

TICA - Cleaning and Energy Saving



TICA Central Air Conditioner
TICA FALLING FILM CENTRIFUGAL CHILLER

TWCF-M
FORM NO.B0719G01

Established in 1991

TICA is a professional enterprise specialized in R&D, manufacturing, sales and services of environment cleaning and thermal energy utilization.

TICA is a national high-tech enterprise, a single leading enterprise cultivated by the Ministry of Industry and Information Technology, a national brand cultivation enterprise of the Ministry of Industry and Information Technology, and a vice chairman member of China Refrigeration and Air-conditioning Industry Association. It has a national-recognized enterprise technology center, an enterprise academician workstation, and a post-doctoral research workstation. Its projects cover Beijing Bird's Nest Stadium, Water Cube, Wukesong Indoor Stadium, PetroChina, Sinopec, State Grid, Nanjing Panda, Hangzhou Xiaoshan International Airport, Hainan Airlines Group, Shangri-La Hotel, Manila Ocean Park, Abu Dhabi Al Muneera, SM City in Philippines and Unilever, etc.

TICA is also the outstanding provider of central air conditioners for China's subway networks and has successfully served nearly 60 key subway lines in major cities such as Beijing, Shanghai, Guangzhou, Shenzhen, Chengdu, Suzhou, Hangzhou and Tianjin. TICA is a professional supplier and service provider in China that specializes in system integration of clean environment. While for microelectronics, hospital operating rooms, biopharmaceutical industry and other professional purification areas, our market share has achieved over 40% in each.

TICA Quality For IAQ

TICA focuses on indoor air quality (IAQ) in clean environments. Product lines include return air purifiers, heat recovery ventilators, fresh air purifiers, air purifiers, as well as the clean air handling units and digital variable-capacity air handling units used in the professional purification field. Regarding core technology, TICA established an ISO class 1 super-clean environment integration system and won the first prize of CMIST.

In the field of thermal energy utilization, TICA's product lines include modular chillers, VRF units, screw chillers, centrifugal chillers, and ORC low-temperature waste heat power generation systems. In 2015, TICA and United Technologies Corporation (UTC) established a global strategic joint venture cooperation relationship and acquired PureCycle, an ORC low-temperature power generation company owned by Pratt & Whitney under UTC. TICA obtained PureCycle trademarks and more than 100 patents and national copyrights. TICA's efficient centrifugal chillers, water-cooled screw chillers, and air-cooled screw chillers are manufactured with the technical license of Carrier under UTC.

TICA is characterized by excellent system integration capability. In the application of "Efficient Refrigeration System of Underground Railway Station", the integrated COP of the refrigeration room amounts to 6.0, and the research achievement reaches the international advanced level. In 2018, TICA merged and acquired an OFC central air conditioning enterprise **SMART**. TICA's excellent system integration capability and the **SMART** world-class OFC water chillers help increase the integrated COP of the efficient equipment room to 6.7 to 7.0.

TICA---We're striving.

TICA aims to build itself into a world-leading system integration supplier and service provider that specializes in clean environment and thermal energy utilization.



DIGITAL VARIABLE-CAPACITY
DX AIR HANDLING UNIT

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TICA owns five production sites in Nanjing, Tianjin, Guangzhou, Chengdu and Kuala Lumpur, and a network of over 70 sales and service filiales around the world. Its Nanjing HQ base received 3-star certification for national No. 001 green industrial construction.

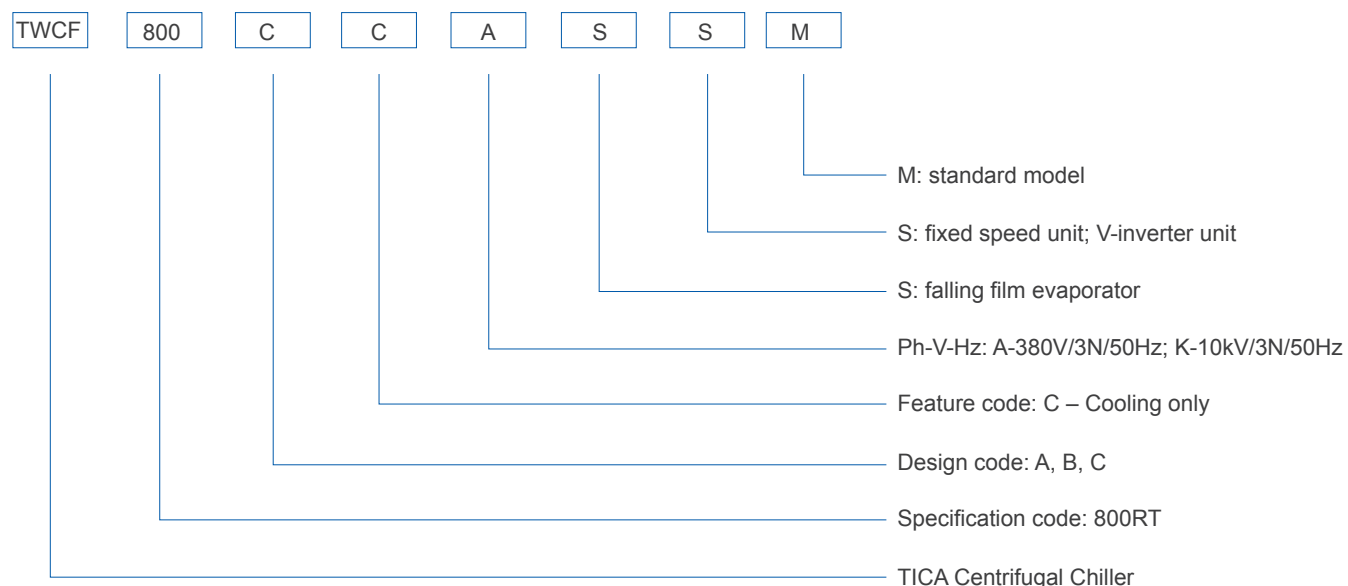


TICA Falling Film Centrifugal Chiller
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Overview

