

**III MULTISTACK®**

# MVSW Series

Water Cooled VSD Screw Chiller



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

Multistack MVS1W series water cooled 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 MVS1W series chillers play an important role in environmental protection and energy conservation.

Cooling capacity of each unit ranges from 75RT to 479RT, 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 MVS/W 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.

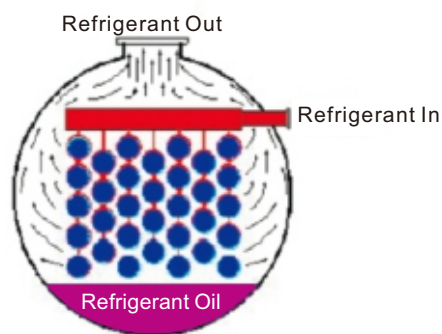


With excellent volumetric efficiency and minimum clearance, the 5~6 tooth profile wound-rotor design has been patented in the U.S.A., Japan and China. Pressure ratio is adjustable based on actual operating conditions and operation loss can be reduced to achieve better capacity control range and more 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.

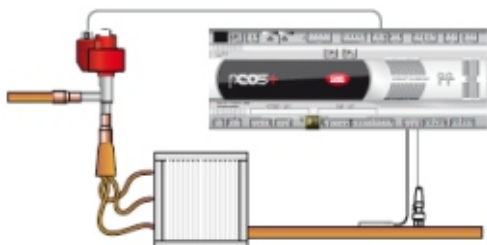
### Evaporator

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.

Multistack MVS1W series water cooled VSD screw chillers use MS One control system. The control core is a programmable pCO<sup>5+</sup> logic controller dedicated for HVAC products. The patent chip of pCO<sup>5+</sup> makes 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.

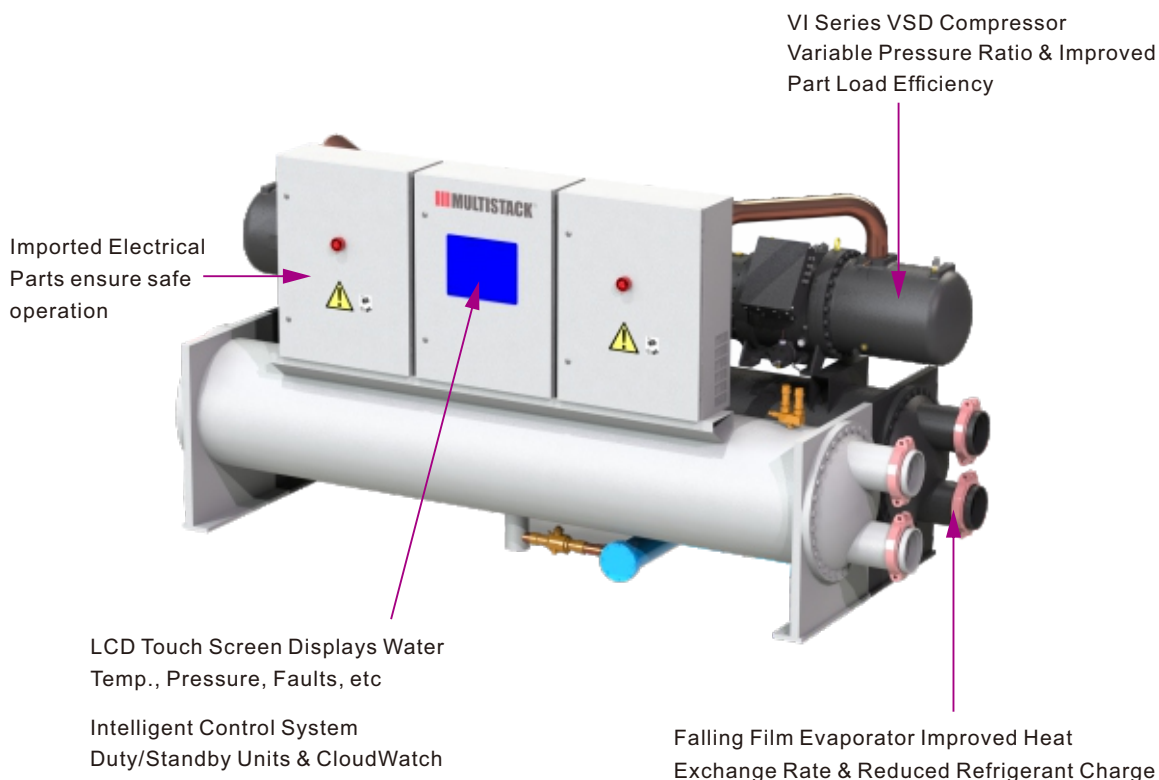
### Remote Communication

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 Security

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.

