



NANJING TICA CLIMATE SOLUTIONS CO., LTD.

About TICA

An accredited national high-tech enterprise, specialized in the development, manufacturing, sales and services of environment cleaning HVAC and thermal energy utilization sectors

A comprehensive lineup of products, ranging from air handling units and fan coil units, centrifugal chillers, screw chillers, VRF units, and ORC low-temperature waste heat power generation systems with highest thermoelectric efficiency in China

Focus on indoor air quality in clean environments, with more than 60% sales revenue from clean-field related products and solutions

Individual Product Champion Enterprise accredited by National Ministry of Industry and Information, with the champion product of air handling unit

One of the top four Chinese brands in commercial HVAC industry

TICA Vision

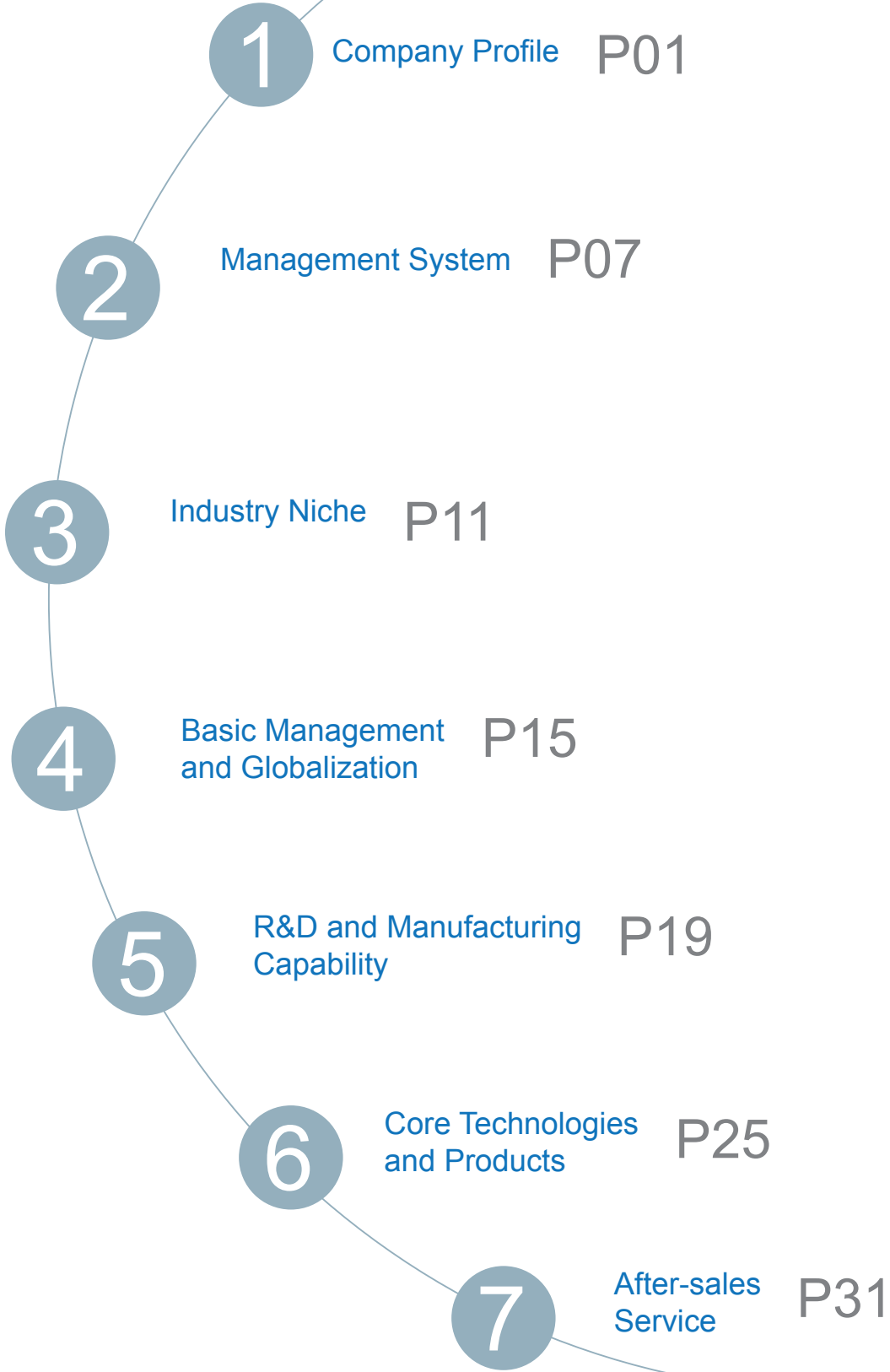
Strive to be the international leading integrated system and service provider in clean environment and utilization of thermal energy

TICA Mission

Persist to maximize the value for customers through innovative technology and provide clean environment in order to improve the quality of life



Contents



- 1 Company Profile P01
- 2 Management System P07
- 3 Industry Niche P11
- 4 Basic Management and Globalization P15
- 5 R&D and Manufacturing Capability P19
- 6 Core Technologies and Products P25
- 7 After-sales Service P31



