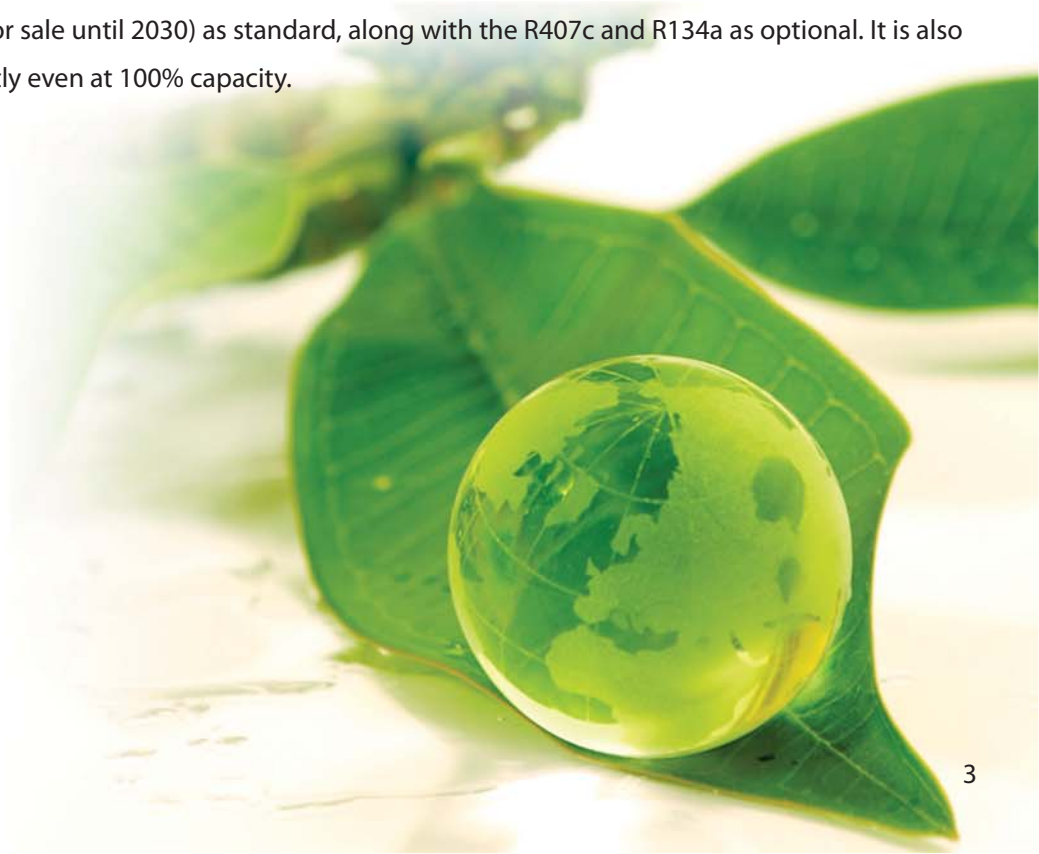
The chiller not only adapts to the heat pump cycle (which is specifically designed to improve heat pump operational performance and obtaining a faster defrosting cycle), but also when an even amount frost build up is present; it will thaw it completely in a very short time. Defrosting cycle is only carried out when the demand for defrosting is present in each module, which means the modules that are frosted will defrost, while the others remain in operation, giving you a reliable and fully uninterrupted system.

This excusive defrosting technology can ensure complete deforesting even in the harshest of environments, ensuring you with excellent heating performance, and a comfortable environment all year round.



ENVIRONMENTALLY FRIENDLY

Multistack Chillers are friendly to the environment, and currently running on the non-toxic R22 refrigerant (approved under the Montral Protocol, and for sale until 2030) as standard, along with the R407c and R134a as optional. It is also pleasing to the ears, running quietly even at 100% capacity.



MV6 Control

The MV6 computer control monitors the chiller's operation and schedules the on and off of each compressor and capacity control stages in respect to the change in load demand. The computer continuously and comprehensively monitors the total operation of all modules in the chiller bank. It will also shut down individual module or the entire bank in the event that a fault occurs. A maximum of 32 refrigeration circuits can be monitored at one time.

System data and Variables Display

The controller's 5.7" touch panel can not only display the chiller's operation data but also provides you with direct access to all of the chillers setting and variables for total system control.

Chiller operation status
___chilled water temperature
___condenser water temperature
___% of chiller cooling capacity
___% demand loading
___load /unload time delay
___current fault number
___% of loading limitation
___lead compressor no.

Chiller operation status
___chilled water temperature
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___condenser water temperature
___% of chiller cooling capacity
___% demand loading
___load /unload time delay
___current fault number
___% of loading limitation
___lead compressor no.

COMPRESSOR SEQUENCE

The MV6 controller accumulates the running hours of each compressor and hence establishes working sequence. A standby compressor with the least working hours will be activated during loading. The same goes for a compressor with the most working hours will be stopped during unloading. This ensures each compressor in the system has an even usage, which will save you time and money in the long run for maintenance.

FAULT REVIEW

The controller will record and display the last 60 faults that occurred, giving detailed information such as time, date, location, cause, current status, as well as the performance data collected at the moment each fault occurred.

LOAD PROFILE

The controller records all working hours of the chiller and compressor and records it accordingly in 10% brackets from 0% - 100%, giving you detailed information for which percentage the chiller is running mostly.

PASSWORD

A two level password protection is included (for both customer and service personnel) to give you piece of mind. For example the service password will give you full access to settings and variables, but the user password will only enable the user see but not change settings and variables.

STANDBY CONTROL

Each module can be set for three modes: auto/ off/independent operation via the slave outstation card installed in the module. Default setting is "auto", with "off" mode for when maintenance is required and "independent" mode (where the module is controlled by its own slave outstation card and operates independently from the controller), is usually for commissioning or emergency operation.

REMOTE CONTROL & MONITORING (OPTIONAL)

MV6 is fitted with a RS485 serial port, which enables remote control monitoring.

(1) Connect it to a pc and install the software (Ms Windows based only) and away you go. Multistack's RCM software give you full access to the chillers controls and settings, with a maximum communi cation cable length of 1200m.

(2) The MV6 is opened to the ASCII agreement and communicates with bas.

(3) Connect it to an Ethernet-card and with an IP address you can access the chiller over the internet giving you absolute flexibility.