# EQUIPMENT ADVANTAGES



# NOMENCLATURE

MVSW	075	E	A	R
1	2	3	4	5

1 — Product Series

MVSW: Multistack Water Cooled VSD Screw Chiller

2 — Cooling Capacity Code

3 — Refrigerant Type: E: R134a

4 — Power Specification: A: AC(380V~415V)/50Hz/3Ph

B: AC(380V~460V)/60Hz/3Ph

5 — R: Heat Recovery

Model: MVSWS			075	090	110	125
Cooling Capacity		RT	75.1	88.7	102.6	124.1
		kW	264.1	312.0	360.9	436.6
Power Supply			380V-50Hz-3Ph			
Power Input		kW	52.6	60.2	69.2	83.6
COP		kW/kW	5.02	5.18	5.22	5.22
Full Load Amps		A	132	151	174	210
Compressor Type			Variable Frequency Screw Compressor			
Evaporator	Type		Falling Film Evaporator			
	Water Flow Rate	M <sup>3</sup> /h	45.4	53.7	62.4	75.1
	Connection Size	DN	100	100	100	125
	Fouling Factor	m <sup>2</sup> k/kW	0.018			
	Water Side Max Working Pressure	MPa	1.0			
	Pressure Drop	kPa	59.1	61.3	60.3	61.2
Condenser	Type		Shell and Tube Heat Exchanger			
	Water Flow Rate	M <sup>3</sup> /h	54.5	64.0	74.0	89.5
	Connection Size	DN	100	100	125	125
	Fouling Factor	m <sup>2</sup> k/kW	0.044			
	Water Side Max Working Pressure	Mpa	1.0			
	Pressure Drop	kPa	49.1	49.8	52.6	54.2
Refrigerant	Type		R134a			
	Charge	kg	66	78	90	109
Physical Dimensions	Length	mm	3300	3300	3300	3300
	Width	mm	1250	1300	1350	1350
	Height	mm	1750	1800	1850	1850
Shipping Weight		kg	2600	2700	2800	2850
Operating Weight		kg	2750	2850	3000	3050

## Notes:

1. Working Conditions: entering/leaving condenser water temp. 30°C/35°C;  
entering / leaving chilled water temp. 12°C/7°C;
2. Power Supply: AC380~415V/50Hz/3Ph, AC380~460V/60Hz/3Ph are available;
3. Non-standard products are available upon request;
4. Technical data are for standard products only and subject to change without prior notice due to product improvement.

Model: MVSW		140	170	190	210	230	
Cooling Capacity	RT	141.5	166.8	187.2	208.8	231.6	
	kW	497.6	586.7	658.5	734.2	814.7	
Power Supply		380V-50Hz-3Ph					
Power Input	kW	94.3	110	122.6	136.6	145.5	
COP	kW/kW	5.28	5.33	5.37	5.37	5.60	
Full Load Amps	A	237	277	309	349	420	
Compressor Type		Variable Frequency Screw Compressor					
Evaporator	Type		Falling Film Evaporator				
	Water Flow Rate	M <sup>3</sup> /h	85.6	100.9	113.2	126.3	140.1
	Connection Size	DN	125	150	150	150	150
	Fouling Factor	m <sup>2</sup> k/kW	0.018				
	Water Side Max Working Pressure	MPa	1.0				
	Pressure Drop	kPa	60.9	60.1	61.8	61.8	61.8
Condenser	Type		Shell and Tube Heat Exchanger				
	Water Flow Rate	M <sup>3</sup> /h	101.8	119.5	134.3	149.8	165.1
	Connection Size	DN	125	150	150	150	200
	Fouling Factor	m <sup>2</sup> k/kW	0.044				
	Water Side Max Working Pressure	Mpa	1.0				
	Pressure Drop	kPa	53.8	56.8	54.3	56.6	57.5
Refrigerant	Type		R134a				
	Charge	kg	124	146	164	184	204
Physical Dimensions	Length	mm	3300	3300	3300	4200	3300
	Width	mm	1350	1400	1400	1450	1450
	Height	mm	1850	1900	1900	1900	1950
Shipping Weight	kg	3100	3500	3700	4200	4100	
Operating Weight	kg	3300	3750	3950	4400	4300	

**Notes:**

1. Working Conditions: entering/leaving condenser water temp. 30°C/35°C; entering / leaving chilled water temp. 12°C/7°C;
2. Power Supply: AC380~415V/50Hz/3Ph, AC380~460V/60Hz/3Ph are available;
3. Non-standard products are available upon request;
4. Technical data are for standard products only and subject to change without prior notice due to product improvement.