With simple design, TICA falling film centrifugal chiller adopts a falling film evaporator, advanced two-stage centrifugal compressor, and leading microcomputer control technologies, with the energy efficiency meeting the national energy-saving standard for water chillers. It can be widely used in various places such as large public buildings, hotels, hospitals, stadiums, and industrial sites.



TICA Falling Film Centrifugal Chiller
|
Nomenclature



Features
|
TICA Falling Film Centrifugal Chiller

High efficiency & energy saving

The unit adopts a highly efficient centrifugal compressor specially designed for R134a refrigerant to combine with a falling film evaporator, enabling the unit to meet the national energy-saving standard for chillers.



Performance test report
by national authority



Energy Efficiency Label

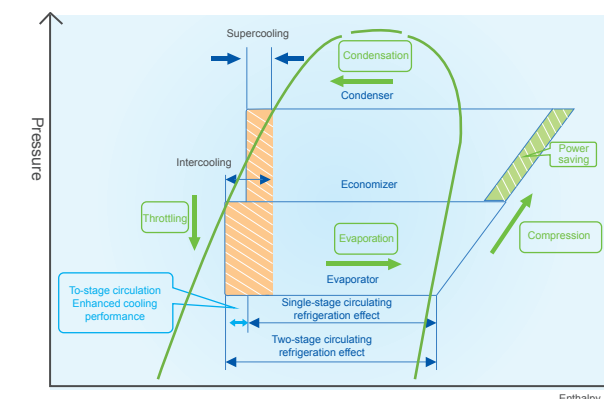
System optimization technology

Two-stage air-supplying and enthalpy-added compression technology

The unique two-stage air-supplying and enthalpy-added compression technology can enhance the heat absorption capacity of the refrigerant and reduce the power consumption of the compressor, thus featuring a 6% energy efficiency increase when compared with those equipped with single-stage compressors.

The unique three-stage separation economizer is simple and highly efficient.

The two-stage impeller can reduce the speed of the compressor and thus has higher reliability.



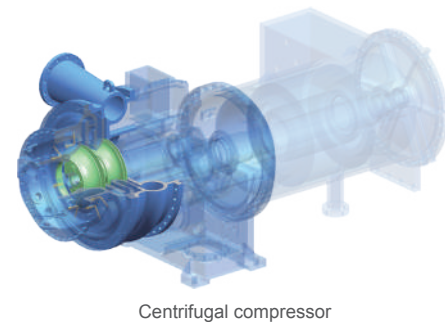
Centrifugal compressor

Aerospace pneumatic technology

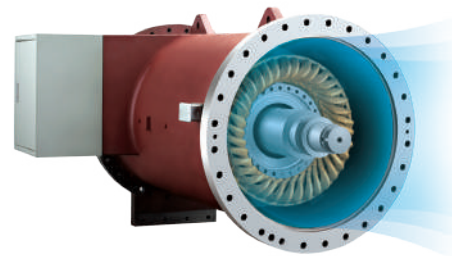
With the advanced technology in the field of aerospace engine design and manufacturing, it adopts professional software to pneumatically optimize the design of centrifugal compressors, and innovate the manufacturing technology of impellers, volutes and other key components, thus greatly improving the efficiency of the compressor, and effectively reducing the power of the whole unit.

Enhanced motor efficiency with highly efficient motor technology

- The motor is highly efficient and produces low noise;
- With the enclosed motor design, the compressor features long service life and low noise, as well as simple structure and high reliability.
- Refrigerant is used to spray and cool the motor to ensure stable temperature inside the motor.



