TICA®

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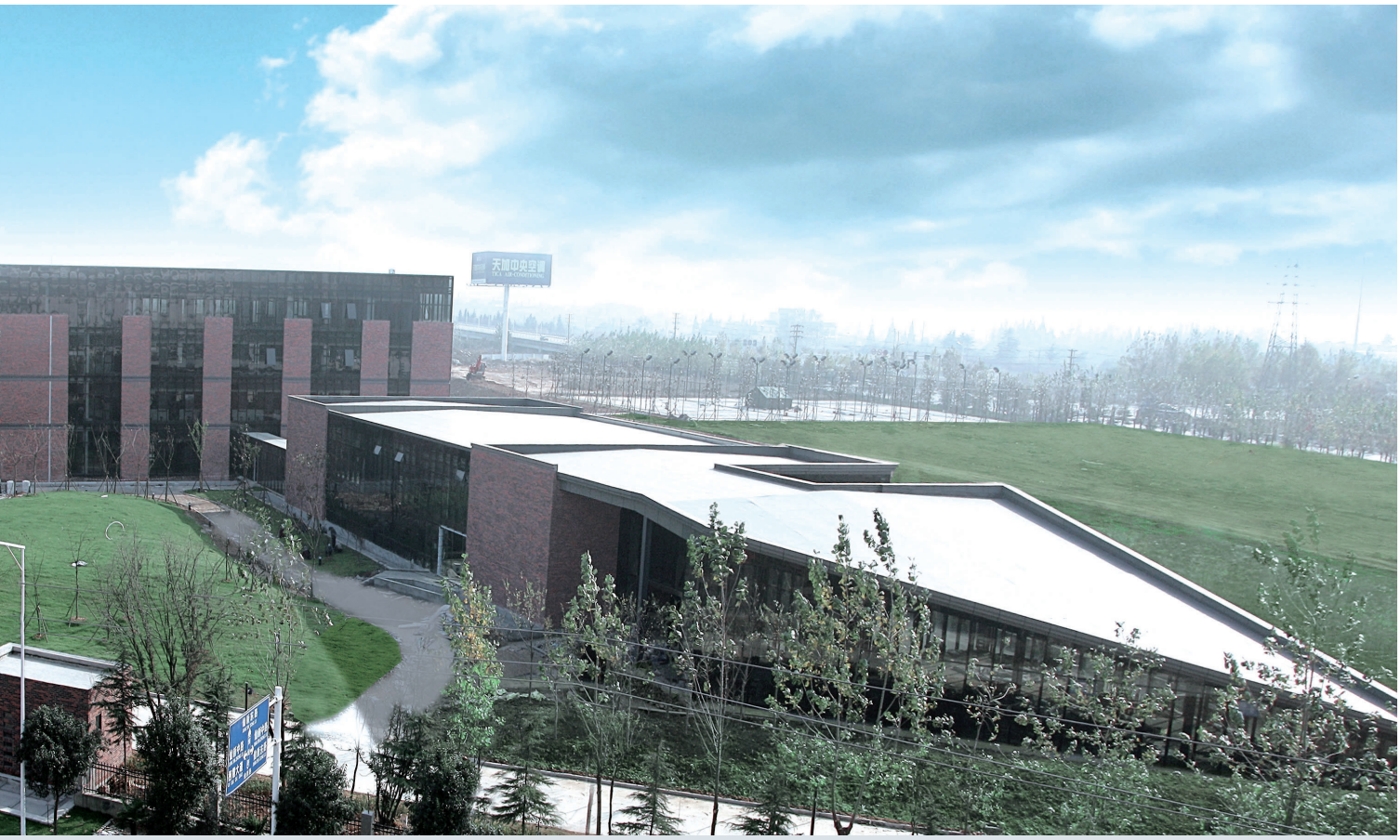
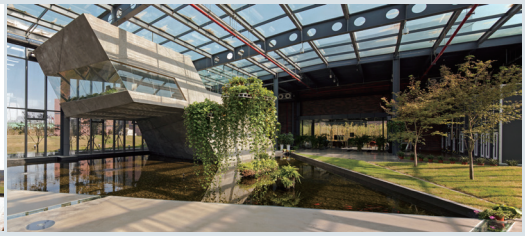
# TICA Central Air Conditioner