Model: MVSWS			250	290	350	390	480
Cooling Capacity	RT		252.5	287.8	345.0	387.2	479.0
	kW		888.0	1012.2	1213.2	1361.8	1684.8
Power Supply			380V-50Hz-3Ph				
Power Input	kW		164.8	186	214	238.6	283.4
COP	kW/kW		5.39	5.44	5.67	5.71	5.94
Full Load Amps	A		421	475	554	618	840
Compressor Type			Variable Frequency Screw Compressor				
Evaporator	Type		Falling Film Evaporator				
	Water Flow Rate	M <sup>3</sup> /h	152.7	174.1	208.6	234.2	289.7
	Connection Size	DN	150	200	200	200	250
	Fouling Factor	m <sup>2</sup> k/kW	0.018				
	Water Side Max Working Pressure	MPa	1.0				
	Pressure Drop	kPa	63.2	61.0	65.7	64.6	64.7
Condenser	Type		Shell and Tube Heat Exchanger				
	Water Flow Rate	M <sup>3</sup> /h	181.0	206.1	245.4	275.2	338.5
	Connection Size	DN	200	200	200	200	250
	Fouling Factor	m <sup>2</sup> k/kW	0.044				
	Water Side Max Working Pressure	MPa	1.0				
	Pressure Drop	kPa	63.2	61.0	65.7	64.6	64.7
Refrigerant	Type		R134a				
	Charge	kg	222	253	303	340	421
Physical Dimensions	Length	mm	4200	4200	4200	4200	4200
	Width	mm	1500	1550	1550	1550	1600
	Height	mm	1950	2050	2050	2050	2100
Shipping Weight	kg	4800	5300	6200	6800	7500	
Operating Weight	kg	5100	5700	6700	7300	8000	

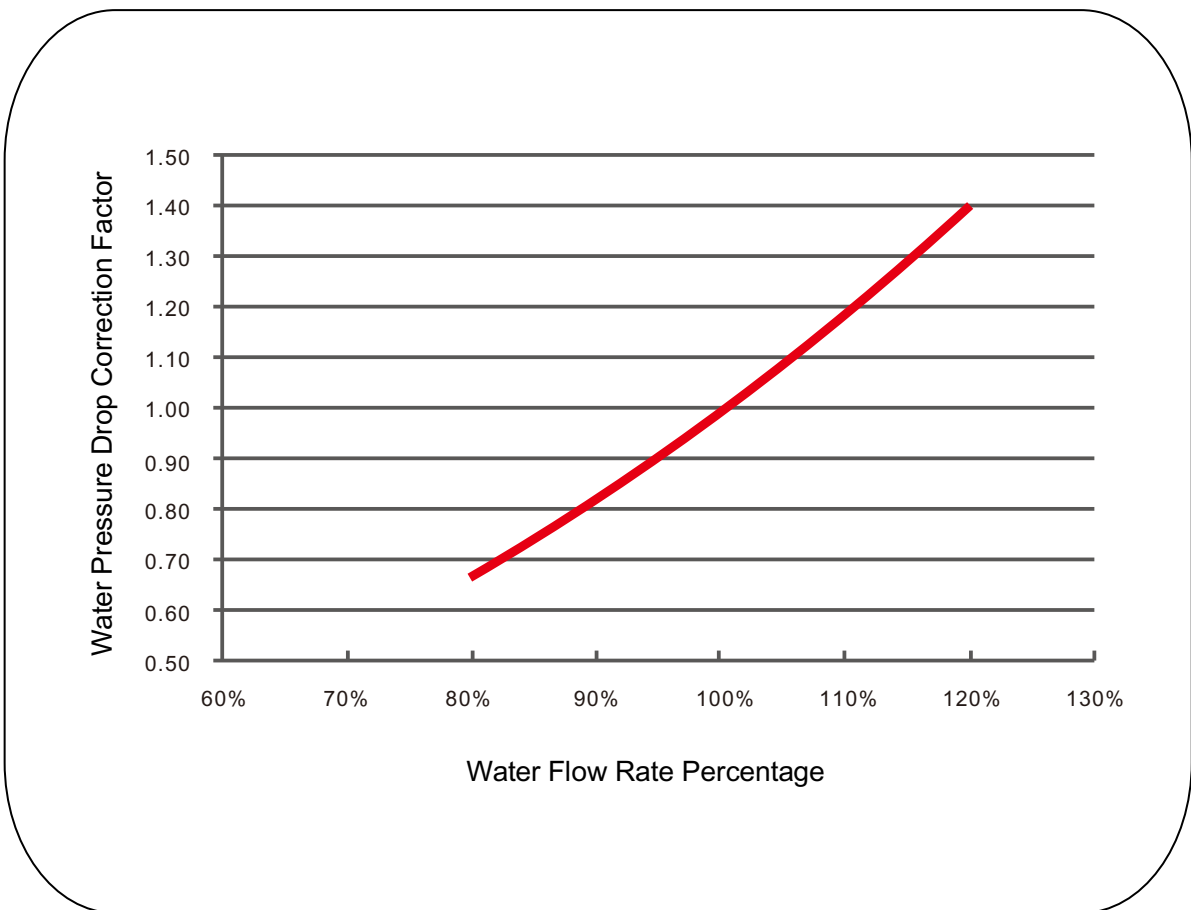
## Notes:

1. Working Conditions: entering/leaving condenser water temp. 30°C/35°C;  
entering / leaving chilled water temp. 12°C/7°C;
2. Power Supply: AC380~415V/50Hz/3Ph, AC380~460V/60Hz/3Ph are available;
3. Non-standard products are available upon request;
4. Technical data are for standard products only and subject to change without prior notice due to product improvement.