MODEL NUMBER DESIGNATION

M	SR	A	131	C	-	5	A	B	F
1	2	3	4	5		6	7	8	9

1 Modular Series

2 Scroll Chiller

3 Cooling Type
- A:Air Cooled
- W:Water Cooled

4 Model Type
- MSRA131
- MSRA290

5 Chiller Type
- C: Cooling Only
- H: Heat Pump

6 The number of modules
- MSRA 131: 0.5-10.0
- MSRA 290: 1.0-10.0

7 Electrical Specifications
- A: 380-420V, 50Hz, 3 Phase
- B: 380V, 60Hz, 3 Phase
- C: 440-480V, 60Hz, 3 Phase

8 Configuration
- B: Back to Back (Standard)
- E: End to End (Option) *For MSRA 131 only

9 Refrigerant
- E:R134a
- F:R22
- R:R407c

Physical Data Per Module

R22 – MSRA131

Model		131H	131C
Cooling	Nominal Cooling Capacity (kW)	129	
	Compressor Power Input (kW)	36	
Heating	Nominal Heating Capacity (kW)	134	-
	Compressor Power Input (kW)	35.6	-
Compressor	Type	Hermetic Scroll	
	Number	4	
	Power	380-420V / 50Hz / 3 Phase	
	Max. Continuous Current (A)	27 x 4	
	Locked Rotor Amperage (A)	147 x 4	
	Control Stages	0, 50%, 100%	
Refrigerant	Charge (kg)	13.5 x 2	13 x 2
Evaporator	Type	Brazed Plate Heat Exchanger	
	Water Flow Rate (L/s)	6.2	
	Water Pressure Drop (kPa)	52	
	Fouling Factor (m^2k/kW)	0.018	
	Max Working Pressure Water (kPa)	2000	
Condenser	Type	Coil	
	Type of Fan	Axial Fan	
	No. of Fan	4	
	Fan Power Input (kW)	1.1 x 4	
	Air Flow Rate (m^3/h)	56000	
Water Connection		6”	
Dimension (W x D x H) mm		1800 x 1800 x 2050	
Operation Weight (kg)		1500	1460
Shipping Weight (kg)		1600	1560

Nominal Values based on:

Cooling:	Ambient	35°C	Heating:	Ambient	7°C DB / 6°C WB
	Chilled Water Entering Temp.	12°C		Hot Water Entering Temp	40°C
	Chilled Water Leaving Temp.	7°C		Hot Water Leaving Temp.	45°C

Note: Minimum Chilled Water Flow Rate per module: Nominal Water Flow Rate less 10%

Contact nearest authorized agent if lower flow rate is required.

R22 – MSRA290

Model		290H	290C
Cooling	Nominal Cooling Capacity (kW)	278	
	Compressor Power Input (kW)	82.4	
Heating	Nominal Heating Capacity (kW)	296	-
	Compressor Power Input (kW)	80	-
Compressor	Type	Hermetic Scroll	
	Number	4	
	Power	380-420V / 50Hz / 3 Phase	
	Max. Continuous Current (A)	69 x 4	
	Locked Rotor Amperage (A)	270 x 4	
	Control Stages	0, 50%, 100%	
Refrigerant	Charge (kg)	44 x 2	36 x 2
Evaporator	Type	Brazed Plate Heat Exchanger	
	Water Flow Rate (L/s)	12.9	
	Water Pressure Drop (kPa)	55	
	Fouling Factor (m^2k/kW)	0.018	
	Max Working Pressure Water (kPa)	2000	
Condenser	Type	Coil	
	Type of Fan	Axial Fan	
	No. of Fan	4	
	Fan Power Input (kW)	2.2 x 4	
	Air Flow Rate (m^3/h)	120000	
Water Connection		8”	
Dimension (W x D x H) mm		2300 x 2200 x 2240	
Operation Weight (kg)		2540	2450
Shipping Weight (kg)		2650	2560

Nominal Values based on:

Cooling:	Ambient	35°C	Heating:	Ambient	7°C DB / 6°C WB
	Chilled Water Entering Temp.	12°C		Hot Water Entering Temp	40°C
	Chilled Water Leaving Temp.	7°C		Hot Water Leaving Temp.	45°C

Note: Minimum Chilled Water Flow Rate per module: Nominal Water Flow Rate less 10%

Contact nearest authorized agent if lower flow rate is required.

R407C – MSRA131

Model		131H	131C
Cooling	Nominal Cooling Capacity (kW)	123	
	Compressor Power Input (kW)	39.6	
Heating	Nominal Heating Capacity (kW)	131	-
	Compressor Power Input (kW)	39.6	-
Compressor	Type	Hermetic Scroll	
	Number	4	
	Power	380-420V / 50Hz / 3 Phase	
	Max. Continuous Current (A)	32 x 4	
	Locked Rotor Amperage (A)	145 x 4	
	Control Stages	0, 50%, 100%	
Refrigerant	Charge (kg)	12 x 2	11.7 x 2
Evaporator	Type	Brazed Plate Heat Exchanger	
	Water Flow Rate (L/s)	5.9	
	Water Pressure Drop (kPa)	52	
	Fouling Factor (m^2k/kW)	0.018	
	Max Working Pressure Water (kPa)	2000	
Condenser	Type	Coil	
	Type of Fan	Axial Fan	
	No. of Fan	4	
	Fan Power Input (kW)	1.1 x 4	
	Air Flow Rate (m^3/h)	56000	
Water Connection		6”	
Dimension (W x D x H) mm		1800 x 1800 x 2000	
Operation Weight (kg)		1500	1460
Shipping Weight (kg)		1600	1560

Nominal Values based on:

Cooling:	Ambient	35°C	Heating:	Ambient	7°C DB / 6°C WB
	Chilled Water Entering Temp.	12°C		Hot Water Entering Temp	40°C
	Chilled Water Leaving Temp.	7°C		Hot Water Leaving Temp.	45°C

Note: Minimum Chilled Water Flow Rate per module: Nominal Water Flow Rate less 10%

Contact nearest authorized agent if lower flow rate is required.

R407C – MSRA290

Model		290H	290C
Cooling	Nominal Cooling Capacity (kW)	255	
	Compressor Power Input (kW)	82	
Heating	Nominal Heating Capacity (kW)	277	-
	Compressor Power Input (kW)	80	-
Compressor	Type	Hermetic Scroll	
	Number	4	
	Power	380-420V / 50Hz / 3 Phase	
	Start Up Current A	69 x 4	
	Max. Running Current A	270 x 4	
	Control Stages	0, 50%, 100%	
Refrigerant	Charge (kg)	36.8 x 2	28.8 x 2
Evaporator	Type	Brazed Plate Heat Exchanger	
	Water Flow Rate (L/s)	11.8	
	Water Pressure Drop (kPa)	55	
	Fouling Factor (m^2k/kW)	0.018	
	Max Working Pressure Water (kPa)	2000	
Condenser	Type	Coil	
	Type of Fan	Axial Fan	
	No. of Fan	4	
	Fan Power Input (kW)	2.2 x 4	
	Air Flow Rate (m^3/h)	120000	
Water Connection		8”	
Dimension (W x D x H) mm		2300 x 2200 x 2240	
Operation Weight (kg)		2540	2450
Shipping Weight (kg)		2650	2560

Nominal Values based on:

Cooling:	Ambient	35°C	Heating:	Ambient	7°C DB / 6°C WB
	Chilled Water Entering Temp.	12°C		Hot Water Entering Temp	40°C
	Chilled Water Leaving Temp.	7°C		Hot Water Leaving Temp.	45°C

Note: Minimum Chilled Water Flow Rate per module: Nominal Water Flow Rate less 10%

Contact nearest authorized agent if lower flow rate is required.