## Air Conditioning Solutions For Green Hospital

FORM No. C0116G01


# TICA





# About Us

TICA is a national high-tech enterprise integrating R&D, manufacturing, sales and service of central air-conditioning and refrigeration equipment. As the vice chairman unit of the China Refrigeration and Air-Conditioning Industry Association and the director unit of the Clean Room Technology Committee of the China Refrigeration Industry Association, our air-conditioning products have strong competitiveness in the market. Our products are widely used in a variety of purification sites such as global microelectronics, biopharmaceuticals, automobile manufacturing, aerospace, and clean operating rooms. The market share of our purification-type air handling units has been ranked first in China for many years.

TICA invested RMB 600 million in the first phase to build the highest-level central air-conditioning manufacturing base in China. Nearly 20 national-level laboratories in our test center have been certified by the China National Accreditation Service for Conformity Assessment (CNAS) and will be built into a national-level public service platform for development.

It's our mission to improve the world with quality products. We know that China is a big manufacturing country rather than a powerful one. To this end, TICA has implemented a “Quality Improvement Plan” and introduced a Japanese senior management team to start with basic management work such as 5S, standardization, process, and execution, so as to comprehensively improve the overall quality of the staff. Through years of hard work, TICA's products have reached the Japanese manufacturing quality level!

# We Understand Your Needs

As a place for treating patients, the hospital has to meet the most stringent design requirements among all civil buildings. To minimize postoperative infection and increase the success rate of surgery, each environment has strict requirements on temperature, humidity, cleanliness, bacterial concentration, and pressure difference control. The purifying air conditioning units must feature low air leakage rate, no dewing, good strength, easy cleaning, disinfection and sterilization. The cold source can achieve cooling throughout the year, with high stability and availability.

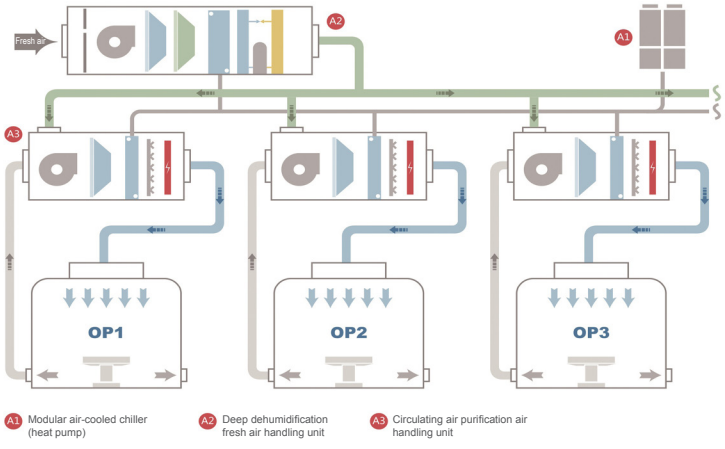
With many years' experience in medical purification, TICA is fully aware of the importance of the good surgical environment to the surgery success. Different surgeries and patients have different requirements for environmental temperature and humidity, cleanliness, airflow organization, and fresh air ratio. This requires targeted and diversified air conditioning solutions. TICA has been dedicated to the research and application of energy-saving solutions and products for air conditioning systems in hospitals, its product solutions serving thousands of hospitals across the country.

TICA is the first air conditioning manufacturer in China to build an "integrated system laboratory for clean operating rooms". With this integrated system, we have thoroughly studied the reliability, advancement and energy-saving effects of various solutions, aiming to provide hospitals with better green solutions.

