ADVANCE COOL TECHNOLOGY CO.,LTD.

Hot Water Heat Pump Unit

with Hybrid Cooling Recovery

R134a

THE CHILLER EXPERT

www.advance-cool.com

We are specialized in Manufacturing Water Chiller Unit Heat Pump and Package Chiller range from Small Chiller to Large Chiller Plant using both Scroll compressor & Screw compressor as well as install Complete Cooling System including Machine Cooling Heat Pump, Large Air Conditioning System

Our Air Cooled Chiller and Water Cooled Chiller are equiped with all high quality and well known components such as Copeland Compressor. With our experiences of more than 30 years we are capable of serving our customers' needs by providing High Quality Chillers as well as Outstanding Services.

Our service teams are highly experienced and well trained, we can ensure quality and fast service within 24hours. We do accept custom made chillers according to customer specific requirement.

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Directory

FEATURES

The TASD series air & water source heat pump adopts the modular design to provide hot water max 90°C to air side or water side products of central air conditioners or any process cooling & heating application. Selective hot parts and control components provided by world-famous manufacturers, together with the most cutting-edge intelligent control system, contribute to the high efficiency, energy conservation, stability and reliability of this heat pump. The standard multi-unit control function supports the control over up to 8 units at the same time; and an optional build-in hydraulic module can be configured as required. The unit can also be connected to the building automation system (BAS) to easily meet various air-conditioning requirements in different places. The unit can be applied to various situations for comfortableness and arts and crafts, such as, hotel, hospital, office building, shopping mall, apartment, and factory.

STABLE AND RELIABLE OPERATION

●The unit compressor adopts the high-efficiency semi-hermetical 2 stage screw design. Therefore, it can be used without concern for refrigerant leakage, when compared to the hermetical compressor, it boasts easier maintenance and less pay for any repairs; and when compared to the single-screw compressor, it features fewer vulnerable parts, zero energy loss, and higher reliability.

●The compressor motor directly connects to the rotor with no gearbox involved, which avoids energy loss caused by gear transmission; moreover, fewer moving parts can ensure lower noise and a more reliable operation.

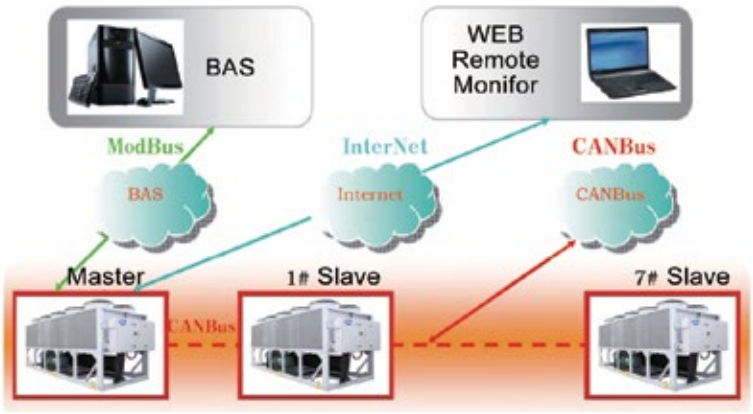
●The unit uses the stand-alone pass and in particular, the two stand-alone passes for twin-compressor units. In this way, the unit can guarantee reliable operations, and there is no requirement for the oil balance pipeline between units, ensuring better backup and substantially improving the unit reliability.

●The unit control system features high efficiency, reliability, and intelligence through constant optimization by engineers. All cooling parts and control components of the unit are provided by world-famous reliable suppliers to make the unit compact, highly efficient, energy saving, and reliable.

●The performance, reliability and structure of the unit are verified and optimized by the long-term simulation tests under various changing conditions and extreme conditions, as well as transportation experiment on actual tertiary roads.

MODULAR DESIGN

●The unit adopts the modular design. Each microcomputer controller of the unit reserves the interface for connecting the combined control module. Networking control between units can be implemented by cable connection and simple master-slave settings. A maximum of 8 main units can be controlled in a combined manner, which means that the unit capacity can be easily expanded to meet various air-conditioning requirements in different places.
●The main unit can be used to manage all modules in a centralized manner, select the number of modules, and monitor the operating data and status.
●Modules are independent of each other. A single failure of a module in a unit does not affect the operation of the other modules.
●The unit is provided with standard RS485 interface and supports the MODBUS-RTU protocol. It can implement centralized control and remote monitoring of the unit, and regulate other heat pump auxiliaries as required by the BAS.



