



Household Central Air Conditioning System & Hot Water Unit

Contents






PART **1** **Air-cooled Chiller Product Lineup**

PART **2** **Household Air-cooled Chiller**

PART **3** **Air Source Heat Pump Hot Water Unit**

PART **4** **CO2 Heat Pump Hot Water Unit**

PART1 **Product Lineup**

Household air-cooled chiller		Air-source heat pump hot water unit		CO2 Heat pump high temp hot water unit
12/14/16 kW (wall mounted type)	12/14/16/18/20 kW (Ceiling type)	14/21/42 kW Direct heating	18.6/38.5 kW Circulating heating	
				

PART 2 Household Air-cooled Chiller

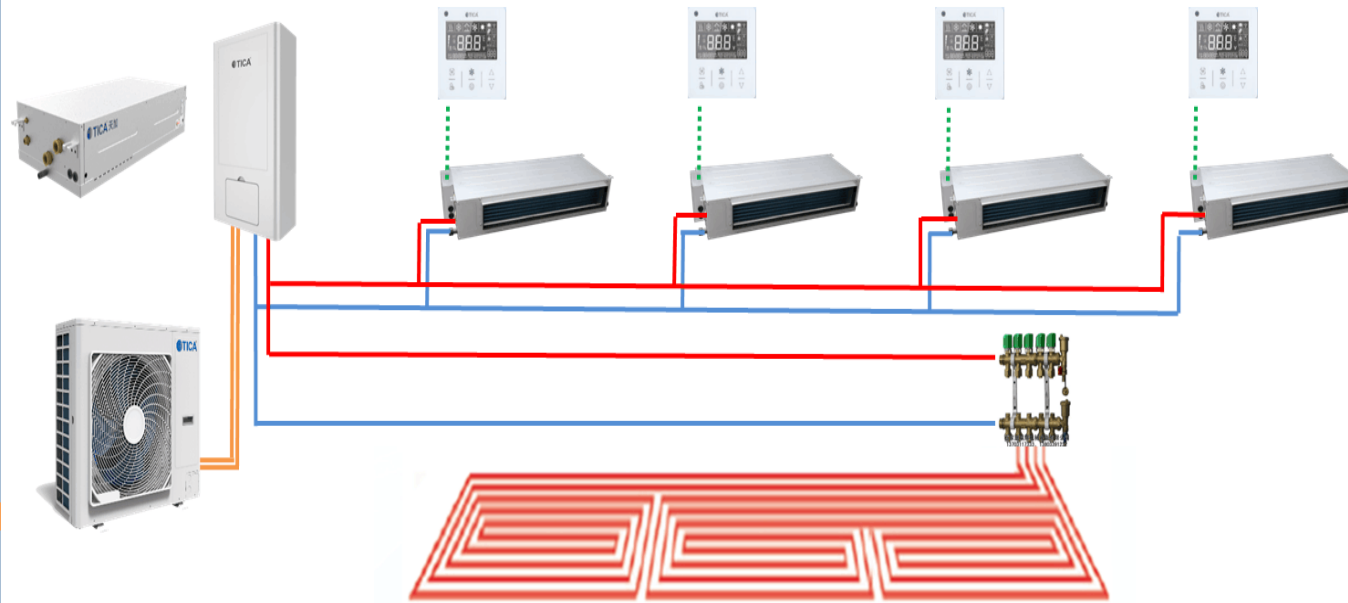
Unit Parameter-Wall Mounted Type

Wall mounted type	ODU	TSCA120FHL	TSCA140FHL	TSCA160FHL
	IDU	TSCI120FHL	TSCI140FHL	TSCI160FHL
Cooling capacity	Capacity(kW)	12	14	16
	Power input(kW)	4.03	4.74	5.52
	COP _c (kW/kW)	2.98	2.95	2.9
Heating capacity 1	Capacity(kW)	14	16	18
	Power input(kW)	4.18	4.85	5.45
	COP(kW/kW)	3.35	3.3	3.3
Heating capacity 2	Capacity(kW)	8.6	10.5	12.5
	Power input(kW)	3.58	4.46	5.38
	COP _h (kW/kW)	2.4	2.35	2.32
IPLV(C)		4.3	4.3	4.3
IPLV(H)		2.8	2.8	2.8
Circulate Water flow(m ³ /h)		2.06	2.41	2.75
Power supply		220V ~/50Hz	220V ~/50Hz	220V ~/50Hz
Ambient temp range(°C)	Cooling mode	16 ~ 48	16 ~ 48	16 ~ 48
	Heating mode	-25 ~ 25	-25 ~ 25	-25 ~ 25
Refrigerant/Charge volume		R410A/2.50kg	R410A/3.05kg	R410A/3.05kg
Sound level(ODU/IDU) (dB(A))		56/37	56/37	56/37

Unit Parameter-Ceiling Type

Ceiling type	ODU	TSCA120FHL	TSCA140FHL	TSCA160FHL	TSCA180FHL	TSCA200FHL
	IDU	TSCI120FHLD	TSCI140FHLD	TSCI160FHLD	TSCI180FHLD	TSCI200FHLD
Cooling capacity	Capacity(kW)	12	14	16	18	20
	Power input(kW)	4.03	4.74	5.52	6.2	7.1
	COP _c (kW/kW)	2.98	2.95	2.9	2.9	2.8
Heating capacity 1	Capacity(kW)	14	16	18	20	22
	Power input(kW)	4.18	4.85	5.45	6.1	6.9
	COP(kW/kW)	3.35	3.3	3.3	3.3	3.2
Heating capacity 2	Capacity(kW)	8.6	10.5	12.5	13.5	14.5
	Power input(kW)	3.58	4.46	5.38	5.62	5.83
	COP _h (kW/kW)	2.4	2.35	2.32	2.4	2.4
IPLV(C)		4.3	4.3	4.3	4.3	4.3
IPLV(H)		2.8	2.8	2.8	2.8	2.8
Circulate Water flow(m ³ /h)		2.06	2.41	2.75	3.1	3.44
Power supply	ODU	220V ~/50Hz	220V ~/50Hz	220V ~/50Hz	380V 3N 50Hz	380V 3N 50Hz
	IDU				220V ~/50Hz	220V ~/50Hz
Ambient temp range(°C)	Cooling mode	16 ~ 48	16 ~ 48	16 ~ 48	16 ~ 48	16 ~ 48
	Heating mode	-25 ~ 25	-25 ~ 25	-25 ~ 25	-25 ~ 25	-25 ~ 25
Refrigerant/Charge volumn		R410A/2.50kg	R410A/3.05kg	R410A/3.05kg	R410A/4.40kg	R410A/4.40kg
Sound level(ODU/IDU) (dB(A))		56/37	56/37	56/37	59/33	59/33

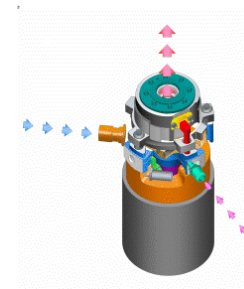
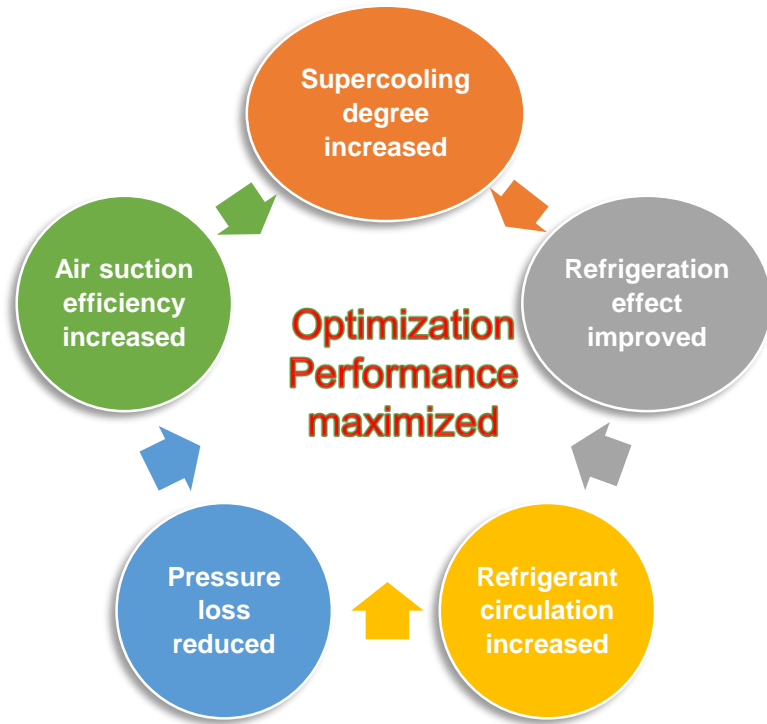
Air conditioning + Floor heating system



Mode :

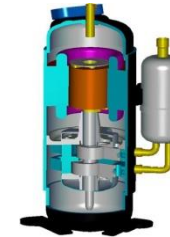
- ✓ Cooling (FCU)
- ✓ Heating (FCU)
- ✓ Floor heating (Floor heating pipe)
- ✓ Heating & Floor heating

Advantages of EVI Technology

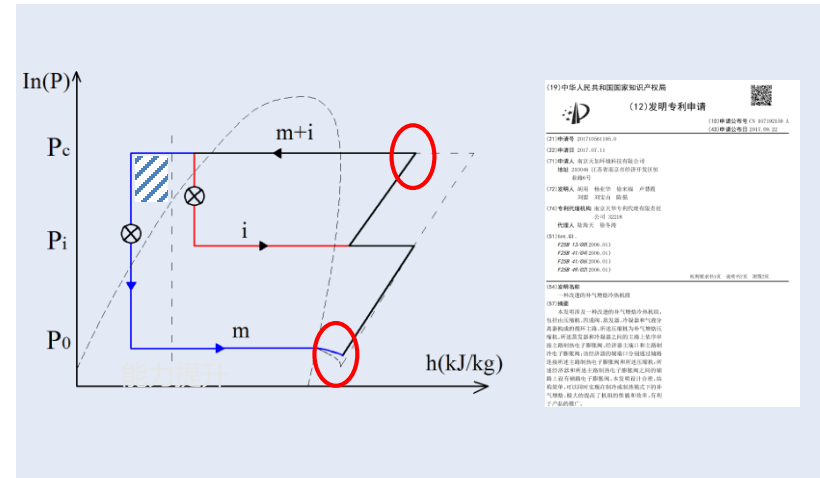


Scroll type + EVI

V.S.