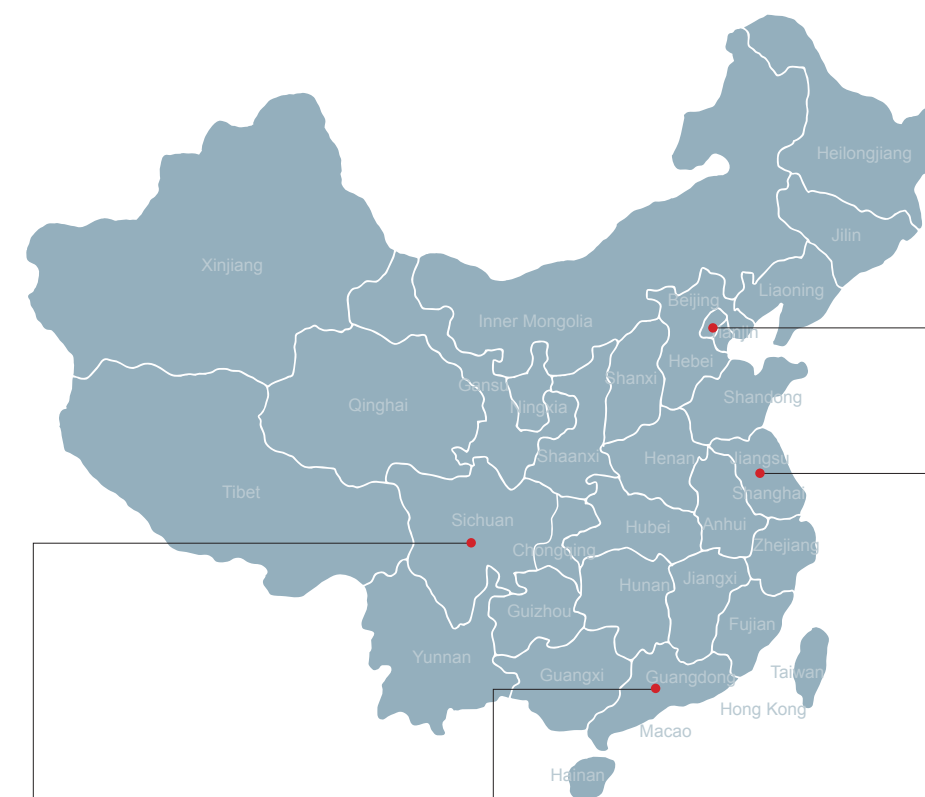
1

Company Profile



Company Profile

More than 70 branches
4 manufacturing bases
7 factories



Tianjin Base

Floor area: 40,000
Construction area: 30,000



Nanjing Headquarters

Floor area: 170,000
Construction area: 90,000



Chengdu Base

Construction area: 20,000



Guangzhou Base

Construction area: 60,000



Nanjing FUCA Automation
Technology Co., Ltd.

Construction area: 10,000

TICA Milestones

1995

TICA brand registered

1999

First factory established in Nanjing

1998

First patented invention of AHU with labyrinth structure

1991

Company established

2002

Tianjin factory established

2004

TICA's system automatic control company - Nanjing FUCA Automation Technology Co., Ltd. established

2008

Sales revenue reached RMB1 billion; Accredited as a High & New Tech Enterprise

2011

Nanjing factory relocated Japanese executives employed Quality Enhancement Plan started

2010

Guangzhou factory established

2012

One of the first enterprises to phase out HCFC; First to achieve the goal; A demonstration enterprise of the United Nations Environment Program and China's Ministry of Environmental Protection

2013

National Green Industry Building. No.001 certified (three-star) in China; Testing Center accredited by CNAS; First in China to get Eurovent Certification

2014

First VRF production line based on Japanese technology completed
Enterprise academician workstation founded

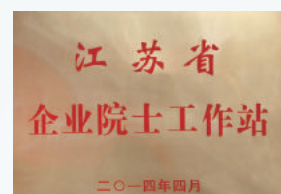
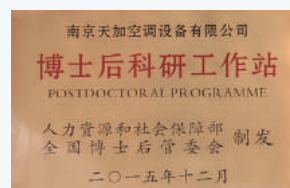
2016

Postdoctoral programme established
World-class super-speed centrifugal chiller launched with technology licensing from Carrier
TICA PureCycle ORC Low-temp Power Generation System Production Base (Nanjing TICA Thermal Technology Co., LTD.) founded

2015

National-recognized enterprise technology center; Global strategic joint capital cooperation with United Technologies Corporation (UTC); ISO class 1 super-clean integrated system won the first prize of CMIST; TICA Osaka Institution founded