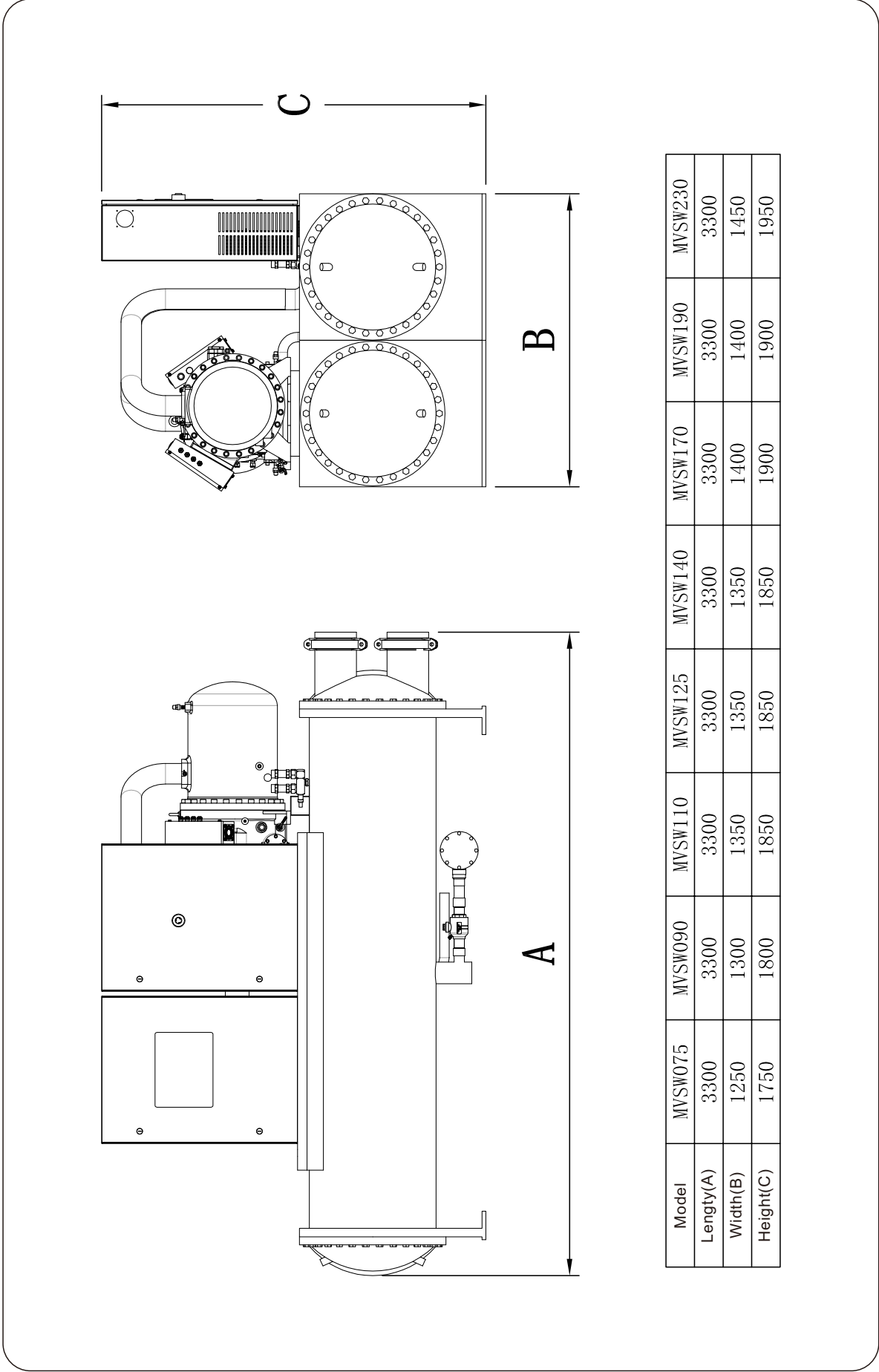
LCHWT °C	ECWT °C									
	15		20		25		30		35	
	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power	Capacity	Power
5	1.04	0.58	1.01	0.74	0.97	0.87	0.92	1.00	0.87	1.13
7	1.12	0.56	1.09	0.72	1.05	0.87	1.00	1.00	0.95	1.13
9	1.21	0.53	1.17	0.70	1.13	0.86	1.08	1.00	1.02	1.13
11	1.30	0.50	1.26	0.68	1.22	0.85	1.17	0.99	1.11	1.14
13	1.40	0.47	1.36	0.66	1.31	0.83	1.26	0.99	1.19	1.14

