

Water Cooled VSD Screw Chiller

MVSW Series



Nominal Capacity 264 to 1684 kW

Refrigerant: R134a



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Features

STRUCTURE

Multistack **MVS** series VSD screw chillers use high efficiency variable frequency screw compressors, falling film or flooded (optional) evaporators and cutting-edge MS One control system to achieve best energy efficiency ratio at both full load and part loads and reduce operating costs significantly. Multistack **MVSW** series Water Cooled VSD Screw Chiller play an important role in environmental protection and energy conservation.

Cooling capacity of each unit ranges from 264 kW to 1684 kW, which is ideal for applications in hotels, restaurants, movie theaters, shopping malls, office buildings, residential buildings, hospitals, etc. as well as industrial process refrigeration, such as plastic chemical and precision instrument industries.

Electronic expansion valve (EXV) is used for metering the supply of liquid refrigerant for the falling film or flooded evaporator. The packaged unit has already been factory-charged with refrigerant and factory-tested, requiring only pipelines and power-lines connections while eliminating complicated pump-down and refrigerant charge during field installation to ensure reliable operation of the equipment.

Multistack's new generation of MS One programmable control system not only provides the most powerful protection and control over the chiller, but also enables remote monitoring with its powerful communication function. The chillers are designed to be compact, space saving and installation cost saving.

Multistack **MVSW** series Water Cooled VSD screw chillers are of packaged design. Main parts include screw refrigeration compressor, variable speed drive (VSD) on compressor, shell and tube condenser, falling film evaporator (optional flooded evaporator), filter drier, EXV and control system. To make sure consistent ex-factory performance, chillers have been pumped down, charged with refrigerant and lubrication oil and run-tested in the factory. Field works only remain water pipes installation and power lines connection.

VI Series VSD COMPRESSOR

Semi-hermetic screw refrigeration compressor has a motor and screw rotor installed in the same housing. The screw rotor is directly driven by the motor without any mechanical driving device, thus avoiding efficiency loss and reducing vibration and noise. This structure and directly driven design eliminate the use of shaft seal and avoid associated refrigerant and oil leakage as well as shaft seal change due to wear and tear.

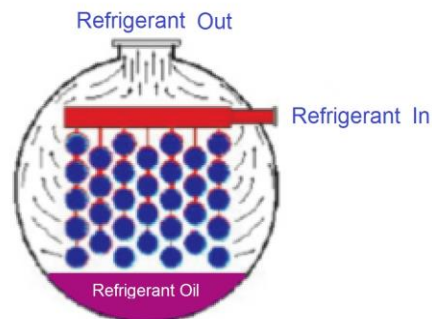


With excellent volumetric efficiency and minimum clearance, the 5~6 tooth profile wound-rotor design has been patented in the U.S.A., Japan and China. Pressure ratio is adjustable based on actual operating conditions and operation loss can be reduced to achieve better capacity control range and more accurate temperature control. Motor and discharge temperature safeties, oil level control, oil heater, oil cooling and anti-slugging functions ensure reliable and stable operation of the compressor.

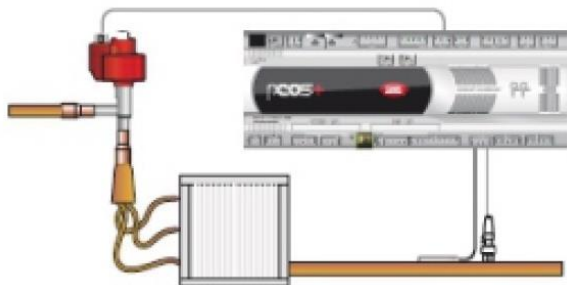
EVAPORATOR

Falling film evaporator is utilized in the chiller. Theoretical heat transfer coefficient of falling film evaporation outside evaporator tubes is 30% higher than that of pool boiling of a flooded type evaporator. Liquid refrigerant can be distributed more evenly and forms a film outside the tubes to ensure better heat transfer. Falling film evaporator has relatively lower internal liquid level and is less influenced by hydrostatic column. Lubrication oil is concentrated together which enables easier compressor oil return.

