

*Sustainable Comfort*

TECS<sup>®</sup> Series

# Water-cooled Magnetic Levitation Variable Frequency Centrifugal Chiller

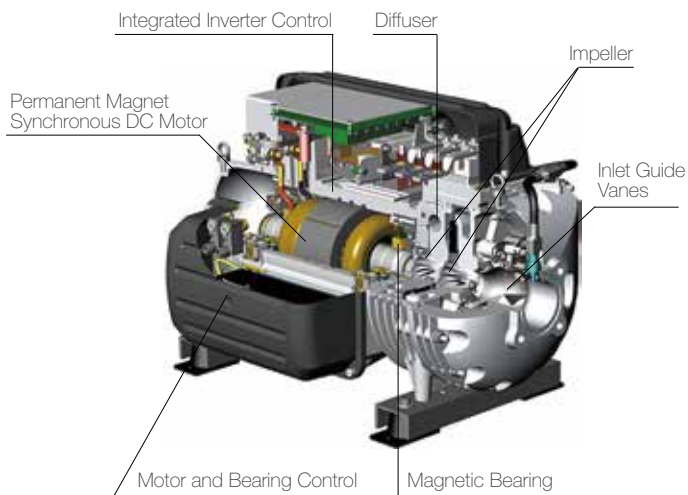
TECS-W/L-E Series  
280-2814kW (80-800RT)



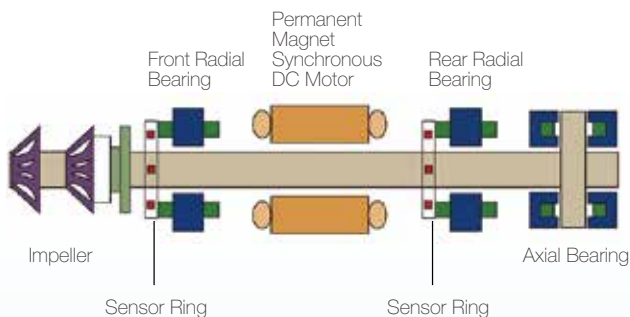
# Water-cooled Magnetic Levitation Variable Frequency Centrifugal Chiller

## Features and Benefits

### Magnetic Levitation Oil-free Centrifugal Compressor



- Inverter driven high-efficiency magnetic levitation oil-free compressor: the compressor is designed with aerodynamic optimized two-stage centrifugal and magnetic levitation technology, high performance pulse width modulator (PWM), automatic regulation of rotation speed, which promise optimal operation and high-efficiency under both full load and part load operation.



- Thanks to the oil-free magnetic levitation bearing, there is no contact friction and no need of lubricating system, which eliminates the thermal resistance caused by oil film and as a result of increasing 15% of evaporator and condenser heat transfer efficiency. The reliability of unit is remarkably improved in the meanwhile and makes service convenient.
- With build-in inverter, which enables variable motor speed of compressor under part load condition, the units are able to operate effectively and with lower power consumption. Soft start-up function makes the starting current of unit low to 2A, therefore to reduce impulse on power network and decrease thermal stress of motor stator.

- Liquid refrigerant spray cooling promises stable operation of motor.
- The rotor and impeller of compressor are suspended in the magnetic field when operation. The sensor ring under the bearing keep sending real-time data to the bearing control system and adjust the position of shaft immediately to maintain its optimal running condition.
- The compressor with oil-free bearing has the feature of stable and low-noise operation. Furthermore, the whole system of the unit is greatly simplified because of eliminating oil system, which remarkably saves the cost of operation and maintenance.

### Super-low Noise and Vibration

- High speed of compressor running, while with no mechanical contact of bearing, enables super-low noise and vibration of compressor under both part load and full load.



### High-efficiency Flooded Type Evaporator and Condenser

- The threaded tube facilitates the formation of gasification core, which therefore greatly enhances heat exchange efficiency of tube outside surface.
- The tube of condenser with thread benefits the dropwise condensation of refrigerant, which increases tube external efficiency. Moreover, the thread inside the tube of both evaporator and condenser enhances the disturbance and turbulence of water.
- Single circuit design for multiple compressors system improves unit part load efficiency.