### WATER PRESSURE DROP CORRECTION CURVE



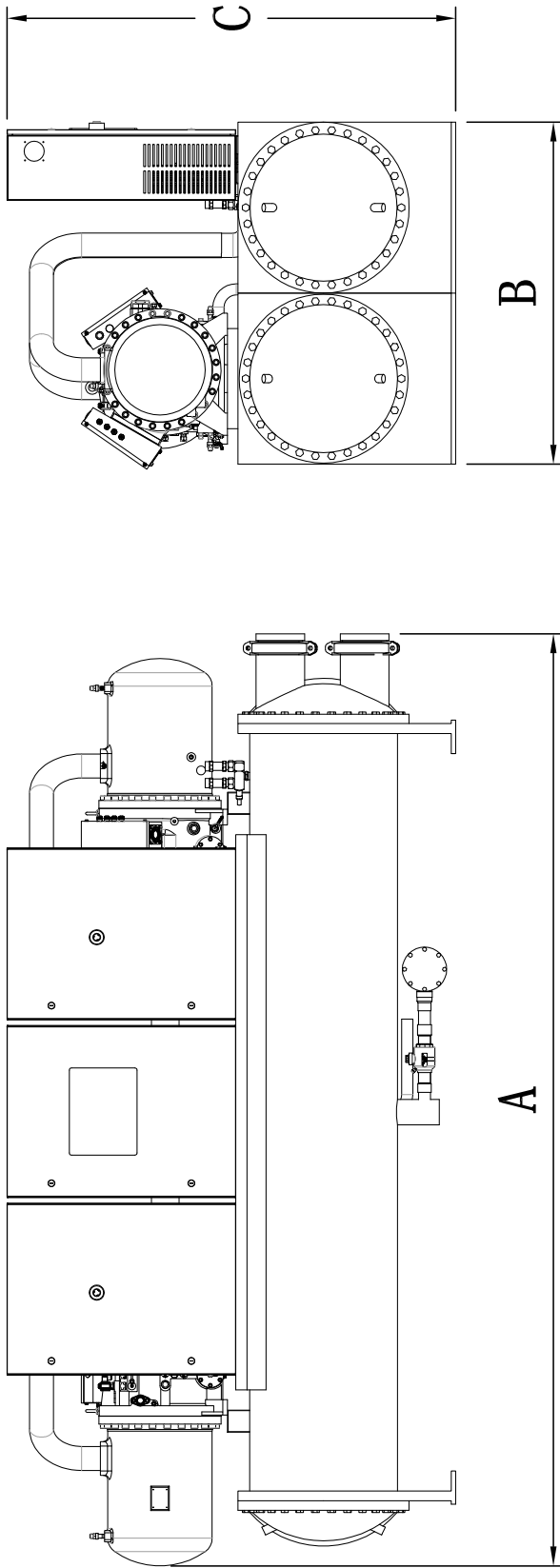
# PHYSICAL DIMENSIONS

MVSW075~MVSW230



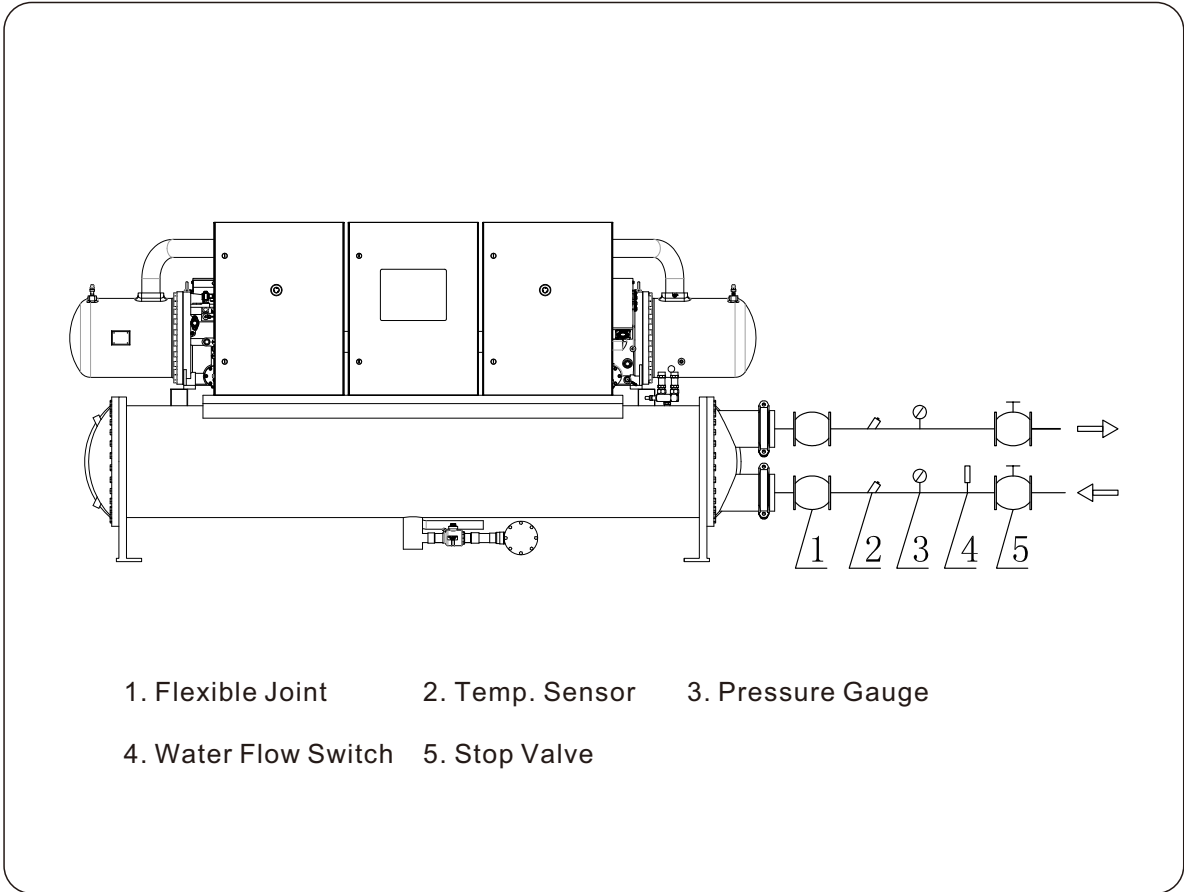
Model	MVSW075	MVSW090	MVSW110	MVSW125	MVSW140	MVSW170	MVSW190	MVSW230
Length(A)	3300	3300	3300	3300	3300	3300	3300	3300
Width(B)	1250	1300	1350	1350	1350	1400	1400	1450
Height(C)	1750	1800	1850	1850	1850	1900	1900	1950