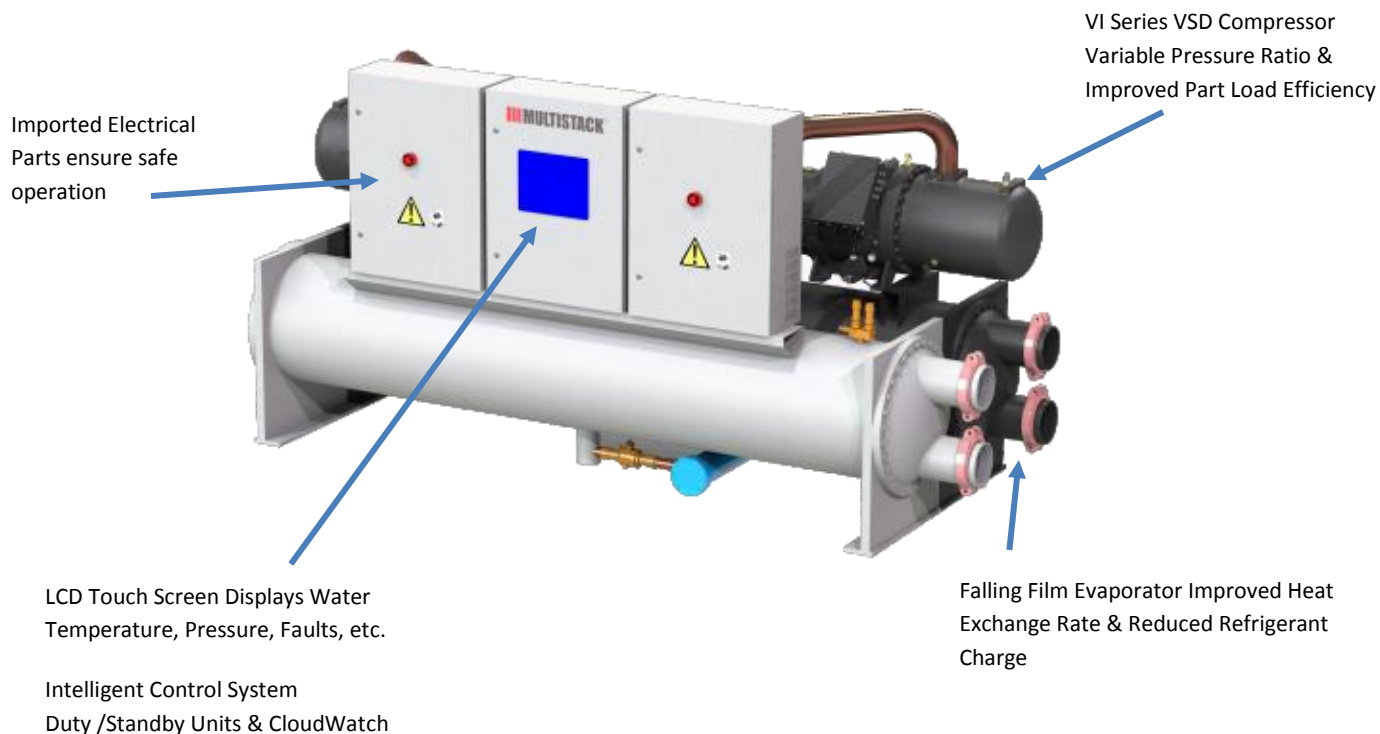
Optional flooded evaporator features high heat exchange efficiency and reliable operation after continuous product improvement.



Advanced Refrigerant Control



EVDEVO driver and super capacitor module are integrated in pCO5+ without the need of solenoid valve. EXV is used to fast and precisely meter refrigerant flow to keep a stable evaporator leaving water temperature.



MODEL NUMBER DESIGNATION

MVS	W	075	E	A	R
1	2	3	4	5	6

1: Variable Speed Drive on Screw compressor

2: Cooling type:

A: Air cooled

W: Water cooled

3: Model Number

4: Refrigerant

E: R134a

5: Electrical Specifications

A: 400V \pm 10% / 50Hz / 3 Phase

B: 380V / 60Hz / 3 Phase

C: 440-460V / 60Hz / 3 Phase

6: Blank for Standard

R: Heat Recovery (Optional)

CAREL Control

Multistack **MVSW** series Water Cooled VSD screw chillers use MS One control system. The control core is a programmable pCO⁵+ logic controller dedicated for HVAC products. The patent chip of pCO⁵+ takes advantage of ASIC technology to ensure flexibility of the control system. LCD touch screen provides operators, factory technicians and service personnel with current operation data of the chiller, faults, load history, start/stop history, etc.

TEMPERATURE CONTROL

MS One Control System compares the entering and leaving water temperature with its setpoint value to compute the capacity required and determine the compressor load. The inverter will adjust cooling capacity of the chiller based on the previous calculated value and keep the water temperature within set point.

COMPRESSOR BALANCE AND START / STOP RESTRICTION

MS One accumulates running hours of each compressor and hence establishes a working sequence to well balance the running hours of the two compressors of the chiller. Minimum non-running hours, minimum running hours, restart times limit and other settings allow the control of start and stop frequency of the compressor, which can improve its life span.

FAILSAFE

Control system can monitor the following faults. In the event of a compressor fault, the controller will close the faulty compressor. In the case of a system fault, the controller will close all compressors of the chiller bank.

Compressor Faults: High discharge pressure, low suction pressure, discharge temperature fault, compressor overload, inverter fault, motor faults, etc.

System Faults: Low chilled water flow, low condenser water flow, low leaving chilled water temperature, high leaving condenser water temperature, system pressure Fault, external interlock fault/protection, pump fault, cooling tower fault, etc.

REMOTE COMMUNICATION

MS One Control System is fitted with Ethernet, RS485, RS232 and USB ports to realize remote communication and integrated controls via connection between the Building Automation System (BAS) or Distributed Control System (DCS) and various protocols. These protocols can also work with DDC and other different types of controllers to build a control network.