# Contents

# Solution for Large- and Medium-sized Clean Operating Rooms

Double-cold-source temperature and humidity control system is a combination of chilled water cooling and deep dehumidification through direct refrigerant evaporation. Fresh air independently assumes the dehumidification function of the operating room; the circulating fan unit is used only for cooling to avoid energy waste caused by the traditional scheme in the way of heating and temperature adjustment after cooling and dehumidifying; the circulating fan unit is completely operating in dry conditions without risk of bacterial growth.




## An example of a clean operating room

| Cleanness class | Total energy consumption of traditional primary air return scheme | Total energy consumption of double-cold-source temperature and humidity control | Energy efficiency ratio |
|---|---|---|---|
| I | 82.6kW | 20.4kW | 75% |
| II | 45.2kW | 16.1kW | 64% |
| III | 27.0kW | 15.5kW | 43% |
| IV | 20.3kW | 12.2kW | 40% |

## Performance of air-conditioning equipment for large- and medium-sized clean operating rooms

| | |
|---|---|
| Multi-step energy regulation, independent running, and mutual standby | Low air leakage rate (L1), no cold bridge (TB1) |
| Meet the requirements of cooling above 0ºC and heating above -15ºC | Smooth inner wall, no dust, and convenient for cleaning and disinfection |
| Electronic expansion valve throttling, quick response, precise control, and constant cooling and heating water temperature | Certified by EUROVENT and AHRI certification, ensuring performance and quality |
| Fresh air dehumidification, no condensed water produced by circulating air, no bacteria breeding | Anti-freezing device equipped for the coil |

## Solution for air-conditioning equipment for large- and medium-sized clean operating rooms



### Modular air-cooled chiller (heat pump)

**Unit series:** TCA
**Air flow range:** 66-1040 kW

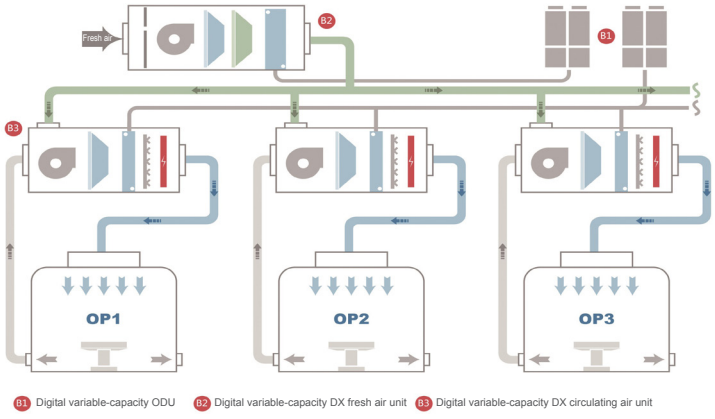
### Modular AHU

**Unit series:** TAC/TMC/TBC
**Air flow range:** 2000-20000 CMH

2

# Solution for Medium- and Small-sized Clean Operating Rooms

Digital variable-capacity direct expansion unit with separate control of temperature and humidity adopts the digital variable capacity direct expansion technology to achieve cooling and deep dehumidification through direct refrigerant evaporation. Fresh air independently assumes the dehumidification function of the operating room; the circulating fan unit is used only for cooling to avoid energy waste caused by the traditional scheme in the way of heating and temperature adjustment after cooling and dehumidifying; the circulating fan unit is completely operating in dry conditions without risk of bacterial growth. An outdoor unit can provide cold and heat sources for multiple indoor circulating fan units at the same time.




## An example of a clean operating room

| Cleanness class | Total energy consumption of traditional primary air return scheme | Total energy consumption of digital direct expansion unit with separate control of temperature and humidity | Energy efficiency ratio |
|---|---|---|---|
| I | 82.6kW | 19.8kW | 76% |
| II | 45.2kW | 15.7kW | 65% |
| III | 27.0kW | 15.1kW | 44% |
| IV | 20.3kW | 11.9kW | 41% |