MVSW210~MVSW480

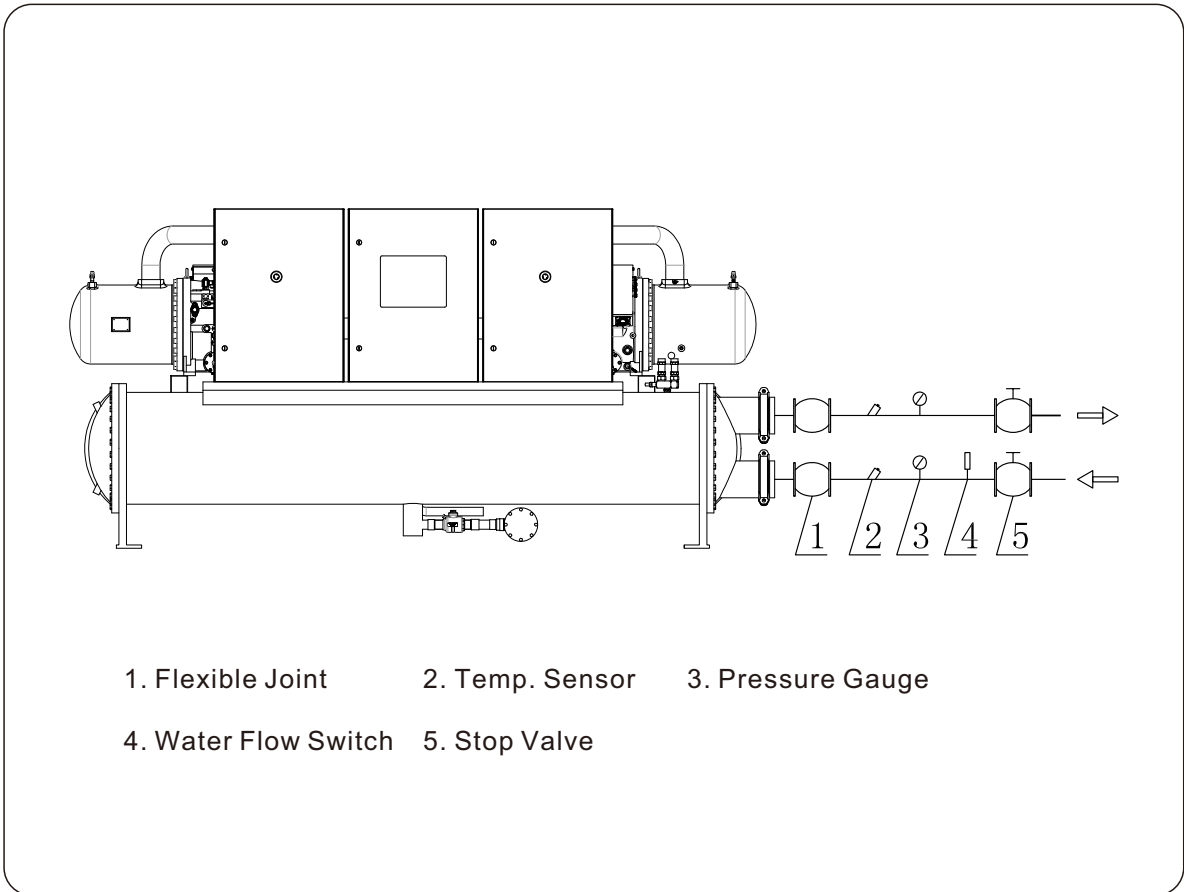


Model	MVSW210	MVSW250	MVSW290	MVSW350	MVSW390	MVSW480
Length(A)	4200	4200	4200	4200	4200	4200
Width(B)	1450	1500	1550	1550	1550	1600
Height(C)	1900	1950	2050	2050	2050	2100

