

TWM-4 Series 351-2813kW (100-800RT)









#### **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.



- A significant improvement(15%) in the heat exchange can be achieved by magnetic levitation technology without oil lubrication system, contact friction and the thermal resistance caused by oil film.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 decease thermal stress of motor stator.

- Liquid refrigerant spray cooling promises stable operation of motor.
- The rotator 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 operates without any oil, allowing its 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 Evaporator and Condenser

- Special Hybrid Counter-Flow Spray evaporator is an improved type of falling film evaporator, which overcomes the shortcomings of large refrigerant charge capacity of the flooded evaporator and unstable working conditions of the traditional falling film evaporator, and maintains the advantages of small falling film refrigerant charge, high heat exchange efficiency and stable operation of the flooded evaporator under variable working conditions.
- The condenser with special flow channel design has high heat transfer coefficient, low condensing temperature and reduced water pressure drop.
- 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 allows 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 HFO1234ze is adopted with ODP=0 and Ultra low GWP.
- 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 feeds power to the various controls and bearing actuators then until the rotor de-levitates onto the touchdown 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(China GB).
- 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 operation stability.

#### **Easy Installation**

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

#### **Excellent Part Load Performance**

TWM-4 is brought in by Climaveneta with extremely outstanding performance in the chiller industry. With magnetic levitation compressor, variable frequency inverter control and oil free lubrication system, the unit has boosted with 70% of IPLV to compare with traditional chiller and less service cost.

15 14.84 14 13.90 13 12 \_\_\_\_\_ -----IPLV12.05 11 10 9 40 70% 9 8 7.29 **IPLV7.07** 7 6.84 6.95 6.90 6 5.98 5 4 25% 19°C 50% 19°C 75% 24.5°C 100% 30°C

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



#### Cooling Water Temperature Linear Decline

## **Excellent Integrated part load value**

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 China.

IPLV(@AHRI) up to 12.23

## IPLV (AHRI)

IPLV = 0.01×A + 0.42×B + 0.45×C + 0.12×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×A + 0.415×B + 0.461×C + 0.101×D

Evaporator leaving at 7  $^{\circ}$ C (constant), condenser water (inlet) at 30  $^{\circ}$ C (100% load—A), 26  $^{\circ}$ C (75% load—B), 23  $^{\circ}$ C (50% load—C), 19  $^{\circ}$ C (25% load—D).



# **ALL-ROUND SUSTAINABILITY**



TWM-4

# TWM-4 is the result of CLIMAVENETA Systems' extensive approach to sustainability.

Achieving outstanding performance and ensuring long-term sustainability are challenges that modern HVAC systems need to tackle.

Increasing concerns about the global warming impact of chillers and heat pumps is driving new regulatory policies to push towards even more efficient units with the lowest carbon footprint.

Today, an all-round approach is the only way to effectively reduce the Total Equivalent Warming Impact (TEWI).

## Fully committed to support the creation of a greener tomorrow, CLIMAVENETA Systems designed TWM-4, a complete chiller range optimized for HFO refrigerant R1234ze, with nearly zero environmental impact.

Combining brilliant annual efficiency with the use of a low GWP refrigerant, TWM-4 tackles both the indirect (due to the primary energy consumption) and the direct global warming impact, thus resulting the perfect choice for any new, forward-looking cooling system.

The environmental impact of the refrigerants is measured by two parameters: ODP: Ozone Depletion Potential

**GWP:** Global Warming Potential

While in the past the focus was on reducing ODP values to 0, new regulations encourage Member States to work harder on GWP.



#### The path to a greener world

Starting from the 70s, several international agreements have been made to drive the industry towards eco-friendly refrigerants. The last crucial step was taken in 2016, when the Kigali Amendment to the Montreal Protocol was passed, paving the way for the global phasedown of HFCs.



#### 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, 25-100% stepless adjustment can be achieved and settings of the operating parameters can be adjusted, which is adaptable to different environments. The temperature and pressure protection using analog measurement can predict and prevent 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 provide MODBUS, BACNET communication protocols with RS485 serial interface.

#### 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 ability. By connecting to the Climaveneta remote service program, it can find potential failures before they occur and take proper preventive treatments.



Patented Black Box

#### Technological Choices

(Options)

#### **Fast Restart**

The management of fast restart enables to minimization of downtime in case of a power failure. This is achieved by accelerating software selfdiagnose time, water pump start delay, pre-condensing time and compressor start time, while ensuring the safety of all units.

This option requires an external UPS power supply provided by customer.

### **Chilled Water Variable Flow Control**

TWM-4



Extended module of variable flow control function enables chilled water variable frequency pump and pipe valve on-off control. The control of chilled water side variable frequency pump, according to terminal side load, ensures lowest pump consumption.

#### **Double Power Supply**

This accessory entails the substitution of two separate power supply with ATS.