## Electronic Expansion Valve (EXV)

- The electronic valve is adopted to grant the ideal operation of the evaporator in all conditions.
- The fast processing of the acquired data allow a quick, fluctuation-free regulation, and therefore a highly accurate adjustment to the swings of load and ambient conditions.



## Energy Conservation and Environment Protection

- Environment friendly refrigerant of HFC134a is adopted with ODP value 0.
- Optimized refrigerant system for better energy saving, lower CO<sub>2</sub> emission and higher operation efficiency.

## Stability and Reliability

- In the case of power outage, the motor becomes a generator which then feeds power to the various controls and bearing actuators until the rotor de-levitates onto the touch-down bearings.
- The design, manufacturing and test of the unit are strictly complied with AHRI, EN, UNI, JIS and GB/T18430.1 standards.
- The protection level of enclosure conforms to GB4208-2008.
- The electric system is designed according to IEC60204-1/GB5226.1 and the system meets with EMC specification.
- Performance test of the unit shall be strictly conducted before ex-work to ensure unit operation stability.

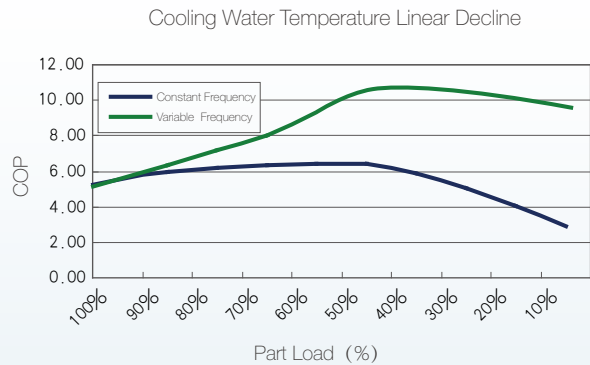
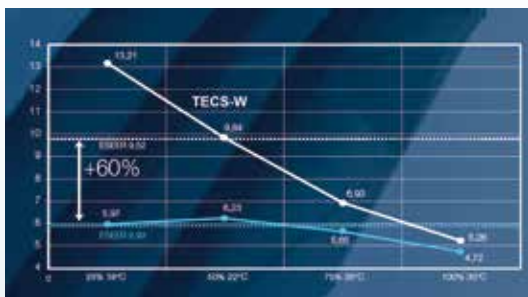
## Easy Installation

- Vertically arrangement of compressor, condenser and evaporator enables compact design of the unit and as a result of less occupied area.
- Refrigerant charge, commissioning and test have been done before ex-factory.
- Water pipe connection and power supply are the only work to do on site before operation.

## Excellent Part Load Performance

TECS-W/L-E is brought in by Climaveneta with extremely outstanding performance in the chiller industry. With magnetic levitation compressor, variable frequency inverter control and no oil lubrication system, the unit has boosted with 60% of ESEER to compare with traditional chiller and with less service cost.

In the transition period, the cooling water temperature decline results in additional energy saving of the unit.



# Water-cooled Magnetic Levitation Variable Frequency Centrifugal Chiller

## Integrated part load value (ESEER)

Increasingly closer attention is being paid towards the power consumption of air-conditioning equipments.

In air-conditioning systems, the chiller only works in full load for a few hours per year. For this reason, “season efficiency” is the truly determining consumption factor.

The valuation indices have been adopted that consider usage in part load conditions as IPLV in the United States and ESEER in Europe.

### ESEER up to 9.58, and IPLV up to 10

ESEER (European Seasonal Energy Efficiency Ratio):  $0.03 \times A + 0.33 \times B + 0.41 \times C + 0.23 \times D$

Evaporator leaving at 7 °C (constant), condenser water (inlet) at 30 °C (100% load—A), 26 °C (75% load—B), 22 °C (50% load—C), 18 °C (25% load—D).

