MULTISTACK®

MTW-M SERIES

Modular Water Cooled Oil-free Centrifugal Chillers

We are
the application pioneer of magnetic levitation technology
the creator of modular refrigeration technology

INTRODUCTION

FEATURES of MULTISTACK modular magnetic levitation centrifugal chillers:

Cutting-edge Compressor Technology

Oil-free magnetic levitation centrifugal compressor is the perfect combination of top aerospace technology and advanced digital control technology. It is a 2-stage centrifugal compressor featuring light weight, oil free, ultra-low noise and vibration, excellent IPLV, integrated variable frequency drive (VFD), soft start and green refrigerant R134a, etc.

Ultra-low Noise and Vibration

The oil-free centrifugal compressor uses patented magnetic bearing system. Main shaft of the compressor revolves at high speed without any mechanical contact with the bearing, achieving extremely low noise and vibration.

100% Oil-free Design

The rotor and impellers of the compressor remain levitating in the magnetic field. The proximity sensors on the bearing constantly send feedback to the magnetic bearing system, reposition the rotor and ensure that the rotor is levitating in the center, staying in the best working condition. The system is simple without lubrication oil, which promises quiet and reliable operation, reduces faults and maintenance costs by eliminating complicated oil system and improves efficiency.

High Reliability

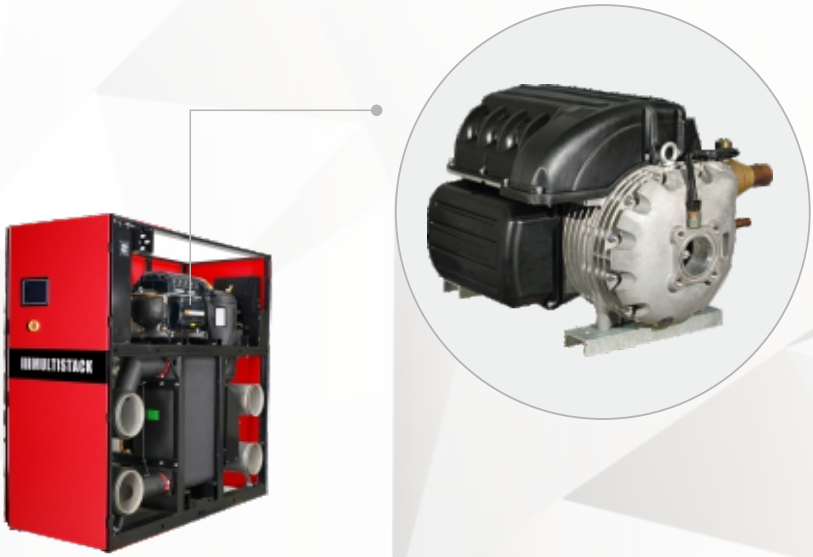
Redundancy design allows every module to work as an independent refrigeration circuit, with adjacent modules operating independently. In the event of a malfunction in the system, the computer selects the next available standby module to provide backup. One failed module will not disrupt the other modules or system.

Simple Installation & Add-on Flexibility

Chillers could be field-assembled without the aid of a large lifting machine and dedicated doorways. It is easy to move a large chiller to rooftop or basement. When necessary, and pipe size has a certain abundance, just add on new modules to increase unit capacity without any change to the system. Similarly, you can also purchase and install the chiller by stages to improve the capital usage.

Advanced 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. Each module runs smoothly with best efficiency based on system load. The control system features compressor wear leveling control, prolonged service life and automatic capacity control.



DESIGN FEATURES

STRUCTURE

MULTISTACK oil-free centrifugal chillers are designed and constructed under the modular technology patent. A chiller is a bank of individual modules connected in parallel to operate as a complete machine. Cooling capacity is matched to load by varying the number of operating modules. The chiller can be a bank of the same series of modules or a bank of two different series of modules combined. It provides the users with more choices for various capacity and higher flexibility.

Each module operates as a complete independent refrigeration circuit, consisting of an oil-free centrifugal compressor, evaporator, condenser, and other controls and safeties. When total load varies, the controller can change the chiller's capacity accordingly by either adding/subtracting the number of on-line compressors based on wear leveling control or by adjusting the capacity of the last started compressor.

The chiller is enclosed within an attractive 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 SPACE-SAVING

The compact size of each module means easy access via standard doorways and elevators. Users no longer need special access to install the chillers.

In comparison to conventional water cooled chillers users can gain up to 40% more space, meaning larger capacity. Chillers can be easily installed in confined and small places.

ADD-ON FLEXIBILITY

As your needs for cooling increases, MULTISTACK has the solution. Being a modular chiller, it has never been easier to expand the system as larger cooling capacity is needed to meet increased building loads, with no complicated changes to the room, piping system or control system, and all work can be done quite easily.

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 modules or system, giving you total piece of mind.

CONDENSER AND EVAPORATOR

Condenser and evaporator are efficient, compact and anti-corrosive brazed plate heat exchangers, which are made from AISI316L stainless steel. The manufacture of condenser and evaporator meet the requirements of cleanliness, dryness and leakage-free for cooling system.
The plate heat exchangers are composed with corrugated heat transfer plates compressed together with certain intervals. Turbulence generated in the internal passages not only improves heat transfer efficiency but also slows down the formation of fouling.

EXCELLENT PART LOAD EFFICIENCY

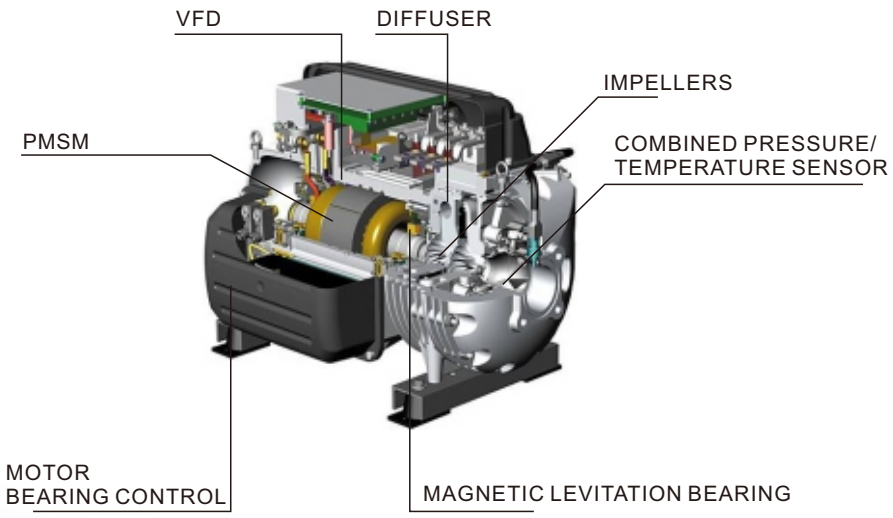
MTW-M compressors feature optimized part load efficiency. The special design and structure allow the compressors to run at part load condition as long as possible to achieve the best COP (W/W). When the cooling load decreases, MULTISTACK's unique MV7-Plus controller will shut down a certain number of compressors if necessary, leaving the rest to run at part load to meet the required capacity at high efficiency. With this self-adaptive control logic, a 450RT (1,600kW) MTW-M chiller can satisfy the required cooling capacity as low as 45 RT (158kW) at high efficiency with Integrated Part Load Value (IPLV) of 9.5.

IN-LINE WATER STRAINERS

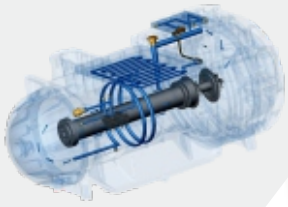
In-line water strainers are made under the MULTISTACK's patent technology, and made from stainless steel. In-line water strainers are supplied and fixed inside both chilled water header pipe and condenser water header pipe for each module. It can be easily dismantled and removed. The In-line water strainers can prevent particles contained in water from getting into the heat exchanger.