## Performance of air-conditioning equipment for medium- and small-sized clean operating rooms

| | |
|---|---|
| Cooling and heating through direct refrigerant evaporation, and 10%-100%continuous energy regulation | No water pump or waterway system, no special maintenance, and no need for antifreezing treatment |
| Meet the requirements of cooling above 0ºC and heating above -15ºC | Fresh air dehumidification, no condensed water produced by circulating air, no bacteria breeding |
| Control integration, with RS485 and information panel communication interfaces | Low air leakage rate (L1), no cold bridge (TB1) |
| Compact structure, easy to install, and short construction period | Smooth inner wall, no dust, and convenient for cleaning and disinfection |

## Solution for air-conditioning equipment for medium- and small-sized clean operating rooms



Digital Variable-capacity Direct Expansion Unit

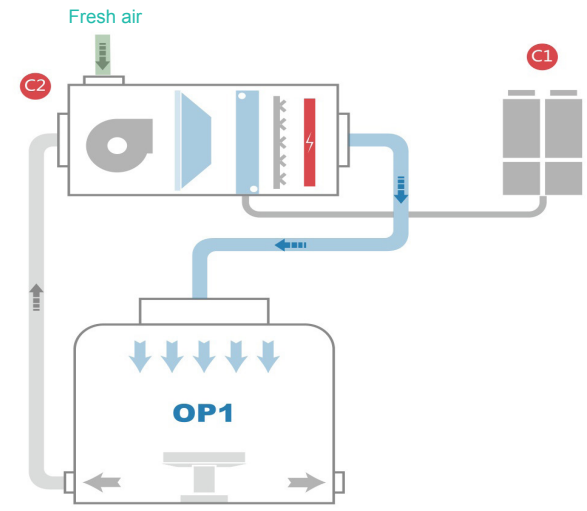
**Unit series:** TDMV/TAC/TMO/TBC

**Air flow range:** 2000-20000 CMH

3

# Solution for Small-sized Clean Operating Rooms

The direct expansion self-acquiring fresh air solution mixes fresh air and return air directly in the unit, and sends it to the room after filtering, purification, and heat-moisture treatment. This solution is suitable for small-sized clean operating rooms, operating room renovation and other purifying places.




C1 Air-cooled purifying type air conditioning outdoor unit

C2 Air-cooled purifying type air conditioning unit

## Performance of air-conditioning equipment for small-sized clean operating rooms

| | |
|---|---|
| Cooling and heating through direct evaporation, and precise regulation control | Compact structure, easy to install, and short construction period |
| Meet the requirements of cooling above 0ºC and heating above -15ºC | No water pump or waterway system, no special maintenance, and no need for antifreezing treatment |
| Control integration, with RS485 and information panel communication interfaces | Low air leakage rate (L1), no cold bridge (TB1) |
| Cooling and heating can be switched quickly, and heat pumps can be fully used for heating in transitional seasons. | Smooth inner wall, no dust, and convenient for cleaning and disinfection |

## Solution for air-conditioning equipment for small-sized clean operating rooms



Air-cooled direct expansion air conditioning unit

**Unit series:** TSA/TMO/TBC

**Air flow range:** 2000-20000 CMH

4

Fast cooling is required during cardiac surgery to meet the low temperature requirements during the operation. TICA adds a special rapid cooling device to the circulating fan unit, which can reduce the temperature of the operating room to below 18°C within 10-15 minutes, thus meeting he relative humidity requirements in the operating room.