CONVENIENT INSTALLATION

●The unit can be directly installed outdoors without the cooling tower. The compact structure of the unit takes small space and is cost-saving.
●The lifting lug design makes the hoisting process simple and safe.
●The water pipe of the water-side heat exchanger has been equipped with the water flow switch and is ready to use, which saves the on-site installation time.
●The unit comes with the startup cabinet and control cabinet and has been filled with refrigerant and refrigeration oil before delivery. Only the water pipe and power supply need to be connected upon installation on site. The unit can be put into use after the initial on-site commissioning by the after-service personnel of ACT.

THROTTLE APPARATUS

●The unit uses the world's most advanced electronic expansion valve, which ensures excellent performance both under full load or partial load and higher control accuracy.
●When compared with the thermal expansion valve, electronic expansion valve reacts more quickly when the unit is partly loaded. In addition, the evaporator can be fully used in any condition, which ensures more adequate and higher efficient heat exchange.

HIGH-EFFICIENCY COMPRESSOR

●The highly efficient semi-hermetical twin-screw compressor adopts the world-class latest generation 5:6 patented asymmetric tooth-type rotor to greatly improve the adiabatic efficiency. This type of high-efficiency motor with large capacity can significantly enhance the energy efficiency.

●The compressor motor directly connects to the rotor with no gearbox involved, which avoids energy loss caused by gear transmission; moreover, fewer moving parts can ensure lower noise and a more reliable operation.

●The high-precision filter screen built in the compressor increases the oil separation efficiency up to 99.5%.

●The unit adopts the semi-enclosed twin-screw compressor and air suction cooling motor to ensure that the motor is fully cooled.

●The compressor adopts the slide valve for adjustment. A single compressor can precisely match 25% – 100% load changes, and dual-compressor up to 12.5% – 100% load changes, which reduces operating expenditure to the greatest extent.

LOW-NOISE OPERATION

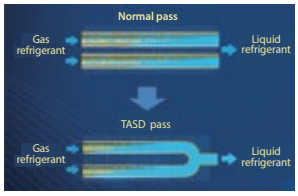
●The unit adopts the low-noise type outer rotor axial flow fan with long type air duct for diversion to effectively reduce the airflow noise. Before delivery, the fan has undergone strict tests for static and dynamic equilibrium to ensure stable and low-noise operation.

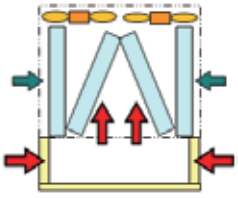
●The silencer built in the compressor reduces noise effectively.

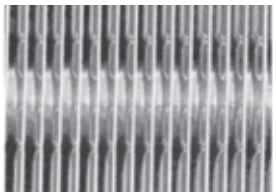
●The compressor uses the precision machined rotor and the surface of the rotor is hardened by laser. The correction of static and dynamic equilibrium can minimize the vibration.

●The compressor feet are equipped with shock pads to reduce unit vibration and substantially lower the unit noise.

HIGH-EFFICIENCY HEAT EXCHANGER







●The patented counter-current water-side combined with the inner-threaded efficient pipe, can increase heat exchange efficien-

●The wind-side heat exchanger adopts a design to ensure that the refrigerant is in any condition. In this way, the refrigerant pressure in the wind-side heat exchange copper pipe can be reduced to a minimum, which effectively decreases the power consumption of the compressor and improves the energy efficiency of the unit.

●The use of inverted “M” type heat exchanger reduces ventilation resistance, improves air flow velocity distribution, and increases heat exchange efficiency.

●The use of large air volume silent fan increases the air flow through the tube fins, which improves the heat exchange efficiency of the wind-side heat exchanger.

●The use of new open-window aluminium fin greatly enhances the gas turbulence of the wind-side heat exchange tube and the surface of the fin. In this way, the heat exchange efficiency is increased by about 8%.