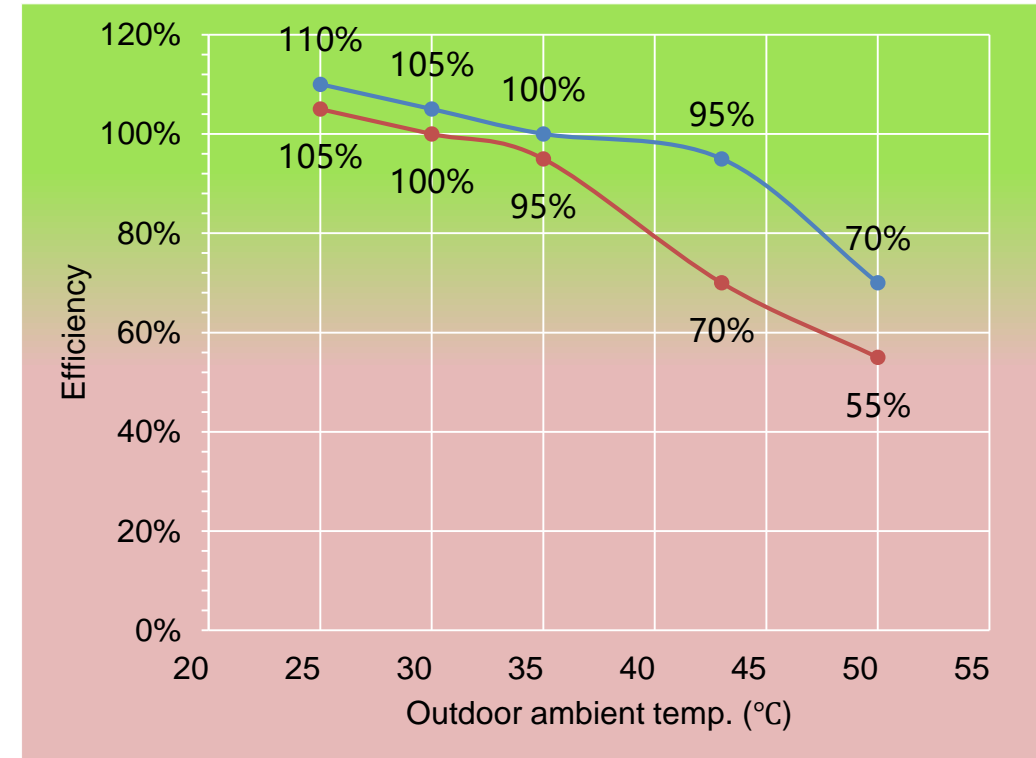
Common double rotor



Industry-leading Patented Full Operating-condition EVI Technology

Innovative use in **cooling**

- No heating capacity attenuation at **43°C, enjoy cozy air in summer**
- Cooling capacity increased by **15% at 50°C, effectively respond to extreme weather**
- Supercooling at **30°C, low noise of refrigerant flow, more stable control**

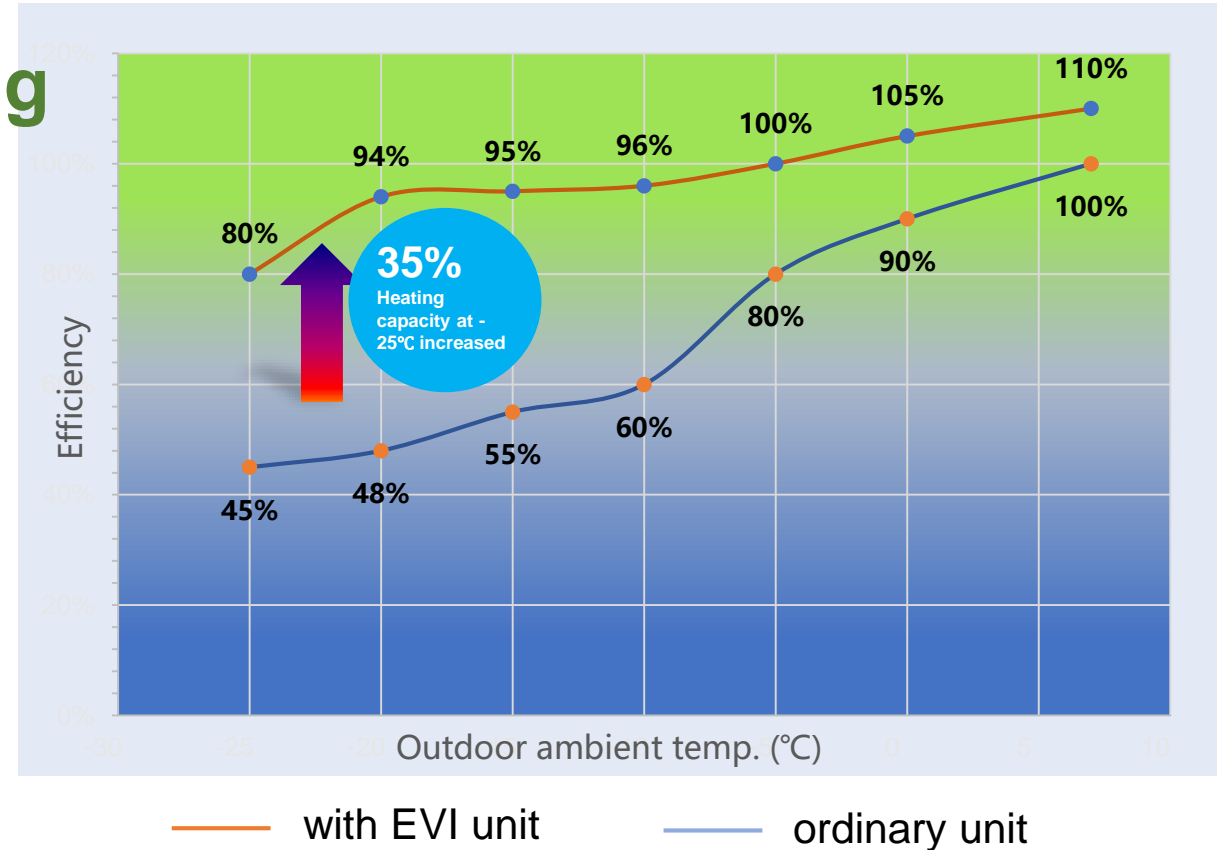


— with EVI unit — ordinary unit

Industry-leading Patented Full Operating-condition EVI Technology

Overall optimization in Heating

- No heating attenuation at **-20°C**
- Heating capacity increased by **35%** at **-25°C**, no electric heater required
Electric heater is not safe/not energy efficient/not comfortable
- Discharge temperature significantly reduced for enhanced operation reliability



Emerson Copeland full DC inverter scroll compressor is adopted to adjust unit running frequency based on load. (Unique to TICA)



Inverter compressor (Emerson Copeland)

01

Match-Well/Weiling inverter motor is configured, increasing the efficiency by 20% than common motors.



Inverter motor (Match-Well/Weiling)

02

Inverter water pump can automatically adjust the unit water flow based on load at the air side and the use status. (Unique to TICA)



Inverter water pump (Grundfos)

04

TICA self-developed compressor driver can better match the unit running efficiency, so as to substantially increase the operation reliability.



Advanced Inverter control

03



Shell and Tube Heat Exchanger Design

Item	Double-pipe type	Plate heat exchanger	TICA shell-and-tube heat exchanger
Heating efficiency	Good	Excellent ✓	Excellent ✓
Cooling efficiency	Poor	Excellent ✓	Excellent ✓
Water-side volume	Spread ✓	Small	Spread ✓
Water quality requirements	Low	High	Low ✓
Water resistance	Spread	Common	Small ✓
Cleaning frequency of the water filter screen	Low	High	Low ✓
Local freeze-damaged part	Good	Poor	Excellent ✓



Unique to TICA



✓ Anti-freezing split design

The unit adopts a split structure (**unique to TICA**). The water system can be installed indoors for anti-freezing.

Multiple anti-freezing measures of the unit can effectively prevent local damage to the water pipe in winter due to low temperature.

The unit supports anti-freezing check from aspects of ambient temperature, water temperature, and standby time, and allows for two sets of anti-freezing programs. Heating operation with the water pump and heat pump, no electric heater.



✓ Easy-to-install mini body

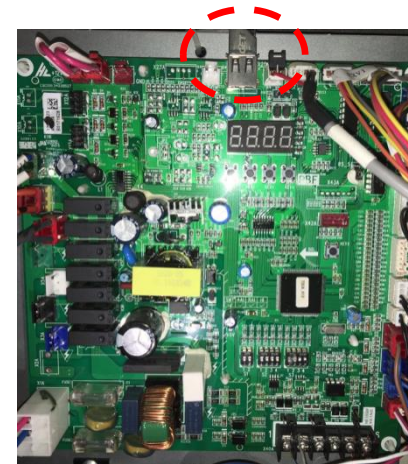
Single fan design, high-efficiency heat exchanging technology; compact and powerful. Unit height at small as **840mm (smallest in the industry)**, can be easily installed in small space such as under a bay window.

No need to reserve special space for installation; particularly applicable to high-rise flats.





Easy-to-maintain blackbox

- The blackbox can record various running parameters (failure code, expansion valve opening, unit frequency, water temperature, etc.) of the unit in real time manner. In case of a unit failure, data can be rapidly exported for diagnosis.
- The updated control program allows for more convenient use.