# Solution for Cardiac Surgery Operating Rooms

## Performance of air-conditioning equipment for cardiac surgery operating rooms

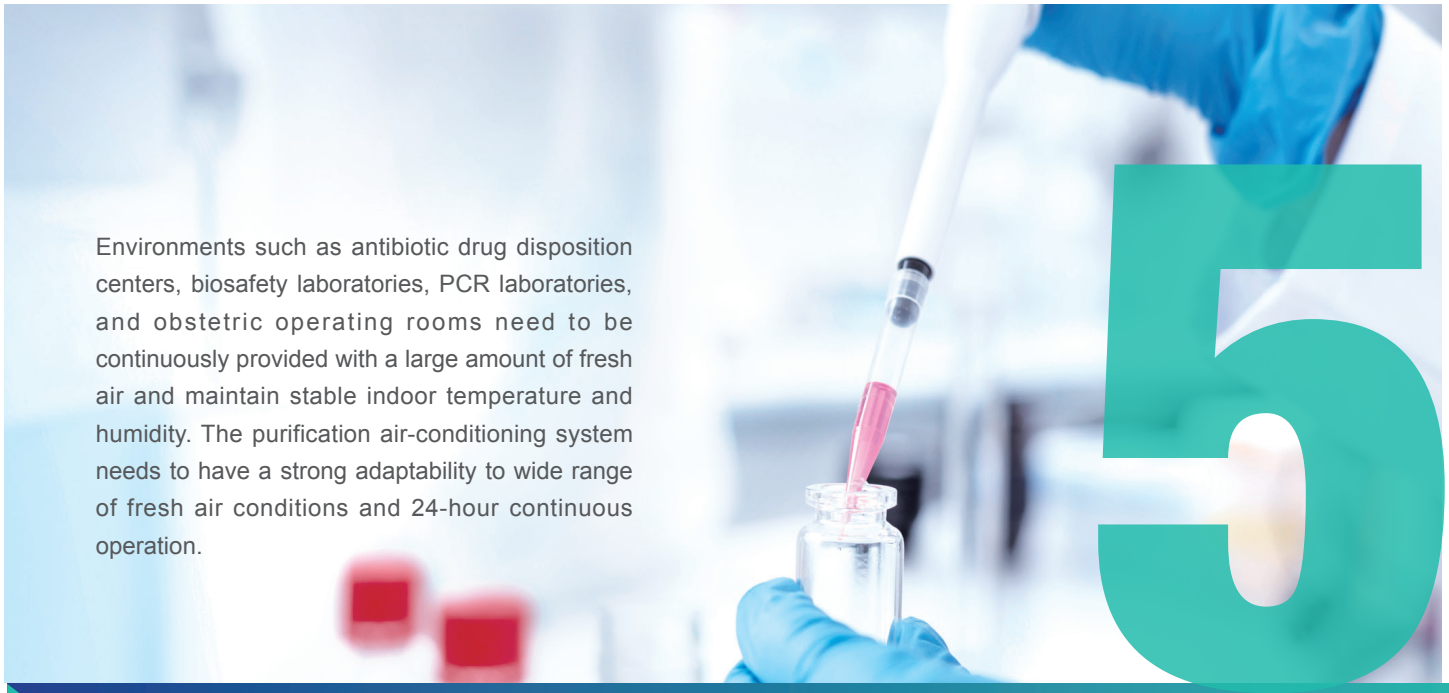
| | |
|---|---|
| Cooling/heating through direct evaporation, one-key start, and rapid cooling/heating | Compact structure, easy to install, construct, and maintain, and no need for coil antifreezing |
| Cooling and heating throughout the year | Low air leakage rate (L1), no cold bridge (TB1) |
| 8ºC ultra-low dew point, ensuring dehumidification capability | Smooth inner wall, no dust, and convenient for cleaning and disinfection |
| Control integration, with RS485 and information panel communication interfaces | Certified by EUROVENT and AHRI certification, ensuring performance and quality |

## Solution for air-conditioning equipment for cardiac surgery operating rooms

### Modular AHU

**Unit series:** TSA/TAC/TMC/TBC

**Air flow range:** 9000-13000 CMH



Environments such as antibiotic drug disposition centers, biosafety laboratories, PCR laboratories, and obstetric operating rooms need to be continuously provided with a large amount of fresh air and maintain stable indoor temperature and humidity. The purification air-conditioning system needs to have a strong adaptability to wide range of fresh air conditions and 24-hour continuous operation.

