AMRTA

Rooftop Packaged Unit

Table of Contents

About Amrta

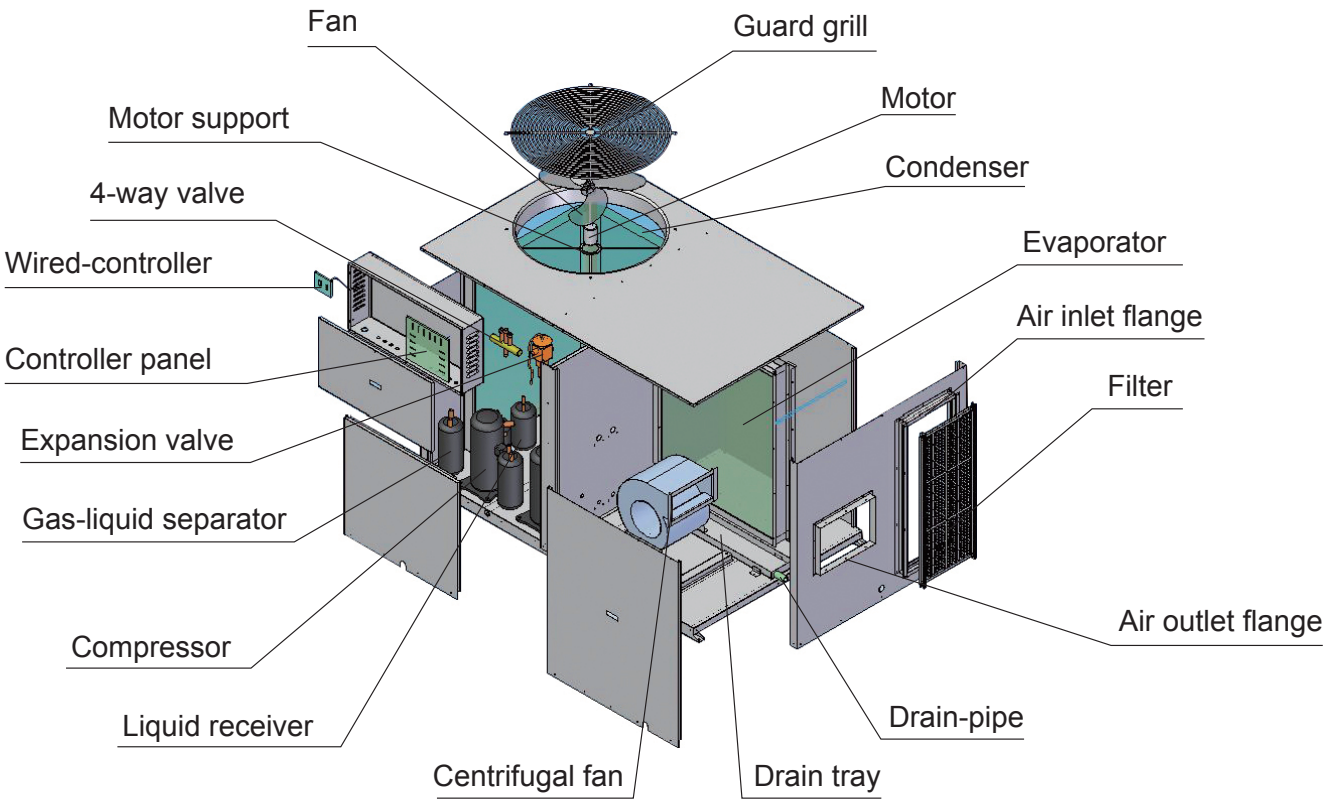
At Amrta, we are about designing and manufacturing highly efficient, reliable and customer-focused products.

We have one of the stringent control mechanisms in place for manufacturing processes and product quality.

Amrta always works closely with customers. We continually strive to meet the customer's demands and listen to the ideas through our distributors.

We are determined to keep on our endeavor and commitment in technology progression and product improvement, by working together with our customers and distributors in its task of offering solutions in environmental technologies with highest innovation, dependability, quality and energy efficiency.

Structure



Benefits

Packaged design

The compact design gives an aesthetic and neat appearance when installed in line of sight. Compact size benefits transport, handling and positioning on site, simplified and cheaper than traditional units.