PASSWORD

MS One has three levels of security access – User, Service and Factory. The three-level security accesses ensure that only authorized personnel can modify chiller control and protection settings to avoid any unwanted change that may result in chiller failure by an unauthorized person.

Physical Data R134a

Model MVSW		075	090	110	125
Nominal Cooling Capacity (kW)		264.1	312.0	360.9	436.6
Power Input (kW)		52.6	60.2	69.2	83.6
COP (w/w)		5.02	5.18	5.22	5.22
IPLV (w/w)		8.96	9.23	9.28	9.32
Full Load Amps		132	151	174	210
Control System		MS One Controller			
Control Stages (%)		30 - 100			
Compressor	Type	VSD Screw			
	Number	1			
	R.L.A. (A)	89	103	119	143
	F.L.A. (A)	150	150	150	176
Evaporator	Type	Falling Film Evaporator			
	Water Flow Rate (m ³ /h)	45.4	53.7	62.4	75.1
	Water Pressure Drop (kPa)	55.1	49.1	48.8	49.4
	Fouling Factor (m ² k/kW)	0.018			
	Max. Working Pressure (Water Side) (kPa)	1000			
	Pipe Size	4"	4"	4"	5"
Condenser	Type	Shell & Tube Heat Exchanger			
	Water Flow Rate (m ³ /h)	54.5	64.0	74.0	89.5
	Water Pressure Drop (kPa)	43.2	43.9	46.5	47.7
	Fouling Factor (m ² k/kW)	0.044			
	Max. Working Pressure (Water Side) (kPa)	1000			
	Pipe Size	4"	4"	5"	5"
Refrigerant charge (kg)		66	78	90	109
Shipping weight (kg)		2600	2700	2800	2850
Operation weight (kg)		2750	2850	3000	3050
Dimension: L x W x H (mm)		3300 x 1250 x 1750	3300 x 1300 x 1800	3300 x 1350 x 1850	

Nominal Values base on:

Ambient	35°C
Chilled Water Entering Temp.	12°C
Chilled Water Entering Temp.	7°C

Physical Data R134a (cont'd)

Model MVSW		140	170	190	210	230
Nominal Cooling Capacity (kW)		497.6	586.7	658.5	734.2	814.7
Power Input (kW)		94.3	110.0	122.6	136.6	145.5
COP (w/w)		5.28	5.33	5.37	5.37	5.60
IPLV (w/w)		9.42	9.53	9.66	9.94	9.42
Full Load Amps		237	277	309	349	420
Control System		MS One Controller				
Control Stages (%)		30 - 100				
Compressor	Type	VSD Screw				
	Number	1			2	1
	R.L.A. (A)	158	188	210	117	246
	F.L.A. (A)	210	260	260	150	360
Evaporator	Type	Falling Film Evaporator				
	Water Flow Rate (m³/h)	85.6	100.9	113.2	126.3	140.1
	Water Pressure Drop (kPa)	52.0	48.8	50.1	91.8	52.2
	Fouling Factor (m²k/kW)	0.018				
	Max. Working Pressure (Water Side) (kPa)	1000				
	Pipe Size	5"	6"			
Condenser	Type	Shell & Tube Heat Exchanger				
	Water Flow Rate (m³/h)	101.8	119.5	134.3	149.8	165.1
	Water Pressure Drop (kPa)	47.2	49.9	51.0	88.5	50.7
	Fouling Factor (m²k/kW)	0.044				
	Max. Working Pressure (Water Side) (kPa)	1000				
	Pipe Size	5"	6"			8"
	Refrigerant charge (kg)	124	146	164	184	204
Shipping weight (kg)		3100	3500	3700	4200	4100
Operation weight (kg)		3300	3750	3950	4400	4300
Dimension: L x W x H (mm)		3300 x 1350 x 1850	3300 x 1400 x 1900		4200 x 1450 x 1900	3300 x 1450 x 1950

Nominal Values base on:

Ambient	35°C
Chilled Water Entering Temp.	12°C
Chilled Water Entering Temp.	7°C

Physical Data R134a (cont'd)

Model MVSW		250	290	350	390	480
Nominal Cooling Capacity (kW)		888.0	1012.2	1213.2	1361.8	1684.8
Power Input (kW)		164.8	186.0	214.0	238.6	283.4
COP (w/w)		5.39	5.44	5.67	5.71	5.94
IPLV (w/w)		9.99	10.10	10.19	10.28	10.32
Full Load Amps		421	475	554	618	840
Control System		MS One Controller				
Control Stages (%)		30 - 100				
Compressor	Type	VSD Screw				
	Number	2				
	R.L.A. (A)	138	160	186	206	243
	F.L.A. (A)	176	210	260	260	360
Evaporator	Type	Falling Film Evaporator				
	Water Flow Rate (m³/h)	152.7	174.1	208.6	234.2	289.7
	Water Pressure Drop (kPa)	89.5	90.6	89.4	88.8	88.7
	Fouling Factor (m²k/kW)	0.018				
	Max. Working Pressure (Water Side) (kPa)	1000				
	Pipe Size	6"	8"			10"
Condenser	Type	Shell & Tube Heat Exchanger				
	Water Flow Rate (m³/h)	181.0	206.1	245.4	275.2	338.5
	Water Pressure Drop (kPa)	88.7	89.3	91.8	88.9	88.2
	Fouling Factor (m²k/kW)	0.044				
	Max. Working Pressure (Water Side) (kPa)	1000				
	Pipe Size	8"				10"
Refrigerant charge (kg)		222	253	303	340	421
Shipping weight (kg)		4800	5300	6200	6800	7500
Operation weight (kg)		5100	5700	6700	7300	8000
Dimension: L x W x H (mm)		4400 x 1500 x 1950	4200 x 1550 x 2050			4200 x 1600 x 2100