## IPLV (AHRI)

$IPLV = 0.01 \times A + 0.42 \times B + 0.45 \times C + 0.12 \times D$

Evaporator leaving at 6.7 °C (constant), condenser water (inlet) at 29.4 °C (100% load—A), 23.9 °C (75% load—B), 18.3 °C (50% load—C), 18.3 °C (25% load—D).

## IPLV (China GB)

$IPLV = 0.023 \times A + 0.415 \times B + 0.461 \times C + 0.101 \times D$

Evaporator leaving at 7 °C (constant), condenser water (inlet) at 30 °C (100% load—A), 26 °C (75% load—B), 23 °C (50% load—C), 19 °C (25% load—D).

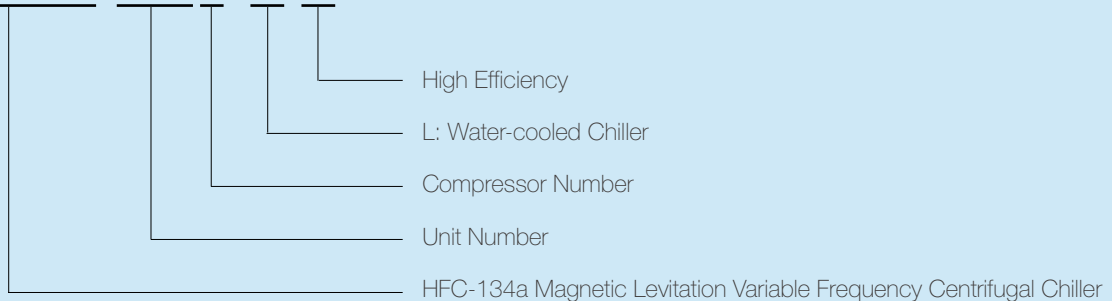
According GB19577-2015 Standard: TECS-W/L-E Whole Series

First Class

Energy Efficiency

## Nomenclature

**TECS-W 1051 L-E**



## TECS-W1051L-E

Means the high efficiency magnetic levitation variable frequency centrifugal chiller of number 1051 with HFC-134a refrigerant.

## Advanced W3000 Touch Control System

The brand-new W3000 touch control system features friendly user interface, excellent control, strong expansion ability and compatibility.

### Color LCD Display

The touch screen is embedded in the unit for convenient operation and well protection. The automatic control by the computer realizes unattended operation.

TFT LCD touch screen can display data and parameter adjustment in various languages and menus. According to the tradition of Climaveneta, the status and parameters of the compressor are visually displayed individually to make sure the operating status clear at a glance.



W3000 Touch Control System

### Unit Control and Operation Management

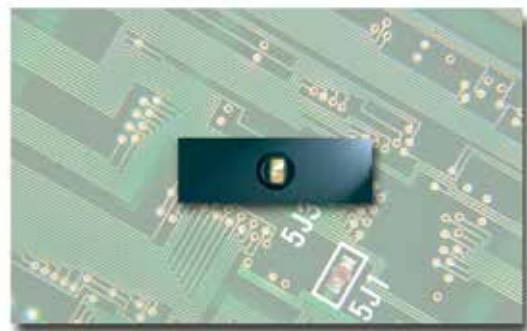
The advanced microcomputer intelligent control system of W3000 contains specially designed control algorithm of Climaveneta. It highlights the energy efficiency and reliability of the unit. The balanced running time of FIFO compressor prolongs the life of machine. The automatic adjustment of the output load makes the machine more energy saving. Combining with the load shedding system of the compressor can achieve 25-100% stepless adjustment. The adjustments and settings of the operating parameters can adapt to different environments. The temperature and pressure protection using analog measurement can predict and prevent of failure and increase reliability. Various expansion accessories are available, such as remote and group control.

### Network Communication and Building Management Control

The chiller supports BMS connection and can connect to common BMS systems such as Climaveneta, De'Longhi, MODBUS, LONWORKS, BACNET and so on.

