MULTISTACK
THAILAND

MTW-F SERIES

Flooded Water Cooled Oil-free Centrifugal Chiller

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MULTISTACK MTW-F 12.2015 V03

AHRI CERTIFIED
www.ahridirectory.org
Water-Cooled Chillers
AHRI Standard 550/590

We are the creator and advocator of energy efficient chillers and the pioneer of magnetic levitating technology in refrigeration industry.

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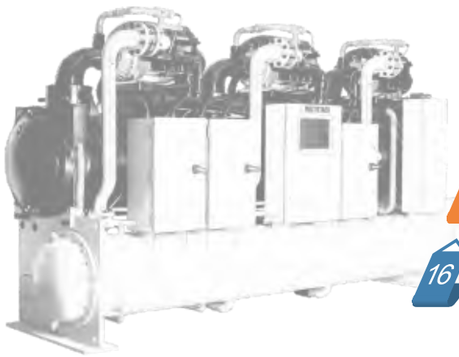
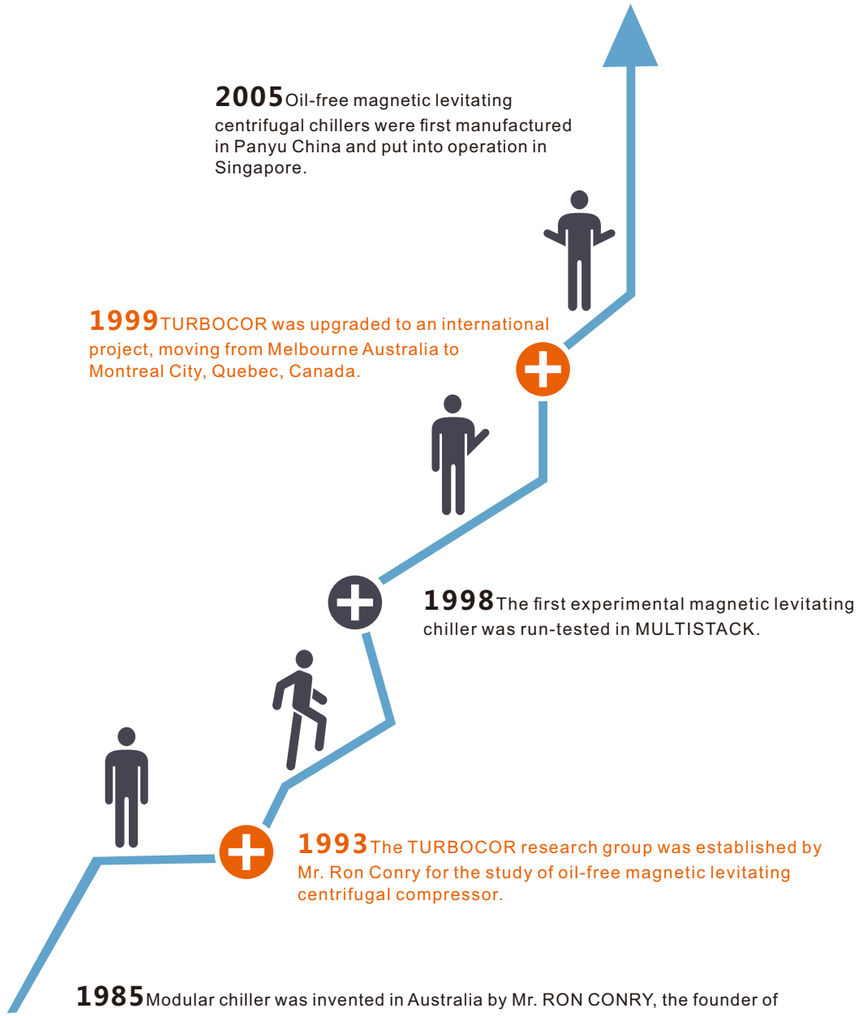


World's First Oil-free Magnetic Levitating Centrifugal Compressor



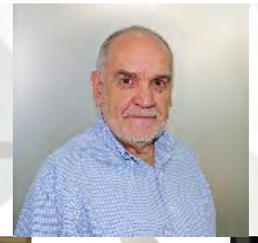
2005 Oil-free magnetic levitating centrifugal chillers were first manufactured in Panyu China and put into operation in Singapore.

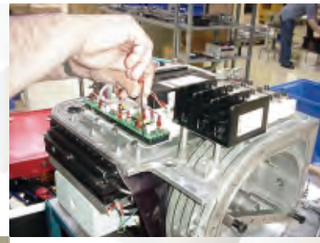
1999 TURBOCOR was upgraded to an international project, moving from Melbourne Australia to Montreal City, Quebec, Canada.

1998 The first experimental magnetic levitating chiller was run-tested in MULTISTACK.

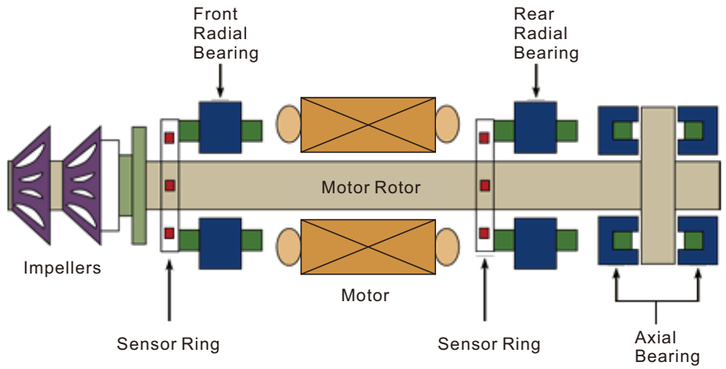
1993 The TURBOCOR research group was established by Mr. Ron Conry for the study of oil-free magnetic levitating centrifugal compressor.

1985 Modular chiller was invented in Australia by Mr. RON CONRY, the founder of MULTISTACK in 1986.





Oil-free Magnetic Levitating Centrifugal Compressor



This is a totally digital technology product with an onboard digital control system which monitors all variables that may affect the safe operation of compressors. The control system consists of several multi-functional modules, including AC-DC converter module, magnetic bearing control module, soft-start module, suction 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 product.