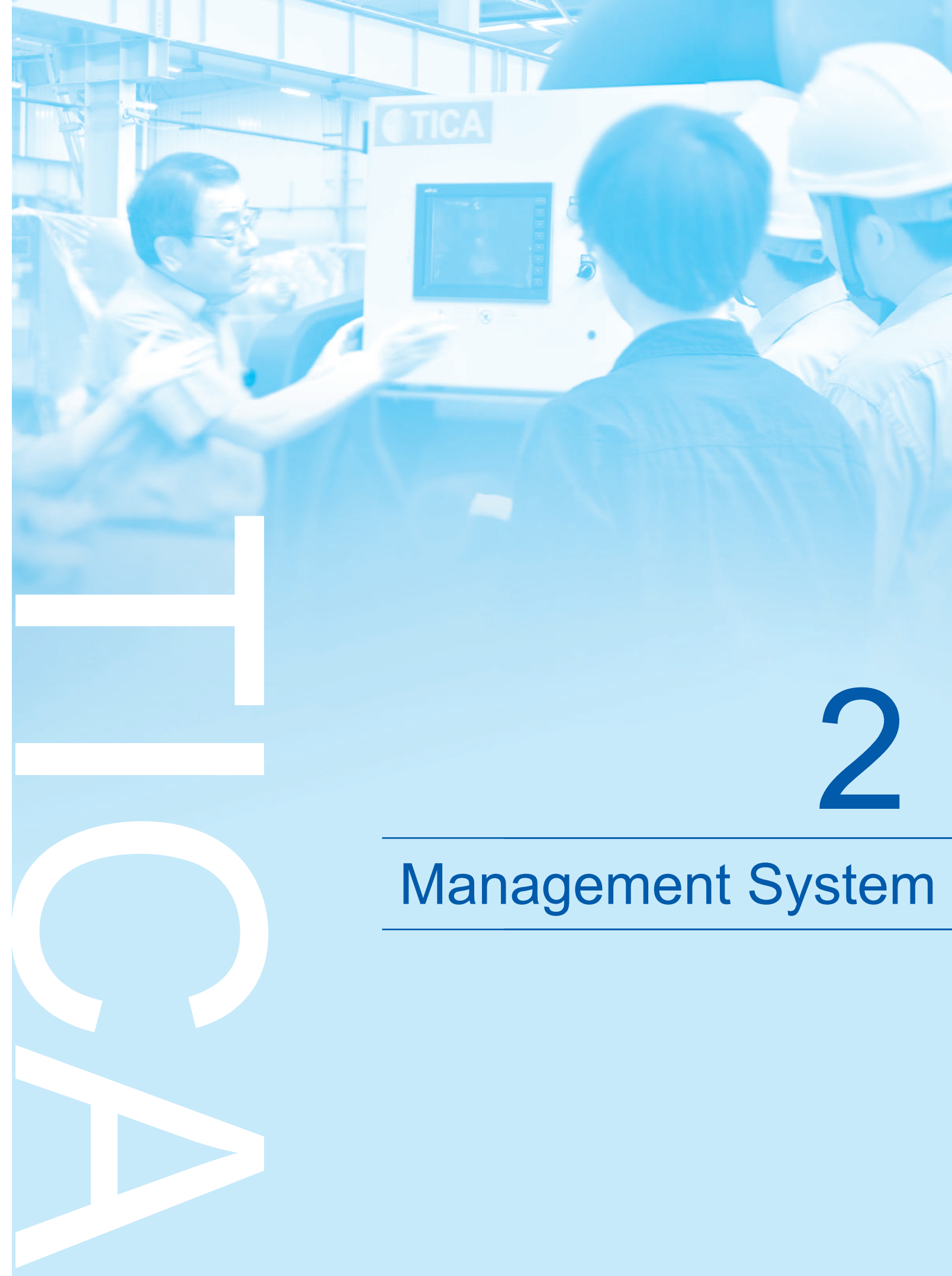
Honor and Awards



- ★ Individual Product Champion Enterprise Accredited by NMII (Only one in manufacturing sector), with the champion product of air handling unit
- ★ National Green Industry Building. No.001 in China (first one in China)
- ★ First enterprise to achieve the HCFC Phase-out Project in China
- ★ Vice Chairman Member of China Refrigeration and Air-conditioning Industry Association
- ★ Chairman Member of Clean Room Technology Committee, CRAA



- ★ National-Recognized Enterprise Technology Center
(Jointly certified by the National Development and Reform Commission, Ministry of Science and Technology, Ministry of Finance, General Administration of Customs, and State Administration of Taxation)
- ★ Enterprise Academician Workstation
- ★ Postdoctoral Programme
- ★ Awarded Nanjing Mayor Quality Prize in 2016
- ★ Jiangsu Manufacturing Outstanding Contribution Award in March 2017 published on a government notice (Smart Manufacturing Enterprise)



2

Management System



About the ACE from UTC

ACE is the operating system in UTC, which has gradually evolved from the concept of lean manufacturing.

ACE enables all UTC employees to do their work using very simple tools and to ensure to consistently deliver benefits to our customers and to improve value flow. The core elements of ACE are culture, ability and tools.



Introduction of Amoeba Management Model

“ The Process to Cultivate People ”

Kazuo Inamori



Purpose	Process	Results
Total participation as all staff behaving like owners (key personnel)	Small units (10~20 persons/financial unit) Visualization of all business costs Make clear of figures on the account book Consistency between physical existence, document and money flow Cross checking	Transparency (Striving for market competitiveness)



Ten-Years Quality Enhancement Program

TICA has introduced a Japanese management team to implement the very fundamental management in terms of 5S, standardization, workflows and execution capability, and improves the overall human quality from top managers to workers, with the aim of enhancing the TICA quality to reach and exceed the Japanese manufacturing standard.

