

MOBILECOOL-OUTDOOR

Air Conditioner for Telecommunication Base Station

Cooling Capacity: 3.5kW–13.6kW



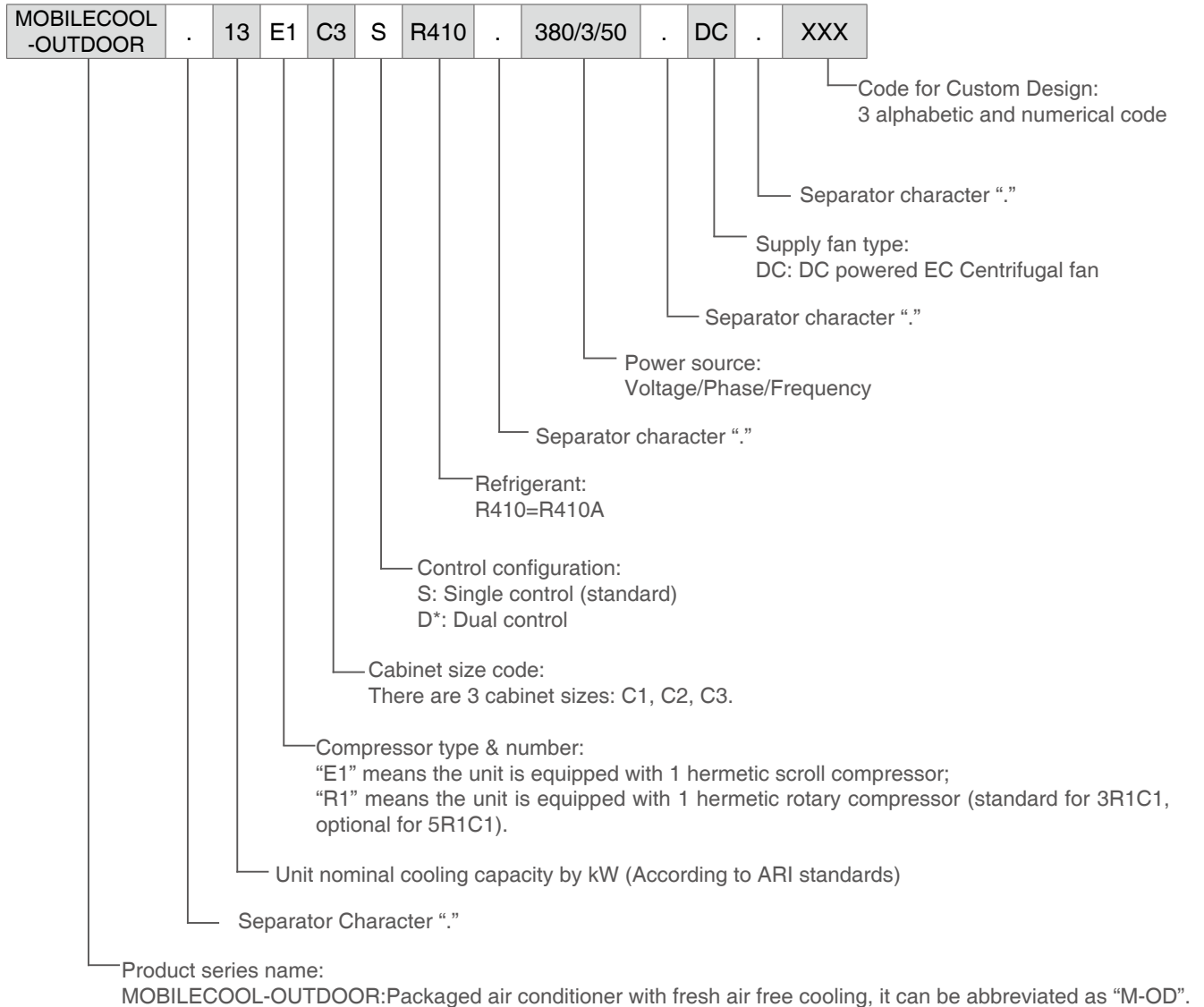
MOBILECOOL-OUTDOOR unit is one of the products of AIRSYS BTS air conditioner family which meets high requirement of high efficiency, various power supplies, green refrigerant, various installation methods, wide working range and safety etc.

The unit is integrated the newest technology and advantages in modern time, supplying a value over the desire of customer.

The product is a packaged unit for outdoor installation, integrated with refrigeration system, free cooling system and control system.

All the components of the unit are assembled and tested in factory. And all the control parameters are factory settings as default before leaving the factory. So, after the unit is installed on site, it can be used once the power is supplied.

Unit Identification



For example:

M-OD.13E1C3SR410.380/3/50.DC stands for MOBILECOOL-OUTDOOR unit with 13 kW nominal cooling capacity, equipped with 1 hermetic scroll compressor; cabinet size is C3; Single control; R410A refrigerant; the input power supply is 380V/3Ph/50Hz; supply fan is DC powered EC Centrifugal fan.

Note: * Once dual units are ordered, one ASLLC.2.48 is needed for every two units.