R134A – MSRA131 | 290

Model		131H	131C	290H	290C
Cooling	Nominal Cooling Capacity (kW)	86		173	
	Compressor Power Input (kW)	27.6		57	
Heating	Nominal Heating Capacity (kW)	89	-	187	-
	Compressor Power Input (kW)	27.6	-	56	-
Compressor	Type	Hermetic Scroll			
	Number	4			
	Power	380-420V / 50Hz / 3 Phase			
	Max. Continuous Current (A)	32 x 4		69 x 4	
	Locked Rotor Amperage (A)	145 x 4		270 x 4	
	Control Stages	0, 50%, 100%			
Refrigerant	Charge (kg)	13.7 x 2	12.3 x 2	38.9 x 2	30.4 x 2
Evaporator	Type	Brazed Plate Heat Exchanger			
	Water Flow Rate (L/s)	4.1		8.0	
	Water Pressure Drop (kPa)	52		55	
	Fouling Factor (m^2k/kW)	0.018			
	Max Working Pressure Water (kPa)	2000			
Condenser	Type	Coil			
	Type of Fan	Axial Fan			
	No. of Fan	4			
	Fan Power Input (kW)	1.1 x 4		2.2 x 4	
	Air Flow Rate (m^3/h)	56000		90000	
Water Connection		6”		8”	
Dimension (W x D x H) mm		1800 x 1800 x 2050		2300 x 2200 x 2240	
Operation Weight (kg)		1500	1460	2500	2410
Shipping Weight (kg)		1600	1560	2610	2520

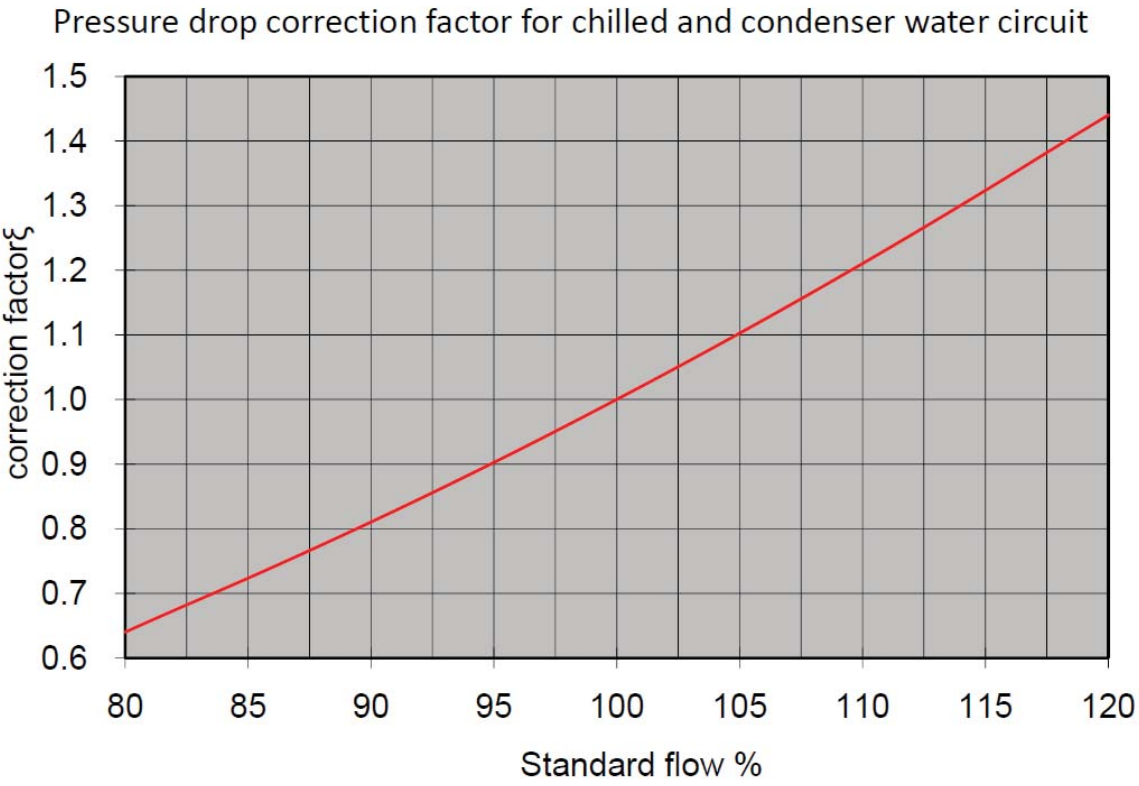
Nominal Values based on:

Cooling:	Ambient	35°C	Heating:	Ambient	7°C DB / 6°C WB
	Chilled Water Entering Temp.	12°C		Hot Water Entering Temp	40°C
	Chilled Water Leaving Temp.	7°C		Hot Water Leaving Temp.	45°C

Note: Minimum Chilled Water Flow Rate per module: Nominal Water Flow Rate less 10%

Contact nearest authorized agent if lower flow rate is required.

Heat Exchanger Water Pressure Drop



Pressure drop correction factor: k related to the modules' number: n of the chiller bank

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	10.5
MSRA131	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
MSRA290	1.00	1.02	1.03	1.03	1.04	1.04	1.05	1.06	1.07	1.08	1.09	1.10	1.12	1.14

Unit Capcity Per Module

Unit Capcity Per Module - MSRA131C

Ambient Air Temp. °C	R22		Leaving Chilled Water Temperature °C									R22
	5		6		7		8		10		12	
	CAP	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI
25	130.5	29.8	135.4	29.8	142.9	29.9	148.1	29.9	156.1	30.0	167.3	30.0
30	124.2	32.7	128.9	32.7	136.1	32.7	141.2	32.7	149.0	32.8	159.8	32.8
35	117.5	35.9	122.0	35.9	129.0	36.0	133.8	36.0	141.2	36.1	151.6	36.1
40	110.6	39.6	114.9	39.6	121.5	39.7	126.1	39.7	133.3	39.8	143.2	39.8
45	103.5	43.7	107.6	43.7	113.8	43.8	118.3	43.8	125.0	43.9	134.5	43.9

Ambient Air Temp. °C	R407c		Leaving Chilled Water Temperature °C									R407c
	5		6		7		8		10		12	
	CAP	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI
25	126.0	32.3	131.2	32.3	139.2	32.4	144.7	32.4	153.3	32.5	165.4	32.5
30	118.7	35.7	123.6	35.7	131.3	35.8	136.5	35.8	144.8	35.9	156.2	35.9
35	111.1	39.5	115.8	39.5	123.0	39.6	128.0	39.6	135.7	39.7	146.7	39.7
40	103.3	44.0	107.6	44.0	114.4	44.1	119.1	44.1	126.4	44.2	136.7	44.2
45	95.1	49.0	99.2	49.0	105.5	49.1	109.9	49.1	116.7	49.2	126.4	49.2