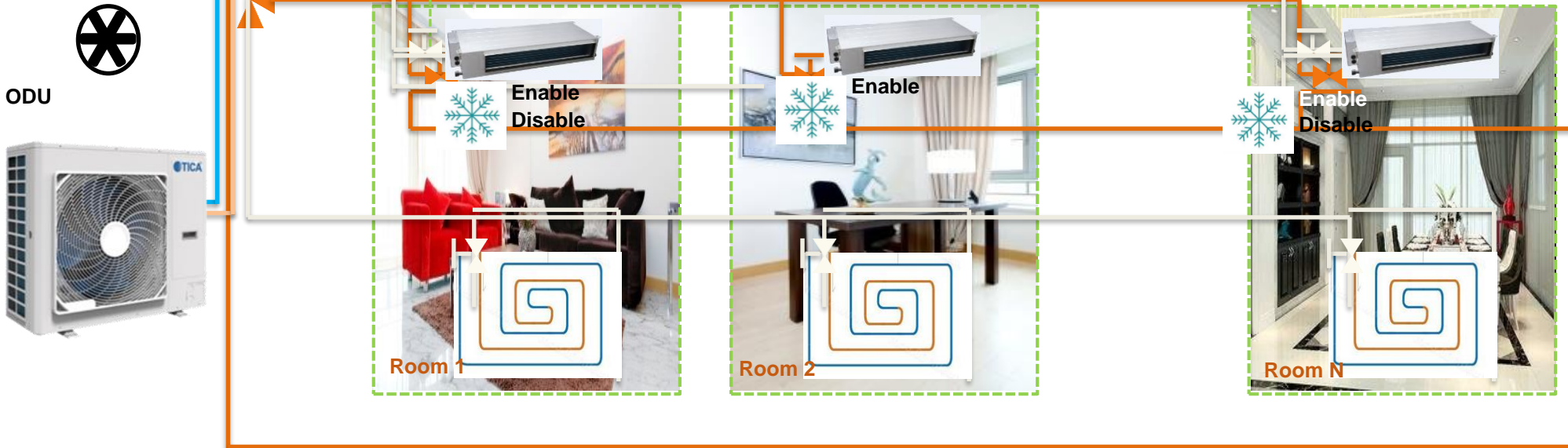
Colling control:

Intelligent control of the chiller and the air side devices, enhanced energy efficiency and comfort

IDU   **DC inverter water pump (5%-100% adjustable)**

Supports water pressure and flow monitoring

Normally open two-way valve
Full load cooling Partial load cooling



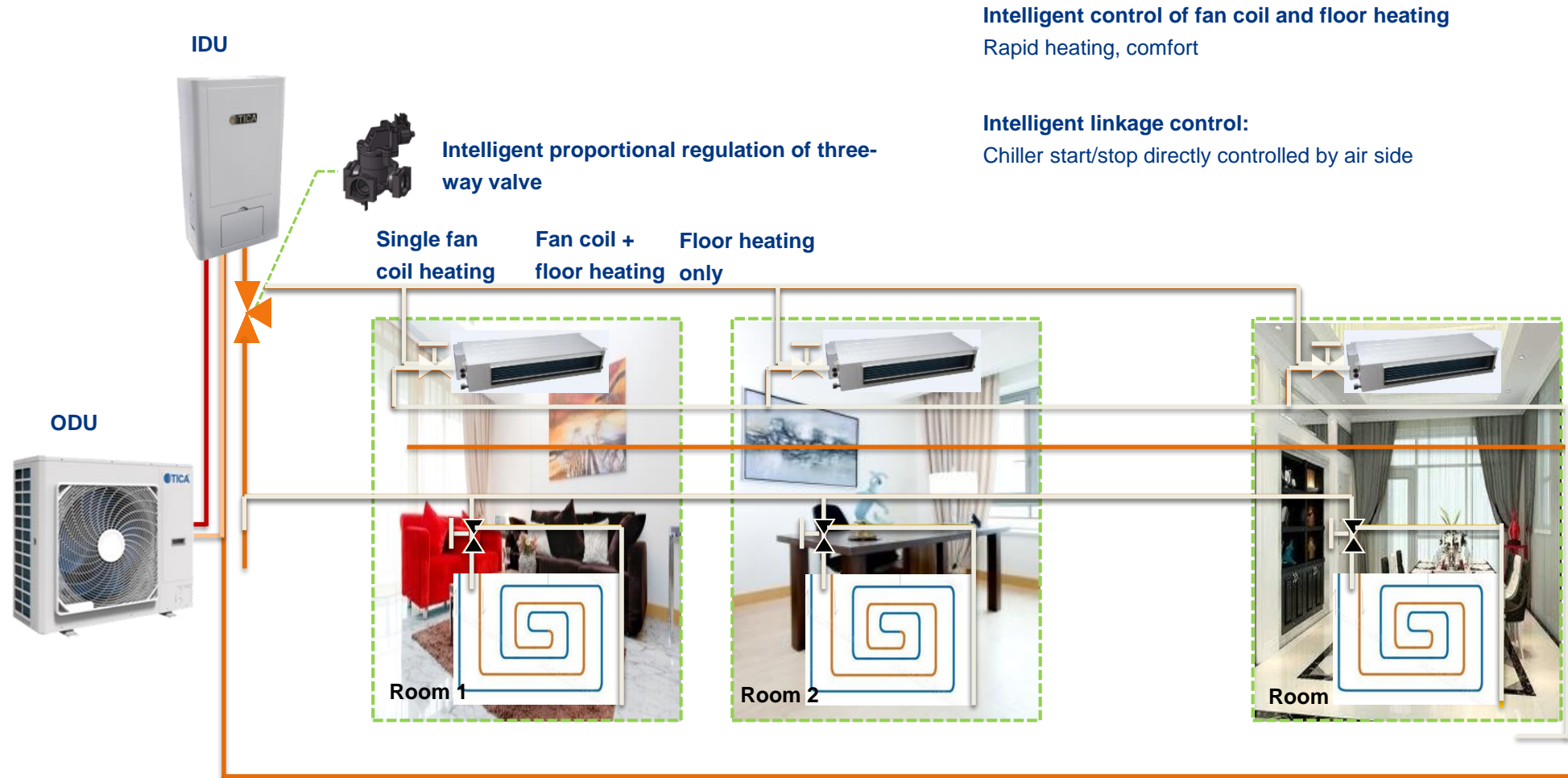
Variable water flow: Compared to the 500W common fixed-frequency water pump, the DC inverter water pump that TICA adopts features a power ranging from 50W to 180W, thus substantially reducing the power consumption.

Adaptive water temperature control: Enhanced comfort, preventing health risks related to air conditioning.



Variable capacity control: VRF control, comprehensive management of water system.

Heating control: Intelligent control of the chiller and the air side devices, enhanced energy efficiency and comfort



Intelligent control of fan coil and floor heating
Rapid heating, comfort

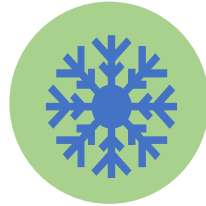
Intelligent linkage control:
Chiller start/stop directly controlled by air side

Part	TICA	Other Brand	Advanced items
Compressor	All DC inverter scroll compressor (Emerson Copeland)	Dual-rotor compressor (Fixed speed/Inverter)	<ol style="list-style-type: none"> 1. Enhanced heating/cooling capacity 2. Effectively respond to extreme weather
Water pump	Variable frequency canned pump (Grundfos)	Centrifugal chiller (Fixed speed/Inverter)	<ol style="list-style-type: none"> 1. Reduced power input of water pump 2. Auto frequency regulation based on load
ODU fan motor	Inverter motor (Match-well/Weiling)	Common motor/Double speed motor	<ol style="list-style-type: none"> 1. High motor efficiency 2. Low operating noise
Heat exchanger form	Shell-and-tube	Plate	<ol style="list-style-type: none"> 1. Large water volume 2. Small water retardant 3. Low requirements for water quality
Structure design	Split	Integral	<ol style="list-style-type: none"> 1. Stronger anti-freezing capability 2. Compact ODU, easy to install
Indoor fan coil motor	Brushless DC motor	Fixed speed motor/DC motor	<ol style="list-style-type: none"> 1. Reduced power input of motor 2. Low operating noise of unit
Indoor air purification	Purification fan coil/Return air purifier	N/A	<ol style="list-style-type: none"> 1. Removal of formaldehyde and PM2.5 2. Functions of both fan coil and air purifier

Multiple safety protection measures

Protection of low outlet water temperature

Prevent tube freezing if the water outlet temperature of the evaporator is too low.



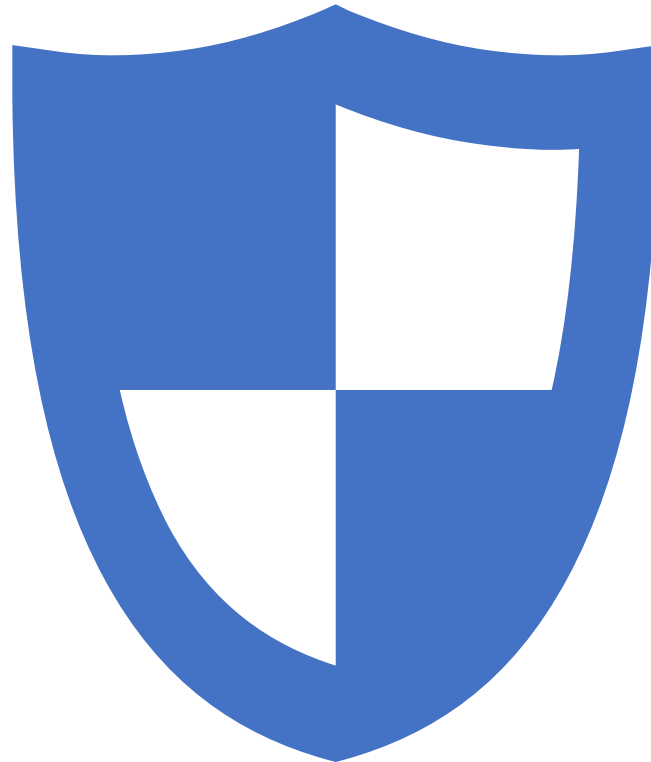
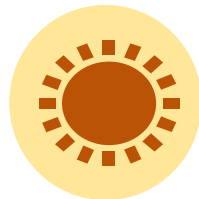
High/low pressure fault protection

Ensure that the components of the system run in the safe range.

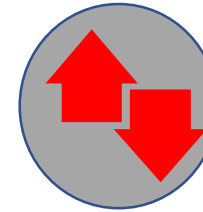


Protection of high outlet water temperature

Prevent compressor overload if the water outlet temperature of the condenser is too high.



20+ protection functions



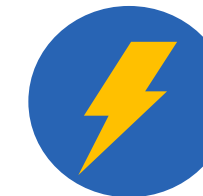
Protection of compressor reverse rotation

Prevent the compressor from operating reversely to avoid compressor damage.