### Fault Protection, Alarm and Analysis Capabilities

The microcomputer intelligent controller contains perfect functions of fault protection, alarm, recording and analysis. It has protection functions of high/low pressure switch, lack of phase, reverse phase, overload, overcurrent, overheat, exhaust temperature, water flow, frost and so on. The controller also achieves fault recording and alarm display. The unique "Black Box" fault recording and analyzing system can record 400 failures and more than 200 field data before each failure. It can diagnose and remove faults rapidly to improve the technical support effect. By connecting to the Climaveneta remote service program, it can find potential failures before they occur and take proper preventive treatments.



Patented Black Box

# Water-cooled Magnetic Levitation Variable Frequency Centrifugal Chiller

## Technological Choices

### Fast Restart

The management of fast restart allows to minimize downtimes in case of power failure, through accelerating software self-diagnose time, water pump start delay, pre-condensing time and compressor start time, meanwhile keeping all the necessary unit safeties.

This option requires an external UPS power supply by customer.



### Chilled Water Variable Flow Control

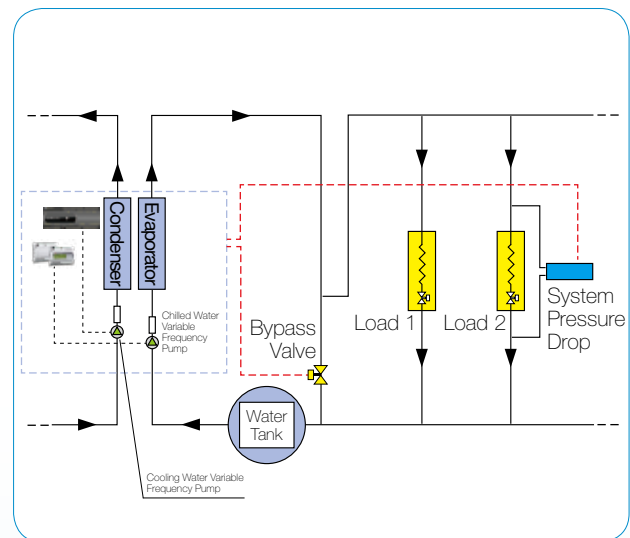
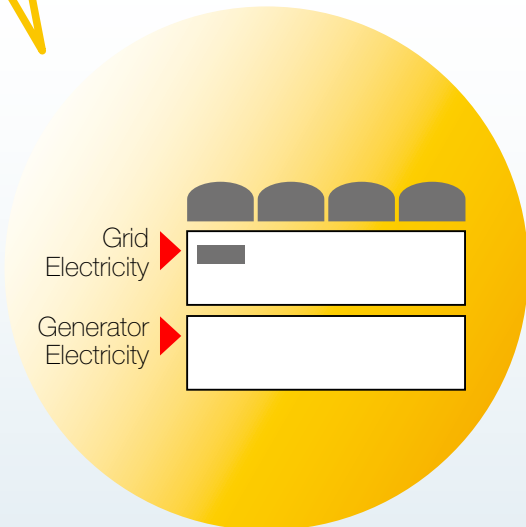
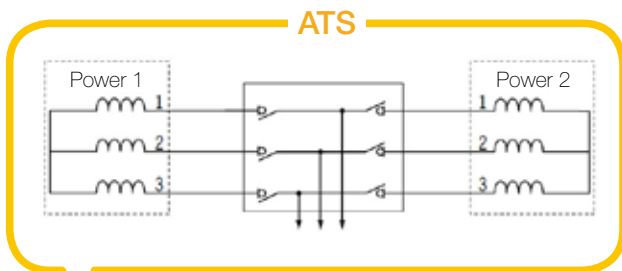


Extended module of variable flow control function enables control chilled water variable frequency pump and pipe valve on-off.

The control of chilled water side variable frequency pump, according to terminal side load, ensures lowest pump consumption.

### Double Power Supply

This accessories entail the substitution of two separate power supply with ATS.



