

# MOBILECOOL-INDOOR

Air Conditioner for Telecommunication Base Station

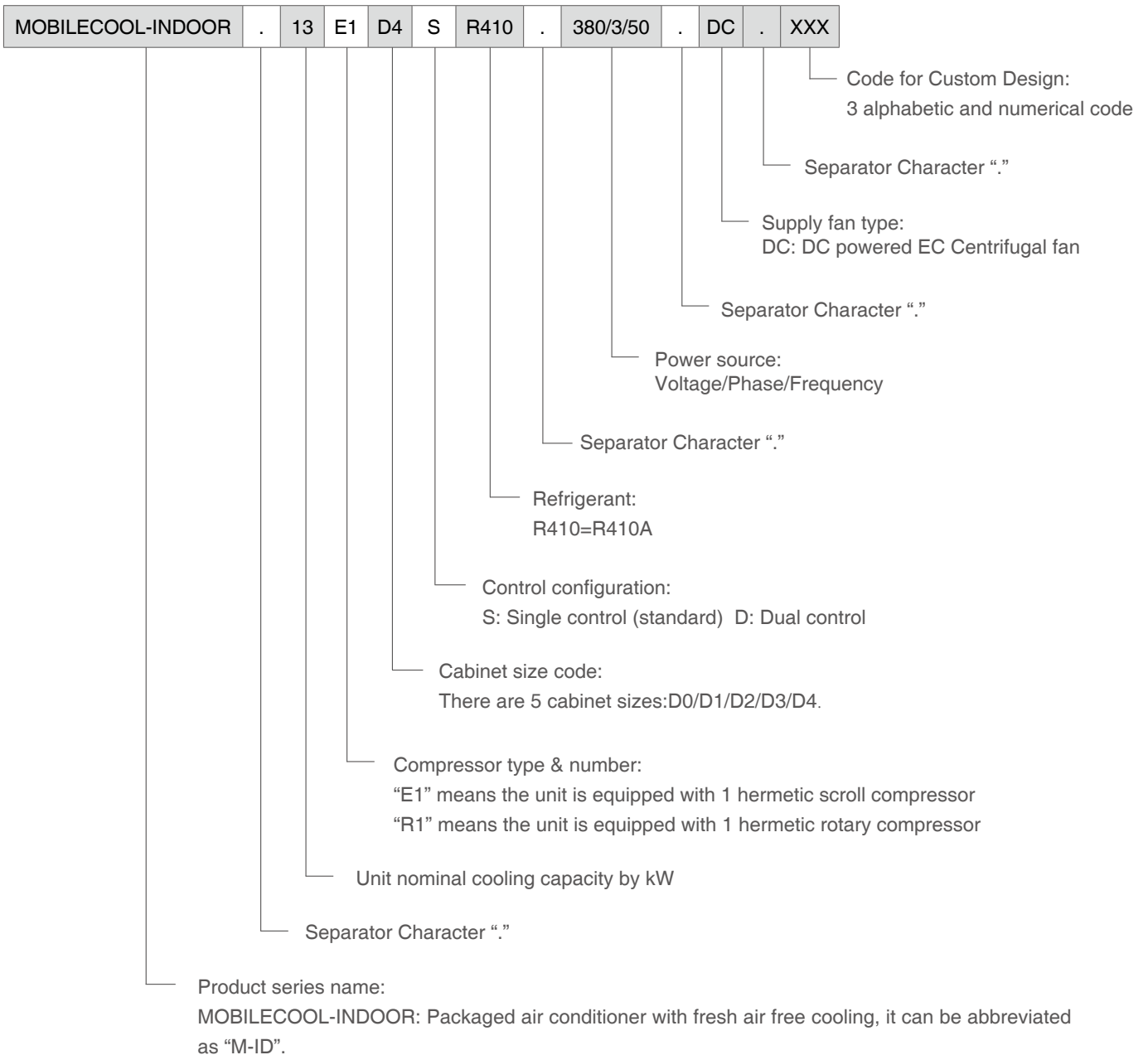
Cooling Capacity: 3.4~13.4kW



MOBILECOOL-INDOOR 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 with the newest technology and advantages in modern time, supplying a value over the desire of customer.

The product is a packaged unit for indoor 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-ID.13E1D4SR410.380/3/50.DC stands for MOBILECOOL-INDOOR unit with 13 kW nominal cooling capacity, equipped with 1 hermetic scroll compressor; cabinet size is D4; Single control; R410A refrigerant; the input power supply is 380V/3Ph/50Hz; supply fan is DC powered EC Centrifugal fan.