Disconnection protection

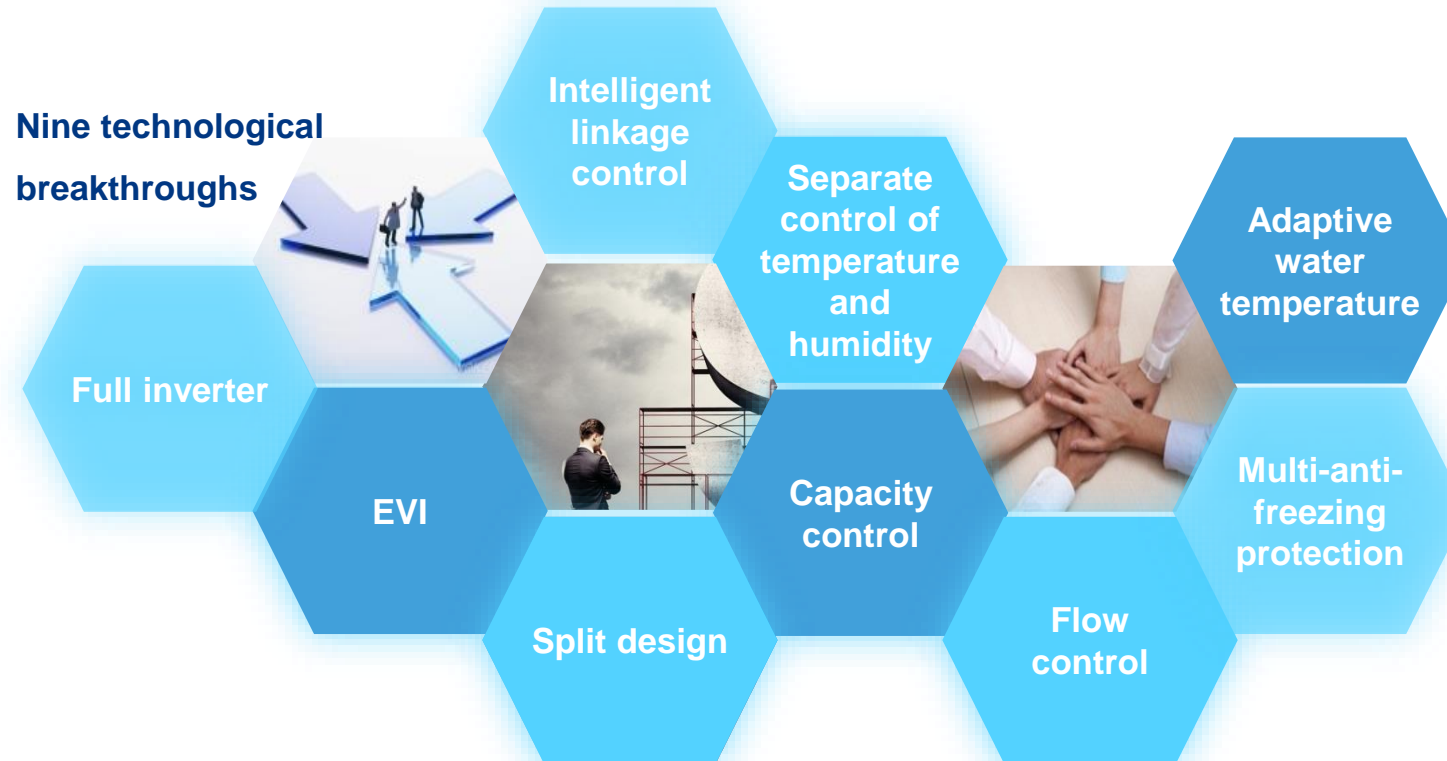
Stop the unit in a timely manner if the evaporator and condenser are disconnected, to avoid tube freezing.



Compressor overcurrent protection

Prevent overcurrent to avoid compressor damage.

Powerful+Efficient+Smart, comfort and precise control, G5 mini central air conditioner

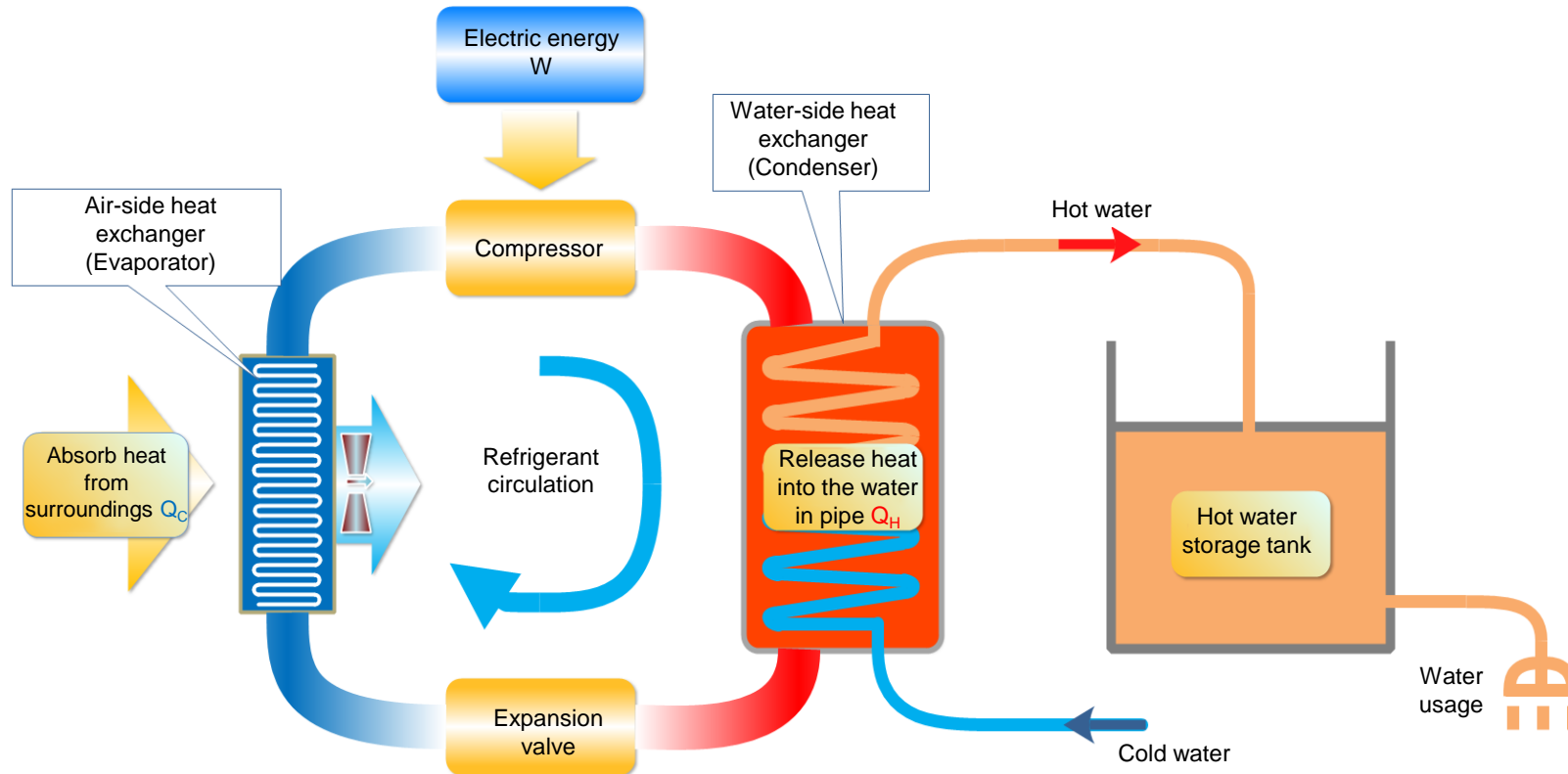


PART 3 Air-source Heat Pump Hot Water Unit

Model	TCAH100F	TCAH50F	TCAH30F
Nominal heating capacity (kW)	42	21	14
Power input (kW)	9.54	4.88	3.25
Nominal current (A)	17.6	8.8	15.5
COP (W/W)	4.40	4.30	4.30
Nominal water flow (m ³ /h)	0.902	0.451	0.301
Max outlet water temp (°C)	60	60	60
Circulating water flow (m ³ /h)	6.5	3.4	1.86
Circulating max inlet water temp (°C)	50	50	50
Power supply	380V 3N~50Hz	380V 3N~50Hz	220V 1N~50Hz
Ambient temp range (°C)	-10 - 48	-10 - 48	-10 - 48
Sound level (dB(A))	65	60	60
Refrigerant/Volume	R410A/5.2 kg	R410A/2.4kg	R410A/1.5kg

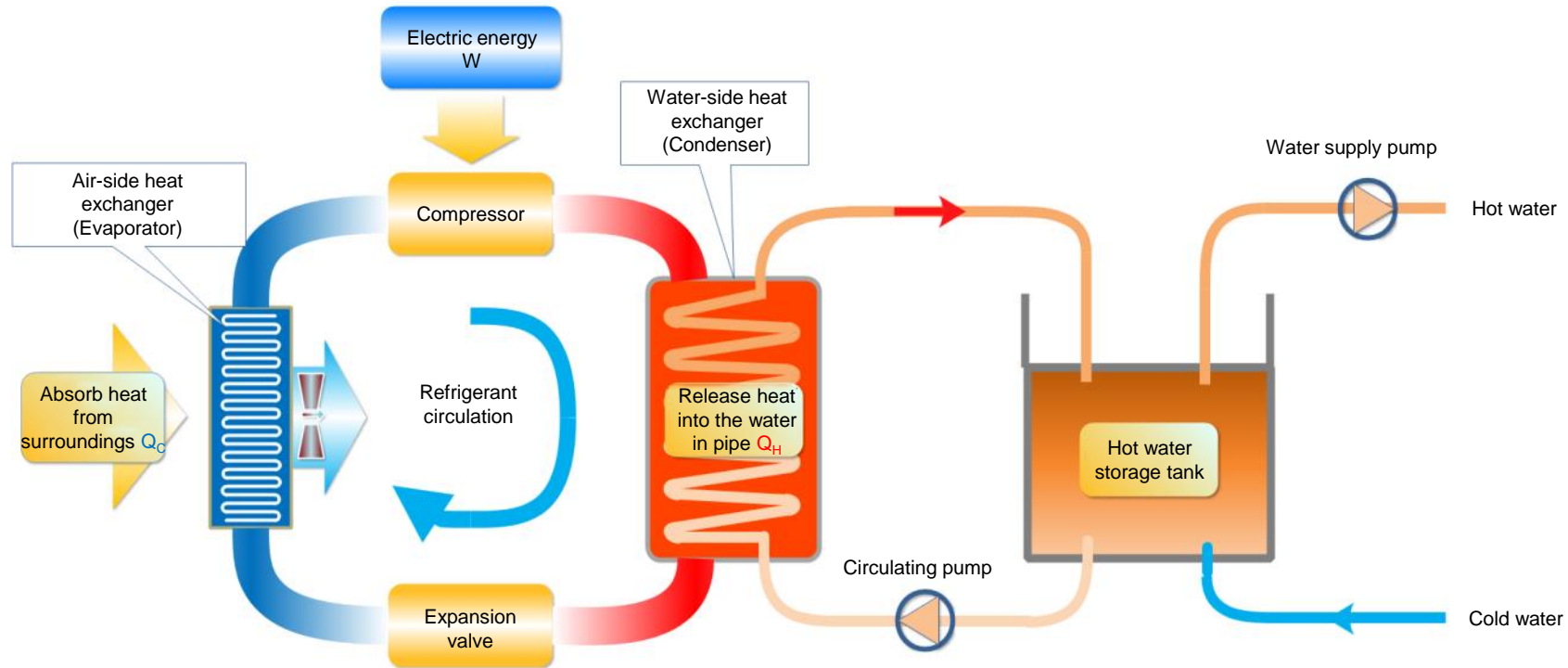
Notes:

1. Test conditions of direct-heating type unit: ambient DB/WB temperature is 20°C/15°C, water entering temperature is 15°C, and water leaving temperature is 55°C;
2. Under some conditions, water may not be heated to the maximum water leaving temperature when the unit is running in direct/cycling heating mode;
3. The unit is not functional when the ambient temperature is lower than -10°C;
4. The unit cannot be used in areas with low ambient temperatures. If the lowest ambient temperature in winter is lower than 10°C, auxiliary heat sources are needed.