Reliability

All products are rigorously factory tested to ensure the top arrived condition in site. The strict testing procedure includes rain test, shipping test, shake and drop test, rigging test, coil leak test, and the whole unit running test. All units are fully factory tested; plug and play for the easier installation in site by reducing any unnecessary costs. This is one of the Amrta's rigorous requirements of responsibility to customers to make sure the reliability of our products.

Durability

Cabinets are constructed from galvanized steel with polyester powder coated for all weather protection. The outdoor air coils' aluminum fins could be epoxy coated for extra protection in corrosive environments, for example the salt laden sea air. External fasteners are made by stainless steel or galvanized steel as well as the corrosion resistant drain trays. 10 years anti-corrosion warranty is guaranteed.

Flexibility

The dedicated vertical or horizontal supply/return configurations allow easy utilization on replacement jobs or new construction applications. Unit may be configured to precisely match the building requirements through the use of factory-installed options such as: integrated economizer, power air exhaust, high static pressure indoor fan and coil protection options.

Economy

2-4 stages operation compressors are progressively switched on only as they are needed. This has the added advantage of lowing start-up current. Especially, economizer such as free cooling or heat recovery option helps to reduce the operating costs.

Safety

The refrigeration system operates with a number of protection means: dry-filter, discharge temperature protector, liquid sigh glass, HP and LP switches, phase sequence relay, circuit breaker and contactor etc.

Low noise

Electrical and compressor section are insulated to reduce noise. The upward discharge of condensing fans carries away effectively the operating noise. And all compressors and fans are mounted on rubber anti-vibration supports for quiet design.

Easy maintenance

The condenser and evaporator fan motor bearings are permanently lubricated with long life, and no annual maintenance need, adding greater reliability to the unit. The service access ports are protected, externally mounted, re-usable, provided on both the high and low lines for ease of evacuating and charging the system. A large, single panel covers the electrical controls makes servicing easy. The blower compartment has a large panel which will allow the blower fan assembly to slide-out for ease of maintenance and trouble shooting.

Features

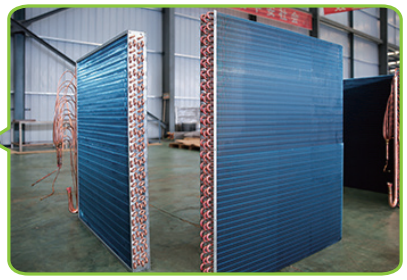
Casing

Panels are made by galvanized steel with polyester powder paint for excellent finish, weatherability and corrosion resistance. The pre-treated galvanized steel provides a better paint to steel bond, which resists corrosion and rust creep. Special primer formulas and matted-textured finish insure less fading when exposed to sunlight. The stainless steel screws are used throughout to further reduce possibility of rusting.

Compressor

The units use high efficiency, hermetically sealed, compressors, oil return lubrication and rubber vibration damper. The thermal overload cut-out, phase sequence relay and crankcase heater are integrated as the security protection to enhance reliability and performance.

Heat exchanger



Condenser/ evaporator coils are manufactured from seamless inner grooved copper tubes with all joints brazed mechanically bonded to aluminum fins to ensure optimum heat transfer. The standard feature represent by Φ9.52mm tubes and high hydrophilic blue aluminum fins. All coils are tested at 30kg/cm² (450 Psi) air pressure to avoid leakage.

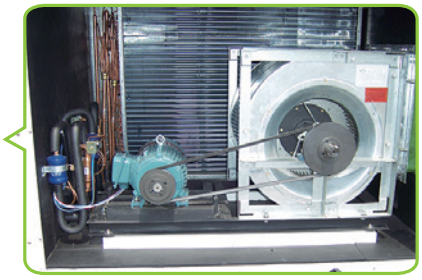
External thermal expansion valve

Independent thermal expansion valve with external balance offers better refrigerant control and wider load condition.

Condenser fan

Condenser fans are direct-driven axial type, air-discharged vertically with a low level noise, which use aluminum blades riveted with corrosion resistant steel spider bracket to allow a statically balanced and smooth operation. All condenser fans are protected by wire guards, and fans motors are secured by permanently lubricated bearings against overload conditions.

Centrifugal fan



Belt-drive centrifugal fans of air supply section are designed with forward-curved blades, ac asynchronous induction motors and multi-speed control for maximum efficiency and adequate airflow distribution. Motors are highly efficient inducted, with class B insulation to ensure quiet operation and smooth performance. VFD drive modulating and upgrade plug-fan are possible as option.