When the condensing temperature and/or heating load change, variable frequency drive (VFD) control is utilized to regulate the compressor capacity with variable rotating speed of the motor and impellers based on actual demand. With the application of VFD control, energy consumptions are reduced and part load efficiency is improved. Chiller will retain smooth running even in 10% part load. This is a great advantage over conventional chillers in part load conditions.

Flooded Water Cooled Oil-free Centrifugal Chiller

Oil-free Magnetic Levitating Centrifugal Compressor

The internal insulated gate bipolar transistor (IGBT) acts as an inverter to convert DCV into three-phase adjustable ACV. The motor rotation is regulated based on the converter output frequency, voltage and phases which are controlled through the motor signals and the sensor rings signals. The compressor rotating speed changes smoothly between 15,000-38,000RPM according to load variation, suction/discharge pressure, running current and other conditions. Compared with 250-350 amps for conventional compressors, the inrush current for magnetic levitating compressor is only 2 amps. The requirements for power distribution system and heat stress on the stator are accordingly reduced.

The compressor control system detects load demand and compression ratio synchronously to match up with rotating speed. Suction guide valve control module continuously regulates the suction guide vane and suction dynamic pressure in order to maintain an optimal working point and avoid surge points. In this way, the compressor can remain smooth operation without surge even in 30% part load condition or at low cooling water temperature.

The digital control system monitors the deviation of the rotor shaft 6 million times per minute and ensures it 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 rotating assembly remains levitating until it is brought to a safe stop without any friction. It 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 65 dB(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 operating data via the browser.

Advantages of Oil-free Feature

Oil Free = Enhanced Reliability

Oil-free system eliminates lubricating oil, oil pump, oil separator, oil cooler, oil heater, oil filter, oil pressure control system, oil tube and oil tank, etc. It makes a simpler compressor with enhanced reliability.

Oil Free = Improved Performance

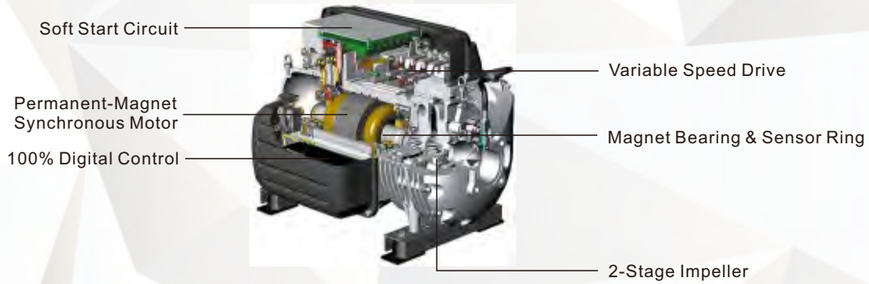
Oil-free cooling system avoids oil film formed on the surface of heat exchanger which leads to increasing evaporating temperature and decreasing condensing temperature. Efficiency is accordingly improved. Capacity decline caused by oil accumulation in the evaporator will also be shed.

Oil Free = Increased Efficiency

Oil free means zero power consumption for oil pump, oil heater and oil cooler. Efficiency of the chiller is therefore increased.

Oil Free = Reduced Maintenance & Operating Cost

Maintenance and operating cost is reduced by getting rid of lubrication, oil change, oil filter retrofit and evaporator refrigerant replacement.



MULTISTACK Flooded Water Cooled Oil-free Centrifugal Chiller

With years of rich experience in modular chiller industry since 1986, Multistack launches a brand -new energy-efficient product MTW-F oil-free magnetic levitating centrifugal chiller with unique MV7 plus control system, leading the way in HVAC industry.

Multistack's MTW-F chiller represents oil-free chiller technology standard not only in product performance, but also in other aspects including reliability, redundancy and maintenance.

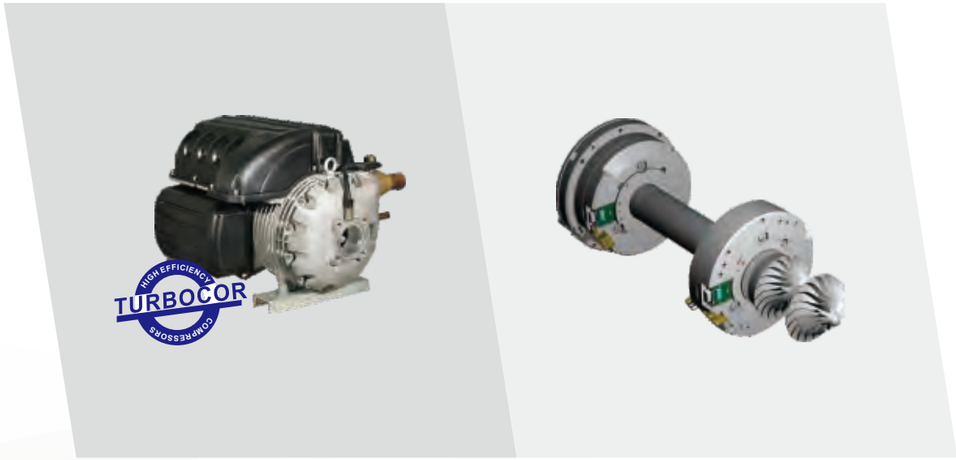
Nowadays, air conditioning industry is placing more and more emphasis on energy-efficient and environment-friendly products rather than low cost products. High-efficient compressor, heat exchanger and variable water flow (VWF) system are used, which further indicates that the necessity of pursuing multiple solutions. In response to the trend of today, Multistack develops MTW-F oil-free magnetic levitating centrifugal chiller, an energy-saving and high-tech product.

Flooded Water Cooled Oil-free Centrifugal Chiller

MULTISTACK Flooded Water Cooled Oil-free Centrifugal Chiller

Oil-free Magnetic Levitating Centrifugal Compressor

Oil-free magnetic levitating centrifugal compressor is a perfect combination of top aerospace technology and advanced digital control technology. It is a 2-stage centrifugal compressor featuring light weight and enhanced mechanical intensity. It not only enables small-capacity compressors to share a same cooling system but also pushes the efficiency, reliability and redundancy to a higher standard. The compressor uses patented technology of magnetic bearing system with only one moving part, which eliminates vibration and allows the compressor to run extremely quiet.