Centrifugal compressor



Highly efficient cantilever-type airtight motor

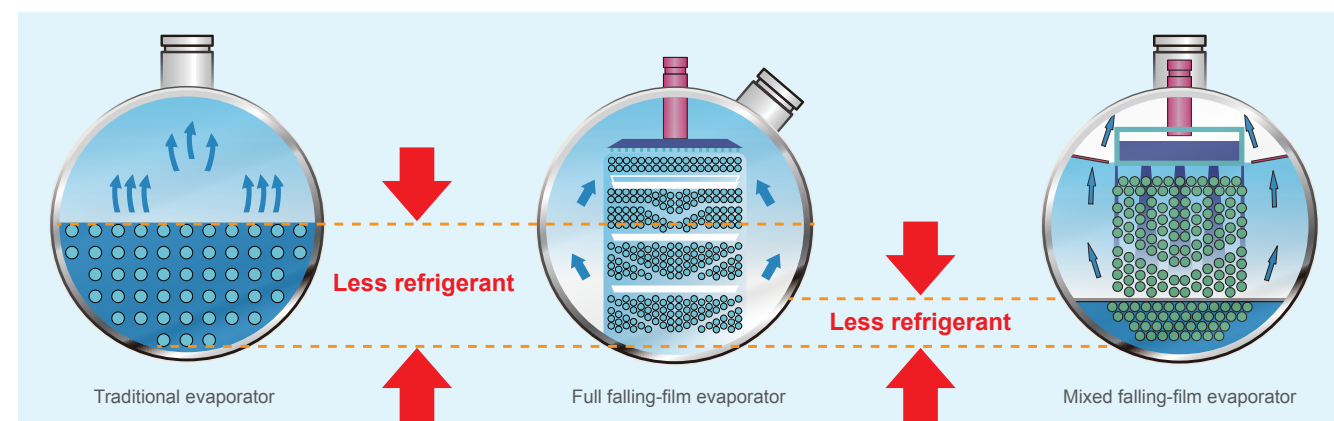
High-efficiency heat transfer technology

Falling film evaporator technology

The spraying and falling film technology is used to make the refrigerant form a liquid film on the surface of the high-efficiency heat exchange tube and evaporates in the film state, thus greatly improving the heat exchange efficiency of the evaporator.

The unique refrigerant distributor can effectively avoid the dry tube caused by uneven liquid distribution.

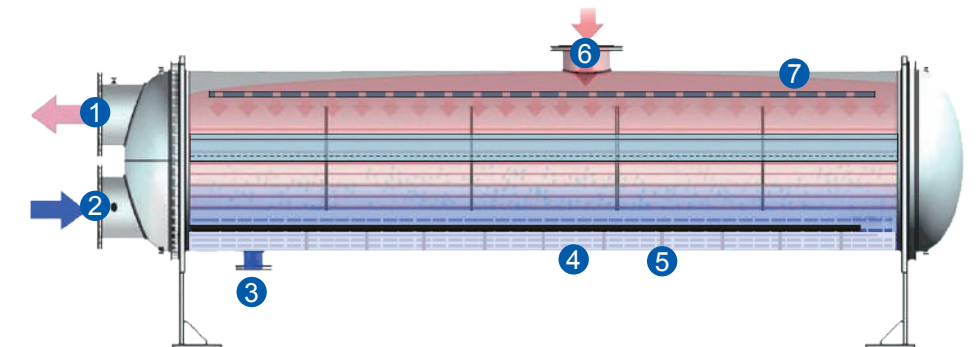
Basically, it can achieve the "zero" liquid level in the evaporator, which reduces the refrigerant charge compared with the traditional full liquid, and improves the oil return of the unit, with the oil return efficiency increased by 30%.



Condenser

It adopts the industry-leading and efficient heat transfer tubes with excellent heat transfer performance to optimize the structure layout of condenser and improve the heat transfer performance. A pure counterflow chamber with multiple turbulent flows is installed at the bottom to improve the degree of supercooling for enhanced performance.

- 1 Cooling water outlet
- 2 Cooling water inlet
- 3 Liquid refrigerant outlet
- 4 Pure counterflow supercooling chamber
- 5 Baffle plate
- 6 Gaseous refrigerant inlet
- 7 Air balancing plate



Environmental-friendly

The environmentally-friendly refrigerant HFC-R134a is used, which does not contain chlorine atoms, is harmless to the atmospheric ozone layer, and has no ban period in the Montreal Agreement;

Higher efficiency, fewer power consumption and reduced CO₂ emissions;

As the first batch of enterprises in China's industrial and commercial refrigeration and air-conditioning industry that signed the HCFC Phase-Out Project with the Ministry of Environmental Protection, TICA has been committed to the development of green and environmentally-friendly products.



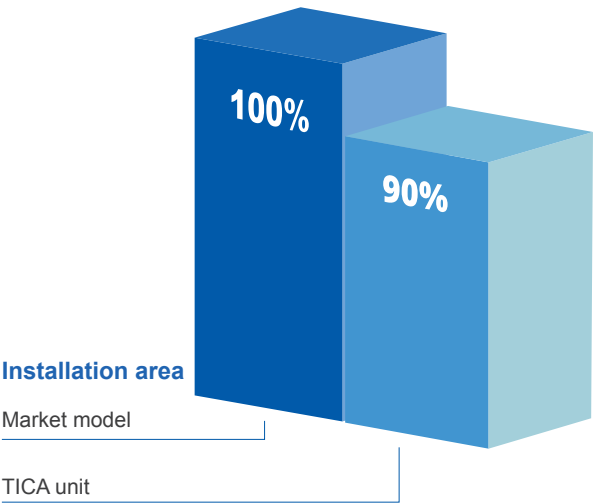
Wide Application

The compressor of the unit adopts the design of "wide range" variable pressure ratio, which is applicable to efficient operation under multiple working conditions. It can be used stably in various system energy-saving solutions such as large temperature difference and small flow rate, primary pump variable flow rate, ground water heat pump, ice storage, etc.



Compact Design and Small Floor Area

Through various measures such as heat exchanger optimization design, TICA falling film centrifugal chiller can ensure the performance and reduce the floor area of the unit, so as to reduce the unit weight, which is conducive to equipment transportation and installation.