Filter

5 mm thickness washable Nylon filter is used as standard feature. G4 filter is available optionally.

Electric components

●Direct-on-line starting contactor for the compressors and condenser fan motor.
●Internal thermal protector for compressor and fan motor.
●Anti-recycling protection (time delay) for compressors through microprocessor.
●Crankcase heater for compressor.
●Control circuit breaker and power circuit breaker.
●Phase sequence relay

Defrost

Dynamic and alternate defrost function is provided to heat pump rooftop units to ensure efficient operation in winter. Units start defrost cycle when the ambient temperature is below a set temperature and repeat the defrost cycles periodically. The defrost cycle is automatically controlled by outdoor sensor. The timing and duration of defrost can be set up by a combination of timing functions on the control device.

Control

Amrta standard controller provides unit control for heating, cooling and ventilation utilizing input from indoor and outdoor sensors. Quality and reliability are enhanced through the smart control and logic for:
●Anti-short cycle timer prevents the unit from short cycling, considerably improving compressor life
●Optional soft start avoids electrical “spikes” by using staging on fans, compressors and heaters
●Interoperability with Modbus protocol allows to integrate with BMS for outstanding control benefits
●Automatic lock out system on failure and reset by interruption of power supply.
●Automatic defrost
●Compressor lead-lag operation to ensure longer life for the compressors and equal running hours between compressors
●External remote ON/OFF button for remote operation of the unit using external ON/OFF switch or connection to BMS
●High and low pressure safety switch (capsule type, factory Pre-set)
●Remote standard control panel with the same functions as the unit on-board control panel at a distance of 20 m

Options

- Heat recovery
- Fresh air
- Economizer
- Free-cooling
- Explosion proof
- Hot water coil
- Electrical heater
- Roofcurb
- Gas burner
- T3 tropical condition
- Medium and HEPA filter
- Plug-fan
- Emergency switch
- Siemens PLC controller
- Carel controller

Performance table

Technical data 10kW~190kW

Model	Unit	RTU10	RTU12	RTU14	RTU16	RTU20	RTU25	RTU28	RTU32	RTU36	RTU42
Cooling*											
Cooling capacity*	kW	10.6	12.1	14.3	16.2	21.2	24.2	28.6	32.4	36.2	41.6
	Ton	3.0	3.5	4.1	4.6	6.1	6.9	8.2	9.3	10.3	11.9
Nominal current*	A	7	7.7	9.3	10	13.4	17.7	18.7	19.5	23.3	25.7
Nominal power input*	kW	3.55	4.17	4.92	5.37	6.75	8.25	9.95	10.5	12.7	13.85
Heating*											
Heating capacity*	kW	11.3	12.8	15	17.3	22.6	25.6	30.2	34.6	38	44.6
	Ton	3.2	3.7	4.3	4.9	6.5	7.3	8.6	9.9	10.9	12.7
Nominal current*	A	6.5	7.2	8.6	9.2	12.4	14.3	17.3	18	21.3	23.7
Nominal power input*	kW	3.26	3.83	4.5	5	6.17	7.57	9.1	9.55	11.6	12.65
Power supply		380~415v/3ph/50Hz									
Refrigerant charge	Kg	3.2	4.2	5	5.8	7.3	8.4	9.8	10.5	12	13
Compressor											
Qty	Nr.	1	1	1	1	2	2	2	2	2	2
Type		Scroll									
Air treatment section											
Centrifugal fans number	Nr.	1	1	1	1	1	1	1	1	1	1
Drive type	/	Direct drive							Belt drive		
Air flow	m^3/h	1950	2400	2920	3150	4250	5400	5700	6300	6800	7900
External static pressure	Pa	150	150	180	180	150	235	305	290	270	250
Motor power	kW	0.5	0.5	0.7	0.7	0.7	1.1	1.5	1.5	2.2	2.2
Condensation section											
Axial fans number	Nr.	1	1	1	1	1	1	1	1	2	2
Air flow	m^3/h	4100	4150	6100	7020	8640	9430	11230	12300	14200	18830
Motor power	kW	0.25	0.37	0.37	0.55	0.45	0.55	0.75	0.75	2*0.37	2*0.37
Dimensions											
Length	mm	1350	1350	1350	1350	1820	1820	1820	1820	2540	2540
Width	mm	990	990	990	990	1400	1400	1400	1400	1860	1860
Height	mm	880	880	880	880	1100	1100	1100	1100	1180	1180
Net weight	kg	240	250	260	260	380	430	480	500	780	800
Sound pressure level **	dB(A)	67	68	70	71	72	70	72	72	72	72