Nominal Values base on:

Ambient	35°C
Chilled Water Entering Temp.	12°C
Chilled Water Entering Temp.	7°C

Unit Performance

MVSW075

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	274.7	30.5	295.8	29.5	319.6	27.9	343.3	26.3	369.7	24.7
20	266.7	38.9	287.9	37.9	309.0	36.8	332.8	35.8	359.2	34.7
25	256.2	45.8	277.3	45.8	298.4	45.2	322.2	44.7	346.0	43.7
30	243.0	52.6	264.1	52.6	285.2	52.6	309.0	52.1	332.8	52.1
35	229.8	59.4	250.9	59.4	269.4	59.4	293.2	60.0	314.3	60.0

MVSW090

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	324.5	34.9	349.4	33.7	377.5	31.9	405.6	30.1	436.8	28.3
20	315.1	44.5	340.1	43.3	365.0	42.1	393.1	40.9	424.3	39.7
25	302.6	52.4	327.6	52.4	352.6	51.8	380.6	51.2	408.7	50.0
30	287.0	60.2	312.0	60.2	337.0	60.2	365.0	59.6	393.1	59.6
35	271.4	68.0	296.4	68.0	318.2	68.0	346.3	68.6	371.3	68.6

MVSW110

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	375.3	40.1	404.2	38.8	436.7	36.7	469.2	34.6	505.3	32.5
20	364.5	51.2	393.4	49.8	422.3	48.4	454.7	47.1	490.8	45.7
25	350.1	60.2	378.9	60.2	407.8	59.5	440.3	58.8	472.8	57.4
30	332.0	69.2	360.9	69.2	389.8	69.2	422.3	68.5	454.7	68.5
35	314.0	78.2	342.9	78.2	368.1	78.2	400.6	78.9	429.5	78.9

MVSW125

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	454.1	48.5	489.0	46.8	528.3	44.3	567.6	41.8	611.2	39.3
20	441.0	61.9	475.9	60.2	510.8	58.5	550.1	56.8	593.8	55.2
25	423.5	72.7	458.4	72.7	493.4	71.9	532.7	71.1	571.9	69.4
30	401.7	83.6	436.6	83.6	471.5	83.6	510.8	82.8	550.1	82.8
35	379.8	94.5	414.8	94.5	445.3	94.5	484.6	95.3	519.6	95.3

CAP Cooling Capacity (kW)

PI Compressor Power input (kW)

Unit Performance (cont'd)

MVSW140

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	517.5	54.7	557.3	52.8	602.1	50.0	646.9	47.2	696.6	44.3
20	502.6	69.8	542.4	67.9	582.2	66.0	627.0	64.1	676.7	62.2
25	482.7	82.0	522.5	82.0	562.3	81.1	607.1	80.2	651.9	78.3
30	457.8	94.3	497.6	94.3	537.4	94.3	582.2	93.4	627.0	93.4
35	432.9	106.6	472.7	106.6	507.6	106.6	552.3	107.5	592.1	107.5

MVSW170

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	610.2	63.8	657.1	61.6	709.9	58.3	762.7	55.0	821.4	51.7
20	592.6	81.4	639.5	79.2	686.4	77.0	739.2	74.8	797.9	72.6
25	569.1	95.7	616.0	95.7	663.0	94.6	715.8	93.5	768.6	91.3
30	539.8	110.0	586.7	110.0	633.6	110.0	686.4	108.9	739.2	108.9
35	510.4	124.3	557.4	124.3	598.4	124.3	651.2	125.4	698.2	125.4

MVSW190

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	684.8	71.1	737.5	68.7	796.8	65.0	856.1	61.3	921.9	57.6
20	665.1	90.7	717.8	88.3	770.4	85.8	829.7	83.4	895.6	80.9
25	638.7	106.7	691.4	106.7	744.1	105.4	803.4	104.2	862.6	101.8
30	605.8	122.6	658.5	122.6	711.2	122.6	770.4	121.4	829.7	121.4
35	572.9	138.5	625.6	138.5	671.7	138.5	730.9	139.8	783.6	139.8