Prospective Logic Control Technology

The microcomputer control system of the unit has multiple functions such as advanced trend forecasting, self-diagnosis, adjustment, safety protection, etc.

The microcomputer control system predicts real-time load changes based on target values and historical load levels over the same period, and performs forward-looking corrections to unit loads, so as to avoid system energy consumption or shutdown due to frequent fluctuations in water temperature of the unit.

In addition, the powerful control logic can not only protect the reliable operation of the unit, but also expand the operation range of the unit, enabling the unit to adapt to various operating states.

Intelligent control technology makes operation easier

- The microcomputer control system is used to complete the automatic operation control of the unit, provide an real-time information display platform for the unit, and realize the remote multi-group control function through MODBUS-RTU (standard) or other (optional) communication protocols. The microcomputer control system integrates logic programs such as early warning, safety protection, and interlock control to ensure the correct start-up, operation, energy-saving suspension and shutdown of the unit.
- The microcomputer control system is installed, wired and tested by the manufacturer to ensure more direct, faster and safer application and operation by the users.

Interface display

- True color graphics display interface
- 10" full-screen touch operation experience
- Unit operating status
- Unit operating data
- Pre-alarm/alarm display and recording
- Historical trend graph query function

Running control

- User-defined cold water outlet temperature
- Automatic load increase/decrease by cold water temperature
- Reduction of operating costs via pause function
- Independent startup/stop control



Oil pump pre-lubrication/post-lubrication	Compressor anti-surge interlocking
Water pump pre-run/post-run	Safety check before startup
Startup cabinet interlocking control	Pre-alarm interlock control
Pause and stop guide vane interlocking	



Low/overflow lubricating oil pressure	Low/overflow evaporating pressure (evaporator)	Too long startup time
High/overhigh lubricating oil temperature	High/overhigh condensing pressure (condenser)	Water cutoff for evaporator and condenser
High/overhigh compressor running current	Oil pump overload	Perform anti-freezing protection
Overflow compressor running current	Startup cabinet failure	and other more than 30 safety protection measures

Everything is under control

The remote operation and maintenance cloud platform of TICA central air conditioner enables the PC terminal and mobile terminal to log in to view the status of the unit at the same time, and realize the functions such as remote power-on/off, water temperature setting, data monitoring, and query of historical faults and historical data.

Real-time mobile monitoring: when an alarm occurs to the unit, the cloud platform will immediately push the alarm information to mobile phone of the relevant personnel in charge, so as to achieve data sharing and mobile working.

Service personnel can view historical data through the TICA operation and maintenance cloud platform, analyze the cause of the failure, provide remote technical guidance, and quickly solve the problem.

TICA cloud control platform



TICA Falling Film Centrifugal Chiller

| Specifications

Model		TWCF-CCASSM	600	650	700	750	800	850	900	950	1000	1100	1200	1300
Cooling capacity	RT		600	650	700	750	800	850	900	950	1000	1100	1200	1300
	kW		2110	2285	2461	2637	2813	2989	3164	3340	3516	3868	4219	4571
	10 ⁴ kcal/h		181.4	196.5	211.7	226.8	241.9	257.0	272.1	287.3	302.4	332.6	362.9	393.1
Power input		kW	368.9	394.4	425.2	461.3	485.6	518.2	544.4	571.3	601.0	657.4	716.4	773.7
Cooling COP		W/W	5.71	5.79	5.78	5.71	5.79	5.76	5.81	5.84	5.85	5.88	5.88	5.90
Motor configuration power		kW	490.0	490.0	490.0	490.0	560.0	560.0	630.0	630.0	630.0	695.0	760.0	840.0
Rated current		A	640.6	684.9	738.3	801.1	843.1	899.9	945.4	992.1	1044	1141	1244	1343
Maximum operating current		A	672.7	719.2	775.2	841.1	885.3	944.9	992.9	1044	1095	1199	1325	1424
Star-type locked-rotor current		A	4700	4700	4700	4700	5400	5400	6100	6100	6100	6800	7400	9200
Evaporator	Water flow	m ³ /h	362.9	393.1	423.3	453.6	483.8	514.0	544.8	575.0	605.3	665.8	726.3	786.9
	Water-side pressure drop	kPa	55.4	64.1	65.6	67.8	67.6	69.6	72.3	70.7	72.7	71.9	67.1	74.4
	Connection pipe diameter	mm	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300
Condenser	Water flow	m ³ /h	423.6	457.7	494.2	529.5	563.2	598.8	635.4	670.7	703.4	774.1	844.3	914.4
	Water-side pressure drop	kPa	60.8	70.3	70.8	70.3	69.7	70.9	70.6	68.3	73.0	68.3	62.5	69.4
	Connection pipe diameter	mm	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300	DN300
Dimensions	Length	mm	4690	4690	4690	4690	4690	4690	4690	4745	4745	4745	4745	4745
	Width	mm	1950	1950	1950	1950	1950	1950	1950	2260	2260	2260	2260	2260
	Height	mm	2410	2410	2410	2410	2410	2410	2410	2610	2610	2610	2610	2610
Shipping weight		kg	11070	11120	11190	11270	11355	11425	11494	11920	12067	12235	12380	12480
Operating weight		kg	13020	13100	13209	13350	13564	13712	13839	14532	14773	15108	15376	15500