Working range and control accuracy

Indoor side

Temperature range and accuracy: 5°C~32°C±1°C

Outdoor side

-30°C~53°C

Storage

Temperature: -40°C~70°C

Humidity: 5~95%

Unit main components

Standard components

Unit base and frame

Unit base is made of folded sheet steel coated with golden epoxy resin powder.

Unit frame is made of folded sheet steel and assembled by bolts or rivets. The surface of unit frame is coated with golden epoxy resin powder.

Unit panel

Unit panels are made of folded sheet steel and assembled with unit frame by bolts or rivets. The surface of panels is coated golden epoxy resin powder.

Mechanical cooling system

Scroll compressor with crankcase electric heater (available for 5E1C1, 7E1C2, 10E1C2, 13E1C3) / Rotary compressor(only available for 3R1C1)

Filter & drier

Thermodynamic expansion valve

Evaporator: made of high efficiency heat exchanging copper tube with continuously enhanced aluminum fining.

Condenser: made of high efficiency heat exchanging copper tube with continuously enhanced louvered aluminum fining.

Auto reset type of high/low pressure switch

Supply fan

DC powered EC centrifugal fan

Condenser fan

Axial propeller fan with directly coupled motor with internal thermal protection and external current protection

Air filter

G4 main air filter, 2" disposable pleated type

G2 nylon filter, at external air inlet

Applications

Various telecommunication base stations

Advanced technology electronic devices switching room

Power distribution station

Industrial process control center

Free cooling system

Air damper

Include: damper blade by galvanized steel, with jamb and head seals to prevent leakage when closed.

Damper blade is covered with insulated material to have a good sealing performance

Damper actuator:

With 24VDC power supply and maximum~90S open or close time and with spring return to close upon unit shutdown.

Electric control

Single control: all the electric components are integrated in an independent space in the unit.

Dual control: the electric components of the unit are assembled in an independent space in the unit; the control part is a separate box which is installed out of the units, like a head to control two units.

Micro miniature breaker: every load is equipped with a separate micro miniature breaker.

Contactors: every load is equipped with a separate contactor.

Phase and over-current protector (Only for 3 phase power source)

Control transformer

Power switch: change the voltage from AC to 24VDC, used for 24VDC controller and damper actuator.

Micro-processor

Controller

Return air temperature sensor

Outdoor temperature sensor

Outdoor humidity sensor

Standard power sources

220V/1Ph/50Hz(available for 3R1C1)

380V/3Ph/50Hz(available for 5E1C1, 7E1C2, 10E1C2,

13E1C3)

Optional components

Electric heating elements

Capacity 2.25kW, 4.5kW and related control components.

Power inverter

Without DC power, a power inverter is needed to change AC to 48VDC for EC fan.

Filter clogged alarm

The filter clogged alarm will be triggered if the filter is clogged through equipped with air pressure differential switch.

Air filter protection device (AFPD)

AFPD is AIRSYS patented product, which is developed for maximizing the filter working life and utilizing more free cooling function in some harsh environments such as sand storm, dust weather etc. to save service cost and more energy.

Anti-corrosion condenser

Condenser coil coated with PoluAl XT* anti-corrosion coating. Aluminum fin, copper tube.

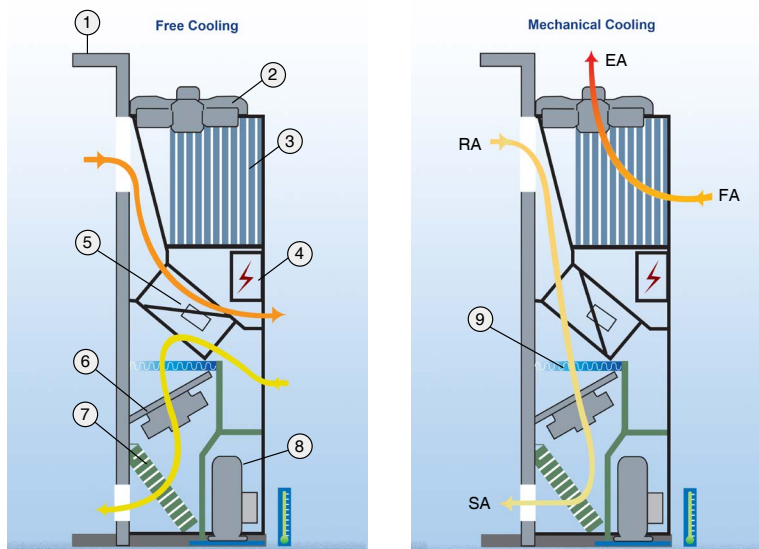
* AIRSYS imported and absorbed BLYGOLD high quality and reliable anti-corrosion coating PoluAl XT for condenser coil protection.

Cabinet for sea air environment

Include frame made of stainless steel and panels.

working principle

Structure working principle



1. Shelter infrastructure
 2. Condenser fan
 3. Condenser
 4. Electric control box
 5. Air damper
 6. Supply fan
 7. Evaporator
 8. Compressor
 9. Air filter
- EA:Exhaust air
RA:Return air
FA:Fresh air
SA:Supply air

Remote communication card

RS485 or RS232 communication card with MODBUS communication protocol;

Network server: remote monitor and control after equipped with IP address.