MVSW210

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	763.6	79.2	822.3	76.5	888.4	72.4	954.5	68.3	1027.9	64.2
20	741.5	101.1	800.3	98.4	859.0	95.6	925.1	92.9	998.5	90.2
25	712.2	118.8	770.9	118.8	829.6	117.5	895.7	116.1	961.8	113.4
30	675.5	136.6	734.2	136.6	792.9	136.6	859.0	135.2	925.1	135.2
35	638.8	154.4	697.5	154.4	748.9	154.4	815.0	155.7	873.7	155.7

CAP Cooling Capacity (kW)

PI Compressor Power input (kW)

Unit Performance (cont'd)

MVSW230

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	847.3	84.4	912.5	81.5	985.8	77.1	1059.1	72.8	1140.6	68.4
20	822.8	107.7	888.0	104.8	953.2	101.9	1026.5	98.9	1108.0	96.0
25	790.3	126.6	855.4	126.6	920.6	125.1	993.9	123.7	1067.3	120.8
30	749.5	145.5	814.7	145.5	879.9	145.5	953.2	144.0	1026.5	144.0
35	708.8	164.4	774.0	164.4	831.0	164.4	904.3	165.9	969.5	165.9

MVSW250

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	923.5	95.6	994.6	92.3	1074.5	87.3	1154.4	82.4	1243.2	77.5
20	896.9	122.0	967.9	118.7	1039.0	115.4	1118.9	112.1	1207.7	108.8
25	861.4	143.4	932.4	143.4	1003.4	141.7	1083.4	140.1	1163.3	136.8
30	817.0	164.8	888.0	164.8	959.0	164.8	1039.0	163.2	1118.9	163.2
35	772.6	186.2	843.6	186.2	905.8	186.2	985.7	187.9	1056.7	187.9

MVSW290

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	1052.7	107.9	1133.7	104.2	1224.8	98.6	1315.9	93.0	1417.1	87.4
20	1022.3	137.6	1103.3	133.9	1184.3	130.2	1275.4	126.5	1376.6	122.8
25	981.8	161.8	1062.8	161.8	1143.8	160.0	1234.9	158.1	1326.0	154.4
30	931.2	186.0	1012.2	186.0	1093.2	186.0	1184.3	184.1	1275.4	184.1
35	880.6	210.2	961.6	210.2	1032.4	210.2	1123.5	212.0	1204.5	212.0

MVSW350

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	1261.7	124.1	1358.8	119.8	1468.0	113.4	1577.2	107.0	1698.5	100.6
20	1225.3	158.4	1322.4	154.1	1419.4	149.8	1528.6	145.5	1650.0	141.2
25	1176.8	186.2	1273.9	186.2	1370.9	184.0	1480.1	181.9	1589.3	177.6
30	1116.1	214.0	1213.2	214.0	1310.3	214.0	1419.4	211.9	1528.6	211.9
35	1055.5	241.8	1152.5	241.8	1237.5	241.8	1346.7	244.0	1443.7	244.0

CAP Cooling Capacity (kW)

PI Compressor Power input (kW)

Unit Performance (cont'd)

MVSW390

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	1416.3	138.4	1525.2	133.6	1647.8	126.5	1770.3	119.3	1906.5	112.1
20	1375.4	176.6	1484.4	171.8	1593.3	167.0	1715.9	162.2	1852.0	157.5
25	1320.9	207.6	1429.9	207.6	1538.8	205.2	1661.4	202.8	1784.0	198.0
30	1252.9	238.6	1361.8	238.6	1470.7	238.6	1593.3	236.2	1715.9	236.2
35	1184.8	269.6	1293.7	269.6	1389.0	269.6	1511.6	272.0	1620.5	272.0

MVSW480

Condenser Water Leaving Temp. °C	Leaving Chilled Water Temperature (°C)									
	5		7		9		11		13	
	CAP	PI	CAP	PI	CAP	PI	CAP	PI	CAP	PI
15	1752.2	164.4	1887.0	158.7	2038.6	150.2	2190.2	141.7	2358.7	133.2
20	1701.6	209.7	1836.4	204.0	1971.2	198.4	2122.8	192.7	2291.3	187.0
25	1634.3	246.6	1769.0	246.6	1903.8	243.7	2055.5	240.9	2207.1	235.2
30	1550.0	283.4	1684.8	283.4	1819.6	283.4	1971.2	280.6	2122.8	280.6
35	1465.8	320.2	1600.6	320.2	1718.5	320.2	1870.1	323.1	2004.9	323.1

CAP Cooling Capacity (kW)