Ambient Air Temp. °C	R134a		Leaving Chilled Water Temperature °C									R134a
	5		6		7		8		10		12	
	CAP	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI
25	86.9	23.2	90.6	23.2	96.4	23.3	100.3	23.3	106.5	23.3	115.1	23.3
30	82.2	25.2	85.7	25.2	91.3	25.3	95.1	25.3	101.0	25.4	109.2	25.4
35	77.2	27.5	80.6	27.5	86.0	27.6	89.6	27.6	95.2	27.7	103.1	27.7
40	72.0	30.0	75.3	30.0	80.3	30.1	83.8	30.1	89.1	30.2	96.6	30.2
45	66.7	32.9	69.7	32.9	74.4	33.0	77.7	33.0	82.8	33.0	89.9	33.0
50	60.2	38.5	63.2	38.6	66.1	38.6	69.0	38.7	74.9	38.8	78.4	38.9

CAP Cooling Capacity (kW)

PI Compressore Power Input (kW)

Note:

- This Table is based on 5 °K difference in water temperature
- Please contact your local Multistack Agent if you require performance data beyond the limits of the above table
- Interpolation is permissible. Do not extrapolate

Unit Capcity Per Module - MSRA131H

Ambient Air Temp. °C	R22		Leaving Hot Water Temperature °C								R22	
	5		6		7		8		10			
	CAPH	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI		
15	156.4	29.6	153.5	32.4	150.5	35.7	147.7	39.3	145.3	43.4		
10	142.8	29.6	140.4	32.4	137.9	35.7	135.8	39.3	134.0	43.4		
7	138.5	29.5	136.2	32.3	134.0	35.6	132.0	39.3	130.5	43.4		
5	134.3	29.5	132.2	32.3	130.1	35.6	128.3	39.3				
0	118.6	29.5	117.2	32.3	115.8	35.5						
-5	104.7	29.5	103.7	32.3								

Ambient Air Temp. °C	R22		Leaving Hot Water Temperature °C								R22	
	5		6		7		8		10			
	CAPH	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI		
15	156.1	32.4	152.2	35.8	148.4	39.7	144.9	44.0	141.6	49.0		
10	141.3	32.4	138.1	35.8	135.1	39.7	132.4	44.0	130.0	49.0		
7	136.7	32.3	133.7	35.7	131.0	39.6	128.5	44.0	126.4	48.9		
5	132.1	32.3	129.4	35.7	127.0	39.6	124.7	44.0				
0	115.5	32.2	113.6	35.6	111.9	39.5						
-5	100.8	32.2	99.6	35.6								

Ambient Air Temp. °C	R22		Leaving Hot Water Temperature °C								R22	
	5		6		7		8		10			
	CAPH	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI		
15	106.5	23.4	104.0	25.5	101.6	27.7	99.2	30.3	97.0	33.2		
10	96.1	23.4	94.0	25.5	92.0	27.7	90.1	30.3	88.3	33.2		
7	92.9	23.3	90.9	25.4	89.0	27.6	87.2	30.2	85.6	33.1		
5	89.7	23.3	87.8	25.4	86.1	27.6	84.5	30.2	83.0	33.1		
0	77.9	23.2	76.4	25.3	75.3	27.5	74.2	30.1				
-5	67.4	23.2	66.4	25.3	65.6	27.5						

CAPH Heating Capacity (kW)

PI Compressore Power Input (kW)

Note:

- This Table is based on 5 °K difference in water temperature
- Please contact your local Multistack Agent if you require performance data beyond the limits of the above table
- Interpolation is permissible. Do not extrapolate

Unit Capcity Per Module - MSRA290C

Ambient Air Temp. °C	R22		Leaving Chilled Water Temperature °C								R22	
	5		6		7		8		10		12	
	CAP	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI
25	282.2	69.3	293.1	69.3	310.0	69.4	321.6	69.4	339.7	69.4	365.0	69.4
30	267.9	75.1	278.3	75.1	294.4	75.2	305.5	75.2	322.9	75.3	347.1	75.3
35	252.7	82.3	262.6	82.3	278.0	82.4	288.6	82.4	305.1	82.5	328.2	82.5
40	237.2	89.0	246.5	89.0	261.1	89.0	271.1	89.0	286.8	89.1	308.8	89.1
45	221.2	97.3	230.1	97.3	243.8	97.4	253.3	97.4	268.1	97.4	288.9	97.4

Ambient Air Temp. °C	R407c		Leaving Chilled Water Temperature °C								R407c	
	5		6		7		8		10		12	
	CAP	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI
25	259.0	66.8	269.2	66.8	285.2	66.9	296.3	66.9	313.5	67.0	337.5	67.0
30	245.7	73.8	255.5	73.8	270.8	73.9	281.4	73.9	297.9	74.0	321.0	74.0
35	231.1	81.9	240.4	81.9	255.0	82.0	265.0	82.0	280.7	82.1	302.7	82.1
40	215.3	89.6	224.1	89.6	237.8	89.7	247.3	89.7	262.1	89.8	282.9	89.8
45	198.4	98.6	206.7	98.6	219.5	98.7	228.4	98.7	242.2	98.8	261.7	98.8

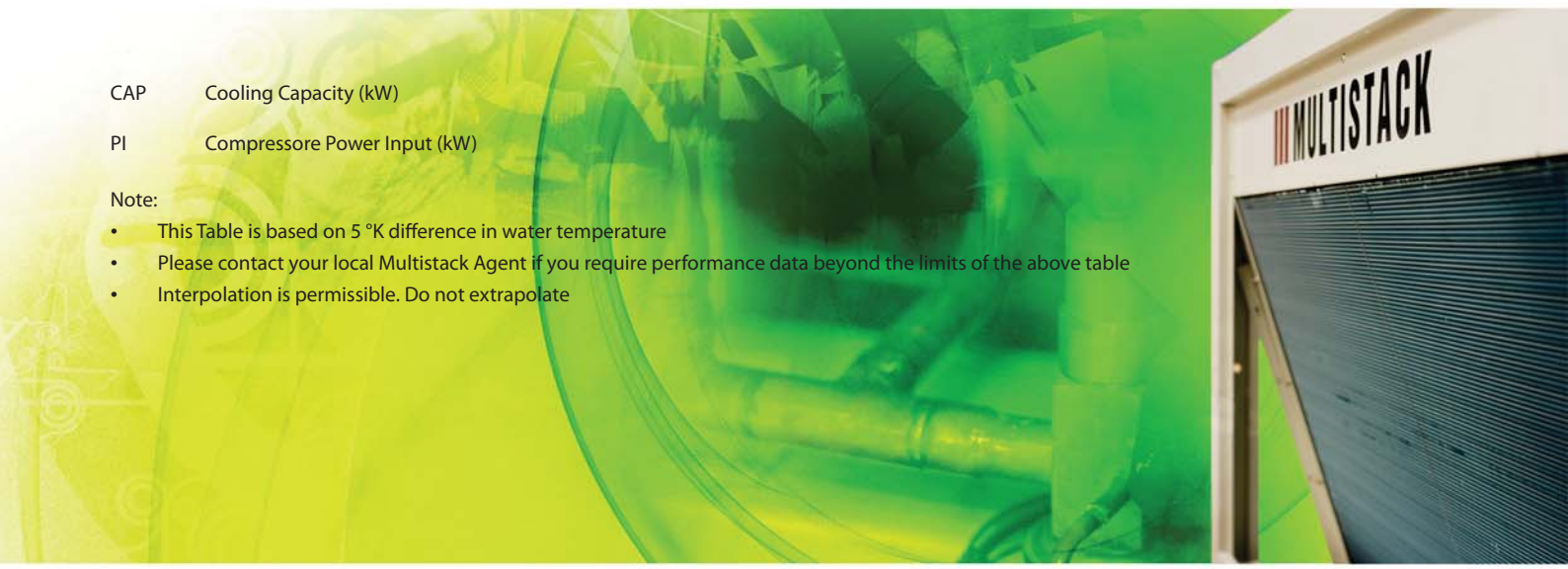
Ambient Air Temp. °C	R134a		Leaving Chilled Water Temperature °C								R134a	
	5		6		7		8		10		12	
	CAP	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI	**CAP**	PI
25	175.1	48.1	182.6	48.1	194.2	48.1	202.3	48.1	214.9	48.2	232.6	48.2
30	165.4	52.2	172.6	52.2	183.6	52.3	191.3	52.3	203.4	52.4	220.3	52.4
35	155.4	56.9	162.2	56.9	173.0	57.0	180.1	57.0	191.6	57.1	207.8	57.1
40	145.3	61.6	151.7	61.6	161.7	61.7	168.7	61.7	179.5	61.8	194.9	61.8
45	135.1	67.1	141.0	67.1	150.4	67.2	157.0	67.2	167.2	67.2	181.7	67.2