Communication protocol conversion card

Change the communication protocol from MODBUS to TCP/IP.

Clock card

Provide calendar function, convenient for operation and management.

Wall mounting kits

The unit is designed to be installed hanging on the shelter wall and is enclosed with related mounting accessories such as: angle brackets, through wall bolts, sealing tape and grill etc.

Supply air temperature sensor

Assemble the sensor in the mixture air box, used for proving control signal for controller and controlling the position of air damper.

Optional power sources

50Hz

220V/1Ph/50Hz(available for 5E1C1, 7E1C2, 10E1C2, 13E1C3)

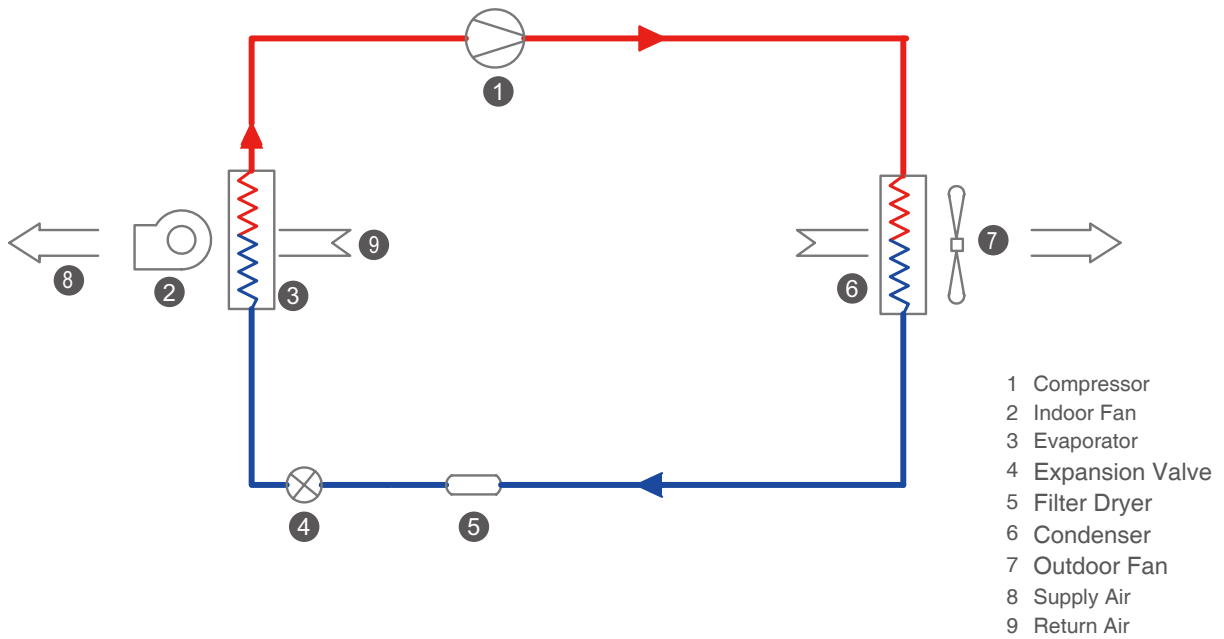
60Hz

230VAC/1Ph/60Hz

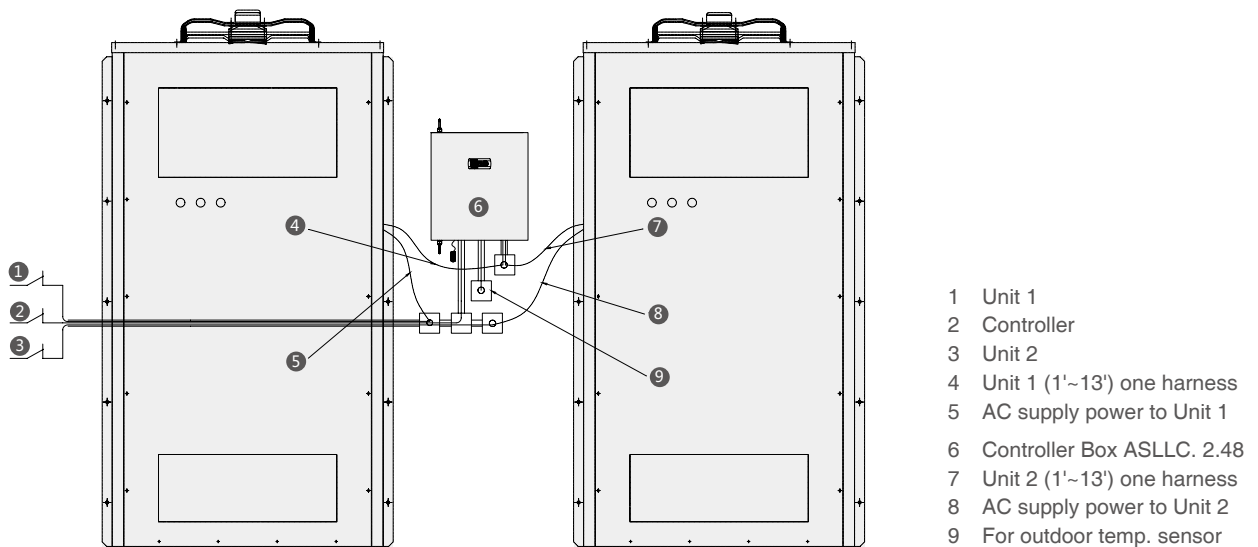
230VAC/3Ph/60Hz(available for 7E1C2, 10E1C2, 13E1C3)

380VAC/3Ph/60Hz(available for 13E1C3)

Working principle for mechanical compressing refrigeration system



Dual units working principle



Free cooling operation condition: When outdoor temperature is ok, the two units will work simultaneously. It will minimize the energy consumption to supply maximum cooling capacity by using EC fan.