TICA Quality = Made in Japan

3

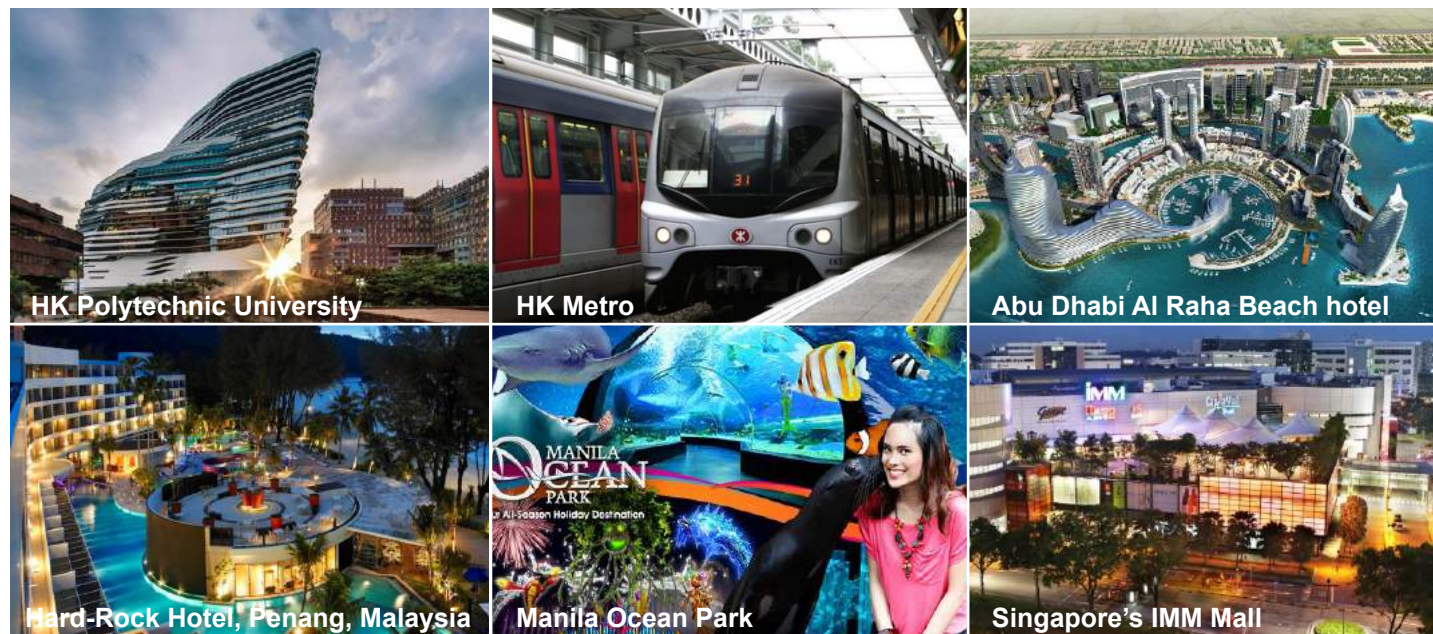
Industry Niche

Reference Projects



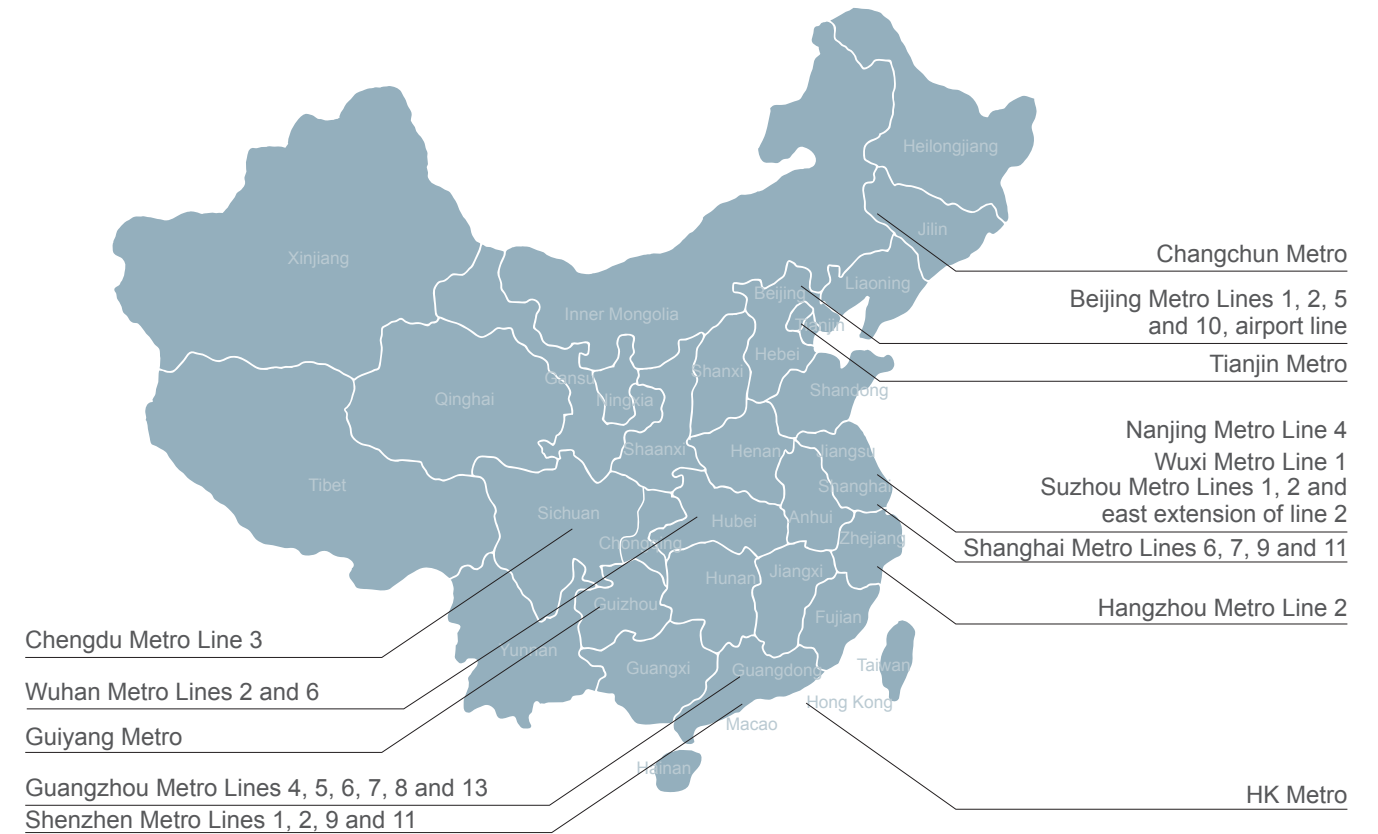
Prestigious Projects in Overseas Market

Sold to more than 50 countries and regions, including Russia, Chile, Singapore, Georgia, Malaysia, UAE, Iran and Philippines, etc



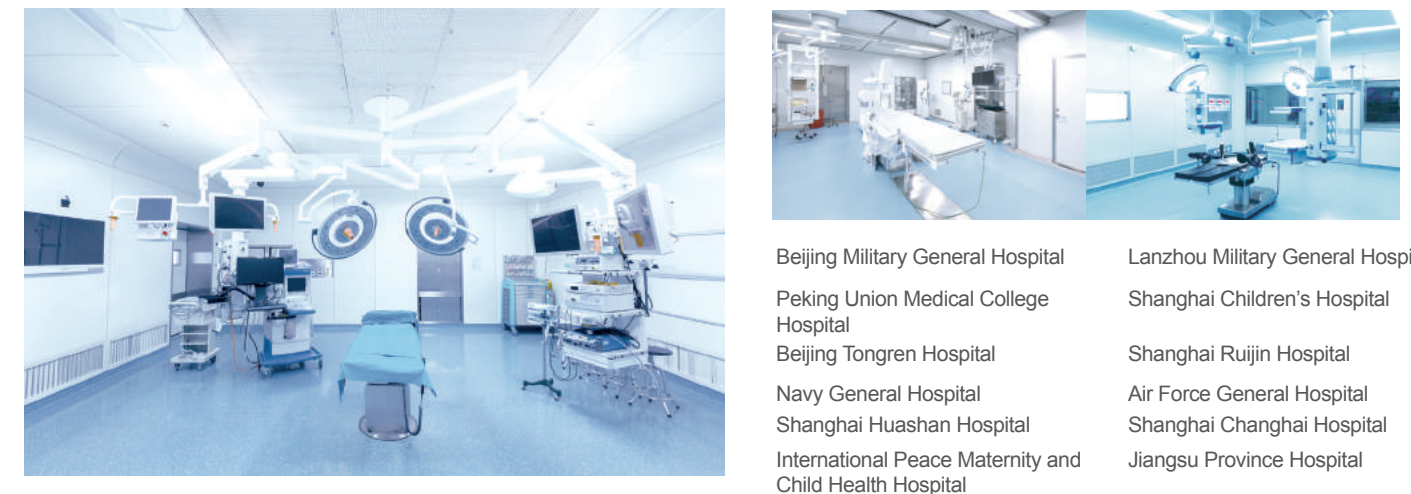
Metro Line Sector

The largest central air conditioning supplier of China Metro
Serving 37 lines in 13 cities



Clean Room Application in Operation Departments of Hospitals

The largest supplier of integrated clean room equipment for operating room in China
Serving over 4000 Grade-A Class 2 and Class 3 hospitals



Clean Room Application in Electronic Industry

The largest supplier of clean room equipment in China
Serving over 1000 electronics enterprises



Clean Room Application in Bio-pharmaceutical Industry

The largest supplier of clean room equipment in China
Serving over 2000 GMP-certified pharmaceutical facilities



Clean Room Application in Paint Shops Sector

The best supplier of clean room equipment for paint shops in China
Serving famous automobile brands



4

Basic Management and Globalization



TICA & UTC Global Strategic JV

On October 9, 2015, official signing of the legal JV Agreements with United Technologies Corporation (UTC)

UTC will provide TICA with advanced global leading core technologies, such as cryogenic power system (ORC), centrifugal and screw chiller, to enable TICA's centrifugal technology ahead of its peers for two decades and its ORC technology for three decades. Both parties will integrate the global networks to come up with a new market strength.

