



39CQ Series Air-handling Unit



39CQ Series Air-handling Unit

Installation, Operation and Maintenance Instructions

Read the instructions carefully before installation, operation and maintenance.

Carrier declines any liability for damage resulting from inappropriate operation that is out of the prescription in the instructions.

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I Safety Notice

When operated under the design specification, 39CQ Air-conditioning Unit can provide safe and reliable service. Only qualified installation personnel and maintainers can install, operate and maintain this unit due to the reasons in aspects such as working pressure, electrical motor connection and devices etc. When operating this unit, comply with all safety measures on the tag attached on the unit, the safety instruction in the instructions and any other applicable safety prevention measures.

- Comply with all the safety specifications
- Be careful when handling, assembling and fixing the unit. Check the weight of the unit or related objects to be handled, in the meantime, pay attention to the special instructions on the objects to ensure safety handling.
- Do not enter the unit when the fan is running. Before maintaining, switch off the unit and make marks.
- Before enter the unit, switch off the power of the motor, take off fuse and hang the tag “Servicing, do not switch on” on the electric power board.

IMPORTANT:

1. Thank you for purchasing Carrier products. Please read the instructions carefully before using the products. When you use the products, Carrier considers you have carefully read the instructions.
2. We will make renovation continuously to make the products better fit the clients. We reserve the right to change the data without notice.

II Introduction of Control System for Air Handling Units

As one of the top class manufacturers in air conditioning field, Carrier provides an integrative AHU control system to meet with comfort demands of customers as well as to be optimized for different application requirements.

1. General introduction

The integrative control solution with variable-frequency drive covers the common demands of AHU control functions. The human-computer interface (HMI) with graphical display is inserted into control box panel for easy operation. Factory-mounted integrated control components help to save installation time and maintenance cost, as well as to ensure optimal operation of AHUs.

- The system has accurate control on fan speed, water valve opening and damper opening, by its internal PID calculation on the change of setting temperature and indoor load.
- The system has control on timing on/off of AHUs by HMI, which is convenient for routine maintenance.
- The system has flexible operating mode for customer choice, both remote and local mode available for different application.
- The system has continuous monitoring on electric loop and equips with quick-checking function, which is used to test the AHU input and output.
- Field controller controls on supply fan on/off and collect signs of on/off status, fault alarm and operating mode etc.
- Field controller can automatically turn on/turn off AHUs by working/holiday logic or accident logic.
- Field controllers record AHUs accumulated operating time and shows maintenance reminding notes if the time gets to limitation.
- HMI shows fault alarming once there is fault for AHUs operation.
- Interlocking control on cold/hot water electric two-way valve, fresh air damper and supply fan, which means the valve and damper will close automatically once supply fan turns off.
- Optional CO2 detector helps to control the opening of fresh air damper by monitoring room CO2 concentration.

2. AHU operation mode

Three operating modes are available for AHU equipped with control system,

2.1 Remote Mode: The unit will be controlled by remote control contact (passive contact) when setting remote button at Remote Mode.

2.2 Local Mode: The unit can run at either automatic mode or manual mode, which is controlled by HMI.

1) Automatic Mode : When setting remote button at automatic mode, the unit will be controlled automatically by touch screen.

2) Manual Mode: When setting remote button to Local Mode, customer can start the fan in case of control system failure. In Manual Mode, customer can only adjust air volume but can't have demand of indoor temperature change.

III Introduction of Control components

1. Control board: SE-serial single digital controller



SE6166

SE-serial controllers provide a complete solution for single unit control application. It can be widely used in common environments including roof, machine room, control panel and other special places. It can fully support EIKON®-LogicBuilder, and be flexible to support BACnet protocol communication based on ARCNET 156 Kbps or BACnet MS/TP.