Mechanical cooling operation condition: When room temperature reaches mechanical cooling set point, the two units will work alternately with lead lag control logic.

Unit main features

Energy-saving operating

When the outdoor temperature is lower than that of the room, the built-in free cooling system will bring the fresh air into the room to avoid the compressor working, which reduces the power consumption.

When the temperature difference between indoor and outdoor is higher than 10°C, the free cooling system can supply 100% of the cooling capacity, saving 90% energy.

Good structure design and easy maintenance

The main components such as: compressors, fans, motor, dampers and other related components can be accessed and maintained in front of the unit.

The weight of each panel is less than 10kg.

Strong structure

The structure is strong enough to be able to transport on low grade ways.

Dual cooling source

Each unit is equipped with both mechanical cooling system and free cooling system as standard. The fresh air free cooling is designed to be the primary source of cooling.

Anti-corrosion treatment

The frames and panels of the unit are made from galvanized steel plate and coated with anti-corrosion protection coating. The working life of WPU frames and panels is up to 15 years as the reliable protection.

The coastal coating system is available now.

High sensible heat ratio

The sensible heat ratio of all the units are higher than 0.8.

Wide working range

The unit can work at minimum -30°C, maximum 53°C ambient temperature continuously and reliably.

High efficiency air filter

When the pressure drop of the filter reached 250Pa end resistance, the unit air flow will not be lower than 90% of air flow at standard condition.

High torque and low leakage air damper

The unit is equipped with high torque air damp actuator for free cooling system. The time from open and close is less than 90 seconds. The air volume loss will be less than 5% when the damper withstands 125Pa air pressure.

Fully automatic control

The unit is equipped with a full automatic control system. All the control and protection and alarms are automatic with auto restart.

Working mode auto-alternated

The unit automatically selects the working mode: mechanic cooling or free cooling according to the indoor and outdoor temperature. In the event of either power outage or mechanical cooling failure affecting the refrigeration system, the unit will be alternated to free cooling mode.

Random restart when power recovered

When the power recovered after power goes off, the unit will restarts automatically with a random time delay between 1 to 60 seconds, to avoid equipments starting at the same time. Do not need manual intervention.

Automatic self-diagnosis

All the components connected to the controller, if there is a component failure, the alarm will be triggered and display on controller LED screen.

Comfort mode

When service engineer is working in the base station, he can choose the HVAC work with comfort mode (22°C, adjustable) by pressing 2 buttons on the user terminals. Half an hour later, the unit will recover to work at normal temperature.

4 levels password protection

There are 4 levels password protection for the control system, which are:

Read only: suitable for normally operation people;

Read/write: Suitable for maintenance people;

Maintenance & commissioning: Suitable for commissioning engineer;

OEM: Suitable for the engineer from manufacturer.

Voltage protection

The unit is equipped with a voltage relay for system protection. When the supply voltage is in over voltage and excess the permitted range, the unit will be stopped. For 3 phase unit, if there is phase unbalance or phase absence, the unit will also be stopped for protection.

Brownout circuit for single phase unit (Option):

The unit is equipped with a brownout circuit for compressor protection, extending compressor working life. The brown out can capture the under voltage in 0.008~0.015s and disconnect the compressor signal, stop compressor working. When the voltage becomes normal, the compressor signal will be connected after 3 minutes.

Alarms

The control system can provide a lot of alarms, to make sure the system have better performance. Except for high/low temperature alarm, high/low pressure alarm and temperature sensor alarms, we add fire/smoke alarm, generator run alarm, two compressor run alarm, prime power outage alarm if the system equipped with DC-failover system, power disconnected manually alarm, air damper failure alarm etc to protect the unit. All alarms are classified and can be output with critical, major and minor levels. Which can be used for classify service level to save service cost.

Most of alarms input and output are adjustable by user terminals on site (NO or NC). No need to change new controller board or upgrade the software.

Free cooling function

Humidity control:

The humidity control function can be enabled or disabled on site.

If it is enabled, when the humidity is higher than set point, free cooling will be turned off in order to assure inside humidity of base station at normal range.

Emergency ventilation function:

The emergency ventilation function can be enabled or disabled on site.

If it is enabled, the emergency ventilation function will be engaged when the room temperature excess the set point to protect inside devices out of high temperature. The emergency will be triggered at any time except fire/ smoke alarm triggered.

Step-test

The unit control system has one test function (step-test), which is used for system commissioning or system check if there are something failure.