## ClimaPRO Plant Room Optimization Group Control System (Option)



clima  
**PRO**  
● PERFORMANCE ● RELIABILITY ● OPTIMISATION

### Microprocessor Control Features

Microprocessor	W3000	Microprocessor	W3000
Remote on/off with external volt-free contact	√	Energy limit function	OPT
Multi-language menu	√	Manual control	√
Phase sequence relay	√	ModBus communication protocol	OPT
Cumulative fault alarm	√	BACnet communication protocol	OPT
Alarms code function	√	LonWorks communication protocol	OPT
"BLACK BOX" alarm events record	√	Pump control	OPT
Self-test when power on	√	Backup pump control	OPT
Daily/weekly programming control	Par.	Water temp. regulation by external signal (4-20mA)	OPT
Evaporator inlet/outlet water temp. display	√	Remote relay control	OPT
Compressor/unit alarms display	√	Local/remote network monitor (FWS)	OPT
General unit alarms display	√	Remote secondary temp. control	OPT
Entering water temp. ratio control	√	Set-point regulation from external signal (0-5V)	OPT
Start/stop operating timer	Par.	Compressor run-timer, time balance & FIFO	√
Double set-point timer	Par.	Compressor start scheduling	√
"Pump-Down" when stopped	√		

√ Standard    OPT available on request    Par. available by modifying a value of the configuraton parameters

# Water-cooled Magnetic Levitation Variable Frequency Centrifugal Chiller

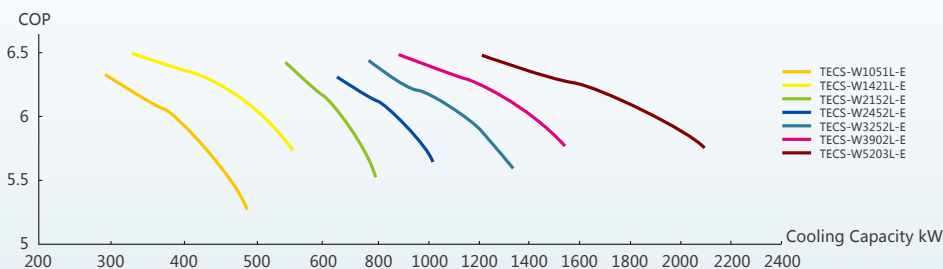
## Technical Parameters

TECS-W/L-E		0801	1051	1401	1421	1801	2152	2452	3252	3902
Cooling Capacity	kW	281.0	422	493.0	563	703.0	880.0	1055.0	1231.0	1407.0
	RT	80	120	140	160	200	250	300	350	400
Power Input	kW	50.7	72.1	87.4	97.2	114.0	153.0	184.0	201.0	224.0
EER		5.54	5.85	5.64	5.79	6.17	5.75	5.73	6.12	6.28
IPLV		8.44	8.38	8.63	8.83	8.48	8.75	8.61	8.86	8.85
Chilled Water Flow	m <sup>3</sup> /h	48.3	72.6	91.3	96.8	120.9	151.4	181.5	211.8	242.0
Chilled Water Pressure Drop	kPa	42.8	48.2	40.0	52.0	62.1	55.9	80.5	47.1	45.1
Cooling Water Flow	m <sup>3</sup> /h	59.4	88.6	104.0	118.3	152.5	182.8	222.2	267.3	304.5
Cooling Water Pressure Drop	kPa	42.8	49.0	40.0	51.6	66.9	55.2	80.1	42.2	39.9
Microprocessor		W3000 Touch								
Compressor No.	n	1	1	1	1	1	2	2	2	2
Refrigerant Circuit No.	n	1	1	1	1	1	1	1	1	1
Stepless Energy Regulation		20%-100%					15%-100%			
Operating Weight	kg	1840	1895	2185	2195	2385	3100	3210	4625	4785
Dimension										
Length	mm	2930	2930	2930	2930	2930	2990	2990	4450	4450
Width	mm	1210	1210	1210	1210	1300	1480	1480	1350	1350
Height	mm	1800	1800	1800	1800	1830	1980	1980	2050	2050