Together with another patent product is a header pipe stub which connects to the end of the condenser pipe, which enables the user to flush, clean and drain to the condenser water system very conveniently.

OIL-FREE MAGNETIC LEVITATION CENTRIFUGAL COMPRESSOR



MTW series chillers use oil free magnetic levitation centrifugal compressors which represent the current leading compressor technology of the 21st Century. The compressors in the oil-free chillers completely eliminate lubrication oil. Conventional mechanical bearings are replaced by highly-sophisticated magnetic bearings using top aerospace technology. The permanent magnet synchronous motor (PMSM), drive shaft and centrifugal impellers all levitate in the magnetic field without any immediate contacts. Mechanical frictions, efficiency loss, vibration and noise are eliminated. The compressor is free from oil pump, oil supply system and at the same time avoids efficiency loss caused by refrigerant -entrained oil in the heat exchanger.



OIL-FREE MAGNETIC LEVITATION CENTRIFUGAL COMPRESSOR

The oil-free centrifugal compressor is a totally digital part with an onboard digital control system monitoring all variables that may affect the safe operation of compressors. The control system consists of several multi-functional modules, including AC-DC inverter module, magnetic bearing control module, soft-start module, inlet guide valve control module and communication module. All these modules are integrated in the compressor and make the compressor an electronic rather than a mechanical part. AC-DC inverter module converts AC voltage to adjustable DC voltage. The compressor speed is smoothly confined within 15,000-38,000 RPM based on load, suction/discharge pressure, running current and other conditions. The soft-start module of the compressor pulls only 2 amps.

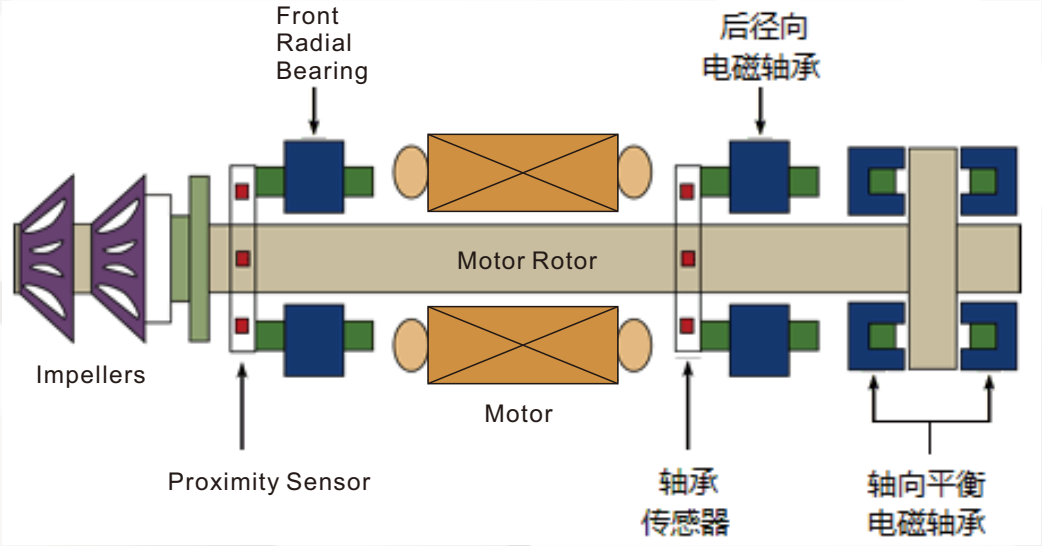
The compressor control system detects capacity required and compression ratio synchronously to match up with the revolving speed. Inlet guide valve control module continuously regulates the inlet guide vane open percentage and suction dynamic pressure in order to maximize operation at compressor sweet spots and avoid surge.. In this way, the compressor can remain smooth operation without surge even at 30% part load condition or at low cooling water temperature. The compressor can even run at part load condition closed to 0% if the chiller has load balancing valve.

Proximity sensors in the magnetic bearing control module sense and reposition the impellor shaft 6 million times a minute to ensure the bearing is within a 0.007mm range.

In the event of a shutdown or power outage, the controller will detect power loss and switch the compressor motor to generator mode. In this mode, the bearing and control system are powered by both the power accumulator and the motor power generated by the inertial kinetic energy of the impellers and shaft. The revolving assembly remains levitating until it is brought to a safe stop without any friction. This is an unprecedented reliability feature of the compressor.

The compressor runs very quietly since it seldom generates mechanical friction or mechanical vibration. Sound level of the compressor measured at 5 meters horizontally around the chiller is as low as 65dB(A).

Advanced communication capability of the compressor enables it to connect to the Ethernet and makes it convenient for the users to access to the compressor running data via the browser.

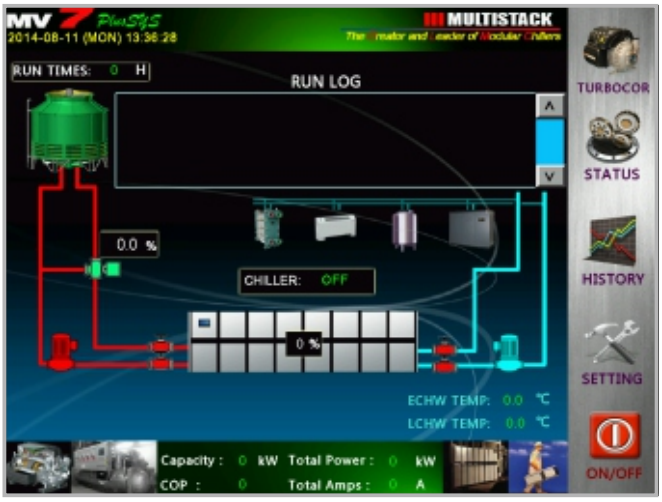


MV7 PLUS CONTROL SYSTEM

Home Screen

The control system consists of programs, touch screen and system input/output. Features of the MV7 Plus controller include:

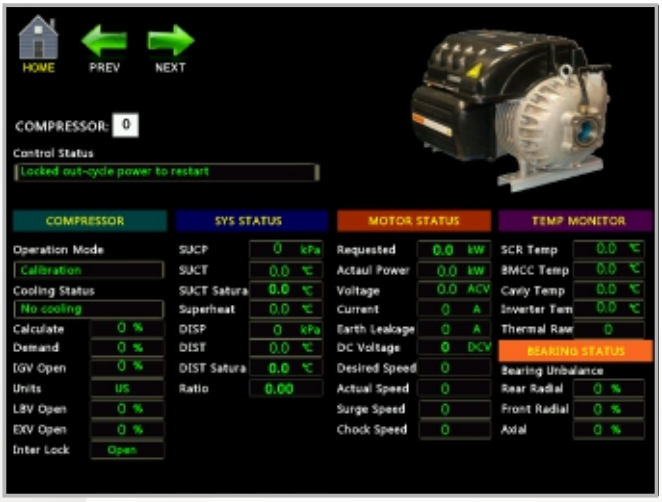
* Remote start/stop input
* Emergency stop input
* Chiller running status output
* Chiller fault alarm output
* Compressor fault lock out output
* Load limit input
* Cooling tower frequency signal setpoint (0-10VDC)
* Chilled/cooling water pump frequency output (0-10VDC)
* Three-way valve signal output (0-10VDC) for the cooling water system temperature control



Chiller Control Screen

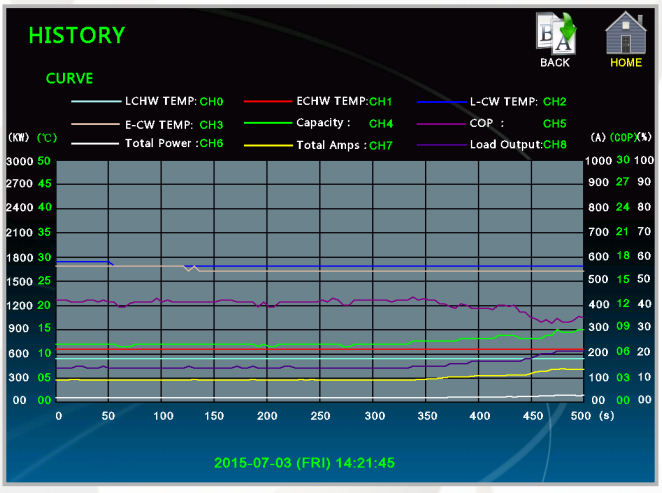
This is where a general system summary for the entire chiller can be found. Features of this page include:

* System On/Off switch
* Compressor Override Controls
* Navigation Menus
  - User Menu (level 1 password login) includes: trend graphs, fault logs, alarm logs and logbook
  - Service Menu (level 2 password login) includes: edit system, edit I/O, edit I/O controls, edit alarms and Modbus set up
* Latest running status overview
* Power status and output
* System information, system fault, alarm and status
* Compressor information, fault, alarm and status



Trend Graphs

* Trend graphs viewable remotely
* All data logged in 5-300 seconds (optional) intervals
* Data storage: 4G
* Storage time: 2 years
* Monitors compressors
* Allows you to analyze system to identify problems
* Exportable via a .CSV file to excel



VARIABLE WATER FLOW (VWF)

The applications below are for MTW-MV series only. For model selection, please consult your local MULTISTACK.

MTW-MV

The oil-free centrifugal chillers are designed for variable water flow, which not only change cooling capacity but also adjust chilled/cooling water working flow for maximum energy efficiency so that power consumption is greatly reduced. Besides, a simple primary flow system is adopted for both chilled and cooling water circulation instead of using secondary pump water system.
Generally at least two modules (maximum four) are involved in the chiller under the VWF mode.

Flow Regulation Valve

Flow regulation valves are installed between chilled/cooling water headers and evaporator/condenser to regulate water circulation of each module synchronously. The flow regulation valves are open when compressors are working and closed when compressors are off-work. The linear on-off design avoids water hammer as well as rapid change of system pressure. A differential pressure switch is used to prevent the compressors from operating when the flow regulation valves are closed.

Water Differential Pressure Transducer

Three differential pressure transducers are provided by MULTISTACK to detect the chiller leaving/entering pressure difference of chilled and cooling water as well as pressure difference of chilled water on load side. Differential pressure transducers for the leaving/entering chilled water on load side could be installed at any proper location, including water loop with the greatest flow resistance. These three transducers are used to monitor water flow changes so that the computer controller can regulate water pump output frequency on demand.

Variable Frequency Pump Control System

MV7 Plus controller not only dominates chiller operation but also regulates the flow change of chilled/cooling water through differential pressure transducers. By way of PID control, frequency signals are transmitted to the VFDs of chilled/cooling water pumps so that the working flows are in accordance with system load demand and energy is saved ultimately.

MV7 Plus controller is connected to a thermal switch and cooling tower fan controller to adjust the cooling water entering temperature and reduce power consumption.

MODEL NUMBER DESIGNATION

MTW	090	M	V	E	A	A	--	4
1	2	3	4	5	6	7		8

MODEL NUMBER DESIGNATION:

1—Multistack Turbocor Water Cooled

2—Model Number (090/110/120/130/150RT)

3—M: Modular Chiller w/ PHE

4—Chiller Type
Default for constant water flow
V: Variable Water Flow

5—Refrigerant
E: R134a

6—Electrical Specifications
A: AC380V/50Hz/3Ph
B: AC(280V-460V)/60Hz/3Ph

7—Development Index
Default for standard chiller

8—The number of modules per chiller bank
Constant: MTW090M 1~5; MTW110/120/130/150M 1~4;
VWF: MTW090M 2~5; MTW110/120/130/150M 2~4;

Example:

1.A chiller consisting of 4 MTW150 modules, with AC380V/50Hz/3Ph power supply and R134a refrigerant is marked as

MTW150MEA – 4

TECHNICAL DATA (PER MODULE)

Model			MTW090M -1	MTW110M -1	MTW120M -1	MTW130M -1	MTW150M -1
Nominal Cooling Capacity		kW	315	394	422	457	526
Nominal Power Input		kW	60.6	73.7	75.2	82.6	97
COP		kW/kW	5.20	5.35	5.61	5.53	5.42
Compressor	Type		Oil-free Magnetic Levitation Centrifugal Compressor				
	Starting Mode		Soft start				
	Power Supply	AC	380V/50Hz				
	F.L.A	A	135		150	150	170
	R.L.A	A	104	130	143	129	160
	L.R.A	A	231		187		
	Starting Current	A	6				
Refrigerant Charge		kg	52		68		
Refrigerant Throttling Device			Electronic Expansion Valve				
Control System			MV7PLUS				
Evaporator	Type		AISI316L Stainless Steel Brazed Plate Heat Exchanger				
	Std.Bearing Pressure	Mpa	2.5				
	Rated Flow	L/s	15.1	18.8	20.2	21.8	25.1
	Rated Pressure Drop	kPa	70	74	72	74	78
	Fouling Factor	m^2k/kW	0.018				
	Connection Size		DN200		DN250		
Condenser	Type		AISI316L Stamless Steel Brazed Plate Heat Exchanger				
	Std.Bearing Pressure	Mpa	2.5				
	Rated Flow	L/s	17.9	22.4	23.8	25.8	29.8
	Rated Pressure Drop	kPa	89	92	89	92	95
	Fouling Factor	m^2k/kW	0.044				
	Connection Size		DN200		DN250		
			W/o Panels (W/ Panels)		W/o Panels (W/ Panels)		
Physical Dimensions	L	mm	1600 (1680)		2000 (2080)		
	W	mm	880 (950)		880 (950)		
	H	mm	1730 (1750)		1780 (1800)		
Weight	Shipping Weight	kg	1120	1220	1370		
	Operating Weight	kg	1240	1360	1530		

Notes:

1.F.L.A: Full Load Amperage; R.L.A: Rated Load Amperage; L.R.A: Locked Rotor Amperage

2.MTW-M Chillers are designed and constructed in conformity with *GB/T18430.1-2007 Vapor Compression Cycle Chiller (Heat Pump) for Commercial, Industrial and Other Similar Uses;*

3.Nominal working condition: entering/leaving chilled water temperature 12℃/7℃; entering/leaving condenser water temperature 30℃/35℃;

4.Customized products are available on request;

5.Technical data in this manual may change and shall be subject to the included manual of the chiller;

TECHNICAL DATA (PER MODULE)

Model			MTW090M-2	MTW110M-2	MTW120M-2	MTW130M-2	MTW090M-3
Nominal Cooling Capacity		kW	630	788	844	914	945
Nominal Power Input		kW	121.2	147.4	150.4	165.2	181.8
COP		kW/kW	5.20	5.35	5.61	5.53	5.20
Compressor	Type		Oil-free Magnetic Levitation Centrifugal Comperssor				
	Starting Mode		Soft Start				
	Quantity		1				
	Power Supply	AC	380V/50Hz				
	F.L.A	A	172		272	300	340
	R.L.A	A	204	240	256	278	320
	L.R.A	A	462		374		
	Starting Current	A	2				
Refrigerant Charge		kg	208		272		
Control System			Electronic Expansion Valve				
Control System			MV7 PLUS				
Evaporator	Type		AISI316L Stainless Steel Brazed Plate Heat Exchanger				
	Std.Bearing Pressure	Mpa	2.5				
	Rated Flow	L/s	30.1	37.6	40.3	43.7	50.3
	Rated Pressure Drop	kPa	70	74	72	74	78
	Fouling Factor	m^2k/kW	0.018				
	Connection Size		DN200		DN250		
Condenser	Type		AISI316L Stainless Steel Brazed Plate Heat Exchanger				
	Std.Bearing Pressure	Mpa	2.5				
	Rated Flow	L/s	35.8	44.7	47.5	51.6	59.5
	Rated Pressure Drop	kPa	89	92	89	92	95
	Fouling Factor	m^2k/k W	0.044				
	Connection Size		DN200		DN250		
			W/o Panels (W/ Panels)		W/o Panels (W/ Panels)		
Physical Dimensions	L	mm	1600(1680)		2000(2080)		1600(1680)
	w	mm	1760(1900)		1800(1900)		2640(2850)
	H	mm	1730(1750)		1780(1800)		1730(1750)
Weight	Shipping Weight	kg	2240	2440	2740		3360
	Operating Weight	kg	2480	2720	3060		3720