Main features

- Support BACnet protocol communication based on ARCNET 156 Kbps or BACnet MS/TP
- Control accuracy increase due to 12bit A/D resolution for all inputs, some inputs support a pluse of 40Hz
- High speed microprocessors with 1 mbyte flash memory for control program storage, supporting for upgrade through remote network
- Real-time clock function for power loss protection, which enables unit independent operation even in case of network interruption
- Removable terminal for easy installation and maintenance
- Support graphic oriented programming and also provide peer-to-peer communication with other ME-serial or ZN-serial controller

Technical specifications	
BACnet Port	Comply with BACnet Advanced Application Controller (B-AAC) defined by appendix L of 135-2004 (BACnet) , ANSI-ASHRAE Standard
Local access port	EIA-485 supports BACnet access of ARCNET 156 Kbps or BACnet MS/TP (9600 baud to 76.8 Kbps).Rnet port is used for job-site local access
Digital output	24VAC 3A relay, manual-shut off-auto switch, with LED indicator
Inputs	0-5 VDC, 0-10 VDC, 0-20 mA, thermistor (10k Ohm type II), 1k Ohm RTD (Platinum, nickel, Balco), dry contact
Input resolution	12 bit A/D
Impulse input	Input point 1 and point 2 support for 40 Hz (minimum impluse width as 12.5ms)
Analog output	0-10VDC, 0-20mA, with LED indicator
Output reolution	8 bit D/A
Microprocessor	High-speed 16 bit microprocessor with ARCNET communication coprocessor
Memory	1MB flash memory, 1MB power-loss protection memory, 16 bit memory bus (service life of battery is 10 years ,which offers 10,000 hours power-loss protection)

Real-time clock	Real independent operation dut to real-time clock with power-loss protection
Status indicators	LED indicators to show status of EIA-485 communication, operation, failure, power and digital outputs
Address	toggle switch for direct shown of internet address
Circuit protection	built-in transient circuit protection to protect power supply and communication
Certification	UL916 (Canadian Standard C22.2 No. 205-M1983), CE, FCC Part 15 - Subpart B - Class A.
Operating environment	-29°C ~ 60°C, relative humidity of 10% ~ 90%, non-condensing, indoor installation
Power Supply	24 VAC ± 10%, 50 ~ 60Hz
Overall Dimension	211mm (width) ×178mm (height) ×38mm (depth)
Mounting hole location	199mm (width) ×127mm (height)

2. Extension board



IM041 input and conversion control module is mainly applied to intelligent building automation field. It converts four-way on-off outputs to a group resistance output, and get function extension cooperating with specified thermistor input port (NTC,10K) of DDC controllor.The extension helps to reduce hardware cost for building automation system.

Technical specifications

Power supply	24VAC
Input	4DI dry contact
Output	1AO thermistor (10k Ohm type II)
Operating environment	-20~50°C , 10~95%RH, non-condensing, internal installation
Indicators	The red indicator lights when the power on. The green indicator turns light when input contact is closed .
Dimesion	108mm x 62mm x 27mm
Installation hole	99mm x 42mm