Once dual units are ordered, one ASLLC.2.48 is needed.

## Working range and control accuracy

### Indoor side

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

### Outdoor side

-30°C~43°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 grey 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 grey epoxy resin powder.

#### Mechanical cooling system

Scroll compressor with crankcase electric heater (available for 5E1D1, 7E1D2, 10E1D3, 13E1D4) /Rotary compressor (available for 3R1D0)

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

EC Centrifugal fan

#### Air filter

G4 main air filter, 2" disposable pleated type

G2 nylon filter, at external air inlet

#### Free cooling system

Air damper

Include: damper blade by galvanized steel, with jamb

## Applications

Various telecommunication base stations

Advanced technology electronic devices switching room

Power distribution station

Industrial process control center

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 DC, 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 3R1D0);

380V/3Ph/50Hz(available for 5E1D1, 7E1D2, 10E1D3, 13E1D4);

## Optional components

### Electric heating elements

Electric heaters of different capacity and related control components are available.

### Power inverter

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

### Air pressure differential switch

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 painted 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.

### 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.

### AC powered EC centrifugal fan

### Brownout circuit for single phase unit

The unit is equipped with a brownout circuit for compressor protection, extend 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.

### Optional power sources

#### 50Hz

220V/1Ph/50Hz(available for 5E1D1, 7E1D2, 10E1D3, 13E1D4)

#### 60Hz

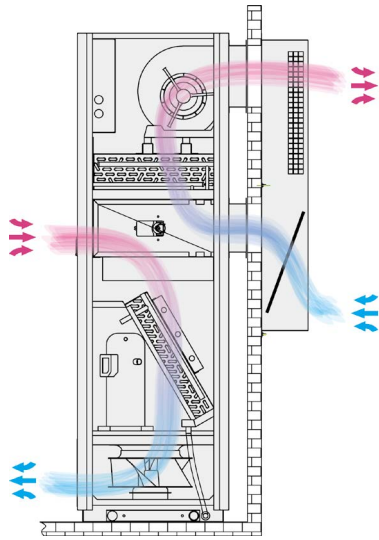
230V/1Ph/60Hz (available for 3R1D0,5E1D1,7E1D2,10E1D3,13E1D4)

230V/3Ph/60Hz (available for 7E1D2, 10E1D3, 13E1D4)

380V/3Ph/60Hz (available for 13E1D4)

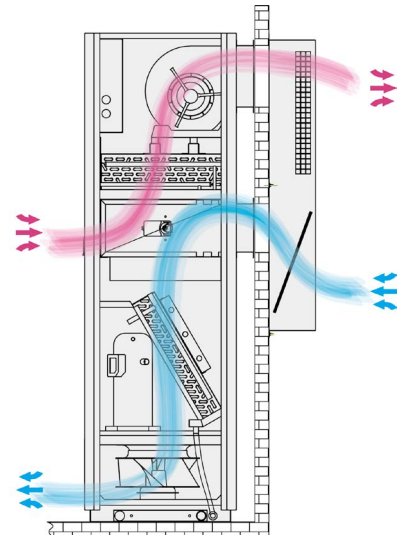
## Working Principle

### Structure working principle



**Mechanical cooling mode**

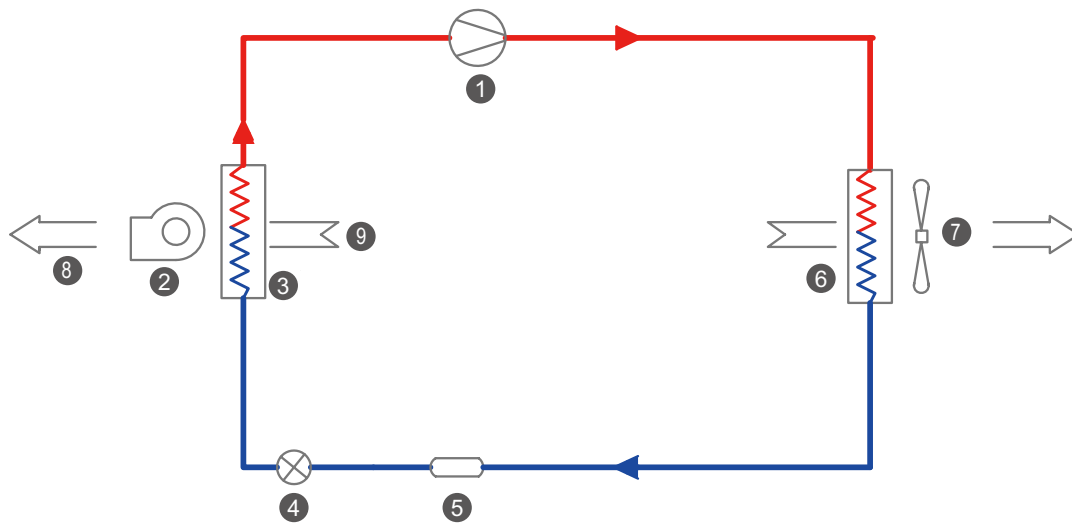
Air returned directly from the room, no external air entering the room.