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



#### Microprocessor Control Features

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

√ Standard OPT av

OPT avaiable on request

Par. available by modifying a value of the configuration paramenters

# **Technical Parameters**

sters	S.A	A	CV	2	2	2	2	2	2	2	2	2	2	7
tric Parame	F.L.A	A	170	170	340	340	510	510	680	680	680	1020	1020	1020
Elec	ELL	КW	100	100	200	200	300	300	400	400	400	600	600	600
Refrigerant Charge		kg	80	120	155	180	250	310	290	350	440	420	510	580
inser	Pressure Drop	кРа	17.6	36.4	21.3	39.1	51.5	49.2	26.7	45.6	31.6	54.7	45.3	58.1
rator Conde	Flow Rate	s/I	18.7	23.5	33.5	39.2	55.9	65.3	74.5	83.8	93.2	111.8	130.3	138.1
	Pressure Drop	кРа	22.4	33.8	18.2	33.3	36.0	34.4	20.5	35.0	22.1	48.6	31.8	40.6
Evapo	Flow Rate	S/I	15.1	18.9	27.2	31.8	45.4	52.9	60.5	68.0	75.6	90.7	105.8	111.9
IPLV		kW/kW	10.92	11.29	11.15	11.56	11.38	11.80	11.49	11.84	12.23	11.56	12.00	12.06
Full Load COP		kW/kW	6.71	6.40	6.85	6.81	6.80	6.77	6.87	6.85	6.85	6.87	6.88	6.79
Power	Input	КW	52.5	68.7	92.4	108.5	155.1	181.9	204.7	230.9	256.6	307.3	357.7	383.6
Capacity		КW	352	440	633	682	1055	1231	1406	1582	1758	2110	2461	2602
		RT	100	125	180	210	300	350	400	450	500	600	200	740
Model			TWM-4-TL1-EF13AQ4- CF13AQ4-2-E	TWM-4-TL1-EG17AQ4- CF17AQ4-2-E	TWM-4-TL2-EF26AQ2- CZ26AQ2-2-E	TWM-4-TL2-EF35AQ2- CZ35AQ2-2-E	TWM-4-TL3-EG35AQ2- CF35AQ2-2-E	TWM-4-TL3-EH40AQ2- CG40AQ2-2-E	TWM-4-TL4-EF26AQ1- CZ26AQ1-2-E	TWM-4-TL4-EF35AQ1- CZ35AQ1-2-E	TWM-4-TL4-EH35AQ1- CF35AQ1-2-E	TWM-4-TL6-EG35AQ1- CF35BQ1-2-E	TWM-4-TL6-EH35BQ1- CG35AQ1-2-E	TWM-4-TL6-EH40AQ1- CG40AQ1-2-E

Remarks:

1. Standard Cooling Condition: Chilled water (in/out)=12.2/6.7°C; Condenser water (in/out)=29.4/34.6°C;

2. IPLV is measured according to AHRI Standard 550/590;

3. Standard water side pressure of evaporator and condenser is 1.0MPa. 1.6MPa or 2.0MPa is optional.

4. F.L.I Full load power input at max admissible condition F.L.A Full load current ampere at max admissible condition

Supply power 400V-3Ph-50Hz(60Hz)or 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.

Mandal	Weight	А	В	Н	Pipe Size		Minimum Clearance				
Model	kg	mm	mm	mm	0/0	3/4	R1(mm)	R2(mm)	R3(mm)	R4(mm)	
TWM-4-TL1-EF13AQ4-CF13AQ4-2-E	1805	1770	870	1980	4 ″	4 ″	1200	1000	900	500	
TWM-4-TL1-EG17AQ4-CF17AQ4-2-E	2300	2225	930	2030	5 ″	5 ″	1200	1000	900	500	
TWM-4-TL2-EF26AQ2-CZ26AQ2-2-E	3070	3060	1420	1970	6 ″	5 ″	2600	1000	900	900	
TWM-4-TL2-EF35AQ2-CZ35AQ2-2-E	3595	3960	1420	1970	6 ″	5 ″	3500	1000	900	900	
TWM-4-TL3-EG35AQ2-CF35AQ2-2-E	4610	4200	1600	2060	6 ″	6 ″	3500	1000	900	900	
TWM-4-TL3-EH40AQ2-CG40AQ2-2-E	5700	4500	1620	2150	8 ″	6 ″	4000	1000	900	900	
TWM-4-TL4-EF26AQ1-CZ26AQ1-2-E	5790	3500	2250	2110	8 ″	8 ″	2600	1000	900	900	
TWM-4-TL4-EF35AQ1-CZ35AQ1-2-E	7370	4400	2250	2110	8 ″	8 ″	3500	1000	900	900	
TWM-4-TL4-EH35AQ1-CF35AQ1-2-E	9150	4590	2320	2120	10 ″	10 ″	3500	1000	900	900	
TWM-4-TL6-EG35AQ1-CF35BQ1-2-E	9120	4650	2320	2200	10 ″	10 ″	3500	1000	900	900	
TWM-4-TL6-EH35BQ1-CG35AQ1-2-E	10740	4670	2320	2220	10 ″	10 "	3500	1000	900	900	
TWM-4-TL6-EH40BQ1-CG40AQ1-2-E	12410	5110	2320	2235	10 "	10 "	4000	1000	900	900	

**Dimension Drawing** 

TWM-4-TL1-EF13AQ4-CF13AQ4-2-E TWM-4-TL1-EG17AQ4-CF17AQ4-2-E



Minimum Clearance



TWM-4-TL2-EF26AQ2-CZ26AQ2-2-E TWM-4-TL2-EF35AQ2-CZ35AQ2-2-E TWM-4-TL3-EG35AQ2-CF35AQ2-2-E TWM-4-TL3-EH40AQ2-CG40AQ2-2-E



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- ② Evaporator Outlet
  ③ Condenser Inlet
  ④ Condenser Outlet
- ⑤ Lifting Points⑥ Power Inlet⑦ Main Isolator

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Please consult with Climaveneta office for detailed drawing.

TWM-4-TL4-EF26AQ1-CZ26AQ1-2-E TWM-4-TL4-EF35AQ1-CZ35AQ1-2-E TWM-4-TL4-EH35AQ1-CF35AQ1-2-E



TWM-4-TL6-EG35AQ1-CF35BQ1-2-E TWM-4-TL6-EH35BQ1-CG35AQ1-2-E TWM-4-TL6-EH40AQ1-CG40AQ1-2-E





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