UNIT MICROCOMPUTER CONTROL CENTER

The industrial-level microcomputer controller, together with the LCD touch screen, constitutes the control unit of the unit. While ACT unique self-control technology and up-to-edge control technology in the world create powerful control functions of our controller.

The leading intelligent control program ensures accurate management of water temperature under any condition and guarantees energy-saving, safe, and stable operation of the unit by automatic control. Meanwhile, the advanced pre-control function enables measures to be taken timely before actual failure occurs to avoid frequent shutdown of the unit.

The unit supports the compiling of weekly operating schedules to implement comprehensive automatic start and stop control of the unit, which truly implements unattended and automatic operation.

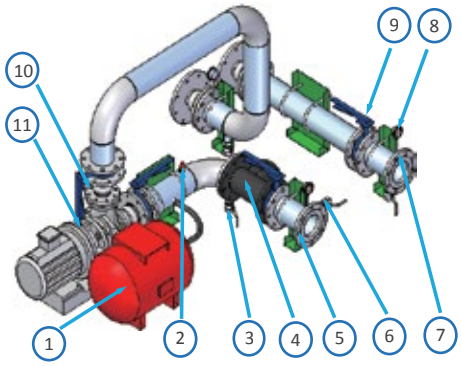
Main functions:

Local and remote automatic control
Start and stop control of the unit
Real-time display of the operating status and parameters
Display and settings of control parameters
Self-test upon unit startup
Adjustment and control of the energy
Control of the balanced operation of the compressor
Control to prevent frequent startup of the compressor
Graded energy-saving control of the fan
Water pump interlock control
Multi-unit control
Real-time displaying operation permission grading function
Automatic shutdown upon alarm and failure display function
Historical fault memory function
RS485 communication interface (communication function)

Protection functions:

Power overvoltage and under-voltage protection
Protection of power supply default phase, reverse phase, and unbalanced phase
Compressor oil level protection
Compressor motor overheat protection
Compressor motor overload protection
Compressor overload protection
Compressor start failure protection
Protection of over high condensation pressure (exhaust)
Protection of over low evaporation pressure (suction)
Protection of air suction/exhaust pressure difference
System pressure warning protection
Protection of over low cooling outlet water temperature
Water flow switch protection
Protection of over high air exhaust temperature
Communication failure protection
EVD electronic expansion valve protection

BUILT-IN HYDRAULIC KIT (OPTIONAL)



Number	Name	Number	Name
1	Expansion Tank	8	Pressure Gauge
2	Safety Valve	9	butterfly valve
3	Drain Valve	10	Soft Rubber Joint
4	Filter	11	Water Pump
5	Water Inlet		
6	Charging Valve		
7	Water Outlet		

Built-in Hydraulic kit system integrate water pump, filter, expansion tank, flow switch, safety valve, pressure gauge, drain valve, etc. It is convenient for users to connect water pipe and operate running test. Saving initial investment and make it easy to install the unit. Built-in hydraulic kit is controlled by micro computer, users can see the state of unit by screen.

RELIABLE PERFORMANCE

●ACT designers conduct optimal design for critical components and system pipelines of the heat pump on the basis of existing theories and in combination with internationally advanced design concepts and always put the stability of the heat pump in the first place.

●The heat pump adopts compressor of international famous brand with high stability.

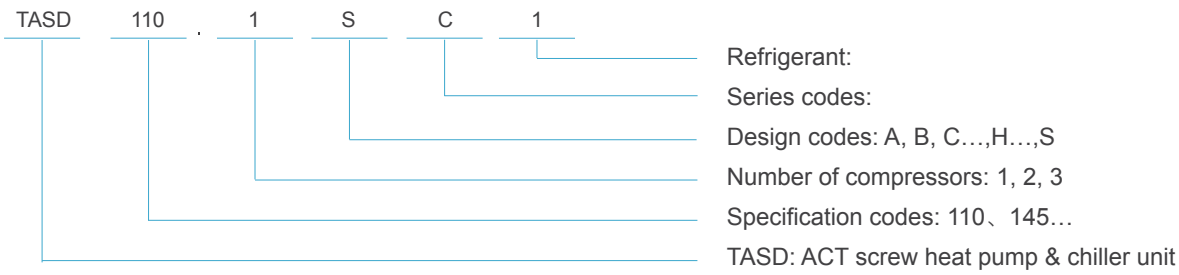
●Original control by electronic expansion valve effectively solves problems of carrying liquid, throwing oil and system oscillation, etc. during defrosting and enables stable operation of the heat pump.