**Free cooling mode**

External air intake for the free-cooling cycle through motorized control damper.

### Mechanical cooling working principle



- 1 Compressor
- 2 Indoor Fan
- 3 Evaporator
- 4 Expansion Valve
- 5 Filter Dryer
- 6 Condenser
- 7 Outdoor Fan
- 8 Supply Air
- 9 Return Air

## Unit main features

### Energy-saving operating

When the outdoor temperature is lower than inside temperature, the built-in free cooling system will bring outside fresh cold air into the room to cool the room temperature down, so that to reduce the compressor working time and save power consumption.

When the temperature difference is higher than 10°C between indoor and outdoor, the free cooling system can provide huge cooling capacity, equal to/ even higher than mechanical cooling capacity. Compared with traditional air conditioner, the annual energy-saving ratio is up to 90%.

### Bottom throw design

The air supply of the unit is designed with bottom throw. Compared with other designs, bottom throw can reduce the unit operating time to cool the room temperature down and save energy.

### 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

Mechanical cooling system and free cooling system are standard for the units. The free cooling system is main cooling source, when the free cooling system can not handle room temperature in normal range, the mechanical cooling system will assist free cooling system to cool the inside temperature down.

### Anti-corrosion treatment

The frames and panels of the unit are 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.

### Wide working range

The unit can work normally from -30°C to 43°C.

### 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 controls, protections 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.

### Comfortable mode for service engineer and technicians

When service engineer or technicians are working in the cell site, they may find the inside temperature is not comfortable, to choose the HVAC comfortable mode (22°C, adjustable) by pressing 2 buttons on the user terminals. Default: 1hr, can be adjusted (1~9hr). It will go back to normal working mode automatically after the comfortable mode is gone.

#### **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**

For 3 phase unit, if there is phase unbalance or phase absence, the unit will also be stopped for protection.

#### **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  
Free cooling startup times  
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