* Performance values refer to the following conditions:
Cooling: room air temperature 27.0°C DB RH 50%, ambient air temperature 35°C.
Heating: room air temperature 21.0°C DB, ambient air temperature 7°C DB / 6°C WB.

** Noise level measured by adopting average value in the noise lab with background noise of 25 dB(A), at a distance of 1.5m high fan speed.

Performance table

Technical data 10kW~190kW

Model	Unit	RTU48	RTU55	RTU64	RTU72	RTU88	RTU104	RTU120	RTU150	RTU170	RTU190
Cooling*											
Cooling capacity*	kW	47.2	53.2	63.3	71.4	87.2	103.3	118.8	153.4	168.6	188.5
	Ton	13.5	15.2	18.1	20.4	24.9	29.5	33.9	43.8	48.1	53.9
Nominal current*	A	31.3	32.5	37	45.5	53	68.7	79.7	88.5	113.8	135.3
Nominal power input*	kW	16.4	18.7	21.5	26.5	30.6	39.8	46	55	65.8	78.3
Heating*											
Heating capacity*	kW	50.2	56.4	67	75.6	93.3	110.5	126.8	164.3	182	202
	Ton	14.3	16.1	19.1	21.6	26.7	31.6	36.2	46.9	52	57.7
Nominal current*	A	29	30.3	34.3	42	47.2	62.3	74.2	84.6	102.5	124.8
Nominal power input*	kW	15	17	19	24.1	27.3	36	43	49	59.3	72.2
Power supply		380~415V/3Ph/50Hz									
Refrigerant charge	Kg	13.5	15.2	18.1	20.4	24.9	29.5	34	43.8	48	54
Compressor											
Qty	Nr.	2	2	2	2	2	4	4	4	4	4
Type		Scroll									
Air treatment section											
Centrifugal fans number	Nr.	1	1	1	1	1	1	1	1	1	1
Drive type	/	Belt drive									
Air flow	m^3/h	9350	10450	11700	14400	16600	19940	22000	29000	31400	34900
External static pressure	Pa	290	280	275	380	345	390	390	360	420	430
Motor power	kW	2.2	3	3	4	4	5.5	7.5	7.5	11	15
Condensation section											
Axial fans number	Nr.	2	2	2	2	2	4	4	4	4	4
Air flow	m^3/h	19200	21420	24620	28400	37500	43680	49200	67500	72000	84000
Motor power	kW	2*0.55	2*0.55	2*0.75	2*0.75	2*1.1	4*0.75	4*0.75	4*1.1	4*1.5	4*2.2
Dimensions											
Length	mm	2540	2540	3090	3400	3400	4700	4700	5200	5800	5800
Width	mm	1860	1860	2200	2200	2200	2240	2240	2240	2240	2240
Height	mm	1180	1430	1430	1590	1590	1650	1650	1650	1650	1650
Net weight	kg	830	850	1200	1400	1500	1700	1750	2300	2500	2500
Sound pressure level **	dB(A)	75	73	75	75	75	75	80	80	82	84

* Performance values refer to the following conditions:
Cooling: room air temperature 27.0°C DB RH 50%, ambient air temperature 35°C.
Heating: room air temperature 21.0°C DB, ambient air temperature 7°C DB / 6°C WB.

** Noise level measured by adopting average value in the noise lab with background noise of 25 dB(A), at a distance of 1.5m high fan speed.

Optional function

Economizer and free cooling

It is one of the most important features of this rooftop as it maximise seasonal efficiency by reducing the use of thermodynamic cooling in mid season.

Thermodynamic cooling can be replaced by Free Cooling when outdoor temperature is below the building set point saving up to 15% on annual energy consumption.

Rooftop units are supplied with economizer and fresh air hood to improve comfort through better fresh air management and allow energy savings with free cooling.