●Balanced design of high precision for distribution pipe of refrigerant in heat exchanger on air side of the heat pumpr guarantees uniform distribution of refrigerant in heat exchanger on air side, enhances heating capacity and improves frosting condition.

●External oil cooler controls oil temperature of compressor and enables more stable and reliable heating operation of the heat pump at low temperature.

●Long-term simulation tests: including tests for various variable working conditions, extreme working conditions, defrosting of heat pump and practical tertiary highway transportation, etc. to verify and optimize performance, reliability and structure of the heat pump.

PRODUCT NOMENCLATURE



SPECIFICATION

TASD-SC (R134a) Screw Duo Source Heat Pump

Model			TASD 047-1SC1
HEATING MODE @ Ambient 35C	Heating Capacity 60°c	kW	814
	Power Input	kW	320
	Water Flow Volume Dt 5°c	m3/h	126
	COP Heating	-	2.54
Heating Mode + 100% Cooling Recovery	Heating Capacity 60°C	kW	728
	Cooling Capacity 7°C	kW	450
	Power Input	kW	276
	Heating Water Flow volume DT 5°C	m3/h	112.8
	Cooling Water Flow volume Dt 5°C	m3/h	69.7
	COP Heating	-	2.63
	COP Cooling	-	1.63
	Total COP	-	4.26
Power Supply		-	380-415V 3P 50Hzs
Pressure Drop	Heating Water Side	kPa	50
	Cooling Water Side	kPa	50
Connection pipe	Heating Water Side	-	250
	Cooling Water Side	-	250
Fan	Type		Axial Flow
	No. of Fan		12
	Air Flow rate	m3/h	270000
Compressor	Type	-	Screw
	Quantity	-	1 (Option 2)
Refrigerant	Type	-	R134a
Dimension	Unit(WxDxH)	mm	1900 x 7000 x 2500
Net Weight		kg	7500
Operating Weight		kg	7700

Note:

1. Nominal Heating conditions: Hot water inlet/outlet temperature 55 ℃ , 60 ℃
   Ambient temperature 35℃;
2. Power supply fluctuation range: ±10%.
3. If you need low ambient temperature heating function, please contact with sales representatives.
4. When choose built-in hydraulic kit, please remark pump lifting.
5. Due to possible product improvement, ACT reserves the right to make changes in design and construction at any time without notice.
6. For more details, please contact with ACT headquarter.

INSTALLATION AND COMMISSIONING

The heat pump must be installed and maintained by professionals who have been trained, are familiar with local standards and rules and have practical operating experiences and qualifications for refrigeration equipment. Initial operation of the heat pump must be carried out by professional service sectors.

Handling of the heat pump

The heat pump is loaded and transported integrally. The heat pump is filled with refrigerant required for normal operation, so special care should be given during loading and transportation to avoid damage to the heat pump or leakage of refrigerant due to reckless operations.

Hoisting of the heat pump

When the heat pump is hoisted, the lifting holes on the pedestal of the heat pump must be tied fast by mooring ropes or chains with enough bearing capacity to hoist. Hoisting must be operated in accordance with the requirements on hoisting schematic, and panels, fins and other parts of the heat pump must be guaranteed not damaged. During hoisting dedicated lifting equipment including spreader bars and hanging brackets, etc. should be used, and inclination of the heat pump is strictly forbidden to exceed 30O.

Requirements for foundation

The heat pump should be placed on horizontal plane foundation, ground floor or roof that can bear operating weight of the whole equipment, for operating weight, please refer to nameplate of the heat pump. For installation on the roof, damping devices such as spring damper, etc. should be equipped to avoid transmission of vibration and noise. If the position of the heat pump is too high and not convenient for overhaul by servicemen, proper scaffolds can be erected around the heat pumpand should be able to withstand the weight of servicemen and equipment. (Some requirements on previous foundation drawing of the heat pump can be referred to).