CAP Cooling Capacity (kW)

PI Compressore Power Input (kW)

Note:

- This Table is based on 5 °K difference in water temperature
- Please contact your local Multistack Agent if you require performance data beyond the limits of the above table
- Interpolation is permissible. Do not extrapolate



Unit Capcity Per Module - MSRA290H

Ambient Air Temp. °C	R22		Leaving Hot Water Temperature °C								R22
	5		6		7		8		10		
	CAPH	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI	
15	351.8	68.9	343.3	74.8	334.6	80.1	326.4	88.5	318.8	96.8	
10	319.5	68.9	312.3	74.8	305.2	80.1	298.6	88.5	292.7	96.8	
7	309.3	68.9	302.7	74.7	296.0	80.0	289.8	88.4	284.4	96.7	
5	299.5	68.9	293.3	74.7	287.0	80.0	281.4	88.4			
0	263.0	68.8	258.4	74.6	254.0	79.9					
-5	230.9	68.8	227.7	74.6							

Ambient Air Temp. °C	R407c		Leaving Hot Water Temperature °C								R407c
	5		6		7		8		10		
	CAPH	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI	
15	328.6	66.6	321.7	73.5	314.0	80.1	305.8	89.2	297.3	98.2	
10	297.8	66.6	292.2	73.5	285.8	80.1	279.1	89.2	272.3	98.2	
7	288.2	66.5	282.9	73.4	277.0	80.0	270.7	89.1	264.4	98.1	
5	278.8	66.5	273.9	73.4	268.3	80.0	262.6	89.1			
0	244.1	66.4	240.5	73.3	236.5	79.9					
-5	213.5	66.4									

Ambient Air Temp. °C	R134a		Leaving Hot Water Temperature °C								R134a
	5		6		7		8		10		
	CAPH	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI	**CAPH**	PI	
15	223.4	48.0	218.1	52.1	212.9	56.1	208.1	61.5	203.6	67.0	
10	201.8	48.0	197.4	52.1	193.2	56.1	189.3	61.5	185.8	67.0	
7	195.0	47.9	190.9	52.0	187.0	56.0	183.4	61.4	180.3	66.9	
5	188.4	47.9	184.7	52.0	181.0	56.0	177.8	61.4	175.0	66.9	
0	164.3	47.8	161.6	51.9	159.1	55.9	156.9	61.4			
-5	143.3	47.8	141.4	51.9	139.8	55.9					

CAPH Heating Capacity (kW)

PI Compressore Power Input (kW)

Note:

- This Table is based on 5 °K difference in water temperature
- Please contact your local Multistack Agent if you require performance data beyond the limits of the above table
- Interpolation is permissible. Do not extrapolate

Chiller Selection

Select air-cooled chiller according to following conditions:

1. Entering Chilled Water Temperature (ECHW)..... 12.5 °C
2. Leaving Chilled water Temperature (LCHW)..... 7 °C
3. Chiller Water Flow (CHWF)..... 69.5 l/s
4. Ambient Temperature..... 35.0 °C
5. Leaving Hot Water Temperature..... 45.0 °C
6. Entering Hot Water Temperature..... 40.0 °C
7. Hot Water Flow Rate..... HWF=220m3/h=61.1 l/s
8. Ambient Temperature (AT)..... 0.0 °C
9. Refigerant..... R22
10. Power..... AC380V ±10%/50Hz/3phz

1. Determine cooling capacity required (kW)
   Cooling Capacity
   = CHWF × 4.187 ×(ECHW - LCHW)
   = 69.5 × 4.187 ×(12.5-7)
   = 1600 kW required
   Heating Capacity
   = HWF × 4.187 ×(HWLT - HWET)
   = 61.1 × 4.187 ×(45.0 – 40.0)
   = 1279 kW required

2. From capacity chart above,
   1 module at stated conditions will achieve;
   Cooling CAP= 288 kW per MSRA290H module
   Heating CAP= 260.6 kW per MSRA290H module

Divide the required capacity by achieved capacity at specified conditions to determine required number of modules:
= 1600 kW required ÷ 288 kW achieved = 5.6 modules
Select 6 modules of MSRA290H
Cooling Capacity of 6 modules = 6 x 288 = 1728kW
Heating Capacity of 6 modules = 6 x 260.6 = 1564kW

3. To establish Water Flow per module, divede new CHWF by number of modules:
(1) Nominal Water flow
= 6 x 13.8
= 82.8 l/s

Chilled Water Pressure Drop for nominal water flow per module is 55kPa

(2) Actual water pressure drop
69.5 ÷ 82.8 = 84%
Use the chart "Pressure Drop Correction Factor for chilled and condenser water Circuit", 6 modules of MSRA290H the correction ξ is 0.71 for 84% of water flow.

Use the table « Pressure drop correction factor: k », k=1.04 for the configuration: 6 modules of MSRA290H

Actual condenser water pressure drop is:
55 × 0.71 x 1.04 = 41 kPa

(Contact Multistack if lower flow rate is required.)