Excellent Part Load Efficiency

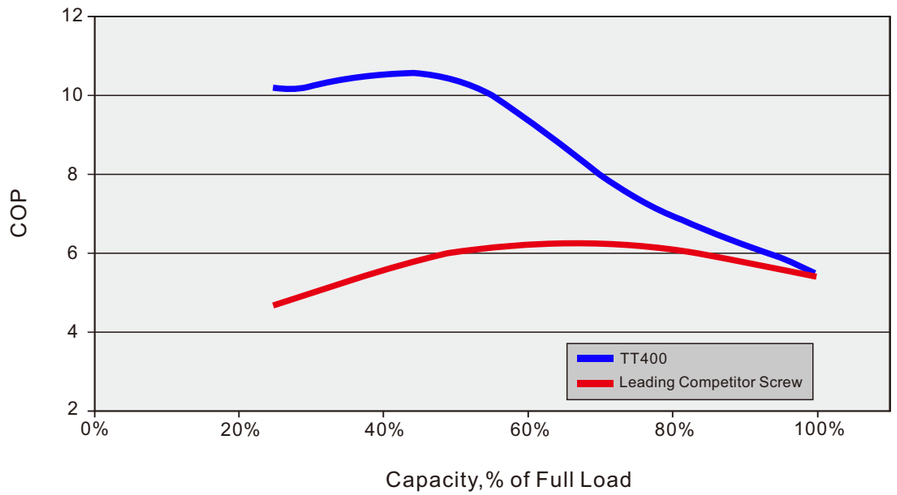
MTW-F compressors feature optimized part load efficiency. The special design and structure allow the compressors to run in part load conditions as long as possible to achieve the best COP (W/W). When the cooling load demand decreases, Multistack's unique MV7 Plus controller will shut off a certain number of compressors when necessary, leaving the rest to run in part load to meet the demand and at the same time retain highly efficient capacity. With this self-adaptive control logic, a 450RT (1,600kW) MTW-F chiller can satisfy the cooling demand as low as 45RT (158kW) while maintain high efficiency with Integrated Part Load Value (IPLV) of 10.34.

The use of multiple compressors allows full play of redundancies of both evaporator and condenser in part load conditions. This feature satisfies not only the building's best peak load efficiency but also the optimal operating efficiency in various part loads. IPLV could reach as high as 12 or even higher.

Compared with other chillers, MTW-F chillers' power consumptions are saved by about 42% and carbon emissions may equally reduced, undoubtedly meeting the needs of low carbon and energy-saving.

MULTISTACK Flooded Water Cooled Oil-free Centrifugal Chiller

Part Load Efficiency: MTW Chillers vs. Conventional Chillers



Energy Saving: MULTISTACK MTW-F Chillers vs. Other Leading Competitors' Chillers

	MULTISTACK MTW-F	Other Leading Competitor	Saving
Cooling Capacity (kw)	1581	1581	-
IPLV (kw/kw)	10.34	6.00	4.34
Average Annual Operating Hours(1) (h)	3600	3600	3600-
Total Annual Consumption(kWh)	550800	948600	397800
Annual CO_2 Emissions(2) (metric Tons)	138.42	227.98	89.56

(1) Annual air conditioning operation during May to September;

(2) CO_2 emission factor: 7.18x10-4 metric Tons (CO_2/kWh);

Compared with conventional chillers, MTW-F magnetic levitating chillers could save 42% or more operating costs and reduce CO_2 emissions with only 2-3 years of investment payback period.

Flooded Water Cooled Oil-free Centrifugal Chiller

MULTISTACK Flooded Water Cooled Oil-free Centrifugal Chiller

Ultra Low Noise and Vibration

Main shaft of magnetic levitating compressor rotates at high speed without any mechanical contact with the bearing, achieving extremely low noise and vibration in either part load or full load condition.

Redundancy

Redundancy is very important to a chiller. However, it is usually overlooked for limited costs. MTW-F oil-free magnetic levitating centrifugal chiller provides a solution by using multiple compressors sharing a same set of evaporator and condenser. Redundancy is then taken into consideration regardless of budget concerns. If one of the compressors encounters malfunction, others will remain in normal operation.

On the other hand, the efficiency of a conventional large centrifugal chiller will obviously decline when the load is lower than 50% of design load. This is a high-cost-consume design which hinders the chiller from achieving high efficiency other than in peak hours. In comparison, a MTW-F chiller uses a number of VFD magnetic levitating compressors. This design saves expenses for additional independent systems, providing better cost efficiency not only in peak hours but also in part load conditions.

100% Oil-free Design

The rotor and impellers of the compressor remain levitating in the magnetic system. The sensor rings on the bearing constantly send feedback to the magnetic bearing system, regulating the rotor position, ensuring that it is levitating in the center, and thus always staying in the best working condition.

Oil-free magnetic centrifugal bearing promises quiet and reliable running of the compressor. Oil-free design eliminates complicated oil system, reduces operating maintenance costs and improves the chiller reliability and economy.