 **UTC Aerospace Systems**
Where ingenuity takes off
UTC Aerospace Systems

 **Pratt & Whitney**
A United Technologies Company
Pratt & Whitney



The largest supplier of HVAC and refrigeration equipment in the world

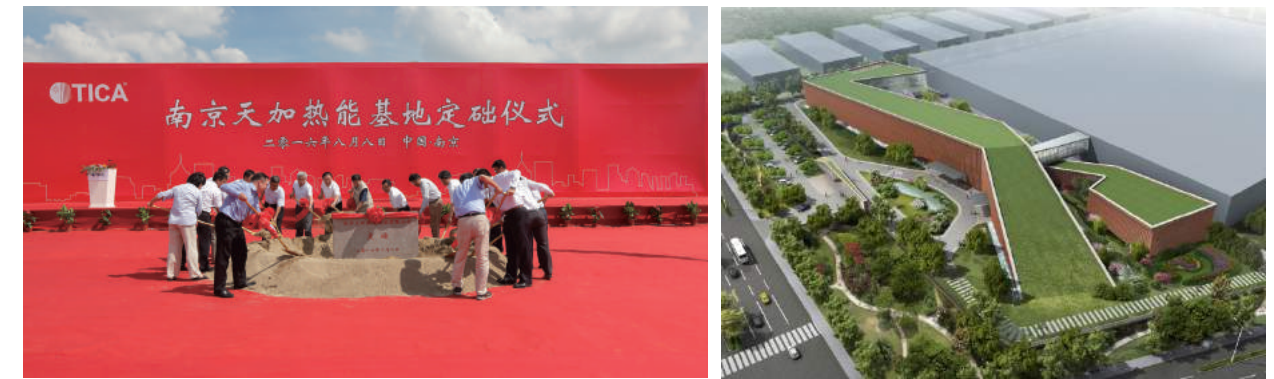


The largest supplier and service provider of elevator and escalator in the world

August 8, 2016

China's biggest ORC Low-temp Power Generation System Production Base (Nanjing TICA Thermal Technology Co., LTD.) founded

TICA Pure Cycle-ORC low-temperature power generation technology achieved industrialization.



TICA has gained all the patents concerning ORC system integration and its core parts, which include over 50 patents, over 30 pending patent applications, and over 20 copyrights, covering more than 20 countries and regions. At present, TICA has owned completely independent intellectual property rights of PureCycle power generation technology.