Only 1~8 steps, less than 10 minutes.

Running data logging

The controller has a memory of 1M for data logging.

If the interval of data logging is less than 5 minutes, the controller can store at least 48 hours working data.

Data output

The RS485 communication card is standard configuration for the unit, which enable automatic download of logs. The format of the data should be CSV or Excel file.

Web server monitoring system

The unit can be equipped with a Web Server card with TCP/IP protocol and Ethernet network to realize remote control and monitoring. Each computer can be connected to the web server by Ethernet network and check the working status and control the unit in time everywhere.

Lead-Lag auto-alternated

When lead or lag unit is failure, the lag or lead unit wil work.

Balance all units working time automatically

If there are 2 units installed, the controller will alternate the working unit automatically according to the total working time of the units to balance the working time.

The control functions

Parameters display

Current control temperature set
Return air temperature
Outside air humidity
Outside air temperature
Supply air temperature
Damper position
Software version
Attend mode

Working status display

Supply fan speed
Main fan hours run
Main fan minimum speed hours run
Condenser fan low speed
Condenser fan low speed hours run
Condenser fan high speed
Condenser fan high speed hours run
Compressor working status
Compressor hours run
Compressor startup times
Compressor total startup times within latest 48 hours
Heater working status
Heater working hours
Heater startup times
Free cooling working status
Free cooling working hours
Free cooling startup times

Alarm display

Unit general failure alarm
Controller failure alarm
High pressure
Low pressure
Supply fan failure
Filter clogged
Free cooling system failure
Low temperature
High temperature
Fire or smoke
Temperature sensor defective

Remote control and monitoring

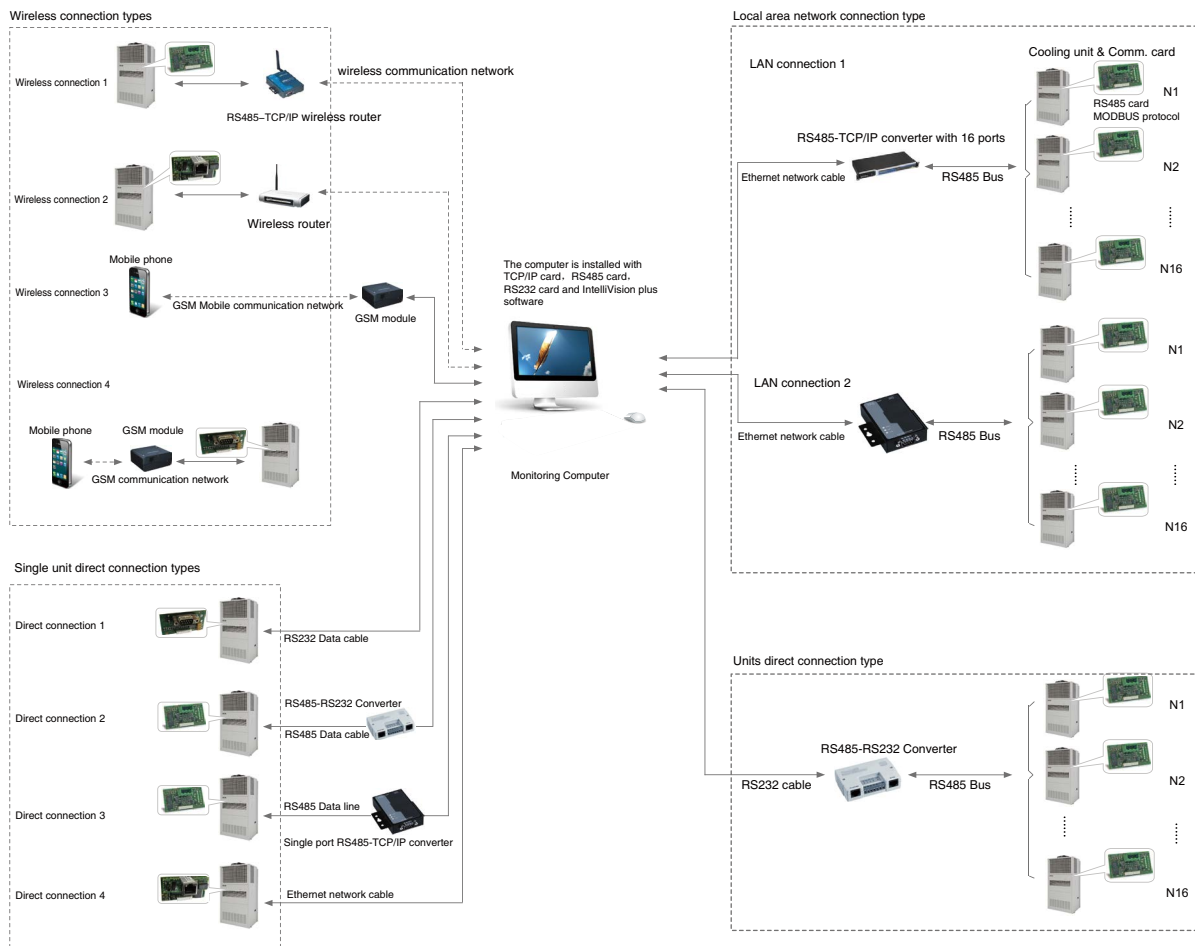
The remote monitoring and control system can be easily connected with the units to realize remote real time monitoring and control and save the running data.