Environmental requirements

It is the best that the installation site of the heat pump is in open area and enough air should pass the fin coils. Enough space should be reserved around the heat pumpso that air can flow into fin coils and it can be taken as overhaul channel. (Some requirements on previous schematic of installation space for the heat pump can be referred to).

Installation of water pipes

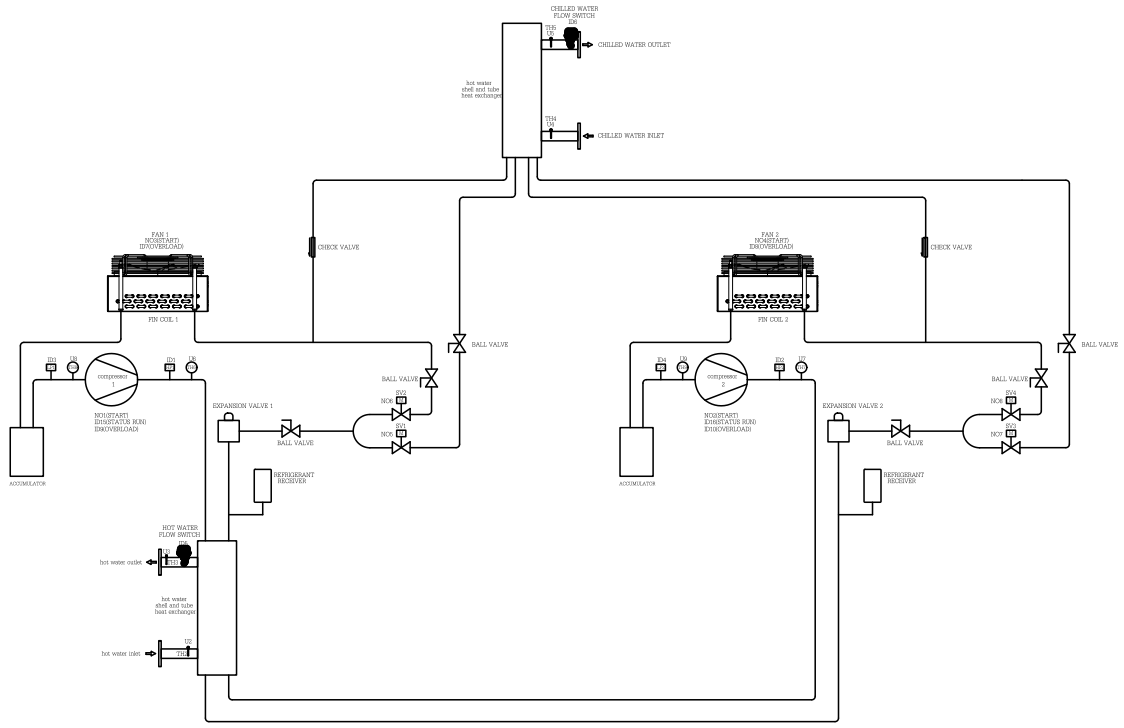
Safety shut-off valves must be installed at inlet and outlet of the heat pump with convenience for regular maintenance of water system. Installation of thermometers and pressure gauges at water inlet and outlet of heat exchanger of the heat pump is recommended for regular inspection and maintenance; At inlet of water pump water filter should be installed to avoid entry of impurities into water pump and heat exchanger; before thermal insulation of water pipes and entry of water into the heat pump, pipeline sealing should be checked; damping devices should be installed for all pipelines connected with the heat pump; flow control devices in compliance with the requirements must be installed.

REQUIREMENTS FOR WATER QUALITY

Since compositions of water quality in different areas are complicated, if the water different from ordinary water is applied, water quality should be inspected before the water enters heat exchanger of the heat pump. If water quality is under the requirement for air conditioning water, it should be treated. Relevant water treatment can refer to standard “Design Specification for Treatment of Industrial Circulating Cooling Water” or other related standards. The table below can be used as reference index.