5

# Solutions for PIVAS, Biosafety Laboratories, PCR Laboratories, Obstetric Operating Rooms, etc.

## Performance of air-conditioning equipment for full fresh air conditions

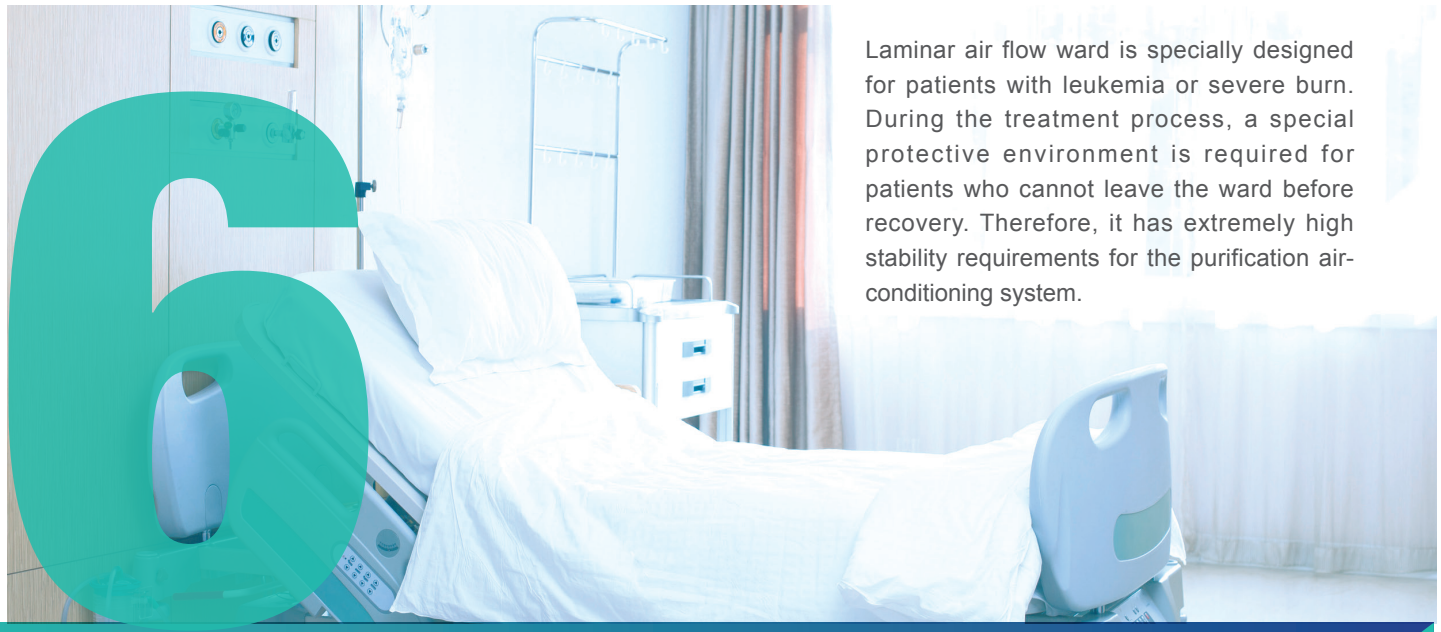
| | |
|---|---|
| Cooling and heating through direct refrigerant evaporation, 10%-100%continuous energy regulation, and precise control | Compact structure, easy to install, and short construction period |
| Meet the requirements of cooling above 0ºC and heating above -15ºC | No water pump or waterway system, no special maintenance, and no need for antifreezing treatment |
| Meet the needs of full fresh air, large temperature difference cooling, dehumidification, and heating and humidification | Low air leakage rate (L1), no cold bridge (TB1) |
| Control integration, with RS485 and information panel communication interfaces | Smooth inner wall, no dust, and convenient for cleaning and disinfection |

## Solution for air-conditioning equipment for full fresh air conditions

Digital variable-capacity direct expansion full fresh air constant temperature and humidity units

**Unit series:** TDMV/TBC

**Air flow range:** 1000-10000 CMH



Laminar air flow ward is specially designed for patients with leukemia or severe burn. During the treatment process, a special protective environment is required for patients who cannot leave the ward before recovery. Therefore, it has extremely high stability requirements for the purification air-conditioning system.