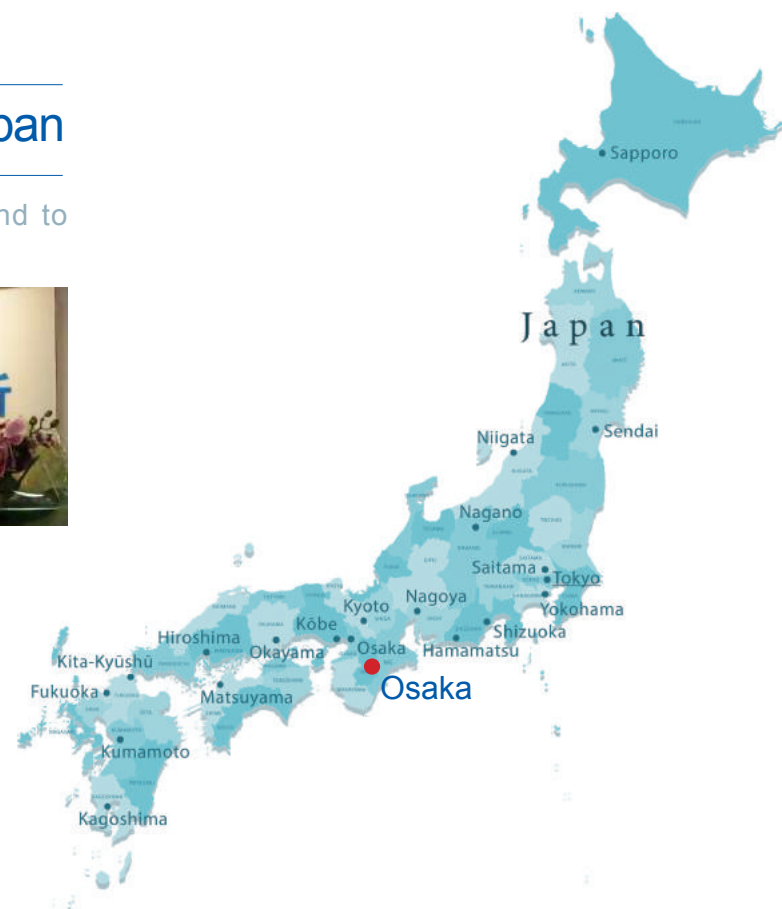


TICA R&D Institute in Osaka, Japan

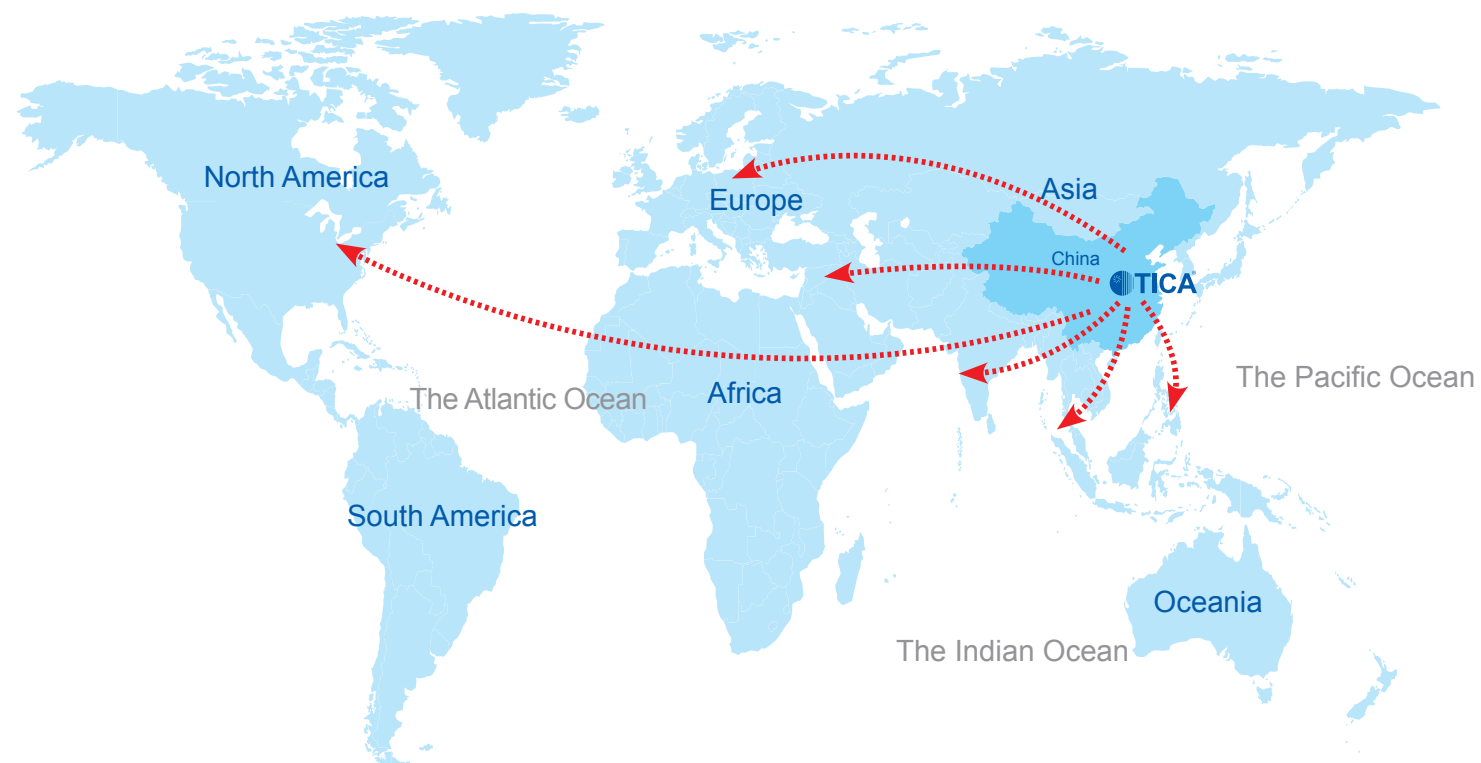
The first Chinese central air conditioner brand to establish R&D institute in Japan



Engaged in advanced research on technologies of VRF, heat pump water heater, cryo-refrigeration, heat pump, professional ACU, air purifier, etc; utilizing talents in Japan to promote the development of Chinese central air-conditioning technology.



TICA will establish research centers and production bases in the USA and Europe.



5

R&D and Manufacturing Capability

CNAS-certified Enthalpy Difference Labs



The largest in HVAC industry
In accordance with GB, IEC, TUV and CSA standards, adhering to the principles of impartiality, independence and scientific standards as well as people-oriented.



Environmental Control Lab



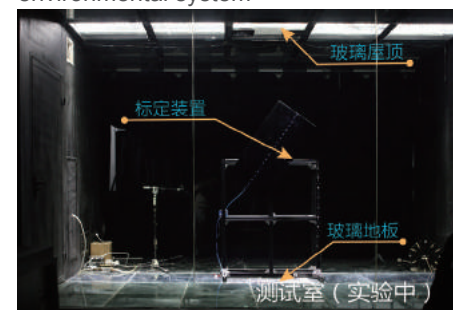
ISO class 1 ultra clean integrated environmental system



Integrated purification for operating room



Air purification analytical lab



Indoor air flow filed visualization and measurement system



The largest air volume test platform in the industry (120,000 m³/h)



Noise Laboratory

Testing Benches for Central AC



2000RT Water-cooled Chiller Test Lab



350RT Air-cooled Chiller Test Lab



100Hp Long-running reliability lab (water)
150Hp Long-running reliability lab (fluorine)



Highway transportation simulation test platform



Lowest in industry of -30°C snowfall simulation lab
55°C ~ -25°C Temp. simulation lab



Raining simulation lab





ISO class 1 ultra clean integrated environmental system



ISO class 1
ultra clean integrated
environmental system

Widely applied in

- Large nanoscale integrated circuit board
- Large flat-panel displays
- Pharmaceutical industry
- Advanced operating theatre
- Graphene industry
- Laser fusion

Leading the technological development of the industry; China's first system up to the highest national standard
Winner of the 1st Grade Tech-Progress Award CMIF in 2015

Report of ISO/TC 209 WG13 Visit and Remark on
Ningbo TICA ISO Class 1 Super Clean Environment System

ISO/TC 209 Working Group WG13 on cleanroom design, meeting was successfully held in Ningbo, China on July 17th and 18th. After the meeting, the members of ISO/TC 209 WG13 issued the inspection report of TICA ISO Class 1 super clean environment. The report confirmed that TICA's cleanroom construction in the system design, construction, independent test and qualification, and use of all the components to the experts. The report also pointed out the areas for improvement. After the discussion, all the experts were very impressed with the standard of cleanliness of the Cleanroom and agreed that it was the highest international standard of cleanliness for cleanroom design. The report signed the report of ISO/TC 209 WG13 Visit and Remark on Ningbo TICA ISO Class 1 Super Clean Environment System.

No.	Name	Time	Signature
1	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
2	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
3	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
4	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
5	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
6	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
7	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
8	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
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18	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
19	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	
20	Chairman	Time: 10:00 AM, 18/07/2015, Ningbo	

Accredited by international clean room experts from China, USA, UK, France, Italy, Netherlands, Korea and Ireland, the system has been acclaimed to achieve the highest international standard, which will help to drive the corresponding technological improvement.