Notes:

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TECHNICAL DATA (PER MODULE)

Model			MTW150M-2	MTW110M-3	MTW120M-3	MTW130M-3	MTW110M-4
Nominal Cooling Capacity		kW	1052	1182	1266	1371	1576
Nominal Power Input		kW	188	221.1	225.6	247.8	294.8
COP		kW/kW	5.60	5.35	5.61	5.53	5.35
Compressor	Type		Oil-free Magnetic Levitation Centrifugal Compressor				
	Starting Mode		Soft start				
	Quantity		1				
	Power Supply	AC	380V/50Hz				
	F.L.A	A	340	270	450	450	540
	R.L.A	A	320	260	429	387	520
	L.R.A	A	374	693	561		924
	Starting Current	A	2				
Refrigerant Type			R134a				
Refrigerant Charge		kg	136	156	204		208
Refrigerant Throttling Device			Electronic Expansion Valve				
Control System			MV7 PLUS				
Evaporator	Type		AISI316L Stainless Steel Brazed Plate Heat Exchanger				
	Std.Bearing Pressure	Mpa	2.5				
	Rated Flow	L/s	50.2	56.4	60.6	65.4	75.2
	Rated Pressure Drop	kPa	70	74	72	74	78
	Fouling Factor	m^2k/kW	0.018				
	Connection Size		DN200		DN250		
Condenser	Type		AISI316L Stamless Steel Brazed Plate Heat Exchanger				
	Std.Bearing Pressure	Mpa	2.5				
	Rated Flow	L/s	59.6	67.2	71.4	77.4	89.6
	Rated Pressure Drop	kPa	89	92	89	92	95
	Fouling Factor	m^2k/kW	0.044				
	Connection Size		DN200		DN250		
			W/o Panels (W/ Panels)		W/o Panels (W/ Panels)		
Physical Dimensions	L	mm	2000(2080)	1600(1680)	1600(1680)		1600(1680)
	W	mm	1800(1900)	2640(2850)	2640(2850)		3520(3800)
	H	mm	1780(1800)	1730(1750)	1780(1800)		1730(1750)
Weight	Shipping Weight	kg	2740	3660	4110		4880
	Operating Weight	kg	3060	4080	4590		5440

Notes:

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TECHNICAL DATA (PER MODULE)

Model			MTW150M-3	MTW120M-4	MTW130M-4	MTW110M-5	MTW150M-4
Nominal Cooling Capacity		kW	1578	1688	1828	1970	368.5
Nominal Power Input		kW	291	300.8	330.4	368.5	388
COP		kW/kW	5.42	5.61	5.53	5.35	0.95
Compressor	Type		Oil-free Magnetic Levitation Centrifugal Comperssor				
	Starting Mode		Soft Start				
	Quantity		1				
	Power Supply	AC	380V/50Hz				
	F.L.A	A	510	600	600	675	680
	R.L.A	A	480	572	516	650	640
	L.R.A	A	561	748	748	1155	748
	Starting Current	A	2				
Refrigerant Charge			R134a				
Control System		kg	204	272	272	260	272
Refrigerant Throttling Device			Electronic Expansion Valve				
Control System			MV7 PLUS				
Evaporator	Type		AISI316L Stainless Steel Brazed Plate Heat Exchanger				
	Std.Bearing Pressure	Mpa	2.5				
	Rated Flow	L/s	75.3	80.8	87.2	94.0	100.4
	Rated Pressure Drop	kPa	70	74	72	74	78
	Fouling Factor	m^2k/kW	0.018				
	Connection Size		DN200		DN250		
Condenser	Type		AISI316L Stainless Steel Brazed Plate Heat Exchanger				
	Std.Bearing Pressure	Mpa	2.5				
	Rated Flow	L/s	89.4	95.2	103.2	112.0	119.2
	Rated Pressure Drop	kPa	89	92	89	92	95
	Fouling Factor	m^2k/kW	0.044				
	Connection Size		DN200		DN250		
			W/o Panels (W/ Panels)		W/o Panels (W/ Panels)		
Physical Dimensions	L	mm	2000(2080)	2000(2080)	2000(2080)	1600(1680)	2000(2080)
	w	mm	2640(2850)	3600(3800)	3600(3800)	4400(4750)	3600(3800)
	H	mm	1780(1800)	1780(1800)	1780(1800)	1730(1750)	1780(1800)
Weight	Shipping Weight	kg	4110	5480		6100	5480
	Operating Weight	kg	4590	6120		6800	6120

Notes:

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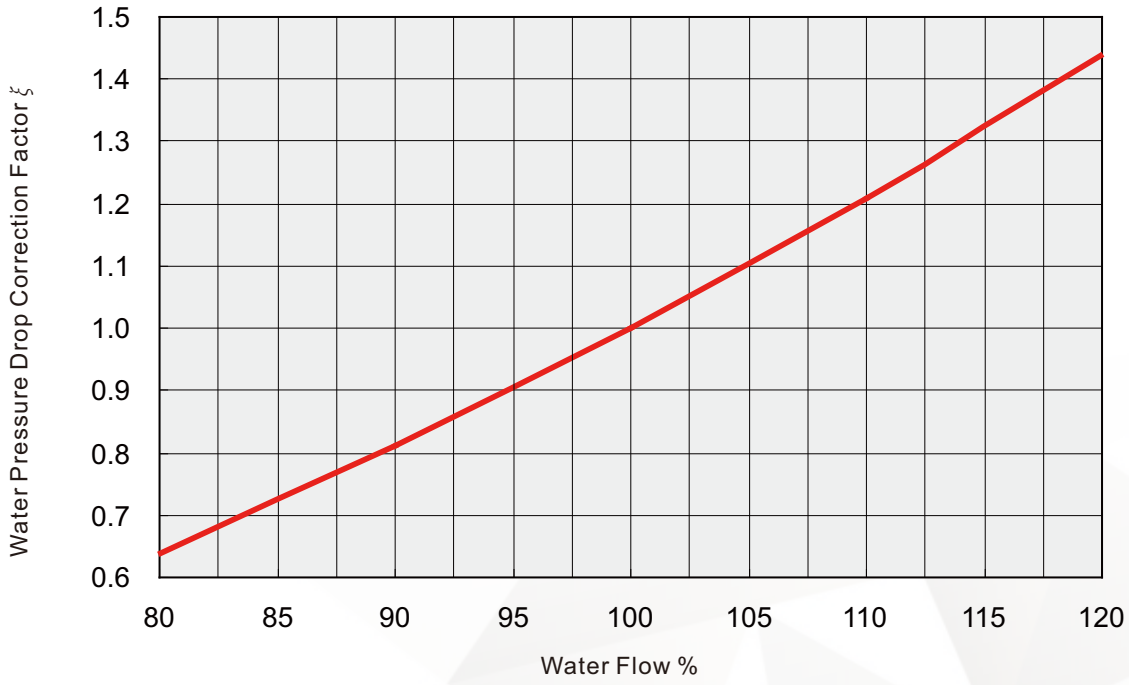
WATER PRESSURE DROP CORRECTION

Water Pressure Drop Correction Factor for Heat Exchanger Water Circuit (per module)



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

Water Pressure drop correction factor (K) in regard to the number of modules (N) per chiller bank

N	1	2	3	4
MTW090M-1	1.00	1.01	1.01	1.02
MTW110M-1	1.00	1.01	1.01	1.02
MTW120M-1	1.00	1.01	1.01	1.02
MTW130M-1	1.00	1.01	1.01	1.02
MTW150M-1	1.00	1.01	1.01	1.02