Exhaust air

Gravity exhaust damper

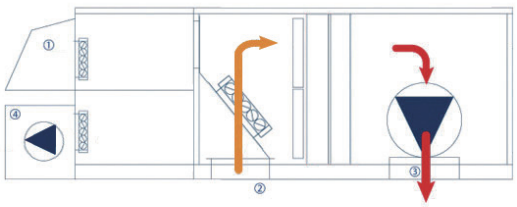
Gravity exhaust damper Installed with economizer assembly, gravity exhaust damper relief pressure when outside air is being introduced in the system. It is a cheap and smart way to avoid over pressure in a building.

Power exhaust fans

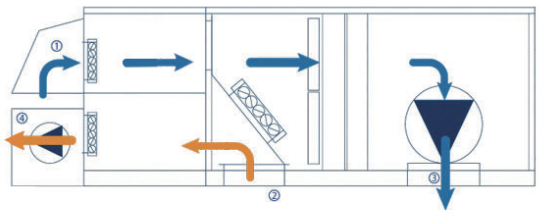
Installed with economizer assembly, it provides exhaust air pressure relief when high levels of fresh air are being introduced in the system.

Interlocked to run when return air dampers are being closed and supply air blower is in operation. The extraction fans run when outdoor air dampers are at least 50% open (adjustable). It is also overload protected. A gravity exhaust damper is supplied with this option to prevent air from entering the unit during shutdown. The power exhaust fans have been size to exhaust 50% of the nominal air flow of the unit.

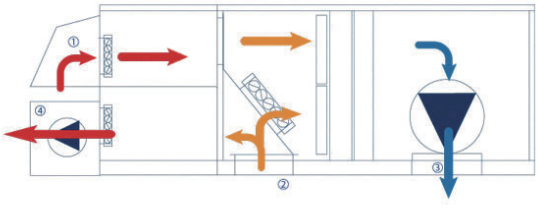
Cooling/heating mode without fresh air



Free-cooling mode



Cooling/heating mode with fresh air



① Fresh air ② Return air ③ Supply air ④ Exhaust air

Heat recovery

Improvement of indoor air quality is one of the major missions of air conditioner equipment. To introduce the ambient fresh air into the building is an ecological and effective solution which is mandatory to control indoor CO^2 level and comfort. Amrta air to air HR system offers a parfait energy recovery solution by absorbing heat from the exhaust air in order to pre-treat the fresh air to achieve at the same time:

- A high performance of the improvement of indoor air quality and comfort.
- A economical operation for remarkable energy saving.

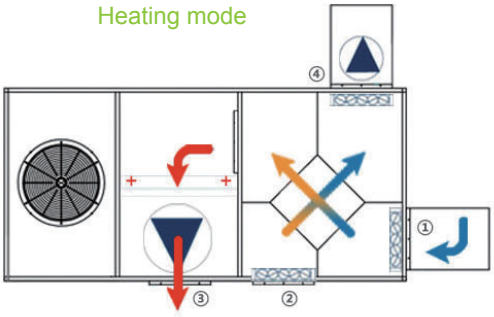
Two types of HR equipment are available according to the project requirement: Plate heat exchanger or Wheel heat exchanger. Although the use of the HR system maybe increase some of energy consumption of fans, but the benefit of energy saving will be certainty greater than that. The test data prove that the performance of heat recovery can be up to 70% for recovery efficiency and 100% for volume of exhaust air.

The HR system is now widely applied in residential, commercial, industrial applications. Practically, applications which demand the higher quality air and fresh air rate are strongly recommended.