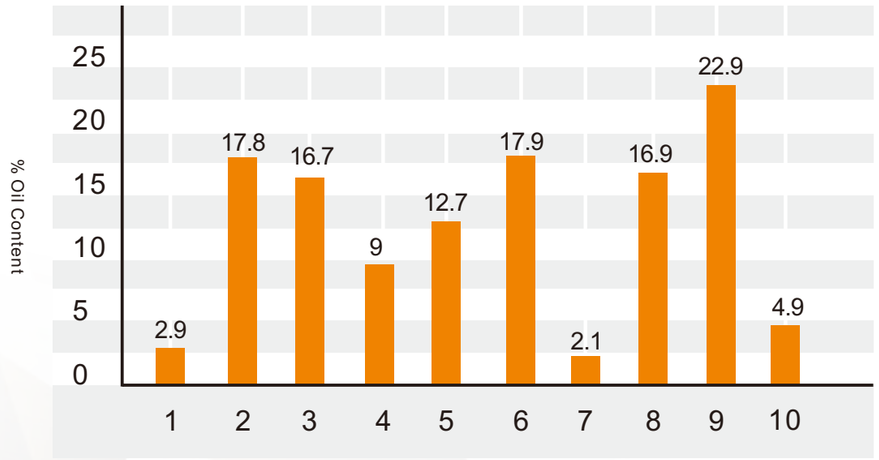
According to in-depth laboratory tests and a research project (601#) led by American Society of Heating Refrigerating and Air-conditioning Engineers (ASHRAE), refrigerant entrained oil in the heat exchanger will greatly reduce chiller efficiency. Based on the 12% average oil content (data source from the research), oil built up in the evaporator will eventually causes declines on chiller performance and efficiency by about 18%. Since large centrifugal chillers must use lubricating oil and need to have annual maintenance (oil change, sampling, oil filter replacement and oil leak handling). The heating of oil tank for lubricating oil system may also result in more operation cost and maintenance cost. Nevertheless, because of the unavoidable refrigerant entrained oil problem, lubricating oil will still greatly reduce the performance and efficiency of chillers.

MTW-F chillers operate without any lubricating oil which avoids declines of cooling capacity and efficiency.

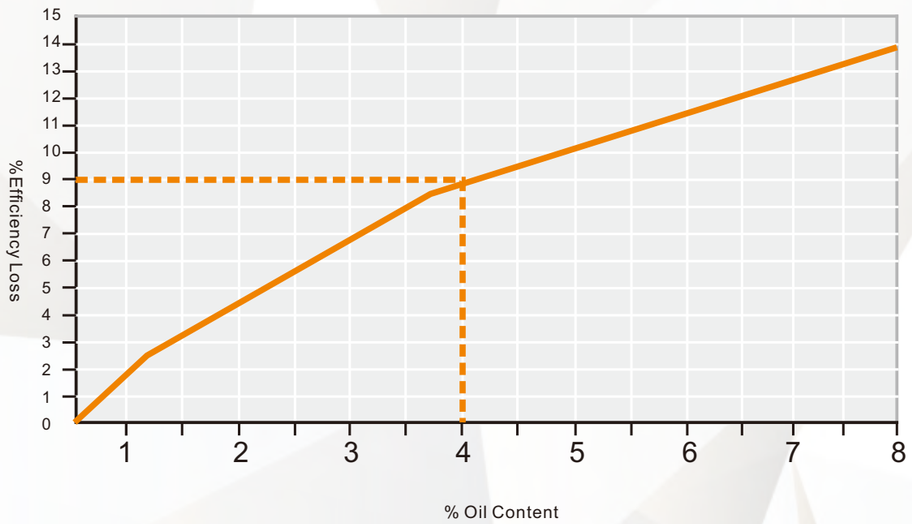
MULTISTACK Flooded Water Cooled Oil-free Centrifugal Chiller

ASHRAE Research Project 601#

Oil Content in Evaporator for Conventional Flooded Chiller Sample



How Much Does the Oil Decrease the Chiller Energy Efficiency



MULTISTACK Flooded Water Cooled Oil-free Centrifugal Chiller

Flooded Evaporator

MTW-F chillers use high efficient flooded evaporator with enhanced tubes. Balanced feeding system is adopted to ensure that each tube is infiltrated into refrigerant to improve heat transfer.

The optimized structure design of an evaporator ensures performance as below:

—Refrigerant and water approaching temperature ≤ 1.5k;

—Suction Superheat ≤ 1.0k;

—Minimum pressure drop;

—Optimum part load efficiency;

—Chilled water VWF (optional)

(Figure 1)

VICTAULIC coupling water connection of evaporator provides great convenience for site piping connection.

Electronic Expansion Valve (EXV)

A Multistack MTW-F chiller with multiple compressors features two electronic expansion valves for maximum redundancy and reliability. This feature allows the chiller to run one or two valves to always meter the proper amount of refrigerant. By using electronic valves in conjunction with level control, MTW-F chillers are able to unload further than chillers with one large EXV, TXV or orifices.

(Figure 2)

Environment-friendly Refrigerant R134a

According to Montreal Convention, R11, R22 and some other refrigerants are forbidden to use in a time period because of their high ozone depletion. New products are not allowed to use such refrigerants. MTW-F oil-free magnetic levitating centrifugal chiller uses R134a with 0 ozone depletion potential (ODP). R134a is globally recognized to be the environment-friendly alternative refrigerant to HCFC. This allows for energy-efficient operation. Carbon emission is also reduced by 40%.

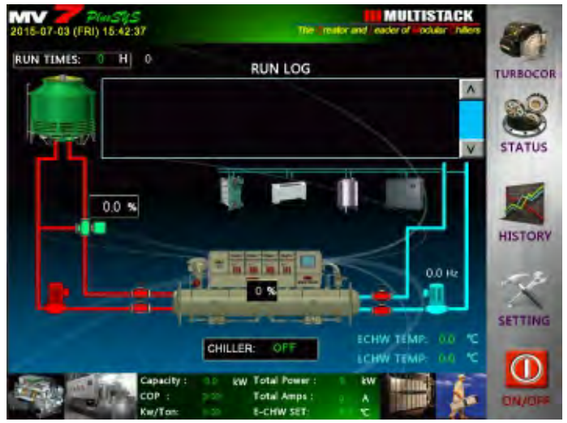
Factory-installed Differential Pressure Transducers

All Multistack MTW-F chillers come with factory-installed differential pressure transducers on the evaporator and condenser. The transducers are plumbed and wired into the control system to decrease field installation requirements. Flow transducers are used for protection in place of flow switch which flutters when used in variable flow applications and causing nuisance trips.