Items	Unit	Requirement for air conditioning water
		Permissive values
Suspended solids	mg/L	<10
pH value (25℃)	mg/L	6.5-8.0
Electric conductivity (25℃)	μS/L	<800
Methyl orange alkalinity	mg/L	<150
Acid consumption (PH=4.8)	mg/L	<100
Full hardness $CaCO_3$	mg/L	<200
Fe^{2+}	mg/L	<1.0
Cl^-	mg/L	<200
SO_4^{2-}	mg/L	<200
SiO_2	mg/L	<50
NH_4^+	mg/L	<1.0
S^{2-}	mg/L	Not detectable
Free chlorine	mg/L	<1.0
Petroleum	mg/L	<5

DIAGRAM



Precautions in design and installation of pipelines:

1.Design of water circulating system should be as simple as possible to avoid excessive elbows, and straight pipelines should be on the same plane as much as possible.

2.Notice the positions of water inlets and outlet of heat exchanger to avoid incorrect connection.

3.Manual or automatic vent valves should be installed on all peaks of water circulating system.

4.Expansion water tank should be made of anticorrosive and antirust materials and must be installed on the highest point of the whole pipeline system.

5.Thermometers and pressure gages should be installed at water inlet/outlet.

6.On the bottom of all local elbows, drain valves should be installed so as to evacuate water in the whole system.

7.Shut-off valves are installed on water pipeline for connection of heat exchanger of the heat pump with water pipes of the user.

8.Bypass valves are installed between inlet and outlet water pipelines of heat exchanger of the heat pump with convenience for overhaul and flush of pipelines.

9.Install elastic joints to reduce vibration of pipelines.

10.Impurities in water system will cause scaling of heat exchanger, so filter should be installed before water pump.

11.In order to prevent frequent tripping of the chiller due to too small load during operation, the user is recommended installing energy storage tank.

SELECTION OF WATER SYSTEM PARTS

1. Shut-off valve: determined based on water pipe diameter, and in general the valve diameter is selected in consistency with the diameter of pipe connected with the unit.

2. Water filter: play a role of filtering impurities in water system, and in general over 60-mesh filter is selected.

3. Check valve: installed at the outlet of water pump to prevent damage to water pump during backflow of water, the valve diameter is consistent with the diameter of pipe connected with the unit.

4. By-pass valve: installed between inlet and outlet water pipes of the unit container and opened when cleaning pipeline.

5. Thermometer: convenient for overhaul, maintenance and observation of operating conditions of the unit. In general 0-100℃ is selected.

6. Water pump: its water yield is selected according to water flow parameters of the unit.

Water yield of pump=L*1.1 (L-water flow of the unit), the delivery head of water pump is calculated as per the following formula:

Delivery head of water pump= (water resistance of the unit + the most unfavorable pipe length* (2%~5%) + end water resistance of the most unfavorable path)*1.1

7. Automatic vent valve: play a role of discharging the air in water system to enable normal operation of the unit and installed at the highest point of the unit.

8. Expansion water tank: play a main role of accommodating excessive water, stabilizing water pressure of the system and replenishing water into the system. In general installed at return water pipe higher than water pipeline inside the system to enable normal operation of the unit. It's volume is calculated as per the following formula:

Volume of expansion water tank V = (0.03~0.034)Vc

Vc = system water volume

9. Energy storage water tank: play a role of regulating energy to reduce frequent start/stop of compressor when system load changes, to improve operating efficiency of the system and meanwhile to extend service life of the unit.

Its volume is calculated as per the following formula:

Volume of energy storage water tank V (m3) = (Q/27.9n) –Vs

Q - refrigerating capacity kW

n - number of heads

Vs - water volume m3 in pipeline and heat exchanger inside the chilled water system

Notice

The value of pipeline pressure test should be over 1.25 times the operating pressure, but not be less than 0.6MPa, after pressure is maintained for 5 min, the pressure drop is not more than 0.02MPa, and the system is qualified if no leakage exists upon inspection.

Hydrostatic test should not be carried out when air temperature is lower than 5℃, pressure gage for pressure test is qualified upon inspection with accuracy not less than 1.5 class, and the full-scale value is 1.5~2 times the maximum measured pressure.

During pressure test feed water from low part of the system and exhaust air from high part. For pressure test, water should be fed slowly and uniformly, after water reaches the pressure required, stop operation of pump and check the system, and repair work should not conducted with existence of pressure.

After qualification by pressure test, wash water pipeline over and over (notice not to pass heat pump) to be qualified until drainage does not carry impurities such as silt and scrap iron, etc. and is not turbid.

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