First-class manufacturing facilities

- China's most advanced VRF line based on Japanese technology
- Japan Murata sheet metal fabrication center
- Germany Wagner fully automatic spraying line
- CombiCut plasma cutting machine;
- Self-built central gas/liquid transport zone



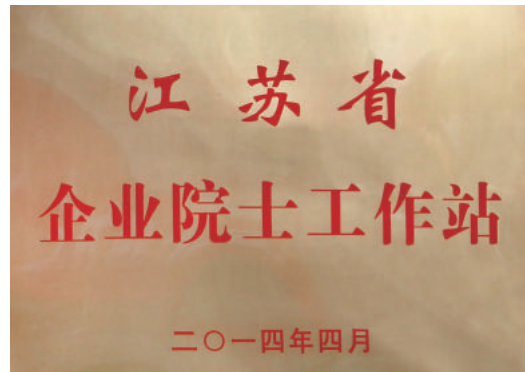
R&D Capability

Enterprise Academician Workstation

Work with academician Tao Wenquan (Xi'an Jiaotong University School of Energy and Power Engineering) on workstation

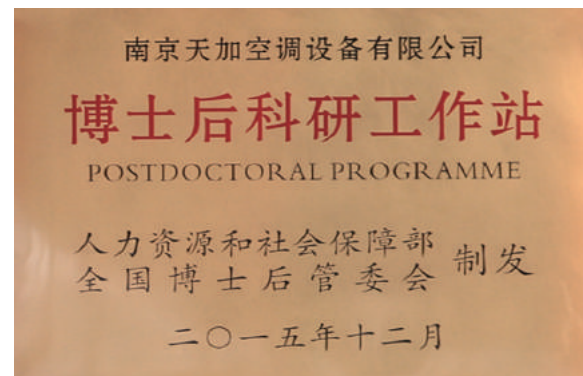
TICA Postdoctoral Programme

TICA established a Postdoctoral Programme under approval by the Ministry of Human Resources and Social Security and the National Postdoctoral Management Committee to carry out the postdoctoral research work and cultivate postdoctoral talents, putting up a bridge for high-tech talents and enterprises of China.



Tao Wenquan

Academician of Chinese Academy of Sciences
President of Xi'an Jiaotong Liverpool University
Vice Chairman of Chinese Society of Engineering Thermophysics
Director Member of Higher Education Thermal Engineering Course Teaching Committee under Ministry of Education
Vice Director Member of Energy Dynamics Course Teaching Guidance Committee under Ministry of Education
Vice Director Member of Heat and Mass Transfer Committee



Bases for Learning

More than 400 R&D engineers, accounting for 20% of total employees
With 12 Japanese experts, and will take in more from USA and Europe
Ministry of Human Resources and Social Security certified postdoctoral research workstation
Cooperation with Xi'an Jiaotong University/Tsinghua University/Southeast University/University of Shanghai for Science and Technology/Tongji University/Hefei General Machinery Research Institute for joint effort projects

 天津商业大学 TIANJIN UNIVERSITY OF COMMERCE	 清华大学 Tsinghua University	 上海交通大学 Shanghai Jiao Tong University
实习就业单位	校企合作单位	实践科学基地
 上海理工大学 SHANGHAI UNIVERSITY OF TECHNOLOGY	 南京工业大学 NANJING UNIVERSITY OF TECHNOLOGY	 同济大学 TONGJI UNIVERSITY
生产实习基地	教学实习基地	实践科学基地
 东南大学 SOUTHEAST UNIVERSITY	 西安交通大学 XI'AN JIAOTONG UNIVERSITY	 南京师范大学 NANJING NORMAL UNIVERSITY
生产实习基地	产学研合作基地	制冷空调实习基地
 南京理工大学 NANJING UNIVERSITY OF SCIENCE & TECHNOLOGY	 南京航空航天大学 NANJING UNIVERSITY OF AERONAUTICS AND ASTRONAUTICS	 南京工程学院 NANJING INSTITUTE OF TECHNOLOGY
生产实习基地	生产实习基地	校外实习教学基地

Core Technologies and Products



Core Technologies and Products

Air Side Products



1st and the 2nd grade tech-progress awards by CMIF No.1 in market share for 6 consecutive years



Commercial Products



Pioneer in China to use eco-friendly refrigerant
Top 3 in sales of modular air-cooled scroll chillers

Chiller Products



Water & air cooled full range line up
Top 3 in sales of water-cooled screw chillers

TICA Inverter Multi System

TIMS-ODU

TIMS-X
Combination modules

8-12HP



14-16HP



18-22HP



TIMS-AS+
Independent modules

8-12HP



14-16HP



18-22HP



26-32HP













Mini-VRF

10-16kW



TIMS-IDU

Model	Type	Photo	Capacity(kW)																											
			2.2	2.5	2.8	3.2	3.6	4	4.5	5	5.6	6.3	7.1	8	9	10	11.2	12.5	14	16	19.5	25	25.5	28	41	45	52	56	62	79
TMCF	Round Flow cassette				●		●		●	●	●	●	●	●	●	●	●	●	●											
TMCS	One way cassette				●		●		●		●		●																	
TMCD	Two way cassette				●		●		●		●		●	●	●	●	●	●	●											
TMDN-AC	Slim duct		●	●	●	●	●	●	●	●	●	●	●																	
TMDN-AB	Low ESP duct		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●										
TMDH-AB	High ESP duct															●	●	●	●											
TMVX	Ceiling & Floor				●		●				●		●		●		●	●	●											
TMVW	Wall-mounted				●		●	●			●	●	●																	
TMDH-AI	Big Capacity duct																			●		●		●		●		●	●	
TMDF	Fresh air processor																				●		●		●		●			

Air-Side Products



Ceiling Concealed FCU



High Pressure Ceiling
Concealed FCU



Floor Standing FCU



Cassette FCU



DX Modular Air
Handling Unit



Modular Air Handling Unit



Standard Air Handling Unit
— Ceiling Type



Standard Air Handling Unit
— Horizontal Type



Standard Air Handling Unit
— Vertical Type

Chiller Products



Air Cooled Screw Chiller (cooling only)



Water Cooled Modular Chiller
(Cooling Only)



Water Cooled Flooded Screw Chiller
(Cooling Only)



Water Cooled Centrifugal Chiller
(Cooling Only)



Air Cooled Mini Chiller
(cooling only/Heat Pump)



Water Cooled Package Floor
Standing (R22)

Commercial Products



Air Cooled Modular Chiller
(cooling only/Heat Pump)



Rooftop



Outdoor Units



Air Source Heat Pump
Water Heater



Water Source Heat Pump



Ducted Type

Commercial Unit



Cassette Type



Standard Air Cooled Ducted Type AC



Purifying Air Cooled Ducted Type AC



Water Cooled Modular Chiller
(Cooling Only)