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) controlled by the cooling water system temperature

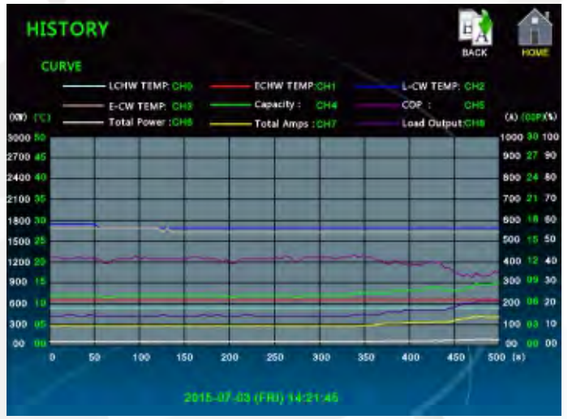


Chiller Control Screen

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 and identify problems
* Exportable via a .CSV file to excel



Technical Data

Model		MTW	120FCEA	150FCEA	300FCEA	450FCEA	600FCEA	750FCEA
Nominal Cooling Capacity(1)		kW	422	517	1048	1572	2108	2660
Nominal Power(1)		kW	69.1	92.3	184	275.8	367.9	450.8
IPLV(2)		W/W	10.08	10.22	10.56	10.53	10.66	10.82
Control System			Mv7 Plus					
Compressor Type			Magnetic Levitating Oil-free Centrifugal					
Number of Compressor		N	1	1	2	3	4	5
Control Stages %		%	30%-100%	30%-100%	15%-100%	9%-100%	7.5%-100%	6%-100%
Power Supply			AC380- 400V/50Hz/3Ph					
Max Running Current (each compressor)		A	145	170	170	170	170	170
Refrigerant Type			R134a					
Refrigerant Charge		Kg	265	325	400	650	750	850
Evaporator	Type		Flooded					
	CH.W.Flow	m^3/h	73	89	181	272	363	454
	Water Pressure Drop(3)	kPa	48	50	52	55	56	58
	Fouling Factor	$m^2.k/kW$	0.018	0.018	0.018	0.018	0.018	0.018
	Max.Working Pressure (Water Side)	MPa	1.0					
	Connection Size		DN150	DN150	DN200	DN200	DN250	DN300
Condenser	Type		Shell & Tube					
	C.W.Flow	m^3/h	84	105	212	317	424	530
	Water Pressure Drop(3)	kPa	52	55	56	58	59	60
	Fouling Factor	$m^2.k/kW$	0.044	0.044	0.044	0.044	0.044	0.044
	Max.working Pressure (Water Side)	MPa	1.0					
	Connection Size		DN150	DN150	DN200	DN200	DN250	DN250
Physical Dimensions	L	mm	3751	3751	4362	4635	4935	5677
	W	mm	1308	1308	1895	2030	2149	2149
	H	mm	2100	2100	1950	2159	2189	2189
Operating Weight		kg	3250	3250	6000	8600	10500	12500

Notes:

(1) Nominal Conditions: chilled water temperature: 12℃/7℃; cooling water temperature: 30℃/35℃;

(2) IPLV is based on AHRI551/591-2011;

(3) Number of passes are 2 for both evaporator and condenser separately.

Heat Exchanger Water Pressure Drop

MTW	150	F	C	E	A
1	2	3	4	5	6

1——MULTISTACK Turbocor Water Cooled

2——Model Number

3——F: Packaged Chiller with Flooded Evaporator

M: Modular Chiller with Plate Heat Exchanger

4——C: Cooling Only

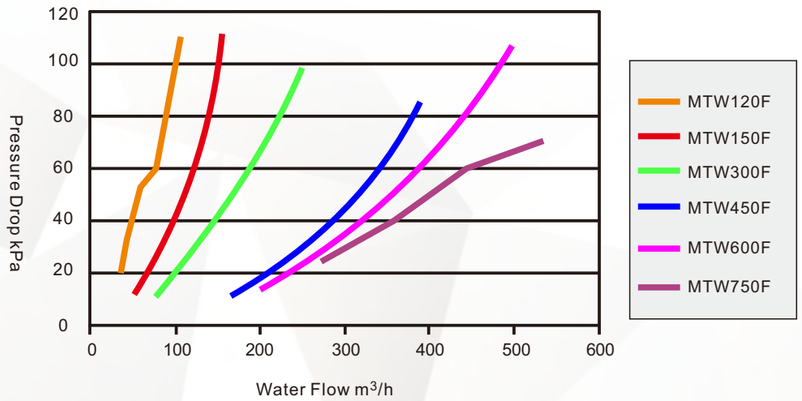
H: Water-Water Heat Pump (N/A)