Note:

1. The above parameters are based on the following working conditions: chilled water inlet/outlet temperature: 12/7°C, cooling water inlet/outlet temperature: 32/37°C;

2. 600-1300 RT units can also choose high voltage such as 10KV, please consult TICA sales staff for details;

3. The evaporator and condenser are designed in two processes. The water-side bearing pressure is 1.0 MPa, with flange connection. It should be stated when ordering in case the working pressure is higher than 1.0 MPa;

4. The shipping weight does not include refrigerant weight;

5. The specifications are subject to change due to product improvement without prior notice.

Model		TWCF-CKSSM	1400	1500	1600	1700	1800	1900	2000	2100	2200
Cooling capacity	RT		1400	1500	1600	1700	1800	1900	2000	2100	2200
	kW		4922	5274	5626	5977	6329	6680	7032	7384	7735
	10 ⁴ kcal/h		423.3	453.6	483.8	514.0	544.3	574.5	604.8	635.0	665.2
Power input		kW	844.3	905.6	969.6	1028.1	1077	1144	1210	1256	1336
Cooling COP		W/W	5.83	5.82	5.80	5.81	5.87	5.83	5.81	5.87	5.78
Motor configuration power		kW	930.0	990.0	990.0	1100	1100	1200	1320	1320	1450
Rated current		A	56.03	60.10	64.35	68.23	71.50	75.93	80.32	83.38	88.67
Maximum operating current		A	58.83	63.10	67.56	71.64	75.08	79.72	84.34	87.55	93.11
Star-type locked-rotor current		A	380.0	405.0	405.0	450.0	450.0	490.0	540.0	540.0	590.0
Evaporator	Water flow	m ³ /h	846.7	907.1	967.6	1028	1089	1149	1210	1270	1330
	Water-side pressure drop	kPa	76.8	73.8	71.9	81.1	85.6	80.1	81.3	81.2	81.4
	Connection pipe diameter	mm	DN400	DN400	DN400	DN400	DN400	DN400	DN400	DN400	DN400
Condenser	Water flow	m ³ /h	988.5	1059	1130	1200	1271	1341	1412	1480	1553
	Water-side pressure drop	kPa	72.5	71.5	69.8	78.6	75.4	72.9	71.2	71.2	71.7
	Connection pipe diameter	mm	DN400	DN400	DN400	DN400	DN400	DN400	DN400	DN400	DN400
Dimensions	Length	mm	5190	5190	5190	5190	5290	5290	5290	5290	5290
	Width	mm	2700	2700	2700	2700	3150	3150	3150	3150	3150
	Height	mm	3010	3010	3010	3010	3180	3180	3180	3180	3180
Shipping weight		kg	19370	20150	20850	21450	23360	23590	23870	24120	24350
Operating weight		kg	22790	23490	24260	25160	26840	27290	27740	27976	28210

Note:

1. The above parameters are based on the following working conditions: chilled water inlet/outlet temperature: 12/7°C, cooling water inlet/outlet temperature: 32/37°C;

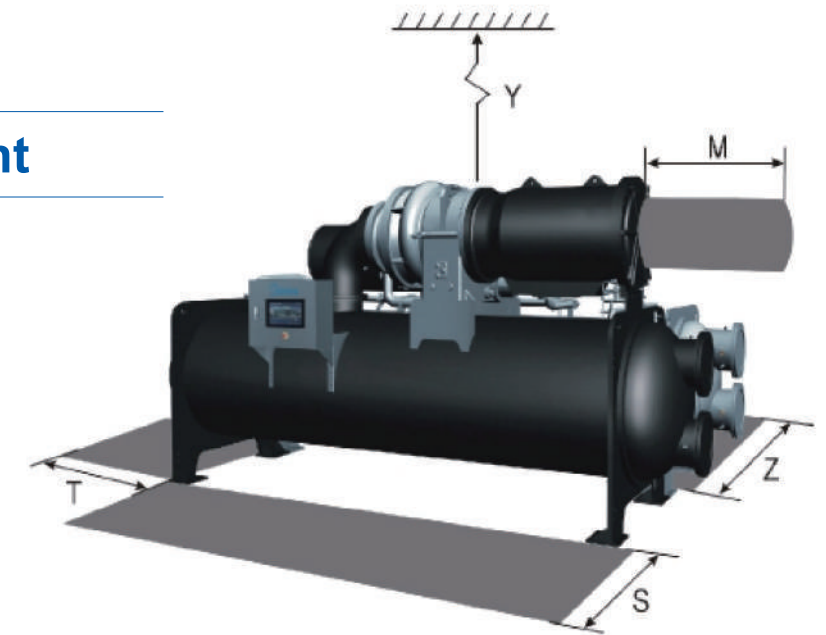
2. 600-1300 RT units can also choose high voltage such as 10KV, please consult TICA sales staff for details;

3. The evaporator and condenser are designed in two processes. The water-side bearing pressure is 1.0 MPa, with flange connection. It should be stated when ordering in case the working pressure is higher than 1.0 MPa;