- Direct-heating type air-source heat pump hot water unit supports direct heating by heating up the incoming cold water and generating hot water.
- It applies to scenarios where 24-hour hot water supply is required.

Circulating-heat System



- Circulating type air-source heat pump hot water unit supports circulating heating by gradually increasing the temperature of cold water replenished in the tank.
- It applies to scenarios where centralized water supply system is adopted.



Features:

- Fast heating and excellent defrosting to ensure sufficient hot water supply during winters
- Reliable performance and advanced integration of hot water systems to guarantee smooth operation in winters
- EEI level 2 energy-saving product
- Smarter control

Targeting on the issues about heat pump in markets, R&D center has introduced the advanced technology from Japan to develop the heat pump—commercial direct-heating type circulating heat pump hot water unit

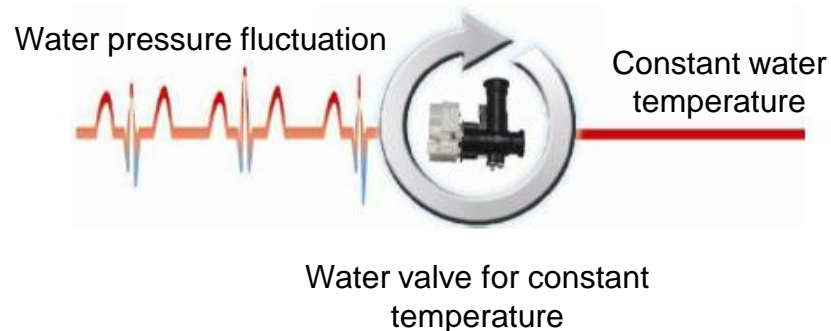
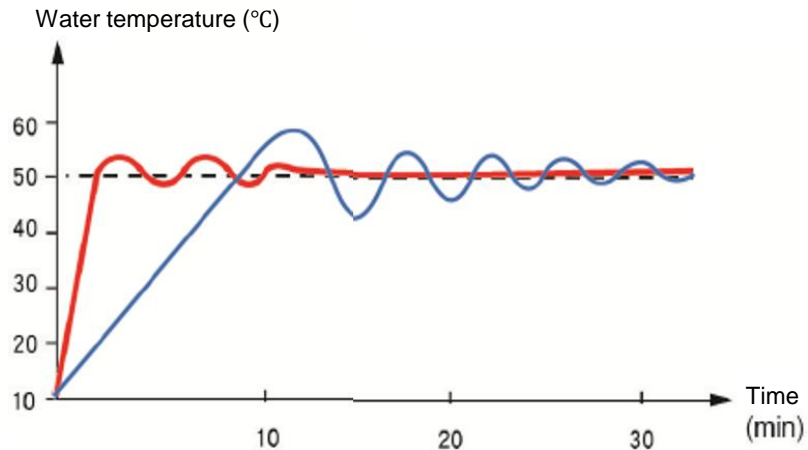


Unit Features

1. Fast heating and constant temperature to ensure sufficient hot water supply in winters

Double-regulated water entering for fast heating and constant water temperature

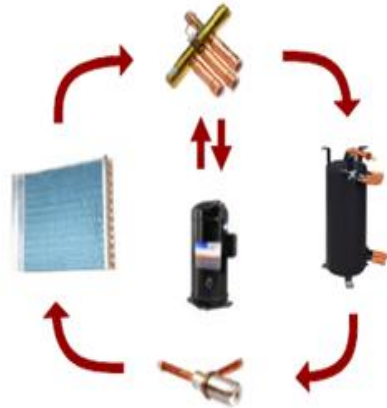
-- Accurate adjustment according to water entering temperature and water flow



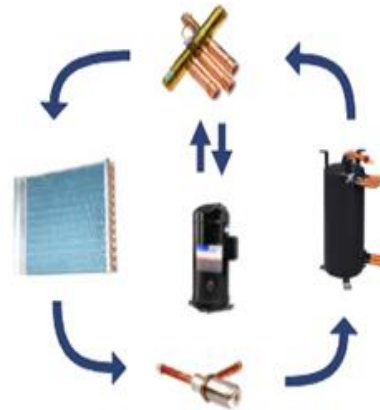
Water leaving temperature reaches 45°C in 1 minute; Reaches the set temperature within 3 minutes.

- EEI Heating up water quickly, no need to fret about the slow heating process in winters that usually occurs in traditional heat pump units
- EEI Constant water temperature during heating, unaffected by the changes of water pressure and water flow, no fear of "mixing water" in the water tank in winters
- Constant water temperature also improved the stability of operation in winters

2. Four-way valve ensures quick defrosting and constant hot water supply



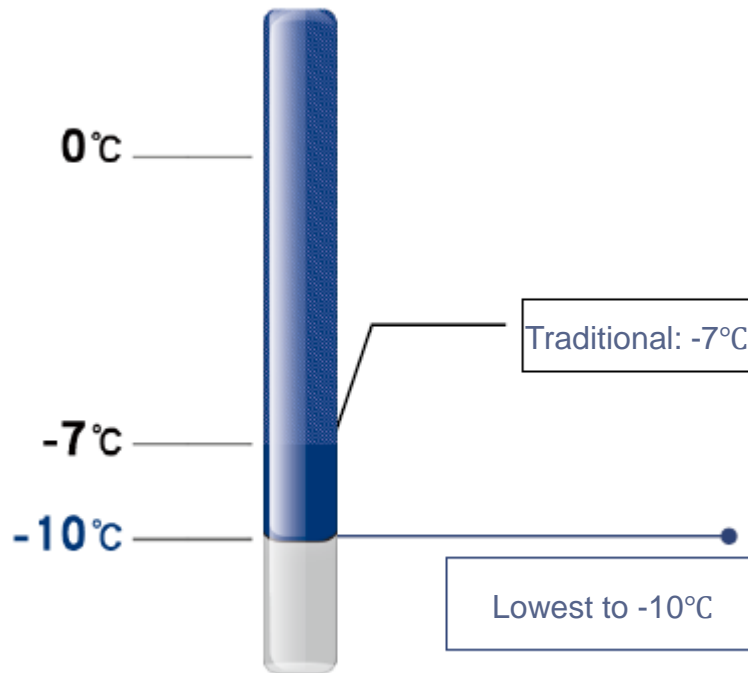
Heating



Defrosting

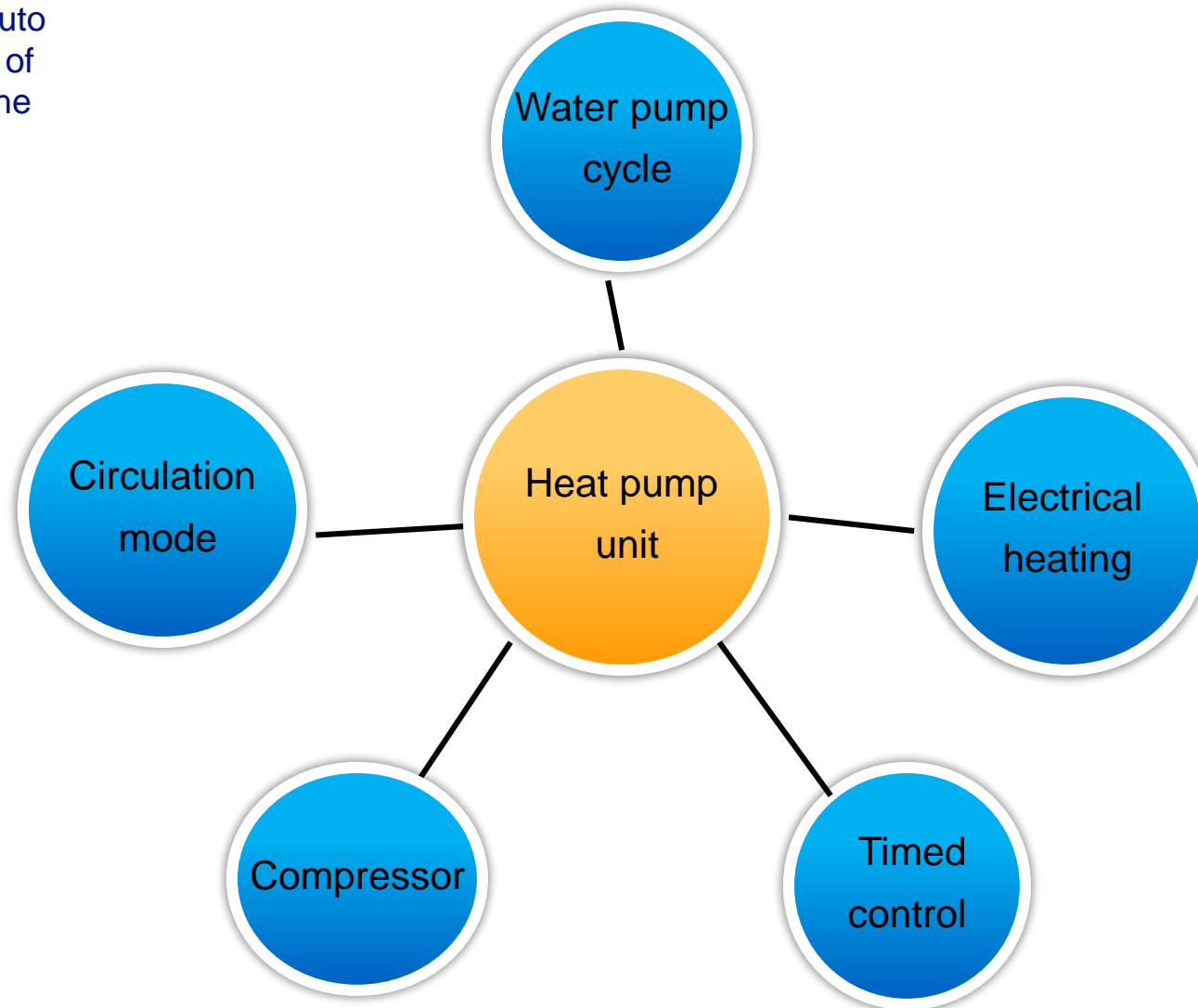
- Parallel four-way valves speed up defrosting with high efficiency; advanced supercooling technology ensures there is no frosting at the bottom of heat exchanger
- Improved evaporator enables automatic adjustment of refrigerant flow to slow the frosting process
- Extended period of effective heating in winters to ensure continuous supply of hot water