5——E: Refrigerant R134A

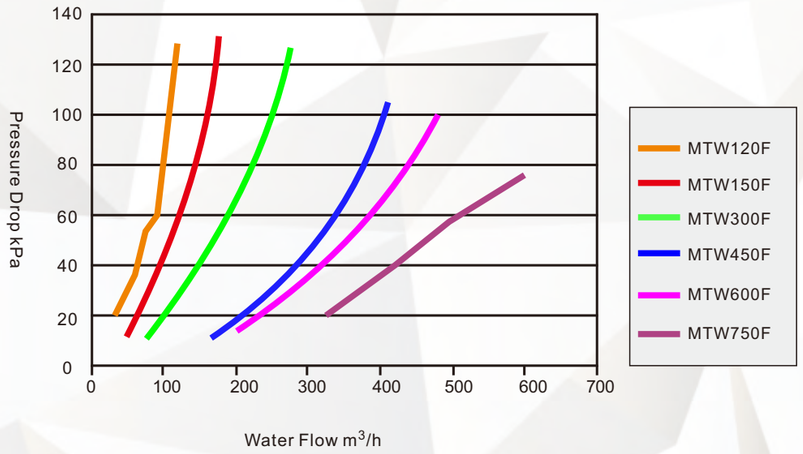
6——A: AC380V-50Hz-3Ph

B: AC400V-50Hz-3Ph

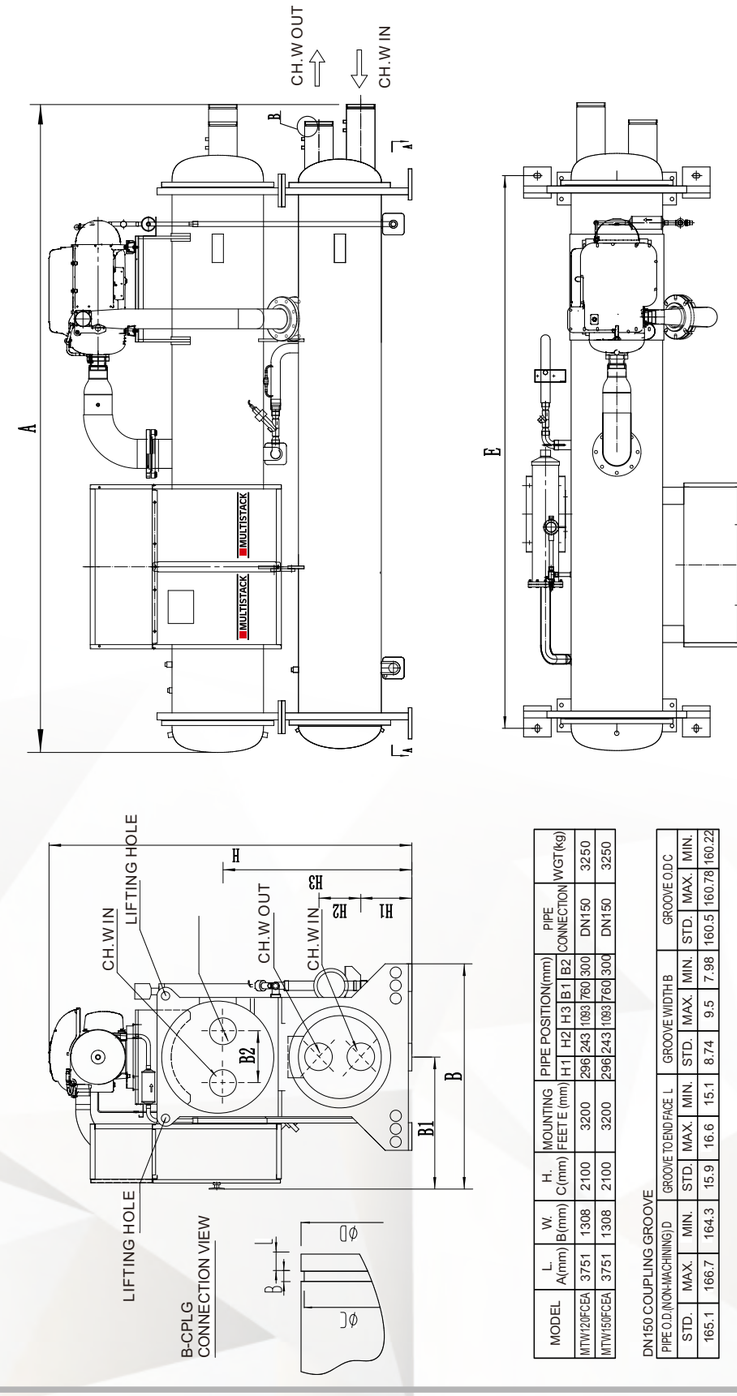
2-Pass Evaporator Water Pressure Drop



2-Pass Condenser Water Pressure Drop



Physical Dimensions MTW120/150FCEA



MODEL	L. A(mm)	W. B(mm)	H. C(mm)	MOUNTING FEET E (mm)	PIPE POSITION(mm) H1	H2	H3	B1	B2	PIPE CONNECTION	WGT(kg)
MTW120/FCEA	3751	1308	2100	3200	296	243	1093	760	300	DN150	3250
MTW150/FCEA	3751	1308	2100	3200	296	243	1093	760	300	DN150	3250

DN150 COUPLING GROOVE

PIPE O.D.(NON-MACHINING) D		GROOVE TO END FACE L			GROOVE WIDTH B			GROOVE O.D C	
STD.	MAX.	MIN.	STD.	MAX.	MIN.	STD.	MAX.	MIN.	MAX.
165.1	166.7	164.3	15.9	16.6	15.1	8.74	9.5	7.98	160.5	160.78	160.22

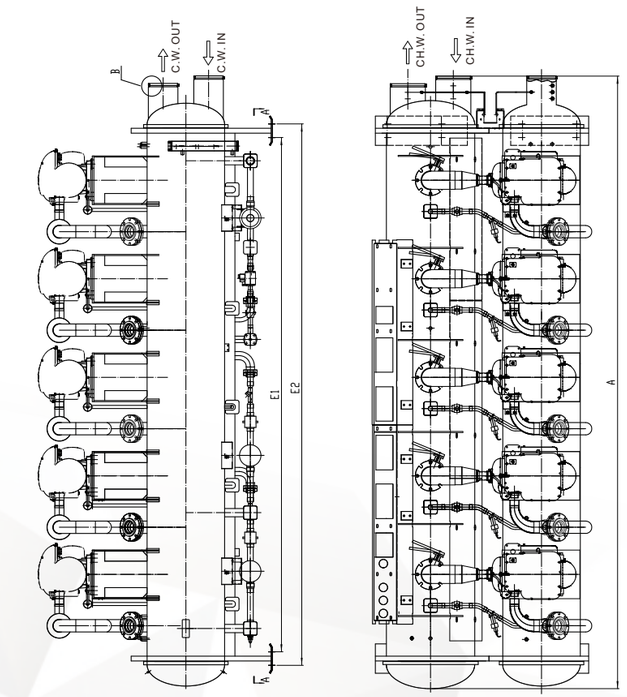
TECHNICAL REQUIREMENTS:

1.PARTS SHALL BE TIGHTLY INSTALLED;

2.SEE COUPLING CONNECTION VIEW FOR MORE DETAILS ;

3.SEE MOUNTING FEET DIMENSIONS FOR MORE DETAILS.