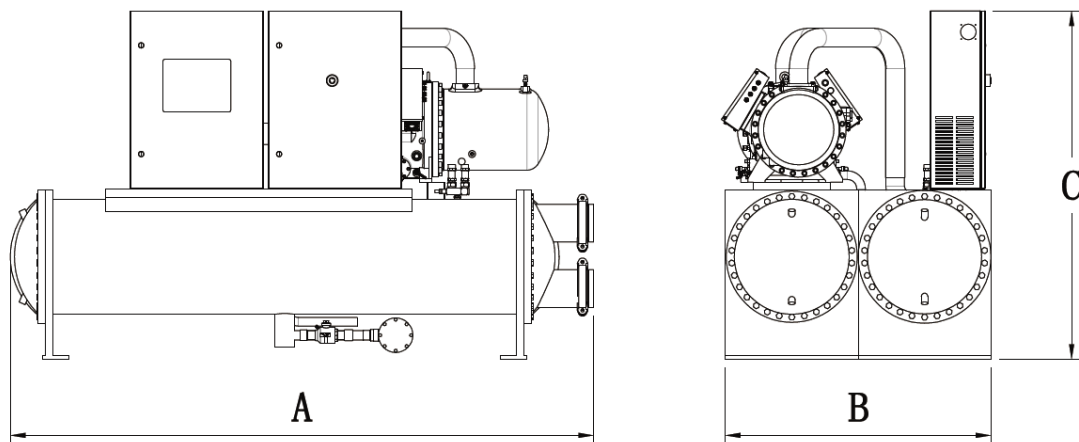
PI Compressor Power input (kW)

Notes:

- Table is based on a 5°C difference in water temperature.
- Please contact your local Multistack Agent if you require performance data beyond the limits of the above table.
- For low temperature applications ($\leq 5^\circ\text{C}$) contact Multistack Ltd
- Interpolation is permissible. Do not extrapolate.

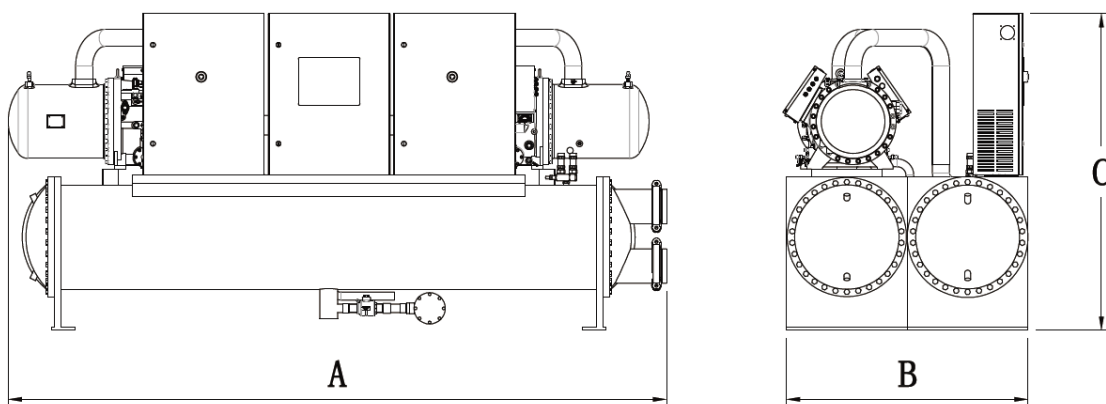
Physical Dimensions

MVSW075 - 230



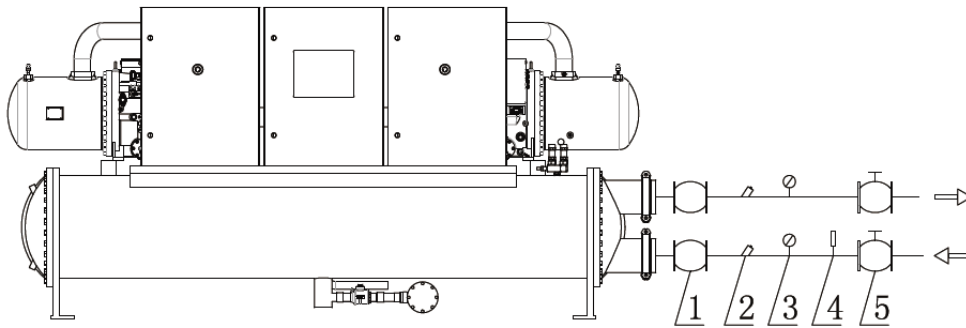
Model	MVSW075	MVSW090	MVSW110	MVSW125	MVSW140	MVSW170	MVSW190	MVSW230
Length(A)	3300	3300	3300	3300	3300	3300	3300	3300
Width(B)	1250	1300	1350	1350	1350	1400	1400	1450
Height(C)	1750	1800	1850	1850	1850	1900	1900	1950