3. Low-temperature resistance design ensures performance reliability in winter



- R410A with better performance of low-temperature resistance is applied to effectively alleviate the problem of decreased performance of heat pump hot water units in winter
- Supporting of ambient temperature as lower as -10°C (-7°C for traditional units) ensures normal operation and hot water supply even in severe weather conditions in winter in southern areas

4. Quintuple anti-freezing protection - auto switching to anti-freezing mode in case of low temperature to effectively prevent the water system components from being frozen and cracked.



5. Optimum configuration to ensure higher-efficiency operation



High-efficiency compliant scroll compressor



Low noise axial-flow fan, low power consumption, high efficiency; Special waterproof design, durable and reliable.

High efficiency and energy saving



Uni-axial heat exchanger
Grooved copper tube, high heat exchange coefficient

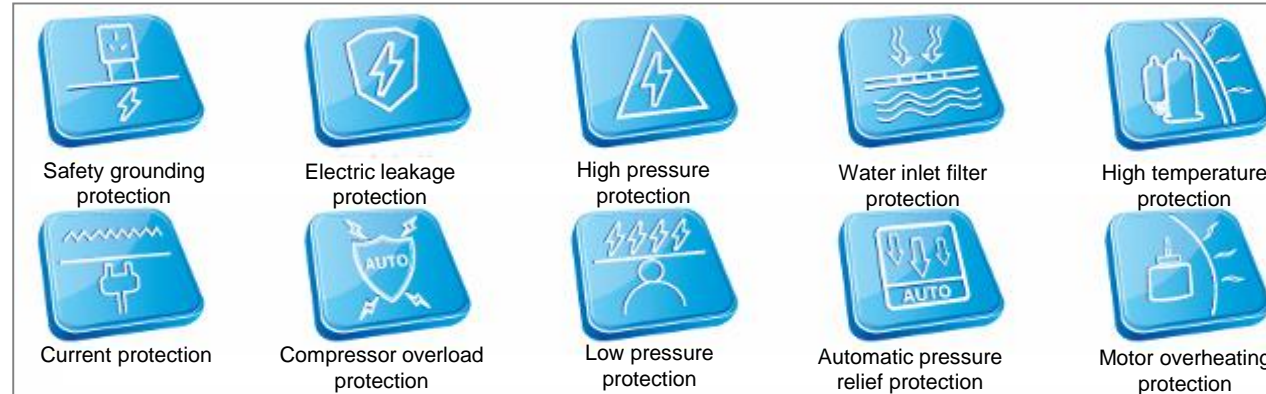


Finer flow control
More stable operation of unit

6. User-friendly UI and perfect protections



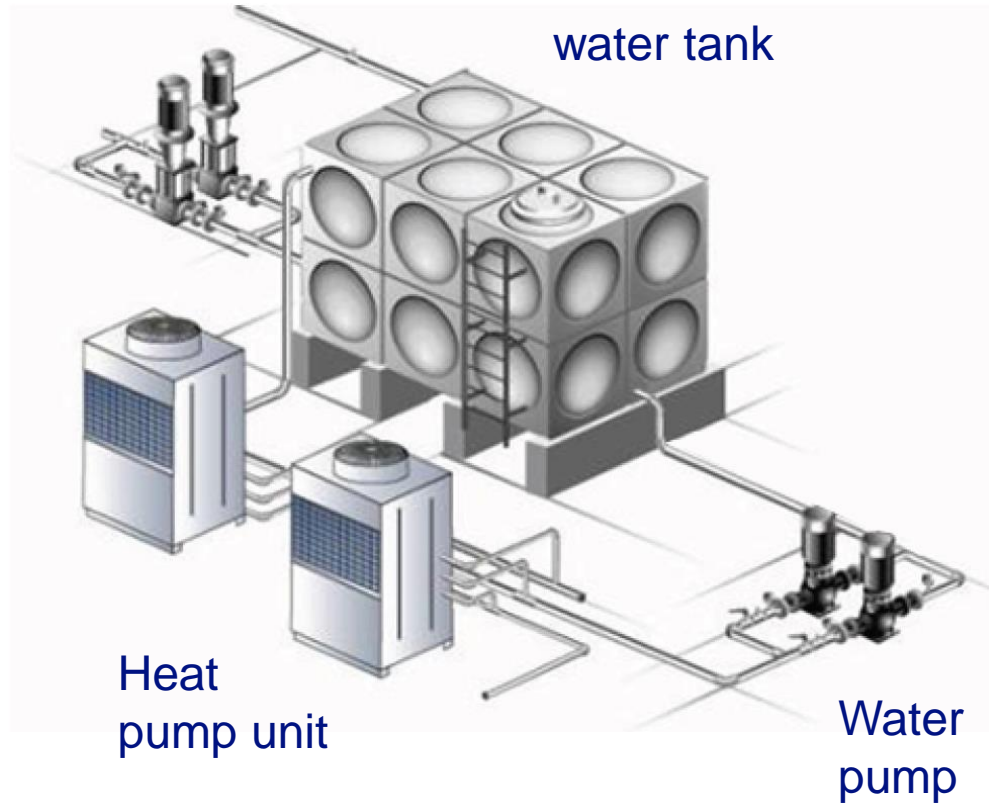
Several security technologies to deliver extensive protection



- ◆ Professionally developed LCD
- ◆ Real-time display of water outlet and power consumption
- ◆ Self-equipped leakage circuit breaker
- ◆ Self-equipped overflow production
- ◆ Combined control of up to 16 units (of the same model)



7. Integrated smart control for a more efficient system



- Include all parts of the hot water unit in control;
- Control every set of hot water unit accurately in real time, and adjust the operation status of system accessories through the intelligent analysis and calculation;
- Reduce considerable operation costs for users by improving unit operation efficiency and lowering energy consumption of accessories.

PART4 CO2 Heat Pump Hot Water Unit

Unit Parameter

Model		TCAH200HH	
Power supply		Three-phase AC 380 V 50 Hz	
Standard 65°C water outlet performance (When the ambient DB/WB temperature is 20/15°C, and water inlet temperature is 15°C)	Heating capability (kW)	80	Largest heating capacity of single unit COP5.01, highest in the industry
	Power input (kW)	15.96	
	Water Flow (m ³ /h)	1.38	
High-temperature 90°C water outlet performance (When the ambient DB/WB temperature is 20/15°C, and water inlet temperature is 15°C)	Heating capability (kW)	79	
	Power input (kW)	17.35	
	Water Flow (m ³ /h)	0.92	
High-insulation 90°C water outlet performance (When the ambient DB/WB temperature is 20/15°C, and water inlet temperature is 50°C)	Heating capability (kW)	56	
	Power input (kW)	19.1	
	Water Flow (m ³ /h)	1.22	
Dimensions	W × L × H (mm)	1,250 × 1,900 × 2,085	
Quality	(kg)	Net weight: 1,344; operating weight: 1,359	
Compressor	Motor power (kW, number of poles)	25*4P	
	Startup mode	Variable-frequency startup	
Internal water pump	W, number of poles	250*2P	
Unit water resistance	kPa	80 (flow: 1.98m ³ /h)	
External interface	Water inlet 1	Rc3/4 (stainless steel SUS304), for filling cold water	
	Water inlet 2	Rc3/4 (stainless steel SUS304), for insulating and circulating water	
	Water outlet	Rc3/4 (stainless steel SUS316)	
	Drainage outlet	Rc1 1/2 (stainless steel SUS304)	
Use conditions	Water inlet temperature (°C)	5~65°C	
	Max. water flow (m ³ /h)	1.98	
	Water inlet pressure	0.15 - 0.49	
	Water outlet temperature (°C) ※5	65 or 90	
	Ambient temperature (°C)	-15 - 43	