The unit can be remote controlled by many kinds of methods as follows:

4 kinds of wireless network connection with computer

3 kinds of local direct connection with computer

3 kinds of LAN network connection with computer



Monitoring and control method	Related network configuration	Farthest distance
Wireless network connection		
Wireless connection 1:Wireless communication without unit server	RS485-TCP/IP converter; wireless router	No limitation
Wireless connection 2:Unit server based Wireless communication	Web server card; wireless router	No limitation
Wireless connection 3:Communication with remote computer by GSM mobile phone	GSM communication module	No limitation
Wireless connection 4:Communication with air conditioner directly by GSM mobile phone	GSM communication module; RS232 card	No limitation
Direct cable connection		
Direct connection 1:Direct connection by RS232 data line	RS232 communication card	1.5m
Direct connection 2:Direct connection by RS485 data line	RS485 communication card	1500m
Direct connection 3:Direct connection by Ethernet network line	Web server card	Can be extended by hub.
LAN network connection		
LAN connection 1:LAN net work by multi port protocol converter	RS485 communication card; Multi port RS485-TCP/IP protocol converter	Can be extended by hub.
LAN connection 2:LAN net work by single port protocol converter	RS485 communication card; Single port RS485-TCP/IP protocol converter	1500m
LAN connection 3:LAN net work by RS485-RS232 protocol converter	RS485 communication card; Single port RS232/RS485 protocol converter	1500m

Unit Specification

50Hz unit Model

Unit Model		3R1C1	5E1C1	7E1C2	10E1C2	13E1C3	5E1C1	7E1C2	10E1C2	13E1C3	
Air flow scheme		Displacement					Displacement				
Cooling Capacity											
Total cooling capacity(1)	kW	3.5	5.2	7.4	10.4	13.5	5.2	7.4	10.4	13.6	
Sensible cooling capacity(1)	kW	3.2	4.4	6.2	8.5	12.1	4.4	6.2	8.5	12.1	
Total cooling capacity(2)	kW	3.3	4.8	7.0	9.8	12.6	4.8	7.0	9.8	12.6	
Sensible cooling capacity(2)	kW	3.0	4.1	5.9	8.4	10.9	4.1	5.9	8.4	10.9	
Free cooling capacity (3)	kW	4.0	4.0	5.1	6.7	9.9	4.0	5.1	6.7	9.9	
Compressor											
Type		Rotary			Hermetic scroll			Hermetic scroll			
Power input(1)	kW	0.9	1.5	2.0	2.9	3.7	1.5	2.0	2.9	3.7	
Current(1)	A	4.2	7.0	9.1	13.3	18.3	2.7	3.7	5.0	6.2	
Power input(2)	kW	0.9	1.4	1.9	2.8	3.6	1.4	1.9	2.8	3.6	
Current(2)	A	4.1	6.9	9.0	13.1	18.0	2.6	3.6	4.8	6.0	
Supply fan		48VDC Powered EC, Centrifugal fan					48VDC Powered EC, Centrifugal fan				
Type											
Qty	n.	1	1	1	1	1	1	1	1	1	
Power input	kW	0.19	0.19	0.24	0.24	0.48	0.19	0.24	0.24	0.48	
Current	A	4.0	4.0	5.0	5.0	10.0	4.0	5.0	5.0	10.0	
Air volume	m ³ /h	1200	1200	1530	2000	2950	1200	1530	2000	2950	
Condenser fan		Axial fan					Axial fan				
Type											
Qty	n.	1	1	1	1	1	1	1	1	1	
Power input	kW	0.24	0.24	0.25	0.64	0.64	0.24	0.25	0.64	0.64	
Current	A	1.1	1.1	1.1	2.8	2.8	1.1	1.1	2.8	2.8	
Air volume	m ³ /h	3200	3200	4200	5800	5800	3200	4200	5800	5800	
Electric heater (4)		Finned stainless tube					Finned stainless tube				
Type											
Heating Capacity	kW	2.25	2.25	4.5	4.5	4.5	2.25	4.5	4.5	4.5	
Current	A	10.2	10.2	20.5	20.5	20.5	3.4	6.8	6.8	6.8	
Air filter		G2 Nylon Net Pre-filter					G2 Nylon Net Pre-filter				
Preliminary filter											
Main filter		G4, 2" disposable pleated type					G4, 2" disposable pleated type				
Power supply		220V/1Ph/50Hz & 48VDC					380V/3Ph/50Hz & 48VDC				
Power source											
Unit max. operating power input(5)	kW	1.63 & 0.19	2.43 & 0.19	3.25 & 0.24	5.15 & 0.24	6.15 & 0.48	2.53 & 0.19	3.15 & 0.24	5.04 & 0.24	5.84 & 0.48	
Unit max. operating current(5)	A	6.9 & 4.0	11.7 & 4.0	15.2 & 5.0	15.2 & 5.0	27.4 & 10.0	5.0 & 4.0	6.2 & 5.0	10.1 & 5.0	11.1 & 10.0	
Unit max. operating power input(6)	kW	2.25 & 0.19	2.43 & 0.19	4.5 & 0.24	4.5 & 0.24	6.15 & 0.48	2.53 & 0.19	4.5 & 0.24	5.04 & 0.24	5.84 & 0.48	
Unit max. operating current(6)	A	10.2 & 4.0	11.7 & 4.0	20.5 & 5.0	23.3 & 5.0	27.4 & 10.0	5.0 & 4.0	6.8 & 5.0	10.1 & 5.0	11.1 & 10.0	
Unit dimensions and weight											
Width	mm	620	620	930	930	1080	620	930	930	1080	
Depth	mm	620	620	700	700	700	620	700	700	700	
Height	mm	1930	1930	2140	2140	2140	1930	2140	2140	2140	
Weight	kg	135	145	235	240	280	145	235	240	280	