4. The shipping weight does not include refrigerant weight;

5. The specifications are subject to change due to product improvement without prior notice.

TICA Falling Film Centrifugal Chiller



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Electrical Specification

Recommended wiring

Recommended wiring for centrifuge					
Voltage level	380V				10KV
Startup mode	Closed star-delta startup cabinet/ Solid state soft startup cabinet (internal)		Variable-frequency startup cabinet		High-voltage (direct/ string reactance/ self-coupled buck/ variable frequency) startup cabinet
Model	Inlet cable	Outlet cable	Inlet cable	Outlet cable	Inlet/Outlet cable
TWCF600CCASSM	3*(2*BVR150)+BVR150+BVR16	6*(1*BVR185)+BVR150	3*(2*BVR185)+BVR185+BVR16	3*(2*BVR185)+BVR185	YJV22-3*25
TWCF650CCASSM	3*(2*BVR150)+BVR150+BVR16	6*(1*BVR185)+BVR150	3*(2*BVR185)+BVR185+BVR16	3*(2*BVR185)+BVR185	
TWCF700CCASSM	3*(2*BVR185)+BVR185+BVR16	6*(1*BVR240)+BVR185	3*(2*BVR240)+BVR240+BVR16	3*(2*BVR240)+BVR240	
TWCF750CCASSM	3*(2*BVR240)+BVR240+BVR16	6*(1*BVR240)+BVR240	3*(2*BVR240)+BVR240+BVR16	3*(2*BVR240)+BVR240	
TWCF800CCASSM	3*(2*BVR240)+BVR240+BVR16	6*(2*BVR120)+BVR240	3*(4*BVR120)+BVR240+BVR16	3*(4*BVR120)+BVR240	
TWCF850CCASSM	3*(2*BVR240)+BVR240+BVR16	6*(2*BVR120)+BVR240	3*(4*BVR120)+BVR240+BVR16	3*(4*BVR120)+BVR240	
TWCF900CCASSM	3*(4*BVR120)+BVR240+BVR16	6*(2*BVR120)+BVR240	3*(4*BVR120)+BVR240+BVR16	3*(4*BVR120)+BVR240	
TWCF950CCASSM	3*(4*BVR120)+BVR240+BVR16	6*(2*BVR120)+BVR240	3*(4*BVR150)+BVR240+BVR16	3*(4*BVR150)+BVR240	
TWCF1000CCASSM	3*(4*BVR120)+BVR240+BVR16	6*(2*BVR150)+BVR240	3*(4*BVR150)+BVR240+BVR16	3*(4*BVR150)+BVR240	
TWCF1100CCASSM	3*(4*BVR150)+BVR240+BVR16	6*(2*BVR150)+BVR240	3*(4*BVR150)+BVR240+BVR16	3*(4*BVR150)+BVR240	
TWCF1200CCASSM	3*(4*BVR150)+BVR240+BVR16	6*(2*BVR185)+BVR240	3*(4*BVR185)+BVR240+BVR16	3*(4*BVR185)+BVR240	
TWCF1300CCASSM	3*(4*BVR185)+BVR240+BVR16	6*(2*BVR185)+BVR240	3*(4*BVR240)+BVR240+BVR16	3*(4*BVR240)+BVR240	
TWCF1400CCKSSM	/	/	/	/	YJV22-3*35
TWCF1500CCKSSM					
TWCF1600CCKSSM					
TWCF1700CCKSSM					
TWCF1800CCKSSM					
TWCF1900CCKSSM					
TWCF2000CCKSSM					
TWCF2100CCKSSM					
TWCF2200CCKSSM					
Remarks					YJV22-3*50
					YJV22-3*70

Notes:

1. Under the ambient temperature of 40°C, the cable adopts single-core PVC copper core wire, and the cross-sectional area is in accordance with the *GB/T 16895.6 Low-voltage Electrical Installations—Part 5-52: Selection and Erection of Electrical Equipment. Wiring Systems* concerning the recommendations for cable tray installation (flat, horizontal placement in contact with each other). For other routing methods that adopt multi-core cables and high temperature, in case of line pressure loss of over 2%, due to the distance factor, please re-select according to the maximum operating current of the unit. When using other types of cables, please pay attention to the size of wire lugs to ensure that the electrical clearance meets the standards.

2. Cable writing method: Take 3 * (2 * BVR150) + BVR150 + BVR16 as an example, it means that 2 BVR150 cables are used for each phase of 3 phases, 1 BVR150 cable is used for the grounding line, and 1 BVR16 cable is used for the neutral line.

3. The above recommended cables are the minimum wire diameter allowed for the unit, and the cables are prepared by the customer.