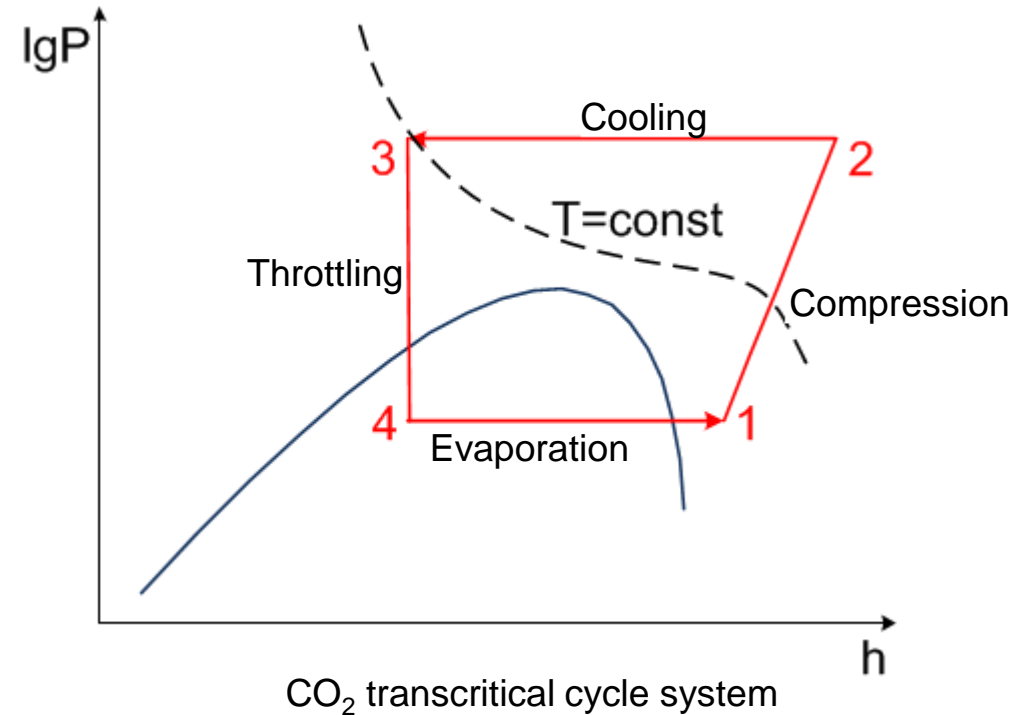
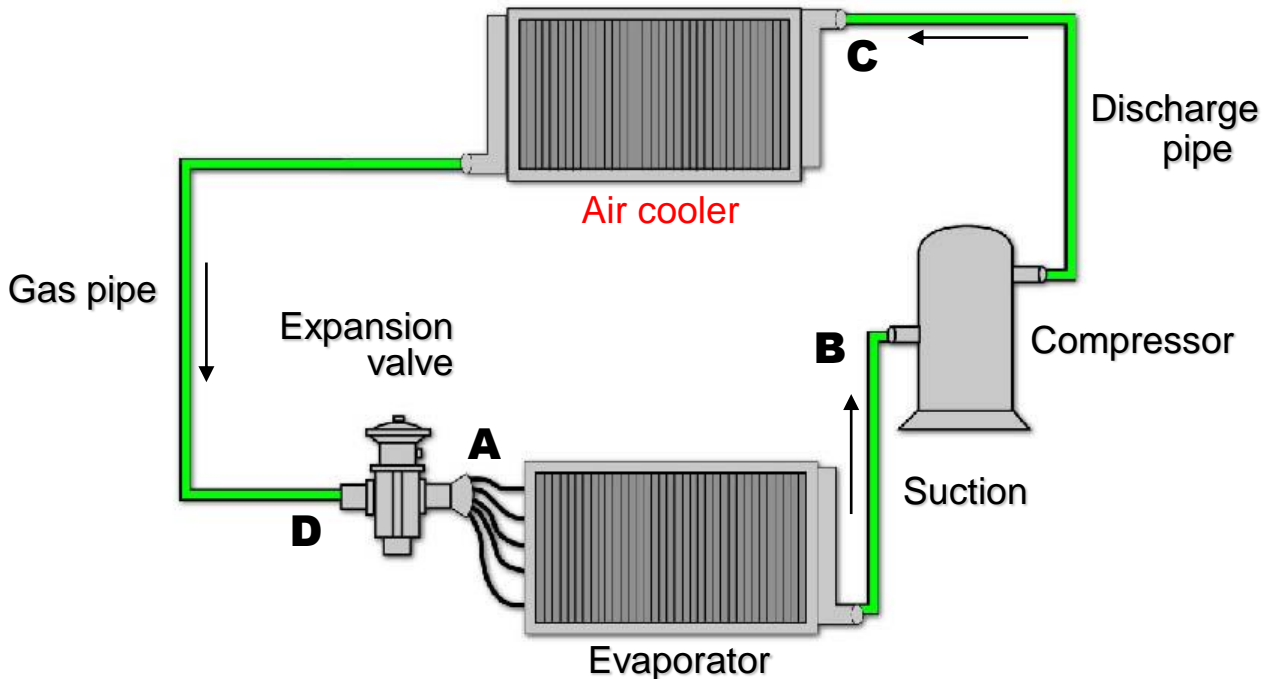
Technology Licensed by Mayekawa Japan



- ◆ CO₂ as refrigerant (R744), UNEP-recommended.
- ◆ License of MAYEKAWA (Japan), cutting-edge technology.
- ◆ Imported core parts (compressor, controller, heat exchanger) from Japan.
- ◆ Single unit capacity of 80kW, combination of multiple units is supported.
- ◆ Best alternative to small water boiler.

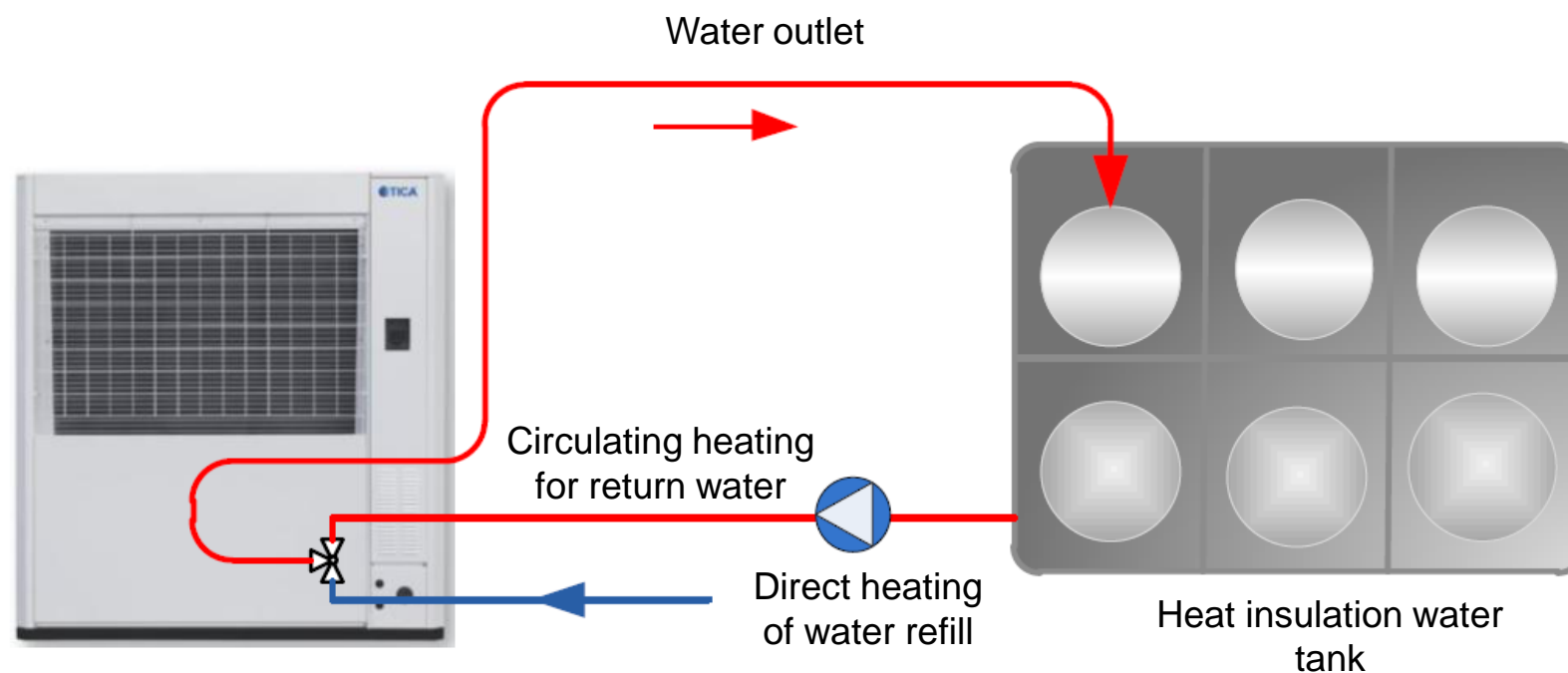


The critical temperature of CO₂ is very low (31.1°C). Therefore, when it is used in heat pump circulation, the temperature must be higher than the critical temperature. Under the supercriticality condition, CO₂ is not saturated, and thanks to its large specific heat capacity, high coefficient of thermal conductivity and small coefficient of dynamic viscosity, it is easy for CO₂ to flow and achieve heat exchange. As a result, the pipeline and heat exchanger size can be reduced, contributing to a more compact system.



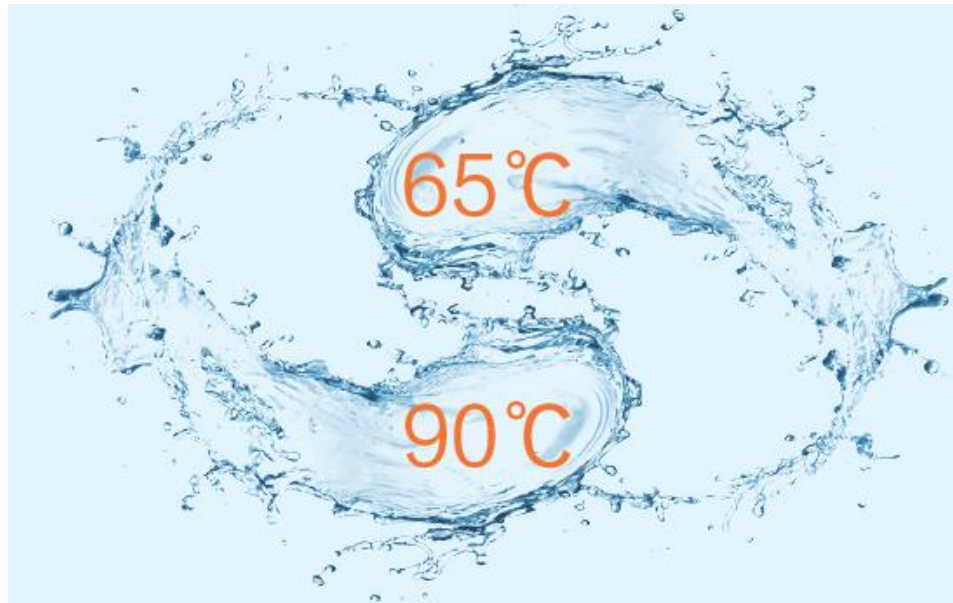
Direct/Recycle Mode Optional

The built-in three-way valve supports switch between direct mode and recycle mode.