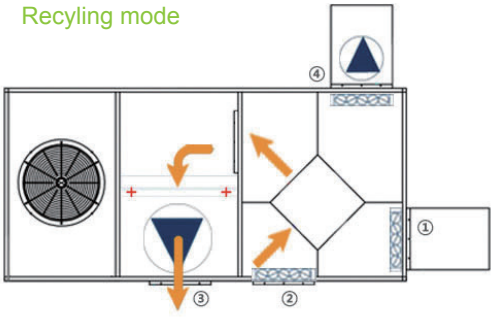
Heat recovery diagram

Plate heat recovery

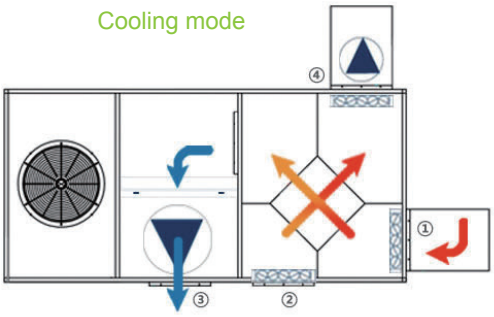
Heating mode



Recyling mode



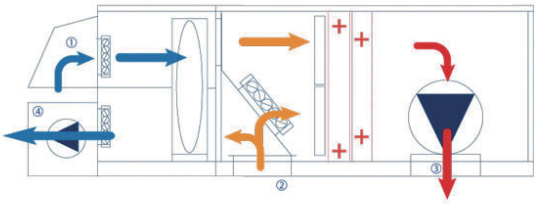
Cooling mode



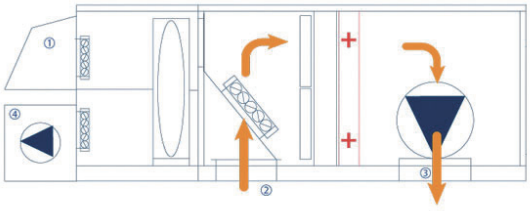
① Fresh air ② Return air ③ Supply air ④ Exhaust air

Wheel heat recovery

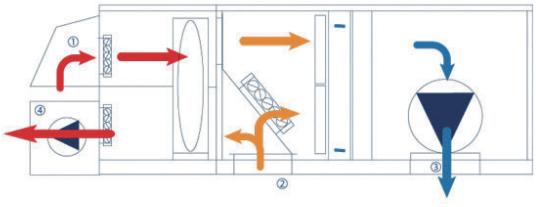
Heating mode



Recyling mode



Cooling mode



① Fresh air ② Return air ③ Supply air ④ Exhaust air

Heating possibilities

Electric heater

The electric heater comprises of shielded resistance heaters, which are smooth stainless steel tubes 6 W/cm^2 capacity. High temperature limit control offers overload protection and is set to 90°C and located at less than 150mm after electric heaters. This is provided as a standard feature on the electric heater, with the electric power supply cables made of reticulated silicon rubber, resistant to temperatures up to 200°C. For any rooftop unit size, three sizes of electric heater are available, S (standard), M (Medium) and H (high).

Hot water coil

Hot water coils offer fully modulating control through the use of a 3 way valve. The hot water coil, connections and valves are all tested at pressure of 15 bars. Frost protection is provided by forcing the opening the 3 way valve when supply temperature from hot water coil falls below 8°C and by stopping the outdoor fan when that supply temperature falls below 6°C. In addition to that, the 3 way valve is also opened at 10% value if the outdoor temperature falls below an adjustable value.

Hot water coils are always factory fitted, wired and fully tested, prior to shipment.

Explosion proof

Designed for Group II A, IIB, IIC.
Designed for Temperature classes T1-T6.
Designed for Explosive atmosphere Zone1, Zone2.
Designed for petroleum exploitation, refinery, storage, chemical, medicine, military facilities, etc.
Efficient energy saving and low noise.
Single refrigeration type and refrigeration & heating type.
Explosion-proof mark: EXdemib II BT4, EXdemia II CT4.

Gas burner

Amrta rooftop units can be fitted with a gas burner. As one of the auxiliary heating devices, it allows the rooftop units to heat without running the refrigeration system or only with a part of it to achieve a high performance of energy-saving at lower ambient temperature in winter and to reduce massively the heating operating costs specially for where the natural gas is cheaper than electricity.

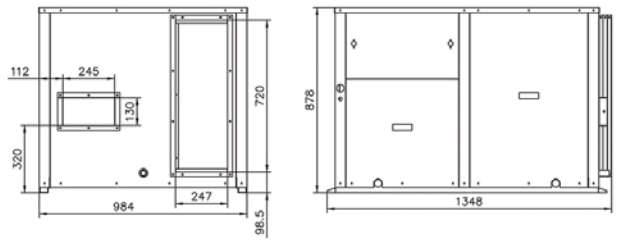
The gas heating modular use a safe and reliable atmospheric gas burner made of aluminized steel tube heat exchanger designed to offer maximum heat transfer and 92% efficiency (PCI%). It runs with natural gas in an operating range of 1.3-2.6KPa. The standard gas module offers 2 stages of control which helps in improving space comfort by avoiding large supply air temperature deviations. The airflow rate in the burner is controlled as the gas flow is being reduced maintaining the burner to its highest efficiency level.