Fresh Air Cooled Ducted Type AC



Air Cooled Cabinet Type AC

Centrifugal Chiller of International Standard

Water Cooled Centrifugal Chiller/Water Cooled Screw Chiller



TICA Pure Cycle-ORC Low-temperature Power Generation Technology

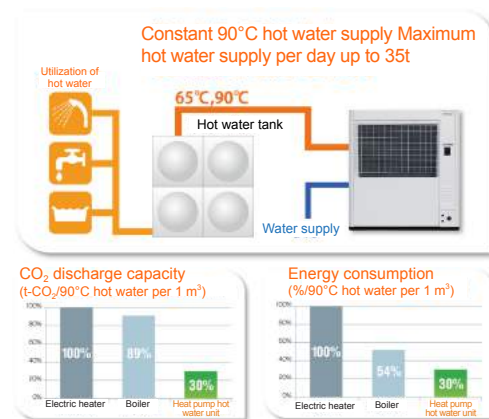
ORC technology ahead of its Chinese peers for 30 years

TICA ORC heat to electricity conversion efficiency up to 10-23%, while, 5~6% by Japanese screw expander and 4~5% by Chinese counterparts

Natural Refrigerant CO₂ Heat Pump Hot Water Unit



Technology license of MAYEKAWA (Japan)



Ferrous metallurgy



Chemical petroleum



Thermoelectric nuclear power



Cement building materials



Fertilizers



Printing & dyeing, and papermaking

- Through transforming low-grade waste heat energy into high-quality electric energy, the Pure Cycle series ORC power generation systems of TICA can be widely used for waste heat recovery and power generation in the high energy consumption industries such as ferrous metallurgy, chemical petroleum, thermoelectric nuclear power, cement building materials, fertilizers, pharmacy, printing & dyeing, and papermaking.
- Geothermal power generation integrated system
- Solar-thermal power generation integrated system

TIMS Purifying Series VRF

Japanese R&D + Japanese configuration +
Japanese management

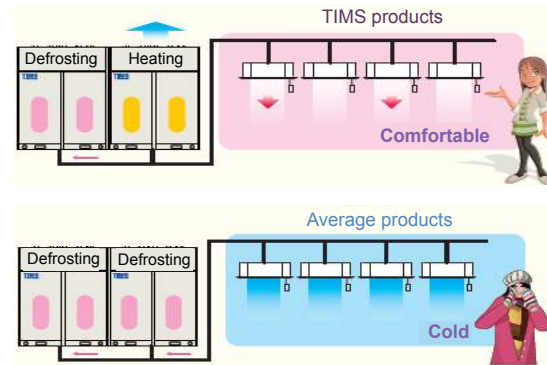
No capacity attenuation for heating at -15°C

- Enhanced heating performance especially suitable for northern area, leading changes in heating technology and reducing haze
- No capacity attenuation at -15°C
- First Chinese VRF brand not to require an electric heater for heating at low temperature



Non-stop heating & defrosting technology

- Based on the technology from Japanese experts, the gaps between Chinese VRF and Japan have narrowed
- Industry-leading, and first Chinese brand that utilizes the technology



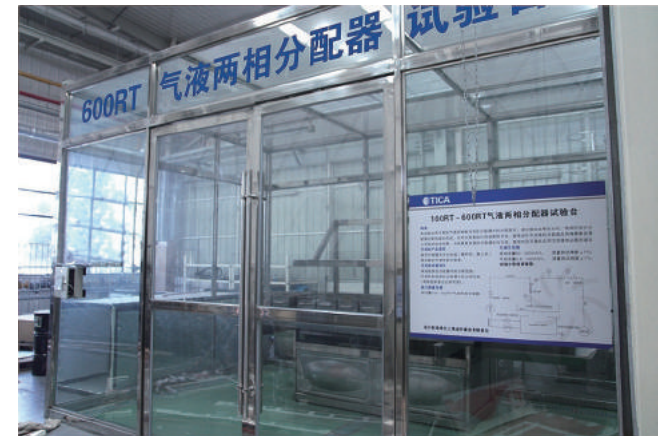
Reduce PM2.5 and indoor chemical pollution

- Return air purification unit, with filtration efficiency of PM2.5 up to 96% (2h)
- Formaldehyde filtration efficiency up to 90% (1h)
- Fresh air and haze purification unit, with double filtration and two functions in one unit

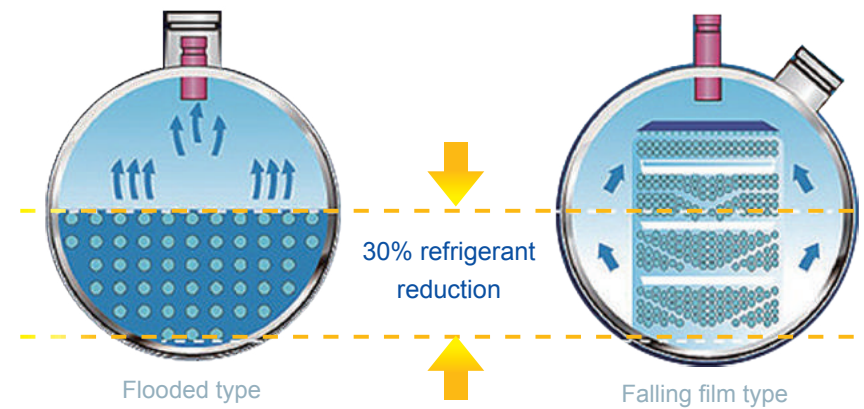


Falling Film Evaporation Technology of Screw Chiller

- CFD simulation design enables to spray refrigerant evenly on heat exchange tube to form a fluid film, hence to improve the heat transfer performance while reducing the consumption of refrigerant
- 10% increase in product performance, 30% reduction in refrigerant consumption
- Winner of China's energy-saving product certification



TICA innovative 600RT vapor-liquid distributor simulation test bench





TICARE

Considerate Services

Advanced Data Center for After Sales Services

The service centre takes the customers to the era of Cloud computing that provides real time data monitoring, defects analysis with suggested solutions, customized maintenance, as well as remote hosting services, to ensure normal operation of its centrifugal chillers, screw chillers, VRF units and ORC low-temperature power generation system.



7

After-sales Service

TICA

Air-conditioning system
integration solutions

An expert in HVAC and
Internet of Things





T

Technology

TICA strives to master the core technology and persists in continuous improvement to offer best products to the customers.
TICA people always have the aspiration for perfection.

I

Intelligence

TICA is committed to enhancing the level of intelligence and to powering the management system with comprehensive information technology.

C

Collaboration

TICA emphasizes teamwork and welcomes working with others.
The cooperation with UTC is just a reflection of such spirit.

A

Art

Like a craftsman dedicated to mastery, we strive for perfection on our products and are committed to offering quality products.



TICA

We are endeavoring to be better

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