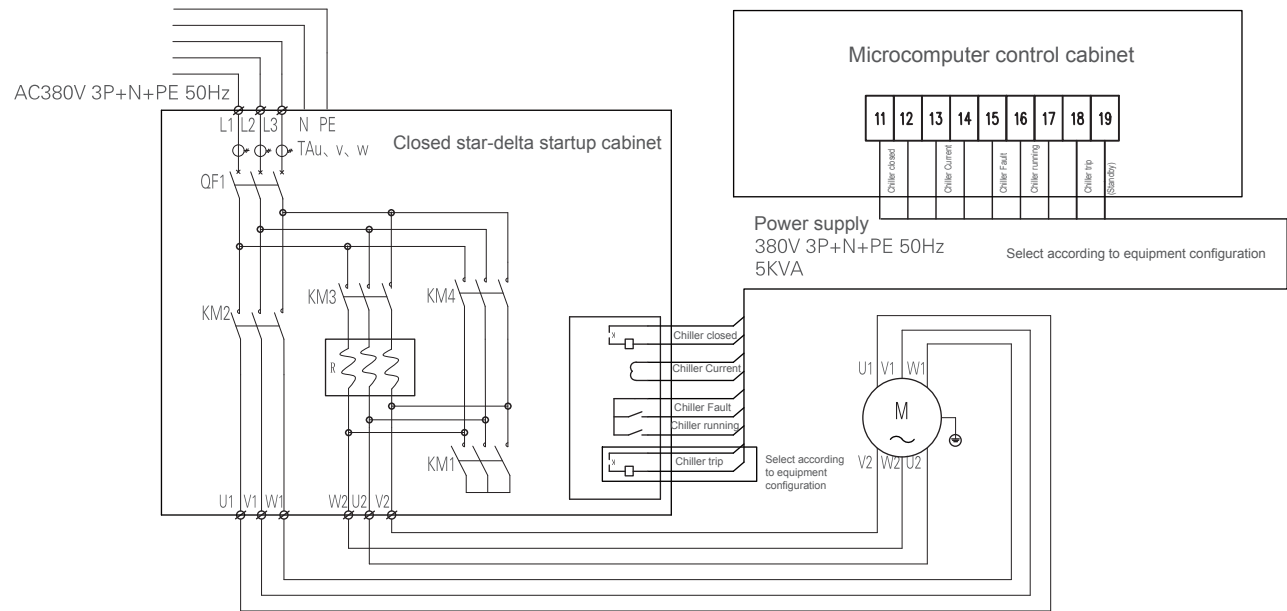
4. When using multiple cables, cables with the same specifications must be equipped.

Note 1: A fixed-frequency compressor has 6 terminals. Taking 6 * (2 * BVR120) + BVR240 as an example, it means that 6 sets of phase wires and 1 grounding line are needed to lead into the junction box of the compressor.

Note 2: The terminal of the inverter compressor has been short-circuited. The customer only needs to lead 3 sets of phase wires and 1 grounding line to the junction box of the compressor.

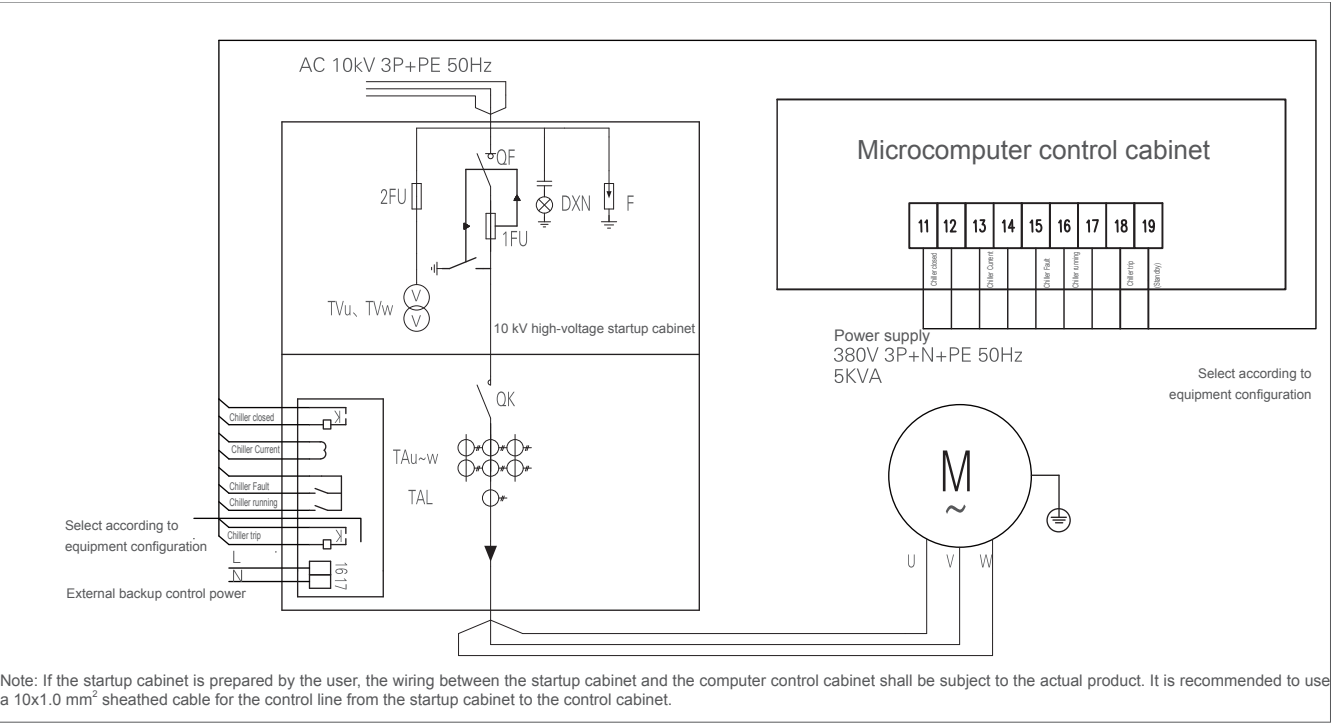
Note 3: Rated cable voltage of 10 kV startup cabinet: YJV22-8.7/15 kV. Cable specification: steel tape armored cable with a sheath. For example, the TWCF600 high-voltage startup cabinet inlet/outlet cable is YJV22-3 * 25, indicating one 3-core cable, with each core cable section is 25 mm².