# 6 Solution for Laminar Air Flow Wards

## Performance of air-conditioning equipment for laminar air flow wards

| | |
|---|---|
| Performance of air-conditioning equipment for laminar air flow wards | Electronic expansion valve throttling, quick response, precise control, and constant cooling and heating water temperature |
| Prepare two fans and motors respectively (one for use one for standby) to guarantee 24-hour running. | Low air leakage rate (L1), no cold bridge (TB1) |
| Multi-step energy regulation, independent running, and mutual standby | Smooth inner wall, no dust, and convenient for cleaning and disinfection |
| Meet the requirements of cooling above 0°C and heating above -15°C | Certified by EUROVENT and AHRI certification, ensuring performance and quality |

## Solution for air-conditioning equipment for laminar air flow wards

### Modular AHU

**Unit series:** TAC/TMC/TBC
**Air flow range:** 6000-8000 CMH

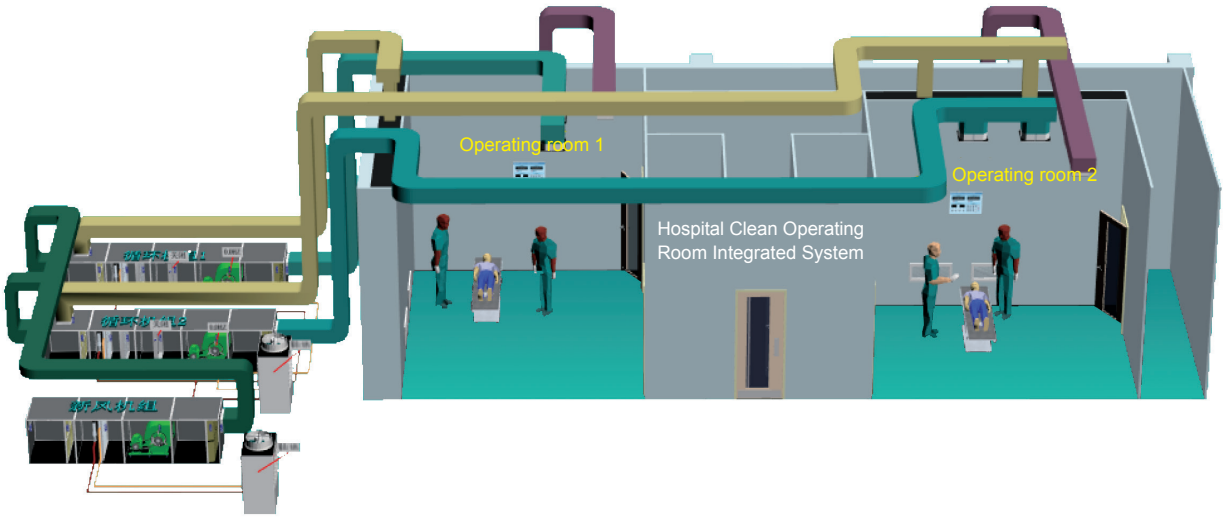
### Modular air-cooled chiller (heat pump)

**Unit series:** TCA
**Air flow range:** 66-1040 kW

# Control System

The automatic control level of medical environments such as operating rooms directly affects the success rate of operation. Therefore, it is extremely important to ensure the reliable running of the control system. A high-quality operation environment is important for improving the success rate of operation.

According to the requirements and running characteristics of the HVAC system in the clean room of hospitals, TICA adopts an industrial-grade controller as the core control element, and uses an industrial personal computer (IPC) as the upper computer to communicate with the PLC to realize the configuration and control of the entire control system, thus providing a complete set of control programs for hospital operating rooms.