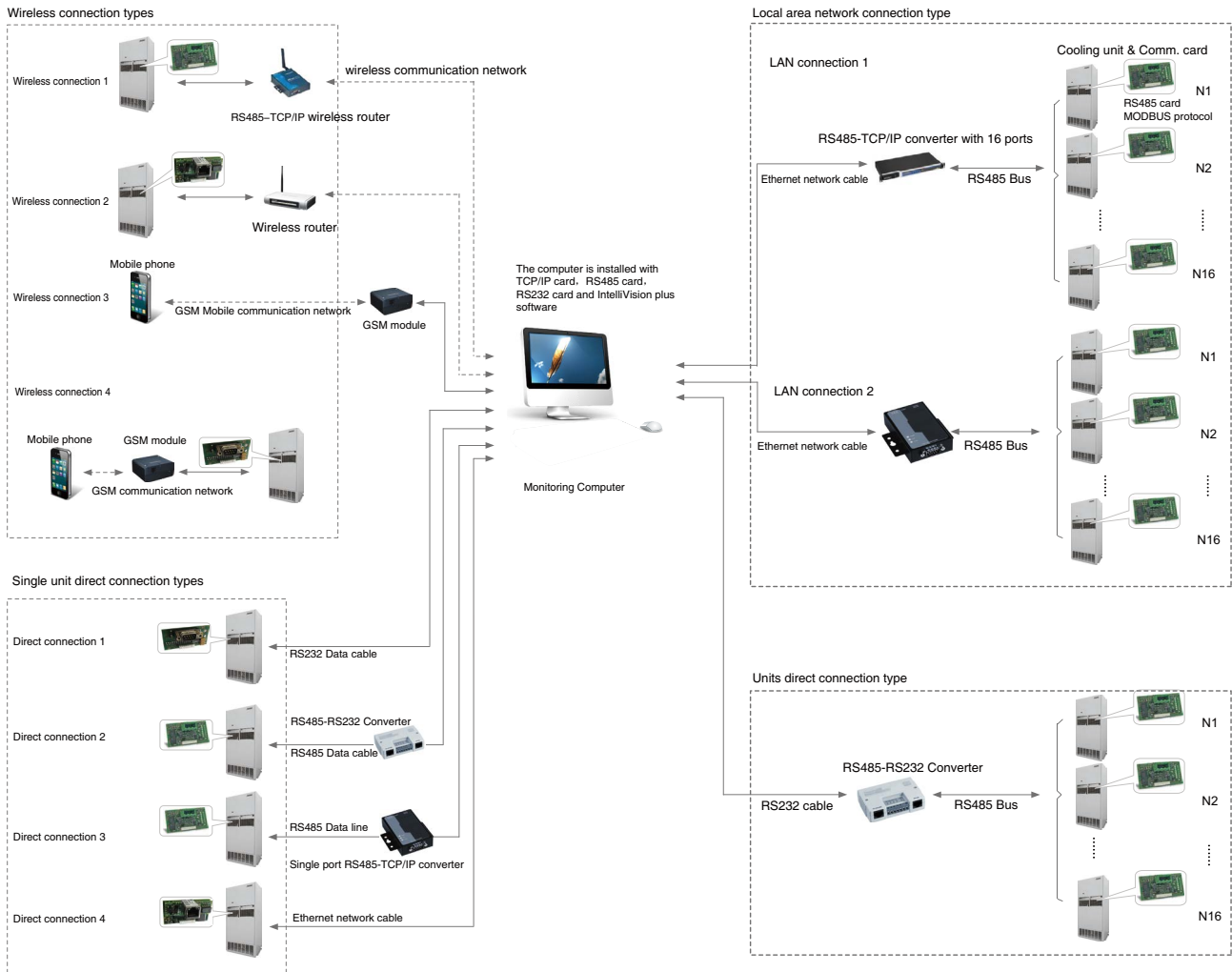


# Remote control and monitoring

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
<b>Wireless network connection</b>		
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
<b>Direct cable connection</b>		
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.
<b>LAN network connection</b>		
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		3R1D0	5E1D1	7E1D2	10E1D3	13E1D4	5E1D1	7E1D2	10E1D3	13E1D4	
<b>Air flow scheme</b>		Displacement					Displacement				
<b>Cooling Capacity</b>											
Total(1)	kW	3.4	5.2	7.3	10.3	13.4	5.2	7.3	10.3	13.4	
Sensible(1)	kW	3.1	4.2	6.3	8.4	12.0	4.4	6.1	8.4	12.0	
Total(2)	kW	3.2	4.5	6.9	9.7	12.5	4.8	6.9	9.7	12.5	
Sensible(2)	kW	2.9	4.0	5.8	8.3	10.8	4.1	5.8	8.3	10.8	
Free cooling(3)	kW	4.0	4.0	5.1	6.7	9.9	4.0	5.1	6.7	9.9	
<b>Compressor</b>											
Type		Rotary				Hermetic scroll		Hermetic scroll			
Power input(1)	kW	0.9	1.5	2.0	3.0	3.8	1.5	2.0	3.0	3.8	
Current(1)	A	4.2	7.0	9.1	13.6	18.3	2.7	3.8	5.1	6.3	
Power input(2)	kW	0.9	1.4	1.9	2.9	3.6	1.4	1.9	2.9	3.6	
Current(2)	A	4.1	6.9	9.0	13.3	17.9	2.6	3.7	4.9	6.0	
<b>Supply fan</b>											
Type		48VDC Powered EC Centrifugal fan					48VDC Powered EC Centrifugal fan				
Qty	n.	1	1	1	1	2	1	1	1	2	
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 <sup>3</sup> /h	1200	1200	1530	2000	2950	1200	1530	2000	2950	
<b>Condenser fan</b>											
Type		EC Centrifugal fan					EC Centrifugal fan				
Qty	n.	1	1	1	1	2	1	1	1	2	
Power input	kW	0.43	0.45	0.45	0.75	0.90	0.45	0.45	0.75	0.90	
Current	A	2.8	2.9	2.9	3.3	5.8	2.9	2.9	3.3	5.8	
Air volume	m <sup>3</sup> /h	2400	2800	2800	4200	5600	2800	2800	4200	5600	
<b>Electric heater(4)</b>											
Type		Finned stainless tube					Finned stainless tube				
Heating Capacity	kW	1.5	1.5	3.0	3.0	4.5	1.5	3.0	3.0	4.5	
Current	A	6.8	6.8	13.6	13.6	20.5	2.3	4.5	4.5	6.8	
<b>Air filter</b>											
Preliminary filter		G2 Nylon Net Pre-filter					G2 Nylon Net Pre-filter				
Main filter		G4, 2" disposable pleated type					G4, 2" disposable pleated type				
<b>Power supply</b>											
Power source		220V/1Ph/50Hz & 48VDC					380V/3Ph/50Hz & 48VDC				
Unit max. operating power input(5)	kW	1.8& 0.24	2.6& 0.24	3.5 & 0.24	5.2& 0.24	6.4& 0.48	2.7& 0.24	3.3& 0.24	5.1& 0.24	6.2& 0.48	
Unit max. operating current(5)	A	8.6&5.0	12.4&5.0	17.1& 5.0	23.8& 5.0	30.4& 10.0	6.8&5.0	8.0& 5.0	10.6& 5.0	14.1& 10.0	
<b>Unit dimensions and weight</b>											
Width	mm	500	600	750	860	1010	600	750	860	1010	
Depth	mm	600	600	650	650	650	600	650	650	650	
Height	mm	2000	2000	2100	2100	2100	2000	2100	2100	2100	
Weight	kg	130	160	200	255	290	160	200	255	290	