Electrical Data Per Module

Model			MSRA131H	MSRA131C	MSRA131H	MSRA131C	MSRA131H	MSRA131C
Refrigerant			R22		R407C		R134a	
Power			AC380±10%V/3Ph/50Hz					
Compressor (each)	MCC(A)		27		32		32	
	MRC(A)		21.8		25.9		20.4	
	LRA(A)		147		145			
	RLA(A)	Cooling	15.8		20.0		13.9	
		Heating	15.6	—	19.5	—	13.9	—
Fan (each)	RLA(A)		2.74					
	STC(A)		10.2					
MSC			(4×N-1)×MRC+LRA					

Model			MSRA290H	MSRA290C	MSRA290H	MSRA290C	MSRA290H	MSRA290C
Refrigerant			R22		R407C		R134a	
Power			AC380±10%V/3Ph/50Hz					
Compressor (each)	MCC(A)		69					
	MRC(A)		49.2		48.5		36.2	
	LRA(A)		270					
	RLA(A)	Cooling	42.9		42.6		32.8	
		Heating	42.2	—	42.0	—	32.2	—
Fan (each)	RLA(A)		4.13					
	STC(A)		13.7					
MSC			(4×N-1)×MRC+LRA					

Note:

N: No. of modules

MCC: Maximum Continuous Current

MRC: Maximum Rated Current

LRA: Locked Rotor Amperage

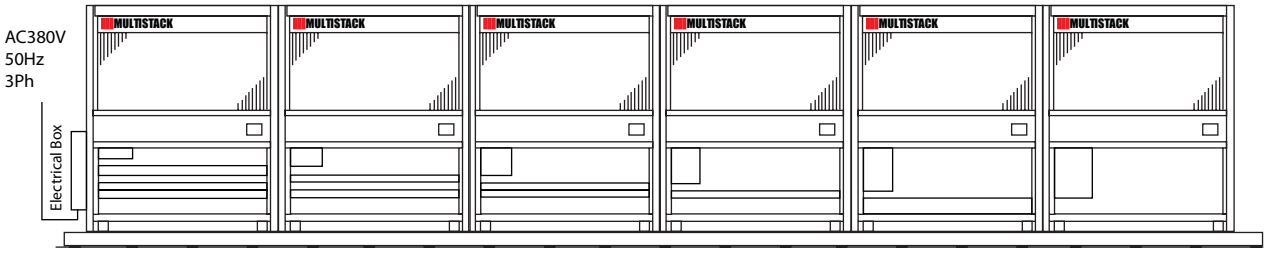
RLA: Rating Load Amperage

MSC: Maximum Starting Current

STC: Starting Current

1. MSRA131 TERMINATION CONNECTION

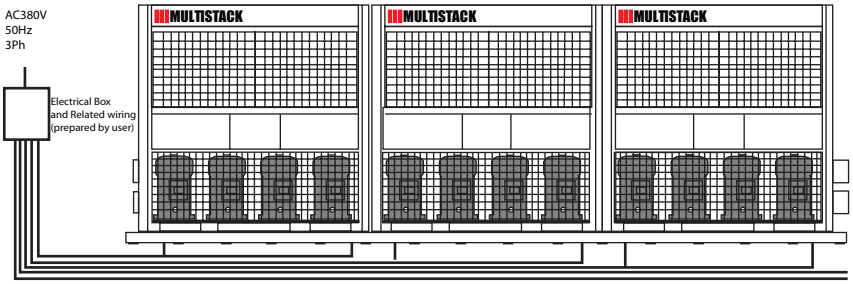
No. of Modules	Mains Termination	
	Location	Connection Procedure
0.5 – 1.0	Half Module Electrical Cubicle	Connect with main circuit breaker of each half module respectively
1.5 – 10.0	Electrical Cubicle	



Electrical Box and related wiring (prepared by user)

2. MSRA290 TERMINATION CONNECTION

No. of Modules	Mains Termination	
	Location	Connection Procedure
1.0 – 10.0	Module Electrical Cubicle	Terminal Block



Notes:

Supply 380v – 415V, 50Hz / 3 phase

1. Design running current is the steady state current draw at a particular set of conditions, ie ambient and chilled water temperatures.
2. Maximum rated current (MRC) is the maximum expected current draw at transient (pull down) and/or greater than design conditions.

CABLE SIZING

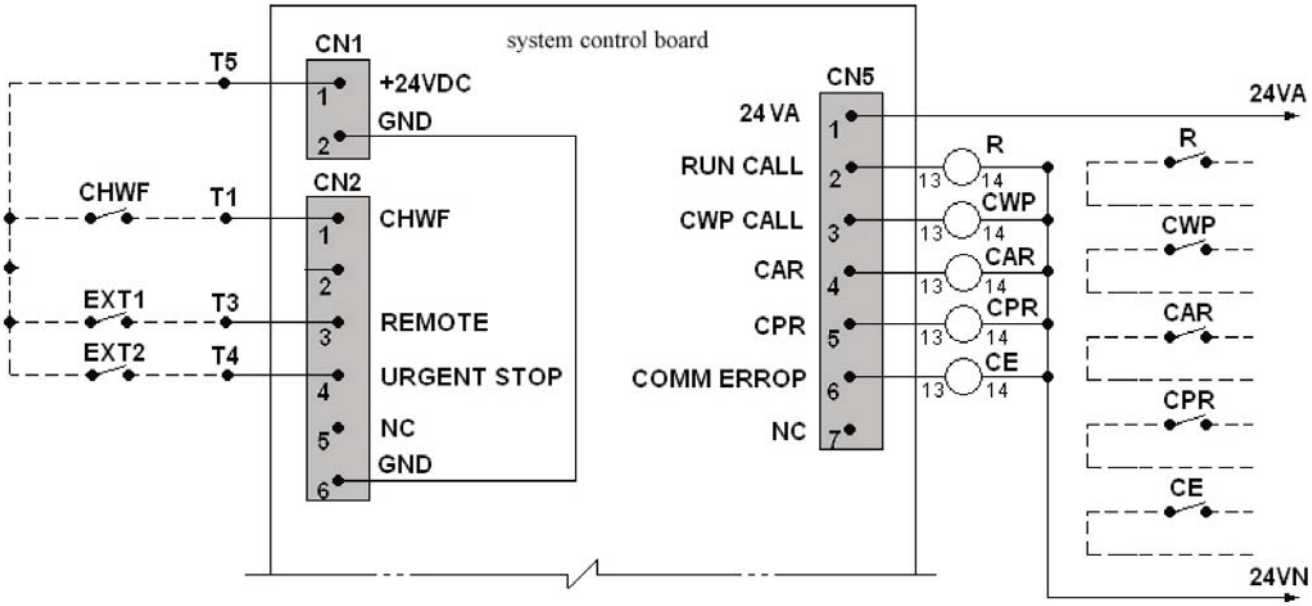
When selecting mains cable size use MRC. Allowances must be made for voltage imbalance, ambient temperature and other conditions in compliance with AS 3000 or local relevant electrical codes.

MAINS TERMINATION

The termination for a full module is at a terminal block located in the back half module electrical housing. For a half only module, termination is at the fuse holders or circuit breaker located in the electrical housing.