1. Condenser Water Piping

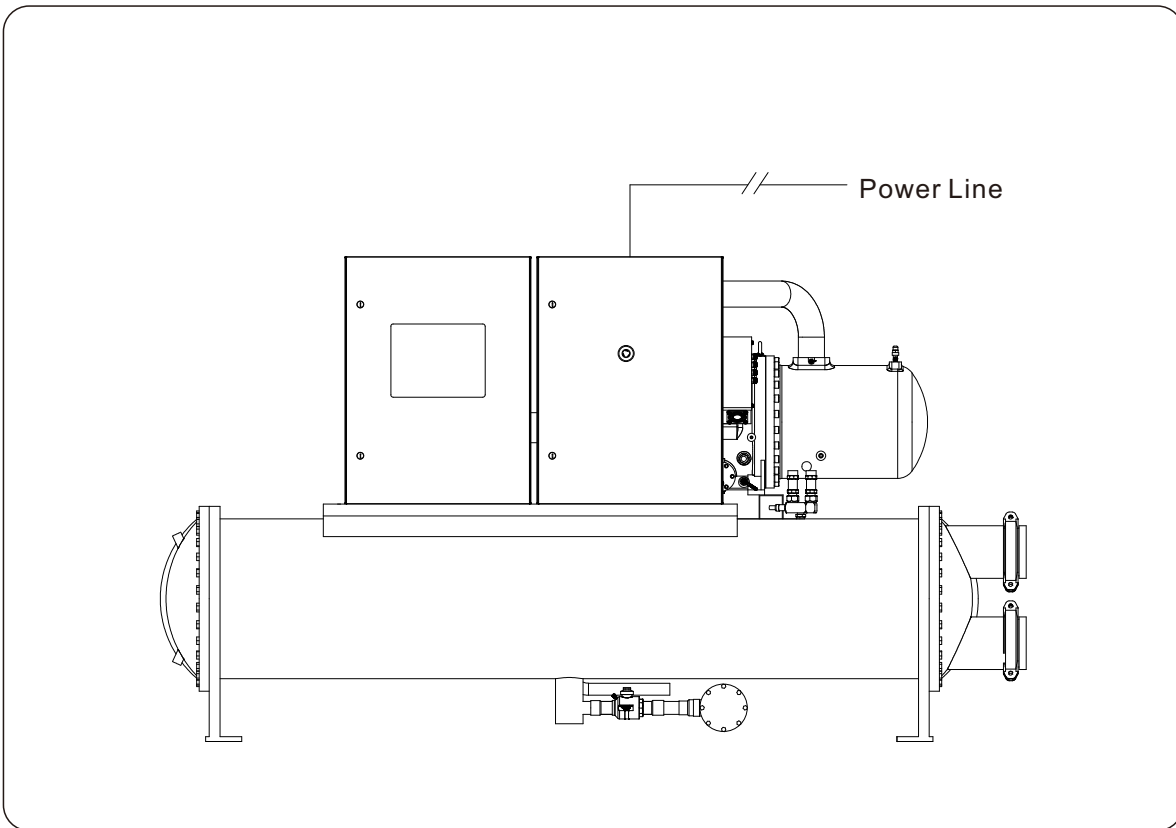


2. Chilled Water Piping



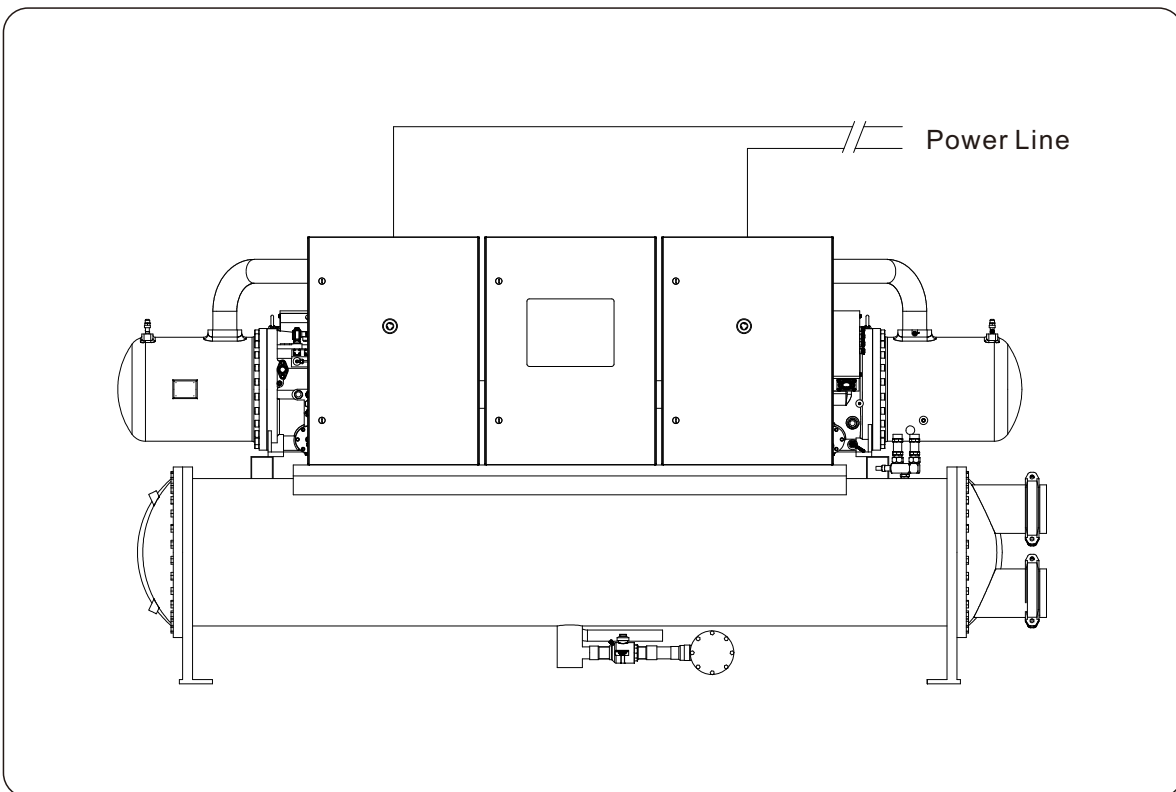
## 1. Single-compressor Unit

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.

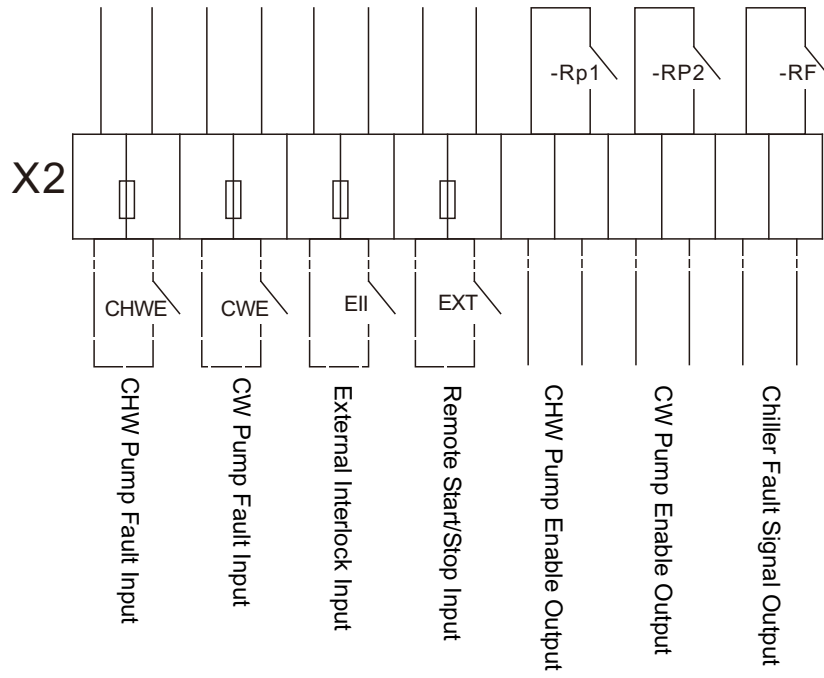


## 2. Double-compressor Unit

Remove the two power inlet covers 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.



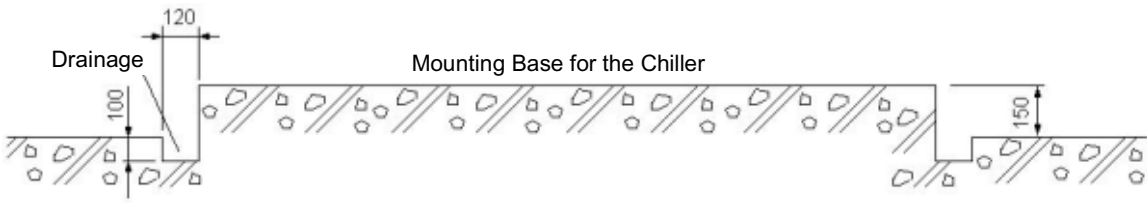
# FIELD WIRING DIAGRAM




### Technical Notes:

1. Minimum cross section of control wires should be 1mm<sup>2</sup>;
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.

# MOUNTING BASE





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