TECS-W/L-E		3903	4503	5203	5853	6304	6904	7504	8104	
Cooling Capacity	kW	1583.0	1759.0	1935.0	2110.0	2286.0	2462.0	2638.0	2814.0	
	RT	450	500	550	600	650	700	750	800	
Power Input	kW	267.0	290.0	311.0	339.0	371.0	395.0	419.0	444.0	
EER		5.93	6.07	6.22	6.22	6.16	6.23	6.30	6.34	
IPLV		8.83	9.01	9.10	8.93	9.12	9.05	9.11	9.12	
Chilled Water Flow	m <sup>3</sup> /h	272.3	302.6	332.9	362.8	393.2	423.4	453.8	484.1	
Chilled Water Pressure Drop	kPa	57.3	49.5	47.7	64.6	48.0	55.7	51.6	58.7	
Cooling Water Flow	m <sup>3</sup> /h	331.8	382.4	419.3	457.2	496.0	533.3	570.8	608.4	
Cooling Water Pressure Drop	kPa	47.5	44.0	42.3	60.7	61.7	71.3	65.3	74.2	
Microprocessor		W3000 Touch								
Compressor No.	n	3	3	3	3	4	4	4	4	
Refrigerant Circuit No.	n	1	1	1	1	2	2	2	2	
Stepless Energy Regulation		10%-100%					8%-100%			
Operating Weight	kg	5110	5760	6080	6690	8770	8850	9310	9365	
Dimension										
Length	mm	4440	4440	4440	5310	5000	5000	5000	5000	
Width	mm	1450	1360	1360	1360	2200	2200	2200	2200	
Height	mm	1990	2150	2150	2150	2150	2150	2150	2150	

### Remarks:

- Standard Cooling Condition: Chilled water (in/out)=-7°C, unit water flow 0.172m<sup>3</sup>/(h\*kW); Condenser water (in/out)=30/-°C, unit water flow 0.215m<sup>3</sup>/(h\*kW);
- IPLV is measured according to GB/T 18430.1;
- Standard water side pressure of evaporator and condenser is 1.0MPa. 1.6MPa or 2.0MPa is optional;



Each project has different application and demand: some require best full load efficiency, while others lowest initial investment, or an unrivaled part load performance. CLIMAVENETA provides optimized and tailored solution based on different cooling capacity and efficiency demand.



## Electric Parameters

TECS-W/L-E			0801	1051	1401	1421	1801	2152	2452	3252	3902	
Max Value	Compressor (Single)	n	1	1	1	1	1	2	2	2	2	
		F.L.I	kW	85	130	105	105	125	130	105	105/125	125
		F.L.A	A	135	210	170	170	206	210	170	170/206	206
	Unit	F.L.I	kW	85	130	105	105	125	260	210	230	250
F.L.A		A	135	210	170	170	206	420	340	376	412	
Recommended Cable		mm <sup>2</sup>	50	95	70	70	95	120*2	185	120*2	120*2	

TECS-W/L-E			3903	4503	5203	5853	6304	6904	7504	8104	
Max Value	Compressor (Single)	n	3	3	3	3	4	4	4	4	
		F.L.I	kW	105	105/125	105/125	125	105/125	105/125	105/125	125
		F.L.A	A	170	170/206	170/206	206	170/206	170/206	170/206	206
	Unit	F.L.I	kW	315	335	355	375	440	460	480	500
F.L.A		A	510	546	582	618	716	752	788	824	
Recommended Cable		mm <sup>2</sup>	150*2	150*2	185*2	185*2	240*2	240*2	240*2	300*2/185*3	

### Note:

- F.L.I Full load power input at max admissible condition  
F.L.A Full load current ampere at max admissible condition  
Supply power 380V-3Ph-50Hz  
Range of voltage fluctuation: 10%  
Range of voltage unbalance: 3%  
The rated power and current are based on the rated working condition. The maximum data is the theoretical limit value. When making wiring and power distribution, the data in the table are as reference. The energy limit function shall be selected as option while the power supply is insufficient.
- The wiring cables shall be single-pole and exposed laying type.
- The cables in the table are chosen under the working temperature of 90 C and environment temperature of 30 C .
- The cables size in use shall not less than the value in the table.