S: 30kW
M: 50kW
L:100kW

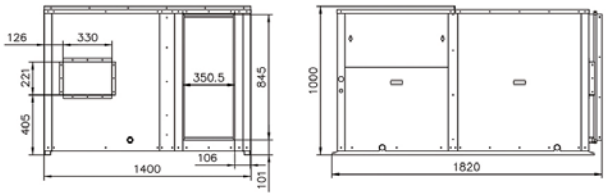
3 modules are available, which can provide separately 30kW, 50kW and 100kW heating capacity in standard working condition according to your different heating requirements. Where more capacity is required a modulating version is available with flexible combination. For safety reasons, the rooftop unit with gas heating can’t be installed inside a technical room.

Standard dimensions

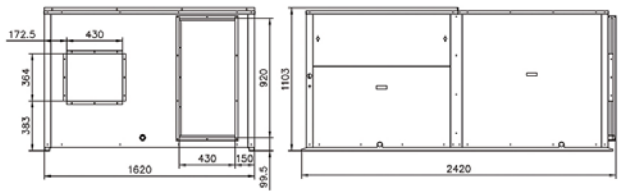
RTU10~16



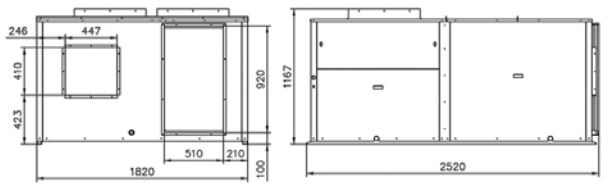
RTU20~28



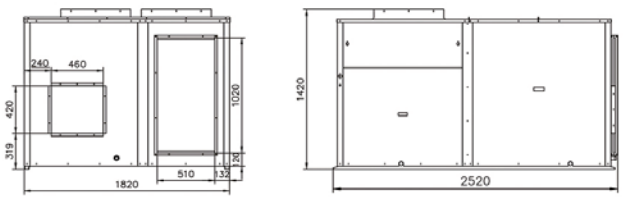
RTU32~36



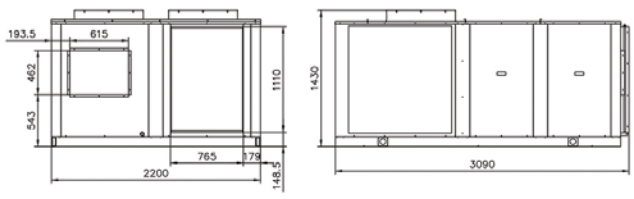
RTU42~48



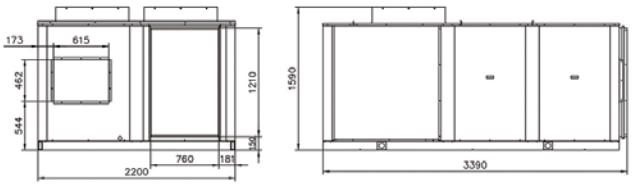
RTU55



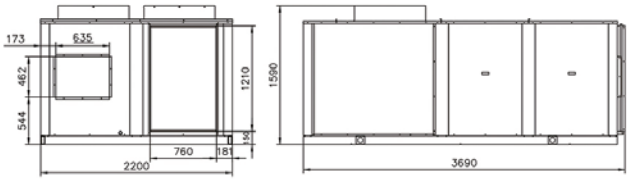
RTU64



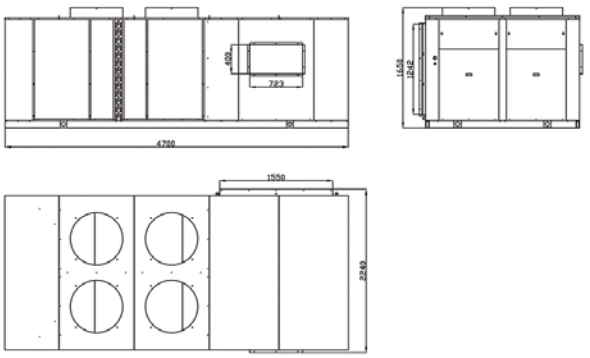
RTU72



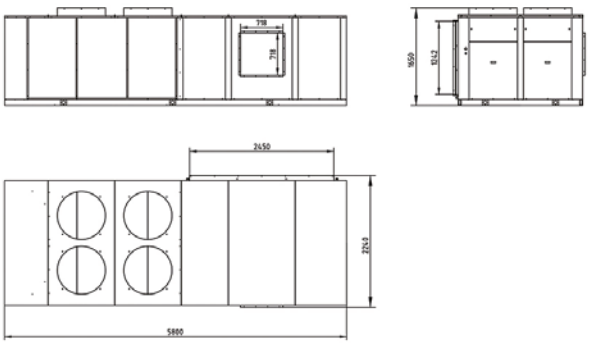
RTU88



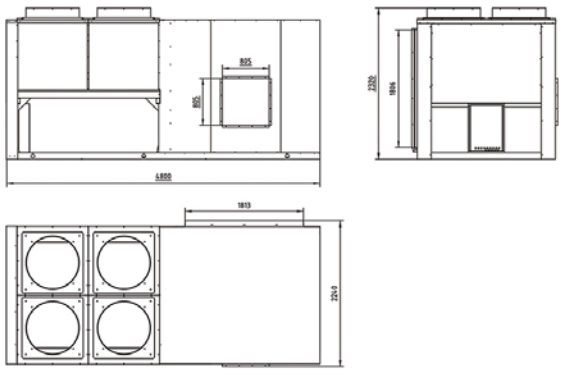
RTU104~120



RTU150~170



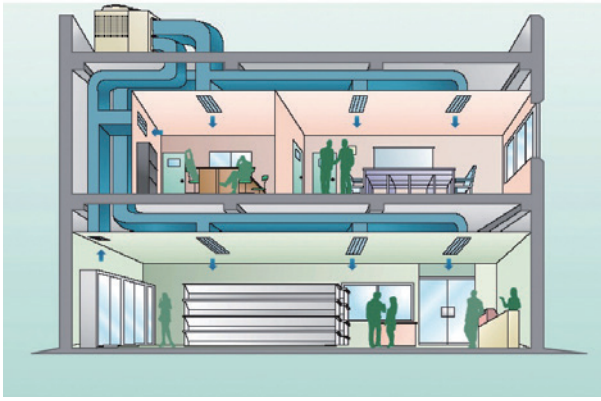
RTU190



Installation, operation and maintenance

Installation

Amrta equipment has been designed for quick and easy installation.



Unit location

The electric unit is designed only for outdoor installations. Choosing the location of the unit should be based on minimizing the length of the supply ducts. Consideration should also be given to availability, service access, noise, and shade. The unit installation shall avoid areas where condensate drainage may cause problems.

Setting the curb

Make openings in roof decking large enough, to allow for duct penetration and work space only. Do not make openings large than necessary. Set the curb to coincide with the openings. Make sure the curb is level. Unit must be level in both horizontal axes to support the unit and reduce noise and Vibration.

Electrical

All electrical work must be carried out by a qualified and licensed electrician. Then installation must comply with the current relevant standards wiring rules and local authority requirements. Wire sizing is the responsibility of the installer, as it depends on the conditions and regulations applicable to each installation site. Refer to the electrical drawing and specification of the unit for the electrical data. The electrical installation requirements are generally as follows:

●The air-conditioning unit shall be supplied directly from a distribution board through a mains lockable isolating switch.
●Pre-punched holed have been provided in the unit casing for the isolating switch. Do not drill into the cabinet as piles may be located behind.

Operation

Unit operations should be controlled with thermostat, or unit controller, never at the main power supply, except for servicing, emergency, or complete shutdown of the unit.

Maintenance

At least once each year, a trained, qualified service technician should check out the unit. Fans, evaporator coils, and filters should be inspected at least monthly.

Product series

Air cooled mini chiller

Air cooled modular chiller

Air cooled screw chiller

Rooftop packaged unit

Tent packaged unit

Water cooled packaged unit

Water cooled scroll chiller

Water cooled screw chiller

Water chilled fan coil unit

Literature Order Number PROD-RTU007-EN
Date May 2018

http://en.amrta.com.cn

Office telephone: 0086-531-88901036
For more information, contact info@amrta.com.cn