MTW300/450/600/750FCEA



MODEL	L.	W.	H.	MOUNTING FEET DIMENSIONS±E		PIPE POSITION DIEMENSIONS						PIPE CONNECTION		WGT(kg)
	A (㎜)	B (㎜)	H (㎜)	E1	E2	H1	H2	H3	B1	B2	B3	D1	D2	
MTW300FCEA	4362	1895	1950	3540	3780	582.5	325	595	360	682.5	335	DN200	DN200	6000
MTW450FCEA	4635	2030	2159	3740	3980	582.5	335	730	472	1464.5	420	DN200	DN200	8600
MTW600FCEA	4935	2149	2189	4030	4280	582.5	335	730	472	1464.5	420	DN250	DN250	10500
MTW750FCEA	5677	2149	2189	4750	5000	590	420	755	522	1757	420	DN300	DN250	12500

DN200 COUPLING GROOVE DIMENSIONS

PIPE O.D.	NON-MACHINING	GROOVE TO END FACE L	GROOVE WIDTH B			GROOVE O.D. C	
	STD.	MAX.	MIN.	STD.	MAX.	MIN.	STD.	MAX.	MIN.
219.1	230.7	230.3	19.1	19.8	18.3	11.91	12.67	11.5	213.3	213.70	212.98

DN250 COUPLING GROOVE DIMENSIONS

PIPE O.D.	NON-MACHINING	GROOVE TO END FACE L	GROOVE WIDTH B			GROOVE O.D. C	
	STD.	MAX.	MIN.	STD.	MAX.	MIN.	STD.	MAX.	MIN.
273.0	274.6	272.2	19.1	19.8	18.3	11.91	12.67	11.5	267.3	267.68	266.93

DN300 COUPLING GROOVE DIMENSIONS

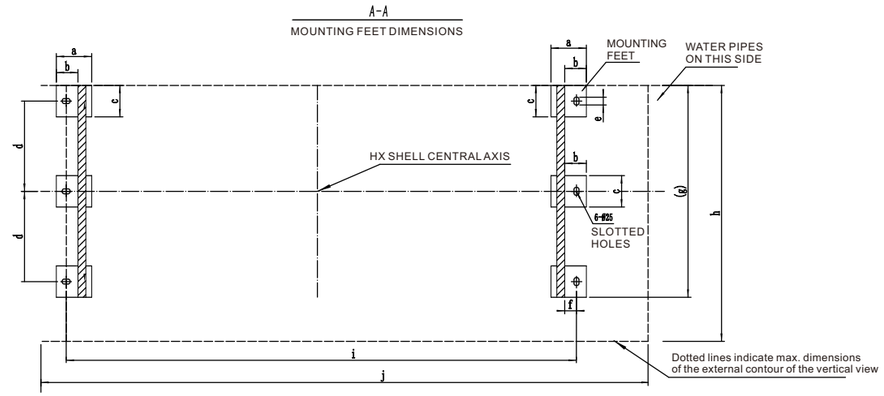
PIPE O.D.	NON-MACHINING	GROOVE TO END FACE L	GROOVE WIDTH B			GROOVE O.D. C	
	STD.	MAX.	MIN.	STD.	MAX.	MIN.	STD.	MAX.	MIN.
325	326.6	324.2	19.1	19.8	18.3	11.91	12.67	11.5	317.9	318.29	317.53

TECHNICAL REQUIREMENTS

1. PARTS SHALL BE TIGHTLY INSTALLED;
2. HIGH PRESSURE LEAK CHECK 12BAR (GAGE PRESSURE); UNALLOWED TO EXCEED 12.5BAR (GAGE PRESSURE) (BFV LIMIT PRESSURE);
3. HIGH PRESSUR SWITCH 11.5BAR (GAGE PRESSURE)
4. SEE COUPLING CONNECTION VIEW FOR MORE DETAILS;
5. SEE MOUNTING FEET DIMENSIONS FOR MORE DETAILS.

Mounting Feet Dimensions

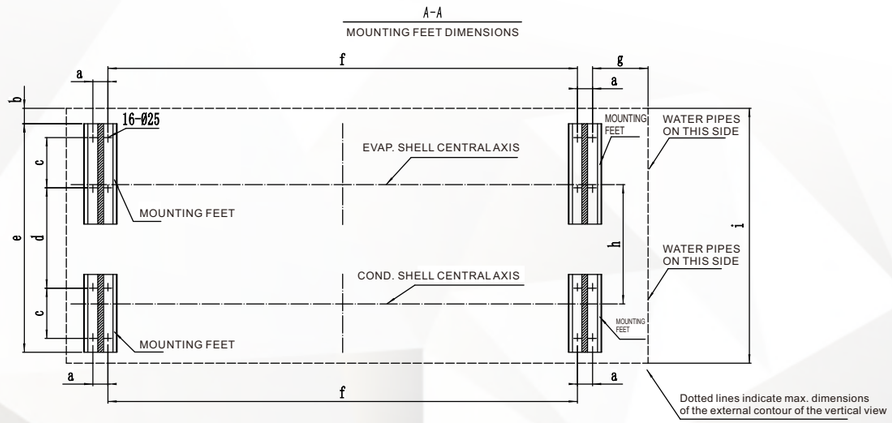
MTW120/150FCEA



1. The base should be concrete platform with min. 100mm above the surrounding ground;
2. Use right angle foundation bolts M16 (JB/ZQ4364-86). Bolts should be embedded min. 300mm in the platform and exposed min. 65mm;
3. Two nuts with flat washer and spring washer shall be screwed to the foundation bolt;
4. Dimensional tolerance: ±1mm.

MODEL	Chiller Foot Mounting Dimensions									
	a	b	c	d	e	f	g	h	i	j
MTW120FCEA	180	110	160	460	40	60	1080	1308	3200	3751
MTW150FCEA	180	110	160	460	40	60	1080	1308	3200	3751