N——Number of modules per chiller bank

Calculation of Actual Water Pressure Drop (Heat Exchanger)

Actual Water Pressure Drop (Heat Exchanger) = K × ζ × Rated Water Pressure Drop

Chiller Variable Working Condition Correction Factor

Correction Table										
Leaving Chilled Water Temp.℃	Leaving Condenser Water Temp.℃									
	15		20		25		30		35	
	Cooling Capacity	Power	Cooling Capacity	Power	Cooling Capacity	Power	Cooling Capacity	Power	Cooling Capacity	Power
5	0.87	0.59	0.93	0.76	0.96	0.93	0.92	0.99	0.83	1.01
6	0.88	0.57	0.95	0.74	0.99	0.92	0.96	0.99	0.86	1.02
7	0.88	0.55	0.96	0.73	1.00	0.90	1.00	1.00	0.89	1.02
8	0.88	0.52	0.97	0.71	1.02	0.89	1.02	1.02	0.92	1.02
9	0.88	0.49	0.98	0.68	1.05	0.88	1.05	1.02	0.95	1.02
10	0.87	0.46	0.99	0.67	1.06	0.86	1.08	1.02	0.98	1.02
11	0.86	0.43	1.00	0.65	1.07	0.84	1.11	1.02	1.01	1.02
12	0.84	0.38	0.99	0.61	1.09	0.82	1.14	1.02	1.04	1.02

Selected chillers should meet the following requirements:

1. CHWE.T=12℃
2. CHWL.T=7℃
3. W.F=97 L/s
4. CWE.T=30℃
5. CWL.T=35℃
6. W.C=m3/h=114 L/s
7. Refrigerant: R134a
8. Power Supply: AC380V/50Hz/3Ph

Calculations

1.Calculation of Cooling Capacity

Cooling Capacity=W.F×Cp×（CHWE.T-CHWL.T）

=97L/s×4.185×（12℃-7℃）

=2030Kw

2.Model and Quantity

Selected Model: MTW150M

When CHWL.T= 7℃ and CWL.T=35℃,

Cooling Capacity (per module): 526kW

Required number of modules: 2,030kW÷526kW=3.86 (Rounding 4)

Total Cooling Capacity: 526kW×4=2,104kW

The selected chiller, MTW150MEA-4.0, meets the requirements.

3. Calculation of Chilled Water Pressure Drop

(1) Rated chilled water flow = 25.1L/s×4=100.4 L/s

Water pressure drop under rated water flow is 78kPa

(2) Actual chilled water flow % = 97.0L/s÷100.4 L/s =96.6%

According to the water pressure drop correction curve (heat exchanger), the water pressure drop correction factor ξ is 0.92 when water flow percentage is 96.6%

The table “Water Pressure drop correction factor (K)” shows that when module number is 4, K = 1.02

Actual chilled water pressure drop is 0.92×78 kPa×1.02 = 73 kPa

4. Calculation of Cooling Water Flow and Water Pressure Drop

（1）Cooling Water Flow 29.6L/s×4=118.4 L/s

Water pressure drop under rated cooling water flow is 95kPa

（2）Actual Water Pressure Drop

Actual cooling water flow % = 114.0 L/s÷118.4 L/s = 96.3%

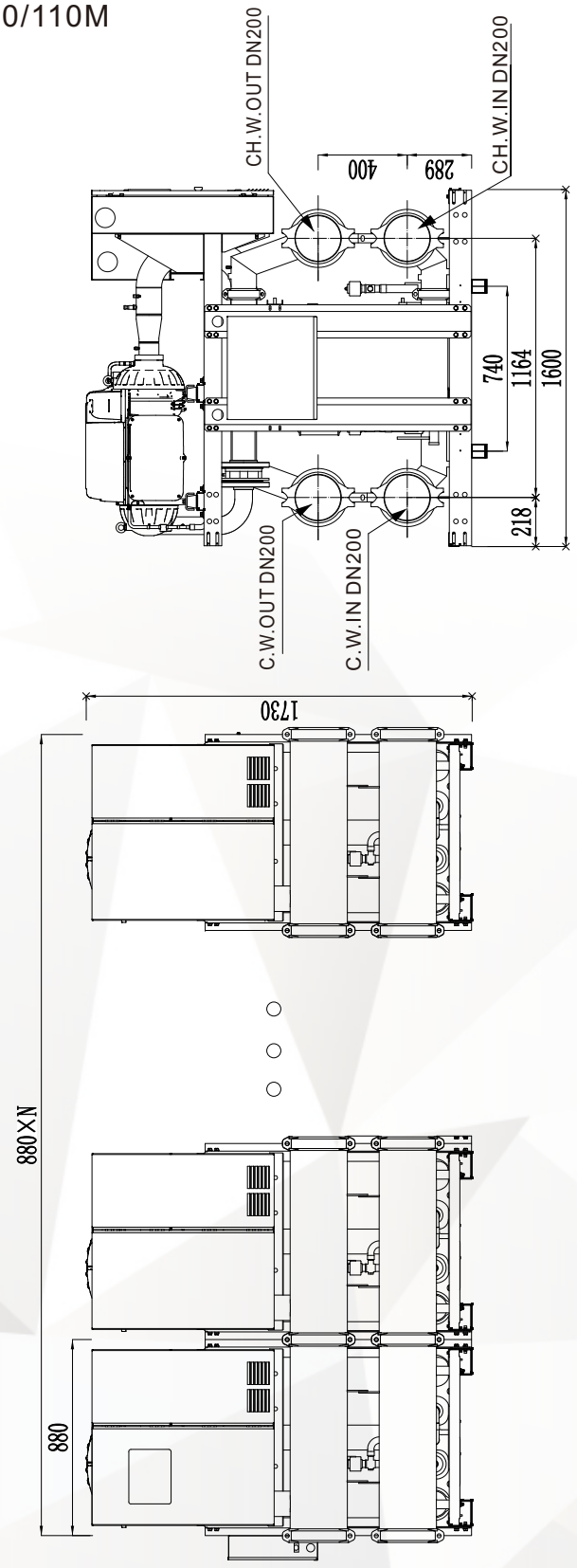
According to the water pressure drop correction curve (heat exchanger), the water pressure drop correction factor ξ is 0.91 when water flow percentage is 96.3%

The table “Water Pressure drop correction factor (K)” shows that when module number is 4, K = 1.02