(1) he cooling capacity @T<sub>indoor</sub> 27°C, RH50% and T<sub>outdoor</sub> 35°C, compressor operating;

(2) The cooling capacity @T<sub>indoor</sub> 24°C, RH50% and T<sub>outdoor</sub> 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.

## 60Hz Unit Model

Unit Model	3R1D0	5E1D1	7E1D2	10E1D3	13E1D4	7E1D2	10E1D3	13E1D4	13E1D4	
<b>Air flow scheme</b>	Displacement					Displacement			Displacement	
<b>Cooling Capacity</b>										
Total(1)	kW	3.4	5.0	7.9	9.7	13.4	7.8	9.6	13.2	13.4
Sensible(1)	kW	3.0	4.3	6.3	7.9	12.0	6.3	7.8	11.9	12.0
Total(2)	kW	3.2	4.6	7.4	9.2	12.5	7.4	9.1	12.4	12.5
Sensible(2)	kW	2.8	4.0	6.0	7.5	10.8	6.4	7.4	10.7	10.8
Free cooling(3)	kW	4.0	4.0	5.1	6.7	9.9	5.1	6.7	9.9	9.9
<b>Compressor</b>										
Type		Rotary		Hermetic scroll			Hermetic scroll			Hermetic scroll
Power input(1)	kW	0.9	1.4	2.3	2.7	3.7	2.3	2.7	3.7	3.7
Current(1)	A	4.2	6.2	9.9	12.1	17.0	6.8	8.5	11.0	6.9
Power input(2)	kW	0.9	1.3	2.2	2.5	3.6	2.2	2.6	3.6	3.6
Current(2)	A	4.1	6.0	9.6	11.7	16.8	6.7	8.3	10.8	6.7
<b>Supply fan</b>										
Type		48VDC Powered EC Centrifugal fan					48VDC Powered EC Centrifugal fan			48VDC Powered EC Centrifugal fan
Qty	n.	1	1	1	1	2	1	1	2	2
Power input	kW	0.19	0.19	0.24	0.24	0.48	0.24	0.24	0.48	0.48
Current	A	4.0	4.0	5.0	5.0	10.0	5.0	5.0	10.0	10.0
Air volume	m <sup>3</sup> /h	1200	1200	1530	2000	2950	1530	2000	2950	2950
<b>Condenser fan</b>										
Type		EC Centrifugal fan					EC Centrifugal fan			EC Centrifugal fan
Qty	n.	1	1	1	1	2	1	1	2	2
Power input	kW	0.43	0.45	0.45	0.75	0.90	0.45	0.75	0.90	0.90
Current	A	2.8	2.9	2.9	3.3	5.2	2.9	3.3	5.2	5.8
Air volume	m <sup>3</sup> /h	2400	2800	2800	4200	5600	2800	4200	5600	5600
<b>Electric heater(4)</b>										
Type		Finned stainless tube					Finned stainless tube			Finned stainless tube
Heating Capacity	kW	1.5	1.5	3.0	3.0	4.5	3.0	3.0	4.5	4.5
Current	A	6.5	6.5	13.0	13.0	19.6	13.0	13.0	19.6	19.6
<b>Air filter</b>										
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
<b>Power supply</b>										
Power source		230V/1Ph/60Hz & 48VDC					230V/3Ph/60Hz & 48VDC			380V/3Ph/60Hz & 48VDC
Unit max. operating power input(5)	kW	1.7&0.24	2.6&0.24	3.7&0.24	4.7&0.24	6.4&0.48	3.7&0.24	4.6&0.24	6.3&0.48	6.4&0.48
Unit max. operating current(5)	A	8.4&5.0	13.4&5.0	17.2&5.0	20.6&5.0	30.4&10.0	13.0&5.0	14.3&5.0	20.9&10.0	15.2&10.0
<b>Unit dimensions and weight</b>										
Width	mm	500	600	750	860	1010	750	860	1010	1010
Depth	mm	600	600	650	650	650	650	650	650	650
Height	mm	2000	2000	2100	2100	2100	2100	2100	2100	2100
Weight	kg	130	160	200	255	290	200	255	290	290