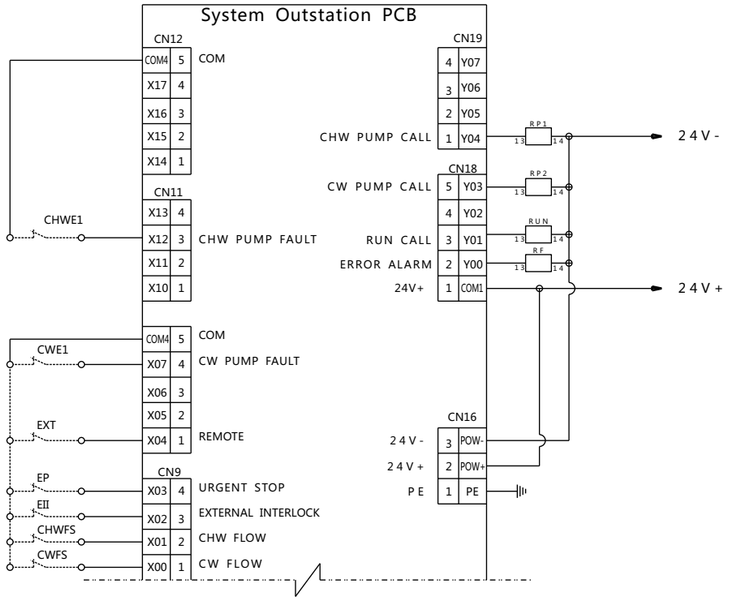
MTW300/450/600/750FCEA



1. The base should be concrete platform with min. 100mm above the surrounding ground;
2. Use right angle foundation bolts M16 (JB/ZQ4364-86). Bolts should be embedded min. 300mm in the platform and exposed min. 65mm;
3. Two nuts with flat washer and spring washer shall be screwed to the foundation bolt;
4. Dimensional tolerance: ±1mm.

MODEL	Chiller Foot Mounting Dimensions(mm)								
	a	b	c	d	e	f	g	h	i
MTW300FCEA	120	168.2	400	650	1620	3540	404.8	850	1895
MTW450FCEA	120	123	400	800	1820	3740	441.9	950	2030
MTW600FCEA	120	92	500	750	1970	4030	441.9	1025	2149
MTW750FCEA	120	92	500	750	1970	4750	441.9	1025	2149

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 board 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 valve signal output;

Wiring Considerations:

-Control wire minimum section 1mm^2;

-Over Bridge the input signal terminals X02, X03 and X04 to common port COM3 as per wiring diagram if EII, EP and EXT are not used;

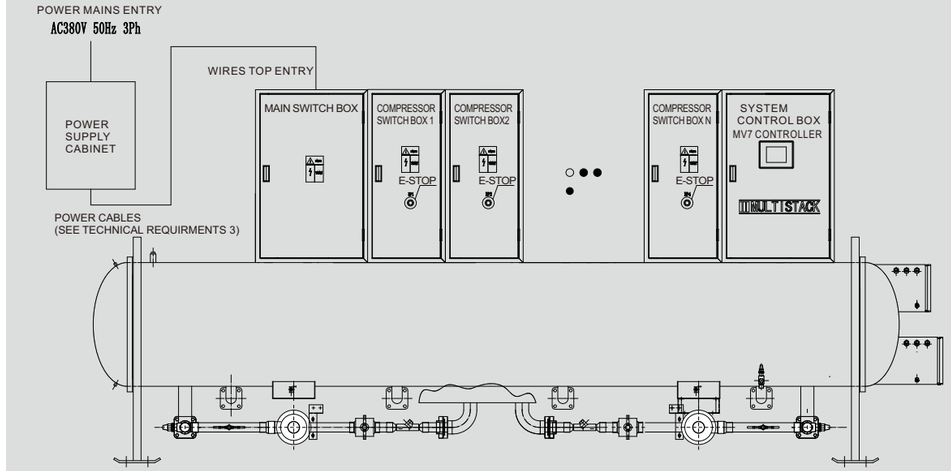
-Passive contact output max. current is 5A;

-Flow switch and external interlock devices are prepared by users or bought from MULTISTACK;

-VWF system is free of flow switch;

-Solid lines for factory wiring and dotted lines for field wiring.

Power Mains Connection



TECHNICAL REQUIREMENTS:

1、MTW120, NUMBER OF COMPRESSOR SWITCH BOX 1, RATED CURRENT116A, MAX. CURRENT145A;
MTW150, NUMBER OF COMPRESSOR SWITCH BOX 1, RATED CURRENT160A, MAX. CURRENT170A;
MTW300, NUMBER OF COMPRESSOR SWITCH BOX 2, RATED CURRENT320A, MAX. CURRENT340A;
MTW450, NUMBER OF COMPRESSOR SWITCH BOX 3, RATED CURRENT480A, MAX. CURRENT510A;
MTW600, NUMBER OF COMPRESSOR SWITCH BOX 4, RATED CURRENT640A, MAX. CURRENT680A;
MTW750, NUMBER OF COMPRESSOR SWITCH BOX 5, RATED CURRENT800A, MAX. CURRENT850A;

SWITCH BOX N REFERS TO THE NUMBER OF SWITCH BOX AND IS FOR REFERENCE ONLY. NUMBERS MAY CHANGE WITH DIFFERENT MODELS. PLEASE SELECT SUITABLE POWER CABLES BASED ON MAXIMUM CURRENT.

2、POWER SUPPLY CABINET AND POWER CABLES ARE PREPARED BY THE USER.

3、FOR MTW600, POWER CABLES ARE TWO INCOMING LINES, LOADING 50% EACH;
FOR MTW750, POWER CABLES ARE TWO INCOMING LINES, ONE LOADING 40% AND ANOTHER LOADING 60%.

4、THIS DRAWING IS FOR REFERENCE ONLY. ACTUAL SIZE AND ELECTRICAL CONTROL BOX ARE SUBJECT TO SPECIFIC MODEL.

NOTES:

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

2. The selection of main cables should base on the voltage, allowable voltage drop and local electrical codes. The cables to the chiller should be flexible copper cord.

3. Electrical Performance Data

Model	Maximum Value				
	Compressor (each)			Chiller	
	Number of Compressor	M.O.P (KW)	F.L.A (A)	M.O.P (KW)	F.L.A (A)
MTW120FCEA	1	78.6	145	78.6	145
MTW150FCEA	1	105	170	105	170
MTW300FCEA	2	105	170	210	340
MTW450FCEA	3	105	170	315	510
MTW600FCEA	4	105	170	420	680
MTW750FCEA	5	105	170	525	850

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%

4. 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 in smooth supply voltage or phase missing resulted from commutation will not only prevent interference from the grid but also reduce impacts on the grid caused by harmonic current of the rectifier unit.

5. 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 is 0.95.