MVSW210 - 480



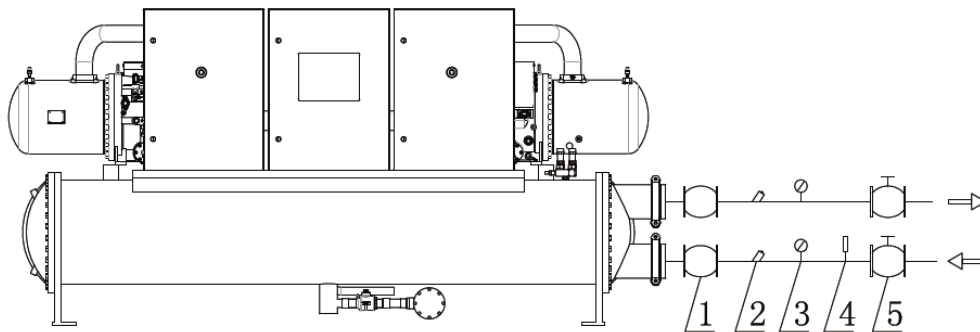
Model	MVSW210	MVSW250	MVSW290	MVSW350	MVSW390	MVSW480
Length(A)	4200	4200	4200	4200	4200	4200
Width(B)	1450	1500	1550	1550	1550	1600
Height(C)	1900	1950	2050	2050	2050	2100