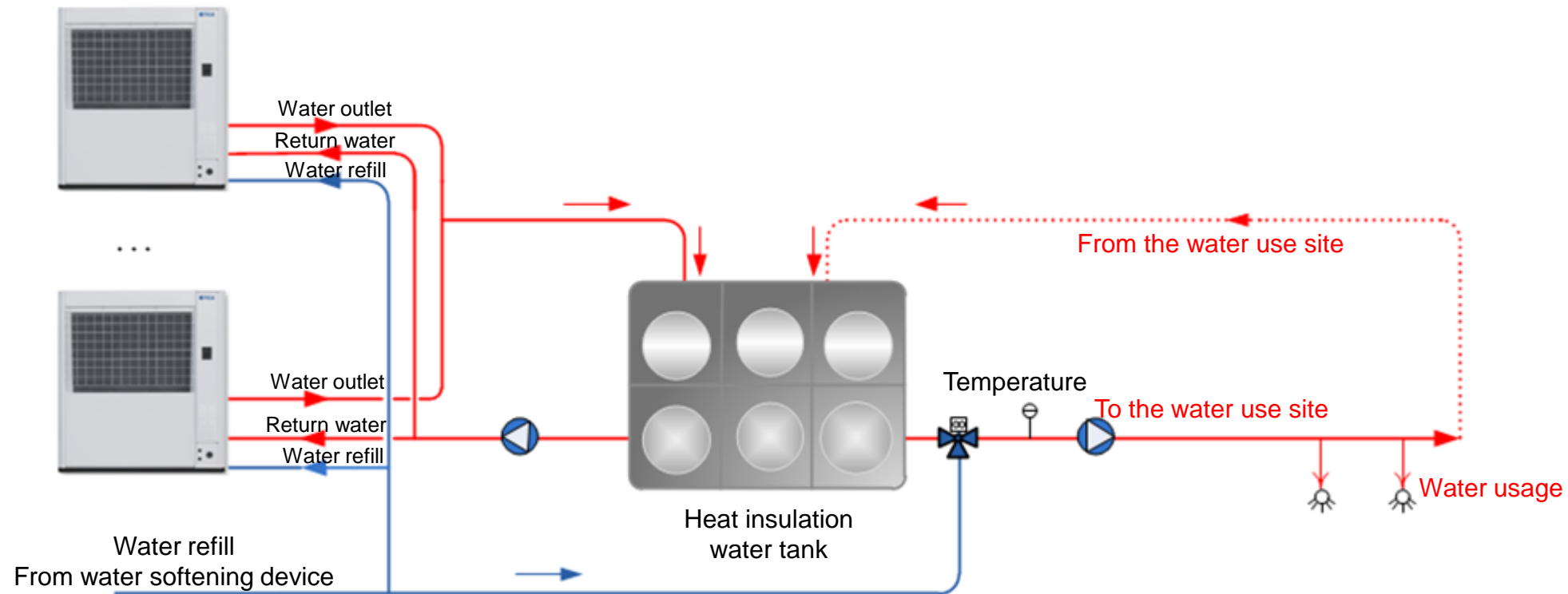


65/90°C Water Supply Optional





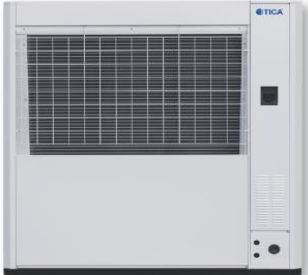
- ◆ 65/90°C water supply is available.







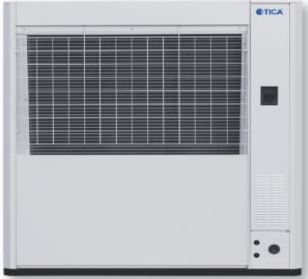
In scenarios with large amount of water required, multiple units can be combined to form a heating system.



Comparison Between Solutions for 20 Tons/Day 90°C Water Generation

	Coal Boiler	Oil Boiler	Gas Boiler	Electric Boiler	CO ₂ Heat Pump
					
Safety	Prone to leakage and explosion	Prone to leakage and explosion	Prone to leakage and explosion	Prone to electric leakage and aging	Safety
Management	Operated by specially-assigned person with certificate	Operated by specially-assigned person with certificate	Operated by specially-assigned person with certificate	Operated by specially-assigned person with certificate	Unattended operation
Intelligence	Unable to adjust parameters	Difficult to adjust parameters	Difficult to adjust parameters	Setting adjustable	Parameters adjustable with intelligent control
Environmental	Severely polluted	Polluted	Pollution-free	Pollution-free	Environmental protection
Efficiency	Low coal utilization ratio	Medium energy efficiency	Medium energy efficiency	Medium energy efficiency	High energy efficiency
Place	Special equipment room required, carbon residue removal facility is required	Special equipment room required, dedicated oil storage place is required	Special equipment room required, high requirement on machine room design	Special equipment room required, high requirement on machine room design	Roof and other vacant space
Life	5 years	10 years	10 years	10 years	20 years

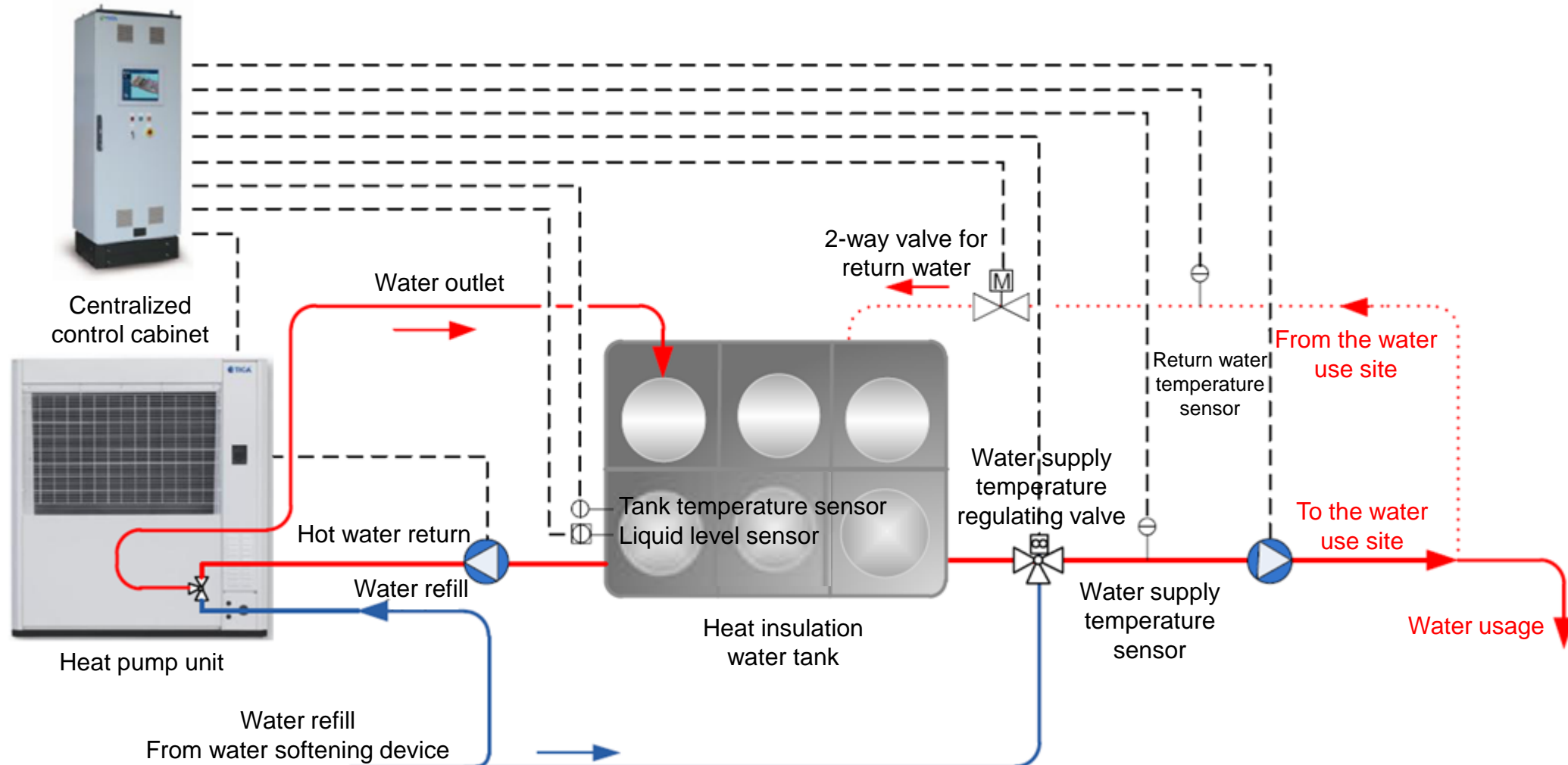
Comparison Between Solutions for 20 Tons/Day 90°C Water Generation

	Coal Boiler	Oil Boiler	Natural Gas Boiler	Electric Boiler	CO ₂ Heat Pump
					
Energy required to heat 20 tons of tap water from 20°C to 90°C = $(90-20)*20000 = 1,400,000$ kcal = 5,880,000 kJ					
Calorific value	4000kcal/kg	10200kcal/kg	8600kcal/m ³	860kcal/kW.h	860kcal/kW.h
Efficiency	60%	90%	90%	95%	334%
Price	RMB 0.8/kg	RMB 8/kg	RMB 4.5/m ³	RMB 0.9/kW.h	RMB 0.9/kW.h
Fuel Consumption	583 kg coal	153 kg diesel oil	181m ³ natural gas	1714kW.h	487kW.h
Fuel Cost	RMB 467	RMB 1220	RMB 814	RMB 1542	RMB 439
Labor Cost	RMB 200	RMB 50	RMB 50	RMB 50	RMB 0
Total Cost	RMB 667	RMB 1270	RMB 864	RMB 1592	RMB 439
Annual Total Cost	RMB 240,000	RMB 460,000	RMB 320,000	RMB 580,000	RMB 160,000

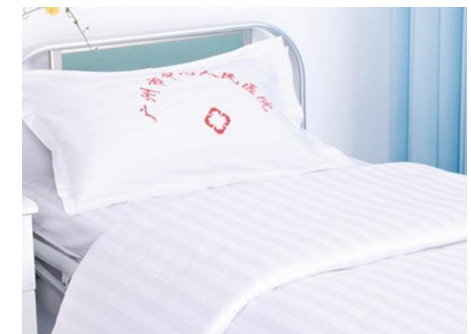
Note: The above operating conditions is calculated based on the annual comprehensive efficiency in East China in accordance with JRA4060-2014.

Application -Hospital

TICA CO₂ heat pump hot water system supplies water up to 90°C and can effectively control the water temperature in the transmission and distribution system at above 60°C to kill legionella and prevent pollution.



Washing System -Hospital





We strive for excellence!

TICA SNG LLC

Tel.: +7 495 127 79 00,
+7 915 650 85 85,
+7 915 190 85 85

E-mail: info@tica.pro

www.tica.pro