# 8 Solution for Other Hospital Areas

## Air-cooled chiller (heat pump)

**Air flow range: 383-1173 kW**
**Product features:**

- Full heat recovery, cooling while providing free domestic hot water for the ward building
- Easy to install on the roof without occupying rooms
- Modular design with strong regulating ability

**Application scenarios:**
Hospital inpatient departments, outpatient departments, medical technology departments, etc.

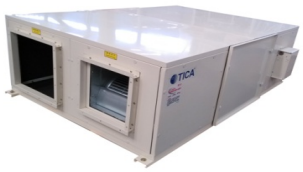
Manufactured under Carrier license

## Centrifugal chiller

**Air flow range: 1055-5276 kW**
**Product features:**

- High-efficiency compressor, few moving parts, high unit reliability, and low running noise
- Sharing of cutting-edge technologies in UTC's aircraft engine design and manufacturing in compressor's key components
- The patented AcouMeter flow adjustment system is adopted to ensure the superior integrated part load value (IPLV) of the unit
- Adopt the latest ultra-efficient heat transfer tube with good heat exchange performance
- Use environmentally leading HFC-134a refrigerant to improve the unit efficiency
- The high-voltage unit can be started directly

**Application scenarios:**
Hospital inpatient departments, outpatient departments, medical technology departments, etc.



## Fresh air ventilator

**Air flow range: 300-6000 CMH**
**Product features:**

- Higher efficiency: adopt the latest heat exchange core with Japanese technology
- Thinner unit: lower height and smaller size save installation space
- Easy maintenance
- Healthy and eco-friendly

**Application scenarios:**
Outpatient halls, consulting rooms, wards and other places that need to be supplemented with fresh air

## Return air purifier

**Air flow range: 340-2400 CMH**
**Product features:**

- Use with fan coil unit to ensure high quality of air in consulting rooms and wards
- Low resistance: 15 Pa @1.2 m/s
- High efficiency filtration: PM2.5 purification efficiency (60 minutes) > 99%; formaldehyde purification efficiency (60minutes) > 80%

**Application scenarios:**
Outpatient halls, consulting rooms, wards, etc.

## Air-cooled direct expansion constant temperature and humidity air conditioning unit

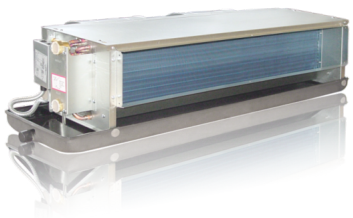
**Air flow range: 19-77.6 kW**
**Product features:**

- Simple system with independent cold source and rapid response
- Equipped with world's top components
- Friendly man-machine interface
- **Application scenarios:**
  Magnetic resonance rooms, nuclear medicine departments and medical technology departments that require temperature and humidity control

## Air handling unit

**Air flow range: 1000-15000 CMH**
**Product features:**

- Patented labyrinth seal structure, low air leakage rate, reaching European standard L1
- China's first national brand with EUROVENT & AHRI certifications
- **Application scenarios:**
  Fresh air treatment in outpatient halls, consulting rooms, wards, etc.



## Fan coil unit

**Air flow range: 190-2380 CMH**
**Product features:**

- **Various in forms:**
  Concealed or open installation, two-pipe or four-pipe system, three-speed motor, DC brushless, and multiple pressure options
- **Stable and reliable:**
  Use well-known fans, motors, integral water tray, and hydrophilic aluminum foil
- **Low noise:**
  The noise is over 3dBm lower than the national standard, especially suitable for consulting rooms and wards.
- **Application scenarios:**
  Outpatient halls, consulting rooms, wards, etc.


The University of Hong Kong – Shenzhen Hospital

# Model Projects

Peking University International Hospital

Tianjin Hospital of ITCWM Nankai Hospital

Shenzhen Eye Hospital

The Fifth People's Hospital of Wuhu

Civil Aviation General Hospital

Ningbo Women and Children's Hospital


Central Hospital Affiliated to Shenyang Medical College


Xiangya Hospital Central South University


The Affiliated Hospital of Qingdao University


Zhengzhou Children's Hospital


Shanghai Ruijin Hospital


The Fourth Affiliated Hospital of Harbin Medical University


Beijing Chaoyang Hospital


Zhangpu County Hospital


The First People's Hospital of Nanning


Navy General Hospital


The Fourth Military Medical University


Dongguan People's Hospital


Tianjin People's Hospital


Shandong Provincial Hospital

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