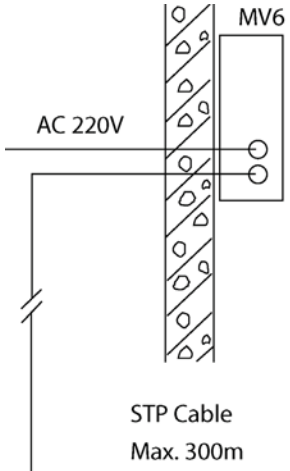
(To be supplied by customer)

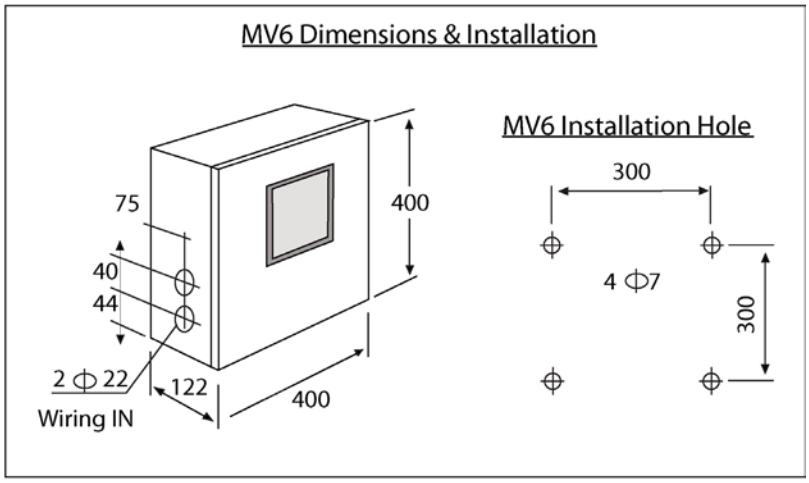
Field Wiring Diagram

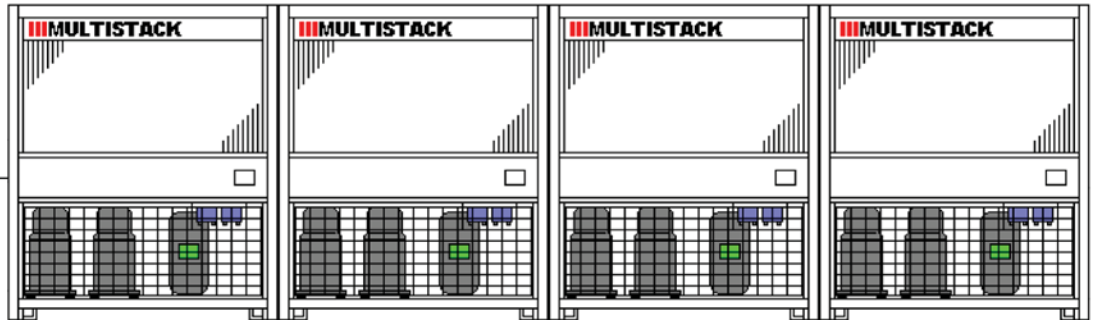


CHWF	Chilled water flow switch
EXT1	External interlock device (Manual reset)
EXT2	External interlock device (Austo reset)
R	Running Status
CWP	Condensor water pump running status
CAR	Customer fault alarm relay
CPR	Compressor running status
CE	Communication error

Notes:
- Control wiring to be 18AWG or 1.0sqmm minimum.
- Bridge between terminals T3 & T5 is EXT-1 is not utilised.
- Bridge between terminals T4 & T% if EXT-2 is not utilised.
- Free contacts have a maximum rating of 5 Amps.
- Flow switches and external interlock devices are not supplied by Multistack
- Wiring by Multistack _____ / Wiring by others ----------


MV6
AC 220V
STP Cable
Max. 300m


MV6 Dimensions & Installation
75
40
44
2 ⌀22
Wiring IN
122
400
400
MV6 Installation Hole
300
4 ⌀7
300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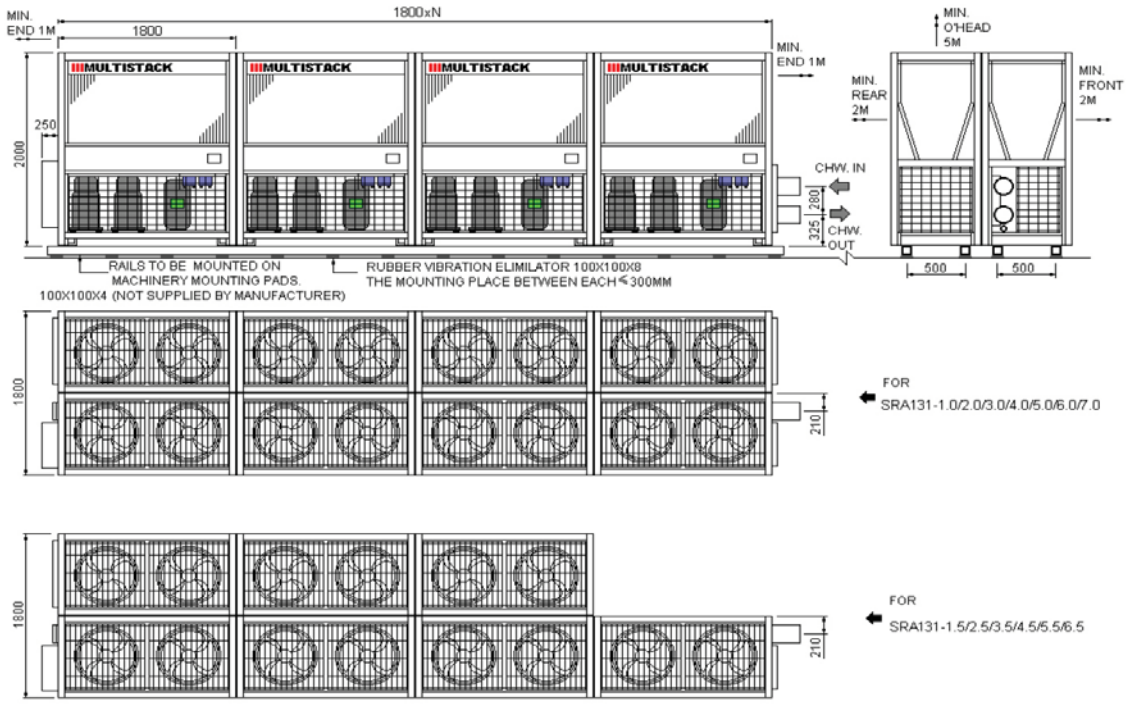
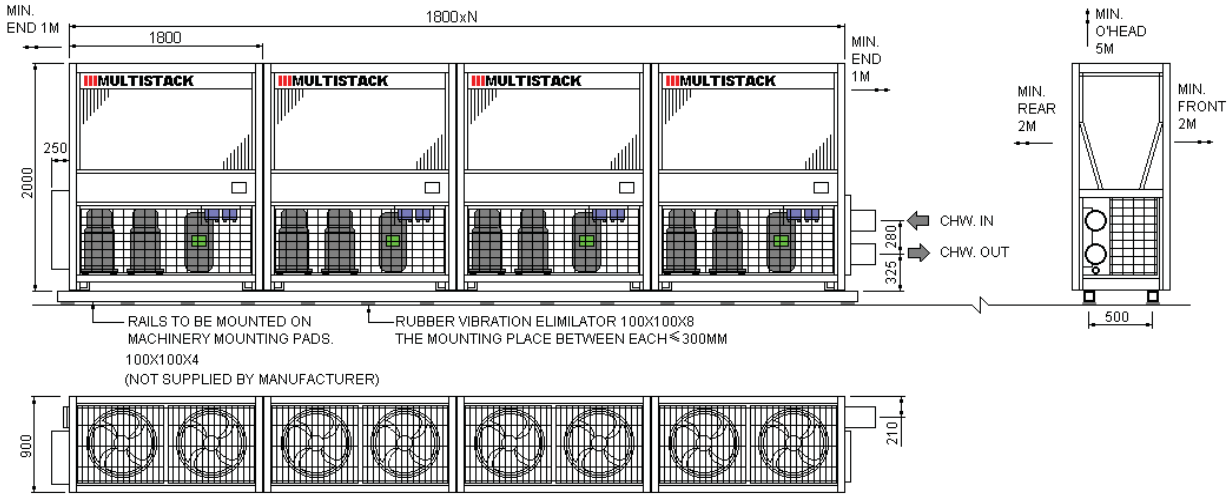
Physical Dimensions