Actual cooling water pressure drop is 0.91 × 95kPa×1.02 = 88 kPa

PHYSICAL DIMENSIONS

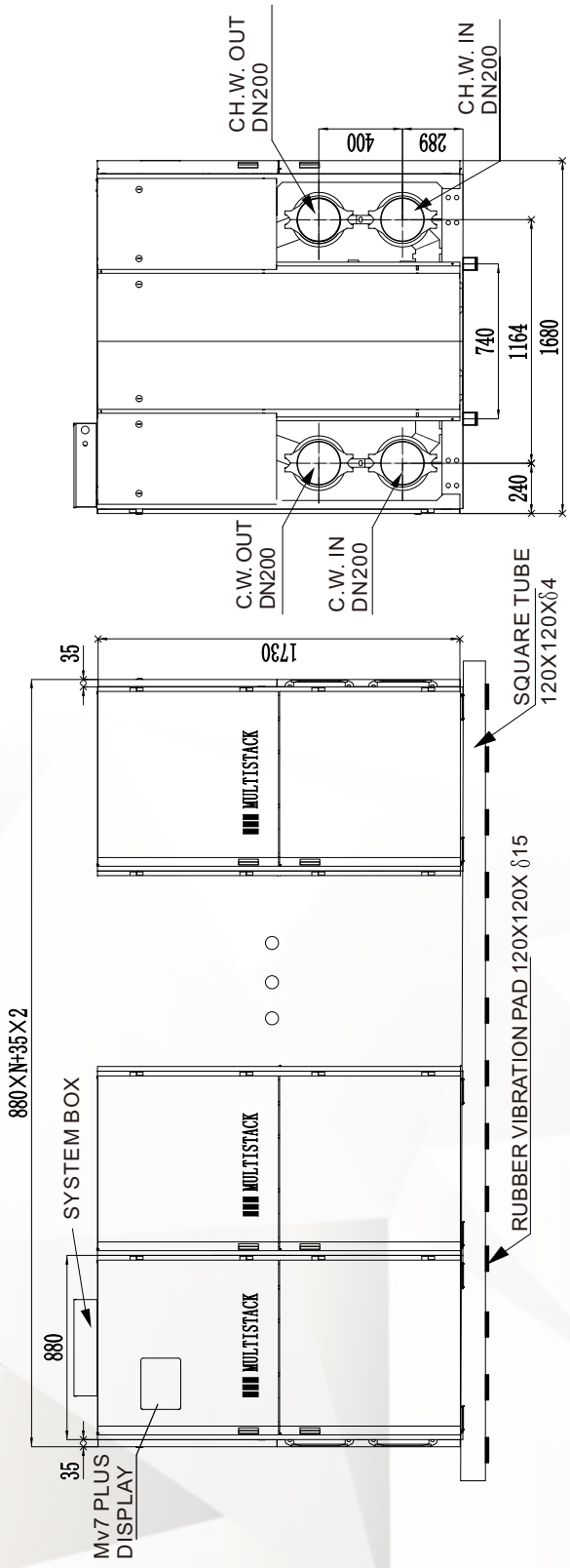
MTW090/110M



NOTES: 1. RUBBER VIBRATION PADS SHOULD BE APPLIED WITH 300MM INTERVALS.
2. MTW090/110M CAN BE SUPPLIED WITH FRAME AND PANELS (OPTIONAL).
SEE DRAWING AS SHOWN BELOW FOR MORE DIMENSIONAL DETAILS.

PHYSICAL DIMENSIONS

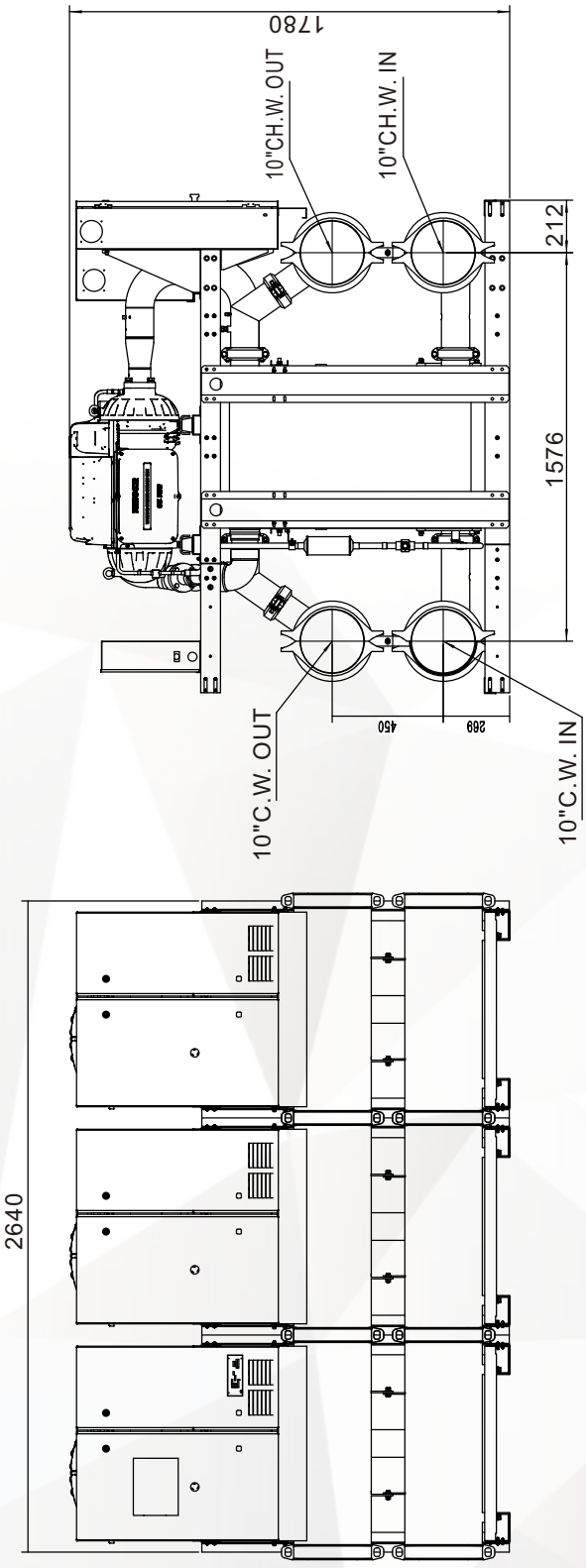
MTW090/110M (with frame and panels)



NOTES: 1.RUBBER VIBRATION PADS SHOULD BE APPLIED WITH 300MM INTERVALS.
2.THE HEIGHT OF SYSTEM BOX IS 112MM, WHICH IS EXCLUDED FROM CHILLER OVERALL HEIGHT.