1. Condenser Water Piping



1. Flexible Joint 2. Temp. Sensor 3. Pressure Gauge
4. Water Flow Switch 5. Stop Valve

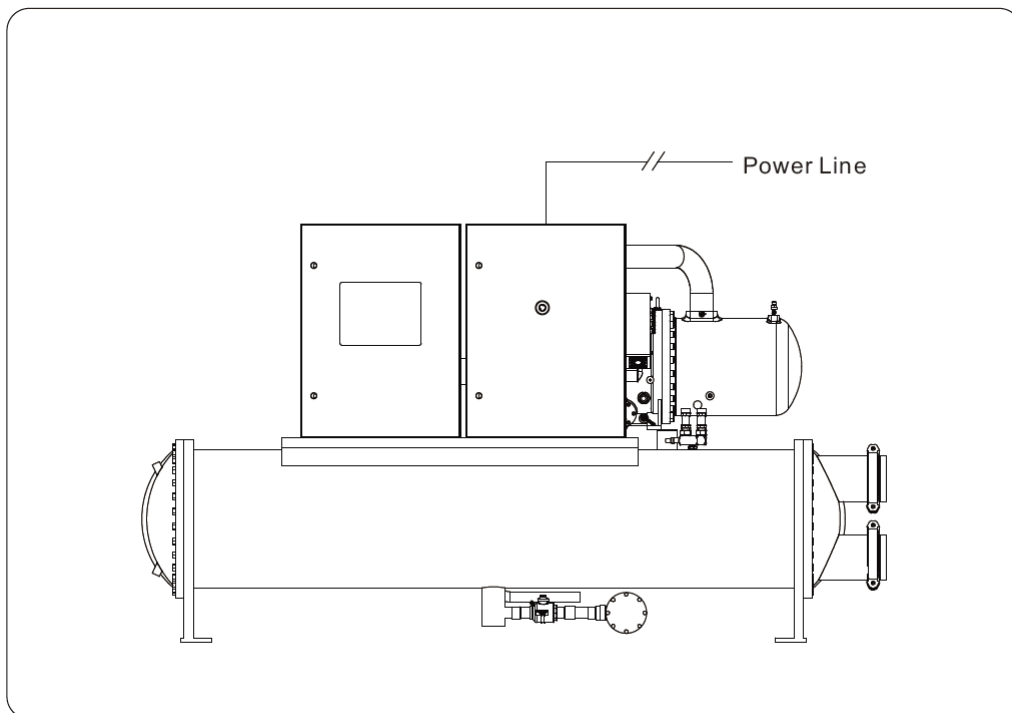
2. Chilled Water Piping



1. Flexible Joint 2. Temp. Sensor 3. Pressure Gauge
4. Water Flow Switch 5. Stop Valve

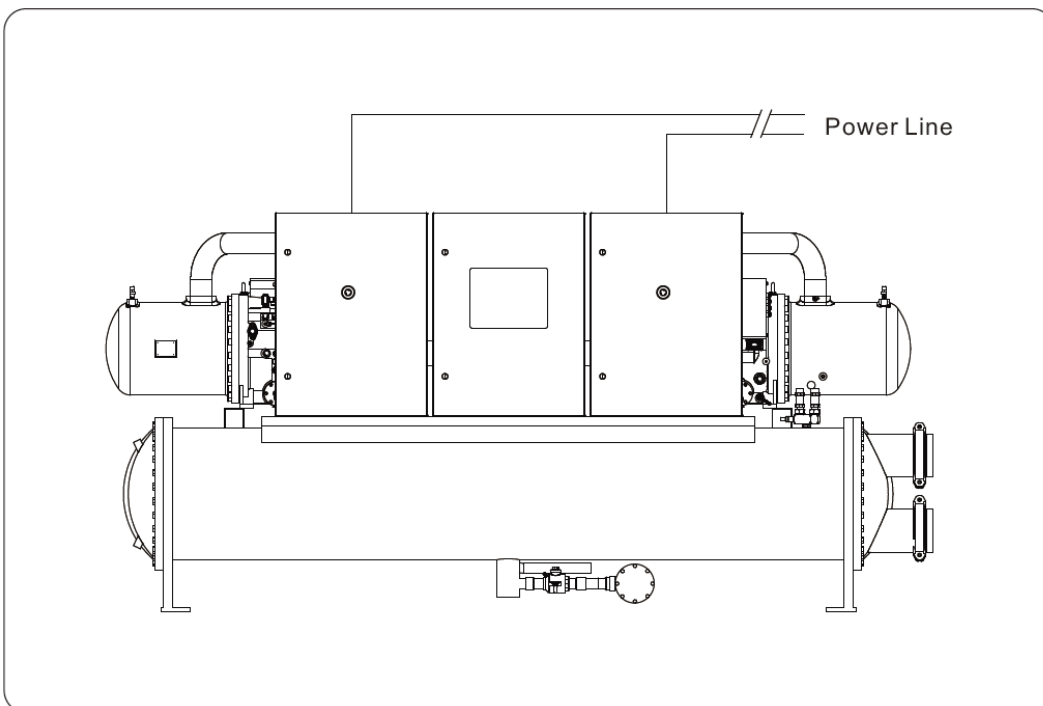
1. Single-compressor Unit

Remove the power mains inlet cover on the top of the electrical box. Power line should be run through the cable entry into the electrical box and connected to the main air circuit breaker.

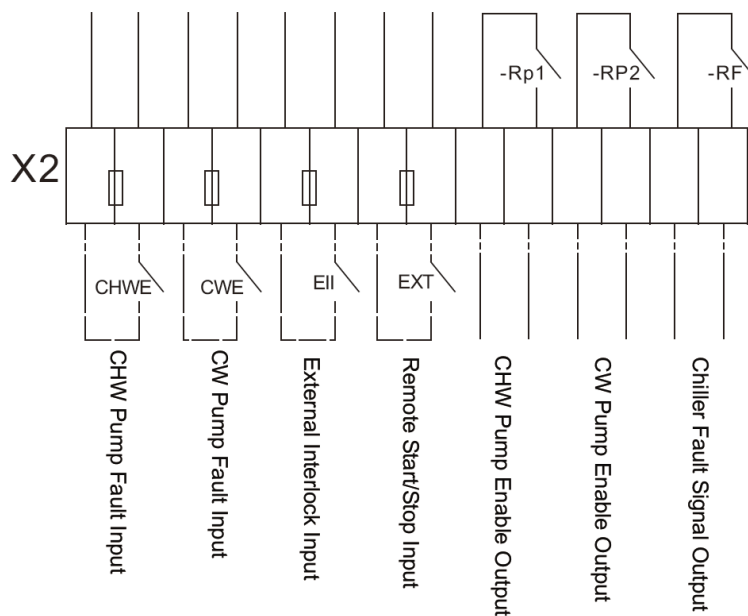


2. Double-compressors Unit

Remove the power mains inlet cover on the top of the electrical box. Power lines should be separately run through the cable entries into the electrical box and respectively connected to the main air circuit breaker of each compressor.

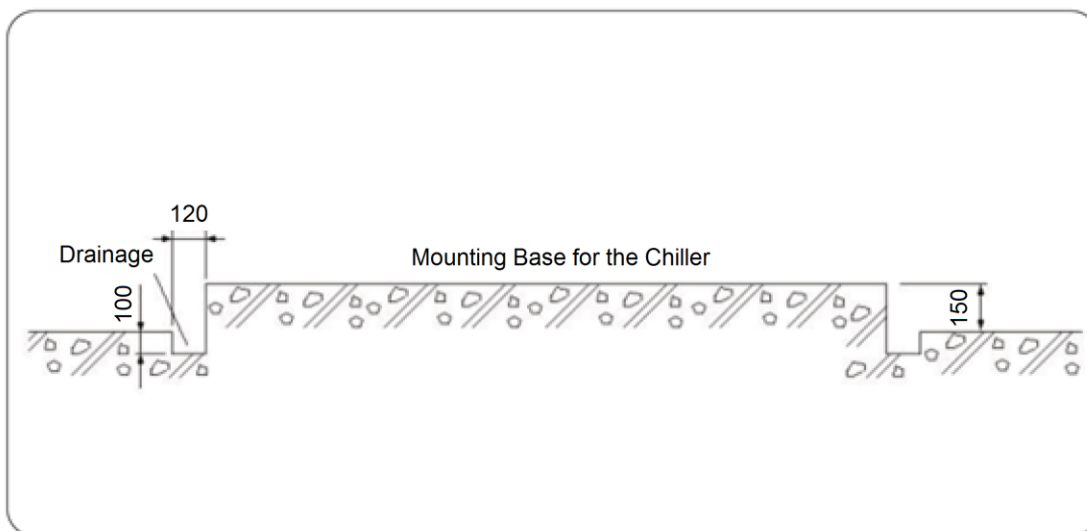


FIELD WIRING DIAGRAM



Technical Notes:

1. Minimum cross section of control wires should be 1mm²;
2. All input terminals have been factory-bridged, which require removal of jumper blocks before use;
3. All input terminals are volt-free contacts;
4. Maximum current allowable for volt-free output contact is 5A (Resistive);
5. "—" for factory wiring and "- -" for field wiring.





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