(1) The cooling capacity@T_{indoor} 27°C, RH50% and T_{outdoor} 35°C, compressor operating;

(2) The cooling capacity@T_{indoor} 24°C, RH50% and T_{outdoor} 35°C, compressor operating;

(3) The cooling capacity@indoor temperature and outdoor temperature difference (ΔT) is 10°C, compressor not operating;

(4) Optional;

(5) Unit maximum operating power input and current separately with AC&DC power supply when working at mechanical cooling without electric heater;

(6) Unit maximum operating power input and current separately with AC&DC power supply when working at mechanical cooling or heating with electric heater.

60Hz Unit Model

Unit Model		3R1C1	5E1C1	7E1C2	10E1C2	13E1C3	7E1C2	10E1C2	13E1C3	13E1C3
Air flow scheme		Displacement					Displacement			Displacement
Cooling Capacity										
Total cooling capacity(1)	kW	3.5	5.0	7.9	9.7	13.5	7.9	9.7	13.5	13.5
Sensible cooling capacity(1)	kW	3.2	4.3	6.3	7.9	12.1	6.3	7.9	12.1	12.1
Total cooling capacity(2)	kW	3.3	4.6	7.5	9.2	12.6	7.5	9.2	12.6	12.6
Sensible cooling capacity(2)	kW	3.0	4.0	6.1	7.5	10.9	6.1	7.5	10.9	10.9
Free cooling capacity (3)	kW	4.0	4.0	5.1	6.7	9.9	5.1	6.7	9.9	9.9
Compressor										
Type		Rotary	Hermetic scroll			Hermetic scroll			Hermetic scroll	
Power input(1)	kW	0.85	1.4	2.2	2.6	3.7	2.2	2.6	3.7	3.7
Current(1)	A	4.2	6.2	9.6	11.5	17.0	6.5	8.2	11.0	6.9
Power input(2)	kW	0.85	1.3	2.1	2.5	3.6	2.1	2.5	3.6	3.6
Current(2)	A	4.1	6.0	9.3	11.3	16.8	6.4	8.0	10.8	6.7
Supply fan										
Type		48VDC Powered EC, Centrifugal fan				48VDC Powered EC, Centrifugal fan			48VDC Powered EC, Centrifugal fan	
Qty	n.	1	1	2	1	2	1	1	1	2
Power input	kW	0.19	0.19	0.48	0.24	0.48	0.24	0.24	0.48	0.48
Current	A	4.0	4.0	10.0	5.0	10.0	5.0	5.0	10.0	10.0
Air volume	m ³ /h	1200	1200	2950	2000	2950	1530	2000	2950	2950
Condenser fan										
Type		Axial fan				Axial fan			Axial fan	
Qty	n.	1	1	1	1	1	1	1	1	1
Power input	kW	0.3	0.3	0.65	0.65	0.65	0.25	0.65	0.65	0.65
Current	A	1.3	1.3	2.9	2.9	2.9	1.1	2.9	2.9	2.9
Air volume	m ³ /h	3400	3400	6300	6300	6300	5000	6300	6300	6300
Electric heater (4)										
Type		Finned stainless tube				Finned stainless tube			Finned stainless tube	
Heating Capacity	kW	2.25	2.25	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Current	A	9.8	9.8	19.6	19.6	19.6	19.6	19.6	19.6	19.6
Air filter										
Preliminary filter		G2 Nylon Net Pre-filter				G2 Nylon Net Pre-filter			G2 Nylon Net Pre-filter	
Main filter		G4, 2" disposable pleated type				G4, 2" disposable pleated type			G4, 2" disposable pleated type	
Power supply										
Power source		230V/1Ph/60Hz & 48VDC				230V/3Ph/60Hz & 48VDC			380V/3Ph/60Hz & 48VDC	
Unit max. operating power input(5)	kW	1.61 & 0.19	2.51 & 0.19	3.56 & 0.24	4.56 & 0.24	6.12 & 0.48	3.55 & 0.24	4.55 & 0.24	6.05 & 0.48	6.2 & 0.48
Unit max. operating current(5)	A	6.9 & 4.0	10.8 & 4.0	15.4 & 5.0	20.2 & 5.0	27.5 & 10	10.3 & 5.0	13.9 & 5.0	18.0 & 10.0	12.3 & 10.0
Unit max. operating power input(6)	kW	2.31 & 0.19	2.51 & 0.19	4.5 & 0.24	4.56 & 0.24	6.12 & 0.48	4.5 & 0.24	4.55 & 0.24	6.05 & 0.48	--
Unit max. operating current(6)	A	9.8 & 4.0	10.8 & 4.0	19.6 & 5.0	20.2 & 5.0	27.5 & 10	19.6 & 5.0	13.9 & 5.0	18.0 & 10.0	--
Unit dimensions and weight										
Width	mm	620	620	930	930	1080	930	930	1080	1080
Depth	mm	620	620	700	700	700	700	700	700	700
Height	mm	1930	1930	2140	2140	2140	2140	2140	2140	2140
Weight	kg	135	145	235	240	280	235	240	280	280