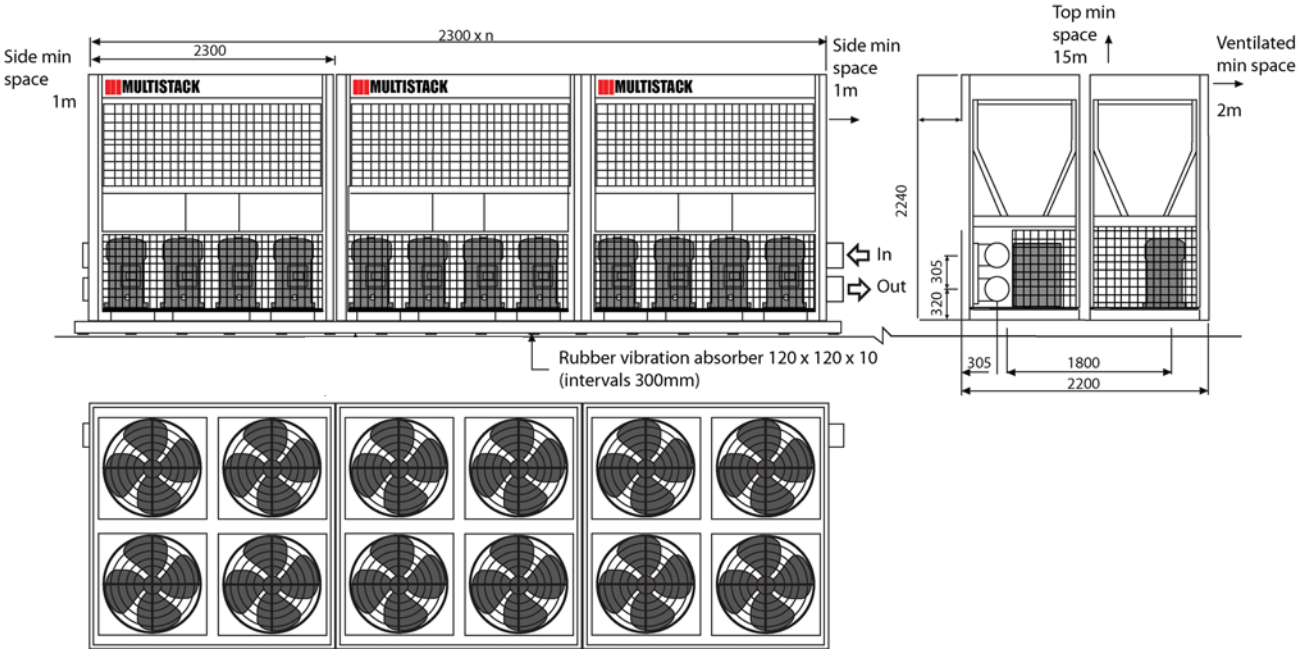
Configuration: Back to Back (Standard) - MSRA131



Configuration: End to End - MSRA131



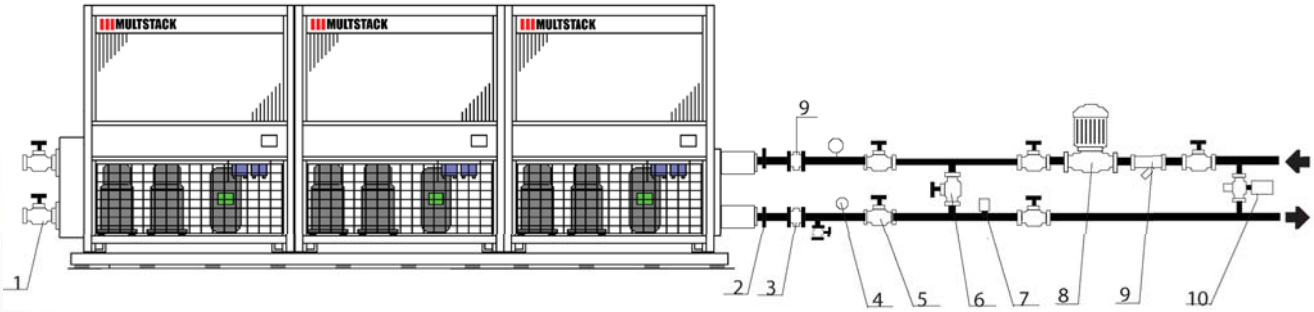
Configuration: MSRA290



Notes: (for all configurations)

1 All installations much have: No.60 Mesh Stainless steel strainers in water inlet piping
2 Only one computer installed per chiller.
3 If Chiller is to be expanded, computer and mains termination should be located so as to allow access after expansion.
4 Chiller to be mounted on 4 x 100sq. RHS positioned as shown (RHS not supplied by manufacturer).
5 Rails must be mounted on machinery mounting pads (not supplied by manufacturer)
6 If unit is to be expanded in back to back configuration a Minimum of 3000mm rear clearance is required
7 Units expanded from 1 module to 1.5 or more will require the fitting of mains termination external to the compressor electrical box.

Piping Schematic



Item	Description	Qty
1	Drain Valve DN50	2
2	Temperature Sensor Socket 3/8"	2
3	Vibration Eliminator	2
4	Pressure Guage	2
8	Isolation Gate Valve	4

Item	Description	Qty
6	Bypass Valve	1
7	Flow Switch	1
8	Water Pump	
9	Strainer 25 Mesh/Inch	1
10	Pressure Differential Bypass Valve	1

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