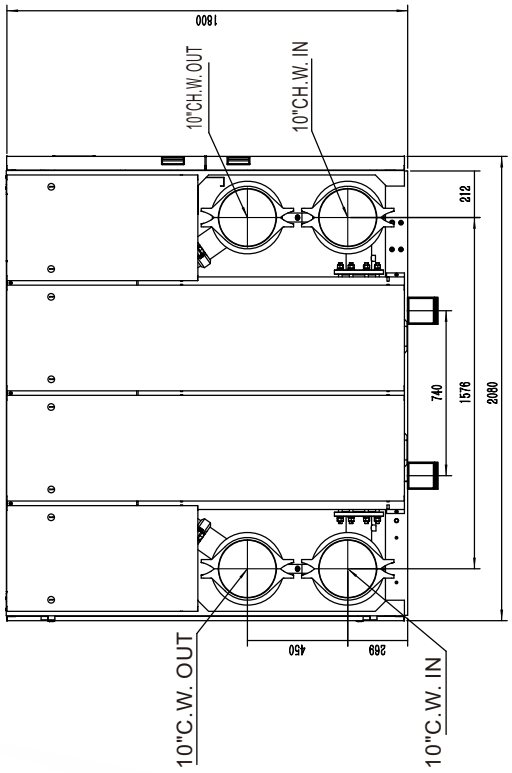
PHYSICAL DIMENSIONS

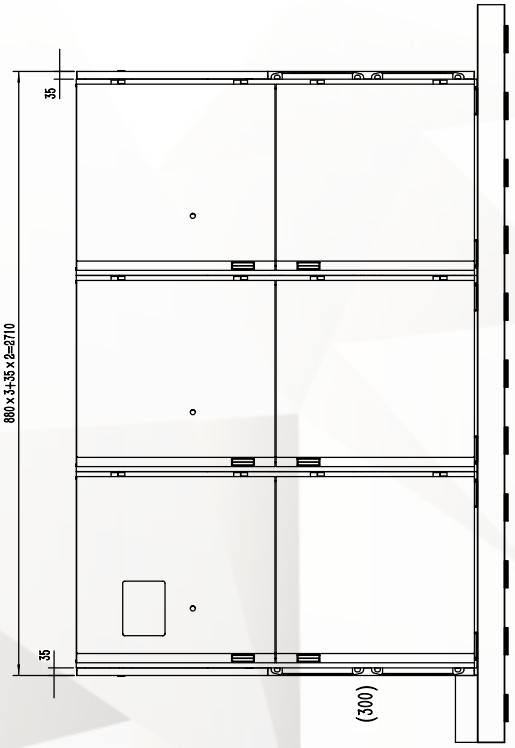
MTW120/130/150M



PHYSICAL DIMENSIONS

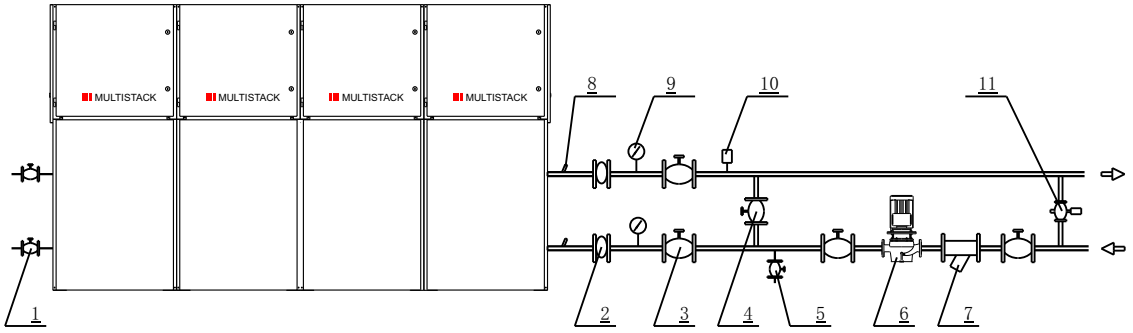
MTW120/130/150M (with frame and panels)



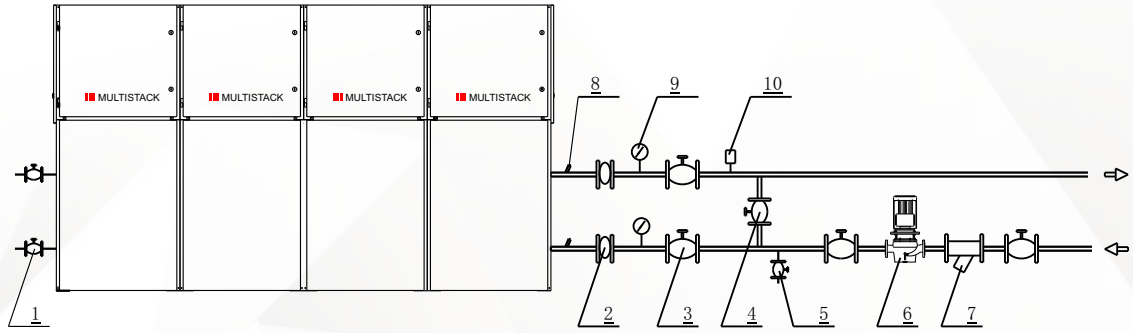


CHILLED/COOLING WATER PIPING

CHILLED WATER PIPING



COOLING WATER PIPING



1. Drain vlave 2. Vibration pad 3. Stop valve 4. Bypass valve 5. Drain valve 6. Water pump
7. Strainer 8. Sensor well 9. Pressure gauge 10. Flow switch 11. Pressure differential bypass valve

CHILLED/COOLING WATER PIPING

NOTES:

(1) The module is installed on two foot rails on the ground. The foot rails are made of square structural steel of 120×120× δ 4 mm. Rubber vibration pad (100×100×15mm) should be applied between the square tubes and the ground every 300mm.

(2) Flow switch shall be installed on the straight pipe section, which is at least 5 times diameter away from the switch to protect the chiller in the event of insufficient water flow. Flow switch is irreplaceable by the pressure differential switch/sensor. Required setting of the flow switch: off when water flow rate ≤80%

(3) External pipes and valves shall have proper support so that their weights would not land on the connections and ensure the tightness of pipe joints.

(4) The mesh number of the strainer in the inlet water pipe should be min. 20. The strainer should be of stainless material and sturdy enough in case that mechanical material taken to the unit blocking the heat exchanger.

(5) After inserting the temperature sensor into the sensor well, apply grease to protect temperature probe from being damaged by water accumulation.

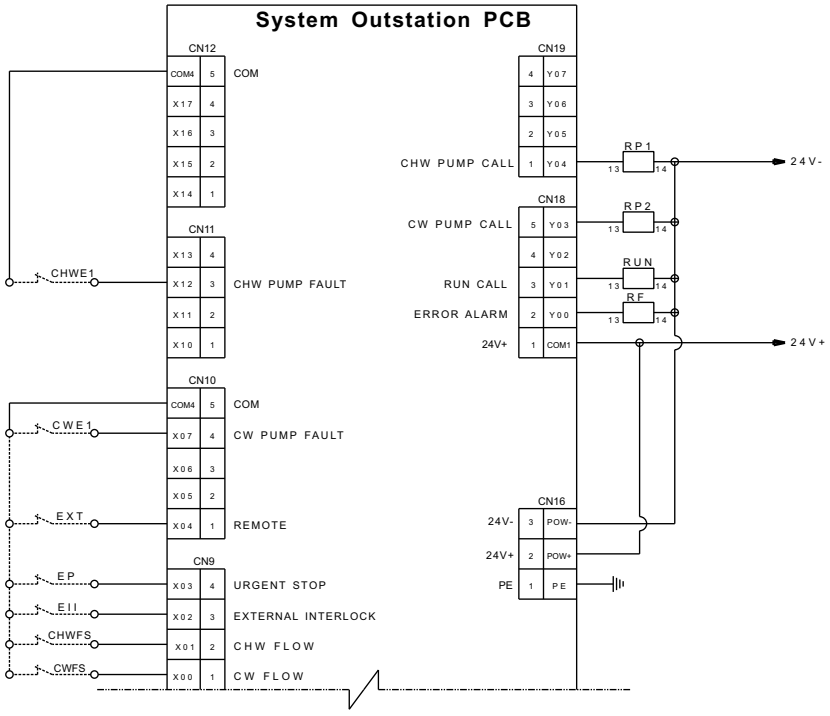
(6) Make sure the stop valves are closed during the chiller installation and perform leak test until the piping system is completely cleaned.

(7) Prior to the chiller start-up, the whole piping system must be thoroughly cleaned and removed of mechanical impurities. Close the stop valves in the process of cleaning and open the bypass valve to avoid water circulating within the chiller.

(8) All piping parts are supplied by users.

(9) All drawings above are for constant water flow system.

ELECTRICAL SYSTEM WIRING



External Interlock Devices:

CHWFS Chilled water flow switch, verifying water flows;
CWFS Cooling water flow switch, verifying water flows;
CHWE1 Chilled water pump fault signal;
CWE1 Cooling water pump fault signal;
EII External interlock signal;
EP External emergency stop input;
EXT External remote start/stop input;

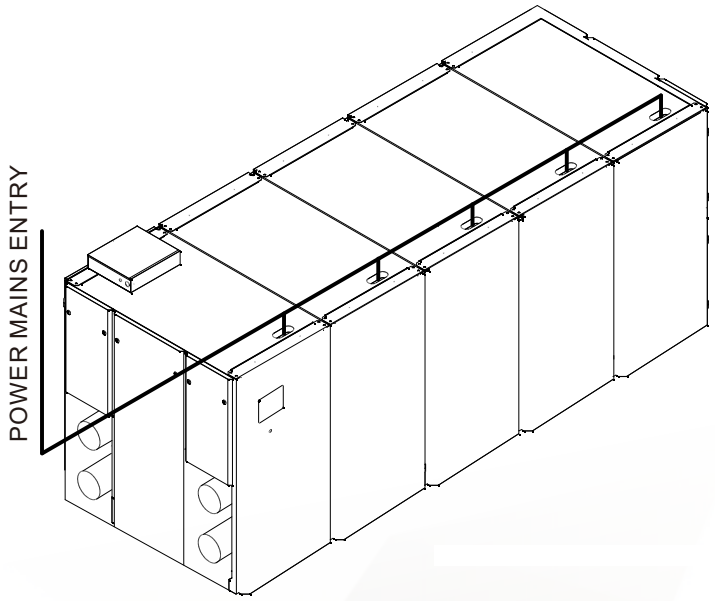
Passive Contacts Output:

System control panel provides 5 passive contacts output for the users.
RF Chiller fault status output;
RUN Chiller running status output;
RP1 Chilled water pump running signal output;
RP2 Cooling water pump running signal output;
MV Motorized valves signal output

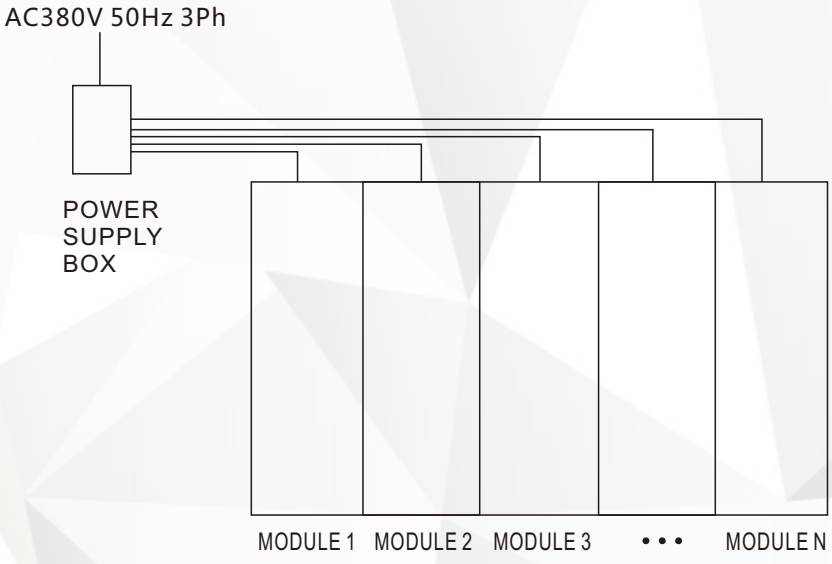
Wiring Considerations:

- Minimum cross section of control circuit conductor to be 1mm^2;
- The input signal terminals X02, X03 and X04 to be bridged to common port COM3 as per wiring diagram if EII, EP and EXT are not used;
- Maximum current of passive contact to be 5A;
- Flow switch and external interlock devices to be supplied by users or bought from MULTISTACK;
- VWF system to be free of flow switch;
- "—" for factory wiring and "--" for field wiring.

POWER MAINS CONNECTION



POWER MAINS ENTER FROM THE TOP OF THE CHILLER.



POWER SUPPLY BOX SUPPLIED BY THE USER SHOULD DISTRIBUTE BRANCH LINES INTO EACH MODULE.

POWER MAINS CONNECTION

Notes:

1. When starting the chiller, the compressor will start stage by stage. Chiller starting current is equal to the total current of operating compressors plus the starting current of the compressor(s) being actuated.

2. Each module has its own power circuit. Power mains entry location is as shown in the figure above.

3. The selection of power mains should base on the voltage, MRC, allowable voltage drop and local electrical codes. Cables to the chiller should be of flexible copper cord.

4. Electrical Performance Data

Model	Compressor (Each)		
	Number of Compressor	M.O.P (KW)	F.L.A (A)
MTW090M -1	1	81.7	135
MTW110M -1	1	90.8	150
MTW120M -1	1	90.8	150
MTW130M -1	1	90.8	150
MTW150M -1	1	90.8	150

M.O.P: Maximum Operating Power F.L.A: Full Load Ampere

Power Supply: AC380V/50Hz/3Ph; Allowable Fluctuation Voltage: 10%; 3-Phase Voltage Imbalance: 3%

5. In order to reduce harmonic interference, the chiller should be equipped with special input line reactor to restrict the fluctuation of power grid or current surge in system operation. Spike impulse in smooth supply voltage or phase missing resulted from rectifier circuit commutation will not only prevent interference from the grid but also reduce impacts on the grid caused by harmonic current of the rectifier unit.

6. Harmonic filter (optional) improves power transmission and utilization, further reducing local parallel harmonic or series resonant and noise created by electrical system, improving system capacity of the transformer, breaker and cables, etc. and ensuring normal functions of safeties and automatic devices. All these configurations comply with GB/T 14549. Total harmonic distortion (THD) is ≤5% and automatic compensation power factor of the chiller can reach 0.95.

SHIPPING AND RIGGING

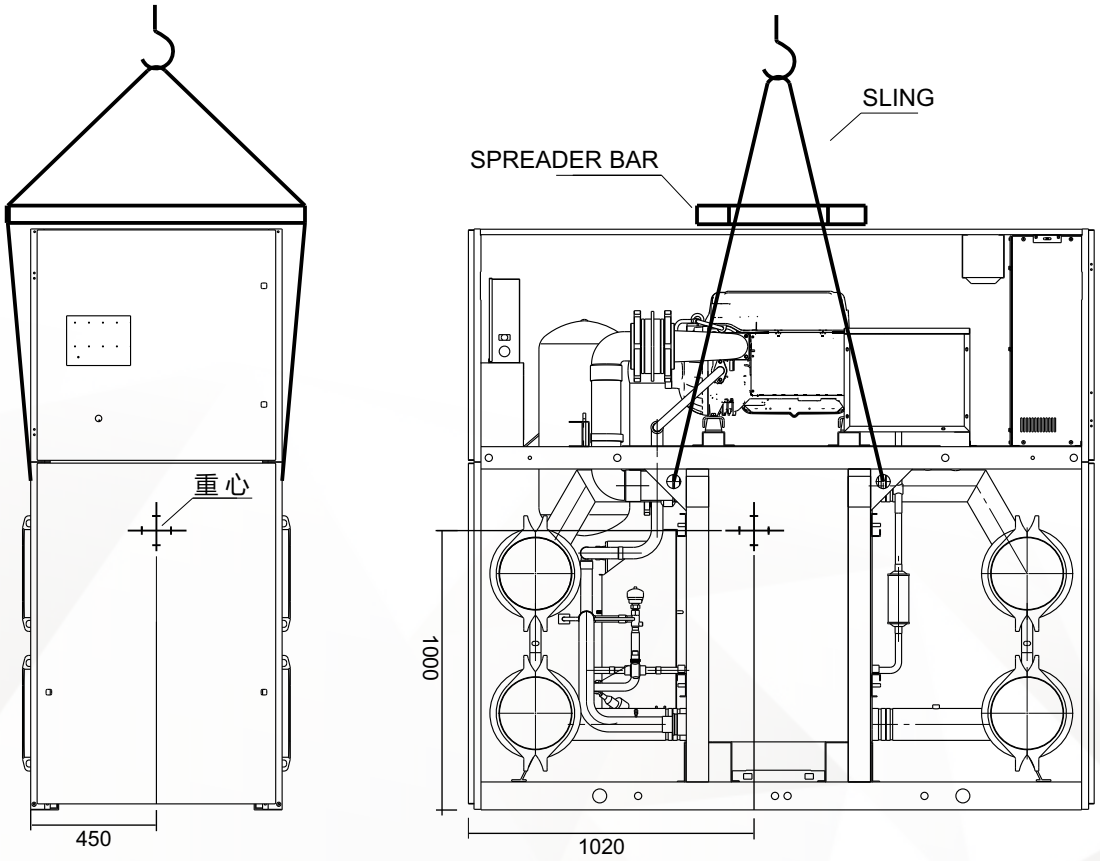
1.1 Rigging

MULTISTACK chillers are designed and constructed for the convenience for rigging and handling, which allow for the use of forklift or slings. Each module has lifting holes. Slings should be spread out by a “#” shape spreader bar on the top of the machine to prevent damage to the components and panels (see figure below).

1.2 Considerations

The gravity center of the module is located in the center the unit (see figure below). Please make sure to balance the unit during handling in case of turnover.

1.3 Hoisting Schematic (Example MTW150M)



1.4 Included Accessories

Accessory types and quantities vary with specific installation and purchase orders. Accessories will be separately packed. Do not unpack the accessories during handling unless they are needed for installation.

MULTISTACK MTW-M 09.2016 V05