(1) The cooling capacity @T<sub>indoor</sub> 27°C, RH50% and T<sub>outdoor</sub> 35°C, compressor operating;

(2) The cooling capacity @T<sub>indoor</sub> 24°C, RH50% and T<sub>outdoor</sub> 35°C, compressor operating;

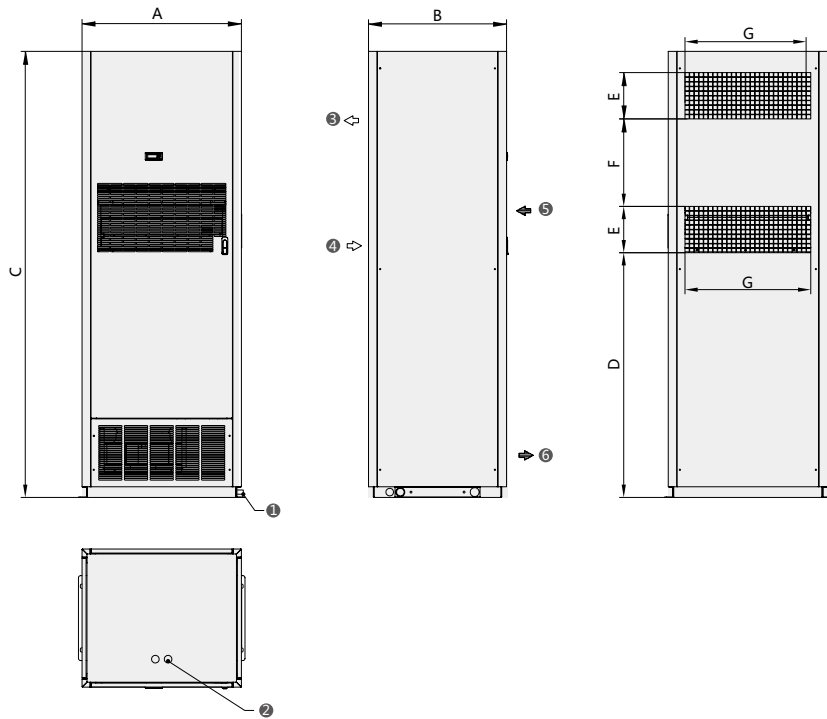
(3) The cooling capacity @indoor temperature and outdoor temperature difference (ΔT) is 10°C, compressor not operating;

(4) Optional;

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

# Dimensions Drawing

## Dimensions



- 1. Condensate drain
- 2. Power connections
- 3. Outdoor air supply
- 4. Outdoor air return
- 5. Indoor air return
- 6. Indoor air supply

	D0	D1	D2	D3	D4
A	500	600	750	860	1010
B	600	600	650	650	650
C	2000	2000	2100	2100	2100
D	1092	1092	1152	1152	1152
E	218	218	218	218	218
F	412	412	412	412	412
G	350	460	592	702	856

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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