## Electric Specification

### TECS-W/L-E Standard Configuration: Line Reactor

In order to reduce current harmonic distortion made by inverter and improve the imbalance of three phase power supply, line reactor is applied in the electric system. It can limit the voltage jump of power grid and the current shock when operation. By smoothing the pulse peak and voltage leakage caused when rectifier commutation, the disorder from grid can be prevented and in the meanwhile to cut down the impact of harmonic current on grid.

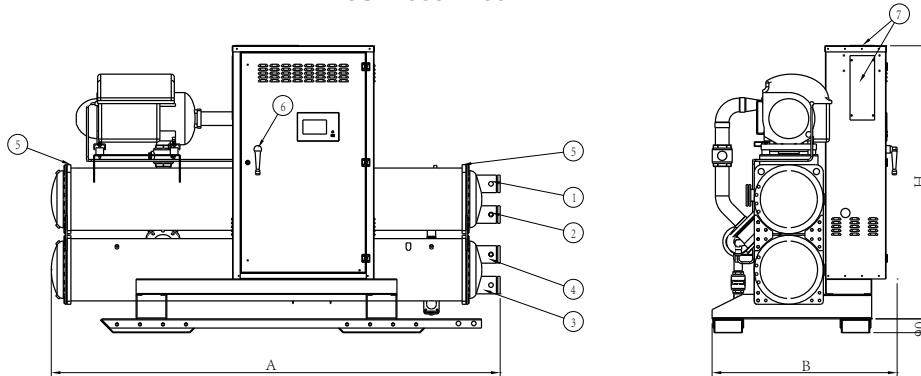
### TECS-W/L-E Optional Configuration: Harmonic Filter

Harmonic filter is able to improve power transmission and usage efficiency, further reduce the electrical system of local parallel resonance or series resonance and noise, to assure the safety of electrical protection and automatic device.

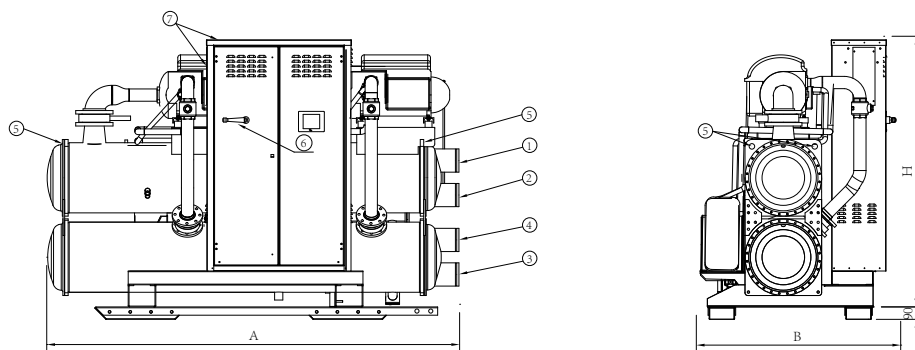
# Water-cooled Magnetic Levitation Variable Frequency Centrifugal Chiller

## Dimension Drawing

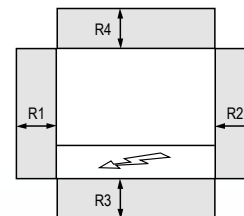
TECS-W0801-1801L-E



TECS-W2152-3902L-E



- ①Evaporator Inlet ③Condenser Inlet ⑤Lifting Points ⑦Power Inlet
  - ②Evaporator Outlet ④Condenser Outlet ⑥Main Isolator
- Please consult with Climaveneta office for detail drawing.