(1) The cooling capacity@T_{indoor} 27°C, RH50% and T_{outdoor} 35°C, compressor operating;

(2) The cooling capacity@T_{indoor} 24°C, RH50% and T_{outdoor} 35°C, compressor operating;

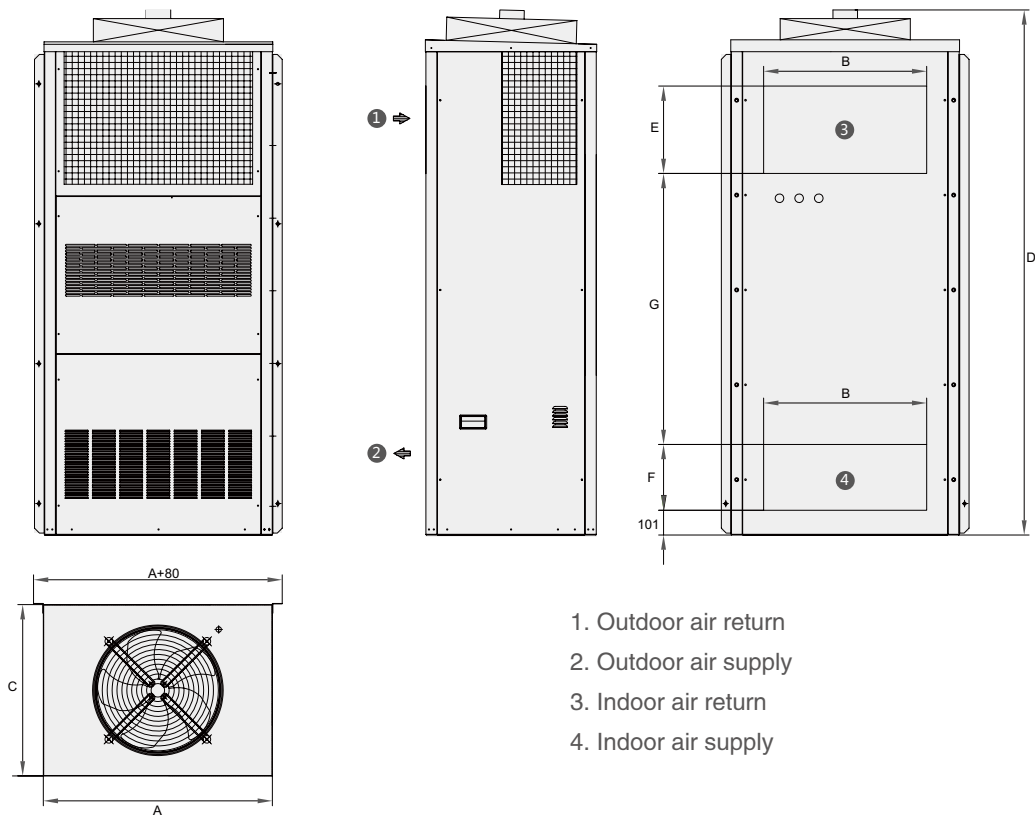
(3) The cooling capacity@indoor temperature and outdoor temperature difference (ΔT) is 10°C, compressor not operating;

(4) Optional;

(5) Unit maximum operating power input and current separately with AC&DC power supply when working at mechanical cooling without electric heater;

(6) Unit maximum operating power input and current separately with AC&DC power supply when working at mechanical/3 cooling or heating with electric heater.

Dimensions drawing



1. Outdoor air return
2. Outdoor air supply
3. Indoor air return
4. Indoor air supply

	C1	C2	C3
A	720	930	1080
B	454	664	814
C	700	700	700
D	2140	2140	2140
E	356	356	356
F	268	268	268
G	1104	1104	1104

AIRSYS is a cooling product and solution provider for ICT (Information & Communication Technology) industry.

The products include:

- Air conditioner and Chiller for IT room and large data center
- Intelligent Control system (BAS) for IT room and data center
- Air conditioning equipments for telecom shelters
- Intelligent control system for shelter cooling.

Air conditioner and heat exchanger for telecom cabinets.

The solution include:

- Cooling system design
- System integration
- Installation and Commissioning
- Operation and Maintenance

AIRSYS is also a global leader in providing cooling solution for Medical Imaging System.

AIRSYS Refrigeration Engineering Technology (Beijing) Co. Ltd.

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