Startup cabinet schematic diagram



Note: If the startup cabinet is prepared by the user, the wiring between the startup cabinet and the computer control cabinet shall be subject to the actual product. It is recommended to use a 10x1.0 mm² sheathed cable for the control line from the startup cabinet to the control cabinet.

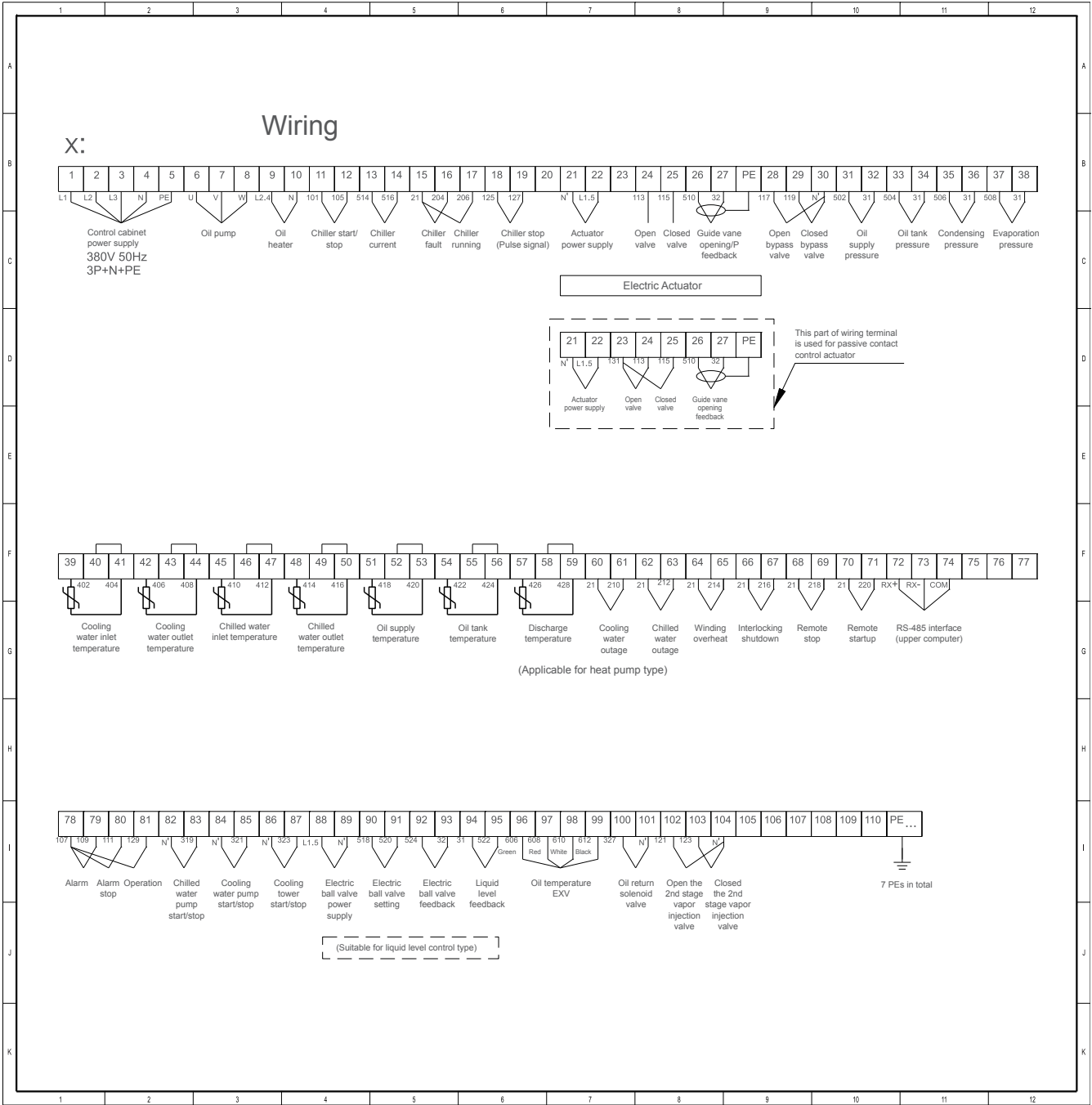
Schematic diagram of closed star-delta startup cabinet



Note: If the startup cabinet is prepared by the user, the wiring between the startup cabinet and the computer control cabinet shall be subject to the actual product. It is recommended to use a 10x1.0 mm² sheathed cable for the control line from the startup cabinet to the control cabinet.

Schematic diagram of high-voltage startup cabinet

Control wiring diagram



Note: Due to different models, the wiring diagram is slightly different, the above diagram is for reference only. For the accurate schematic diagram, refer to the random data of each device.

TICA Quality For IAQ

4008-601-601

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Note: Due to the continuous improvement and innovation of TICA's products, the model numbers, specifications and parameters in this document are subject to change without notice. Please pay attention and understand.