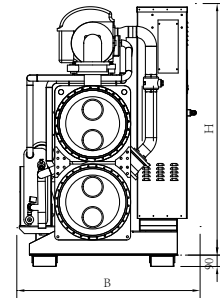
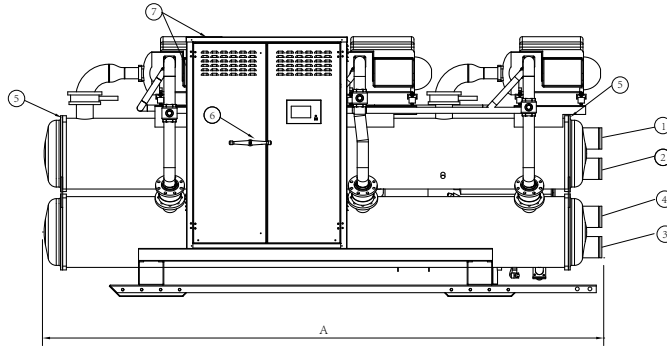
Minimum Clearance

## Dimension and Weight

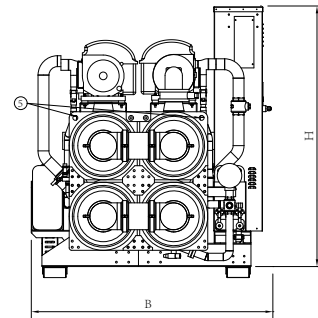
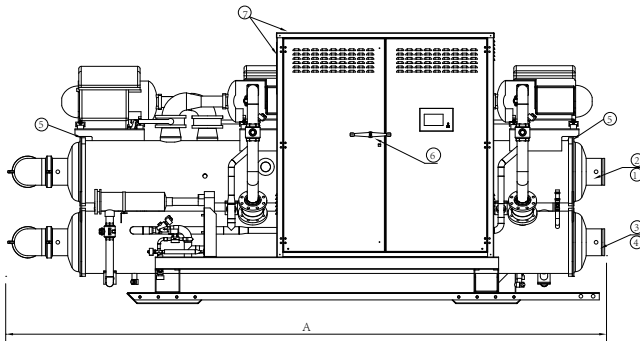
TECS-W/L-E	A	B	H	P.W.	Pipe Size		Minimum Clearance			
	mm	mm	mm		kg	①/②	③/④	R1(mm)	R2(mm)	R3(mm)
0801	2930	1210	1800	1735	3"	3"	2500	1000	900	500
1051	2930	1210	1800	1755	3"	3"	2500	1000	900	500
1401	2930	1210	1800	1985	4"	4"	2500	1000	900	500
1421	2930	1210	1800	2005	4"	4"	2500	1000	900	500
1801	2930	1300	1830	2150	5"	5"	2500	1000	900	500
2152	2990	1480	1980	2783	6"	6"	2500	1000	900	900
2452	2990	1480	1980	2860	6"	6"	2500	1000	900	900
3252	4450	1350	2050	3995	6"	6"	4000	1000	900	900
3902	4450	1350	2050	4050	6"	6"	4000	1000	900	900

## Dimension Drawing

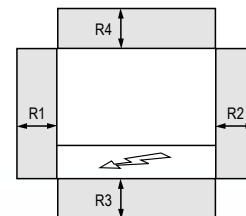
TECS-W3903 -5853L-E



TECS-W6304-8104L-E



- ①Evaporator Inlet    ③Condenser Inlet    ⑤Lifting Points    ⑦Power Inlet
  - ②Evaporator Outlet    ④Condenser Outlet    ⑥Main Isolator
- Please consult with Climaveneta office for detail drawing.



Minimum Clearance

## Dimension and Weight

TECS-W/L-E	A	B	H	P.W. kg	Pipe Size		Minimum Clearance			
	mm	mm	mm		①/②	③/④	R1(mm)	R2(mm)	R3(mm)	R4(mm)
3903	4440	1450	1990	4350	6"	6"	4000	1000	900	900
4503	4440	1360	2150	4845	8"	8"	4000	1000	900	900
5203	4440	1360	2150	4880	8"	8"	4000	1000	900	900
5853	5310	1360	2150	5390	8"	8"	4000	1000	900	900
6304	5000	2200	2150	7315	10"	10"	4000	1000	900	900
6904	5000	2200	2150	7370	10"	10"	4000	1000	900	900
7504	5000	2200	2150	7615	10"	10"	4000	1000	900	900
8104	5000	2200	2150	7670	10"	10"	4000	1000	900	900



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