3. Sensors

(1) Duct temperature and humidity sensor SDB-TN10-20



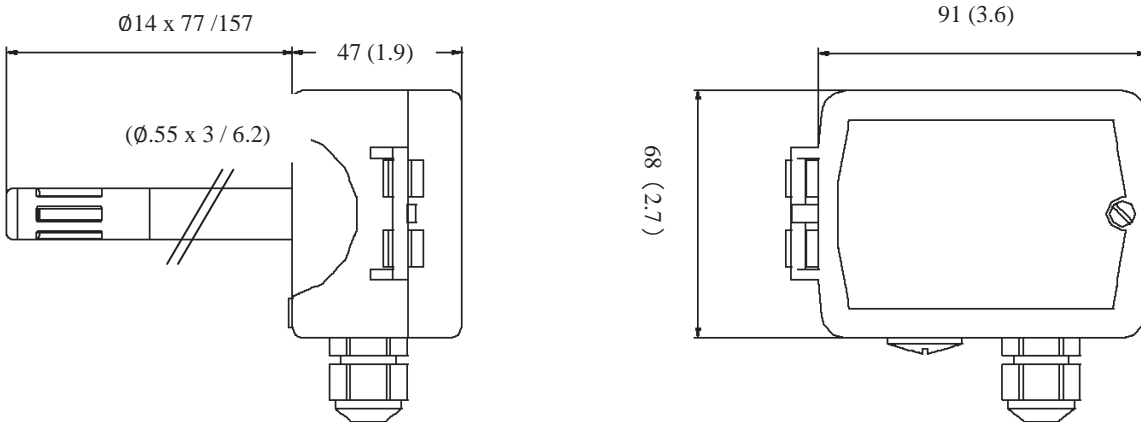
Main features

- Duct temperature and humidity measurement
- Wide signal range of 0...10V, 0...20mA or 2...10V, 4...20mA by use of short cuts

Technical specifications

Power supply	operating voltage	24 VAC 50/60 Hz \pm 10%, 24VDC \pm 10%
	power dissipation	Max 2 VA
Connection	wiring terminals	0.34...2.5 mm ² (AWG 24...12)
Sensing element	humidity sensor scope	Capacitor resin polymer 0...100 % RH
	measurement accuracy	20%...80% \pm 3%
	hysteresis	\pm 1%
	repeatability	\pm 0.1%
	stability	< 0.5% /year
	Temperature accuracy	
	-40...0°C (-40...32°F):	0.5 K
	0...50°C (32...122°F):	0.2 K
	50...70°C (122...158°F):	0.5 K
Signal output	signal output	DC 0-10V or 0...20mA
	resolution ratio	10 Bit, 9.7 mV, 0.019.5 mA
	maximum load	20 mA, 500 Ω
Environment	temperature	0...70°C (32...158°F)
	humidity	<95% RH. non-condensing
	temperature	-40...80°C (-40...176°F)
	humidity	<95% RH. non-condensing
Housing Materials	cover	fire proof ABS plastic
Dimensions (H x W x D)	68 x 91 x 47 mm (2.7 x 3.7 x 1.9 in)	dimensions (H x W x D)
Weight (including package)	220 g (7.8 oz)	weight (including package)

Dimension diagram mm (inch)

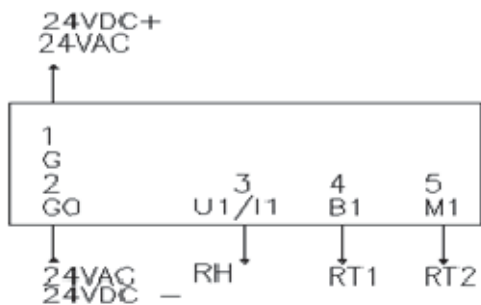


Installation

The product is composed of two parts: (a) probe and (b) upper shell. It shall be installed at position with smooth air circulation. Position with 2-3 meters distance from fan or cooling coil is recommended to achieve accurate measurement.

1. Punching hole on duct with diameter of 16mm (5/8”), use two tapping screws to fix the shell tightly on duct with a diagonal distance of 92mm (3.6”).
2. Open the shell
3. Connecting signals in line with electrical diagrams.
4. Insert the probe in, use two tapping screws to fix the shell tightly on duct
5. Install the shell
6. Fix the screws
7. Screw driver #2, suggest using AMC-2 for cable protection

Wiring diagram



- 1: G power supply, 0VAC, +24VDC
- 2: G0 power supply, 24VAC, -24VDC
- 3: U1 JP1 = 1-2, humidity output voltage 0...10V or 210V (JP3)
- 3: I1 JP1 = 2-3, humidity output voltage 0...20mA or 4 20mA (JP3)
- 4: B1 Resistance temperature signal
- 5: M1 Resistance temperature signal

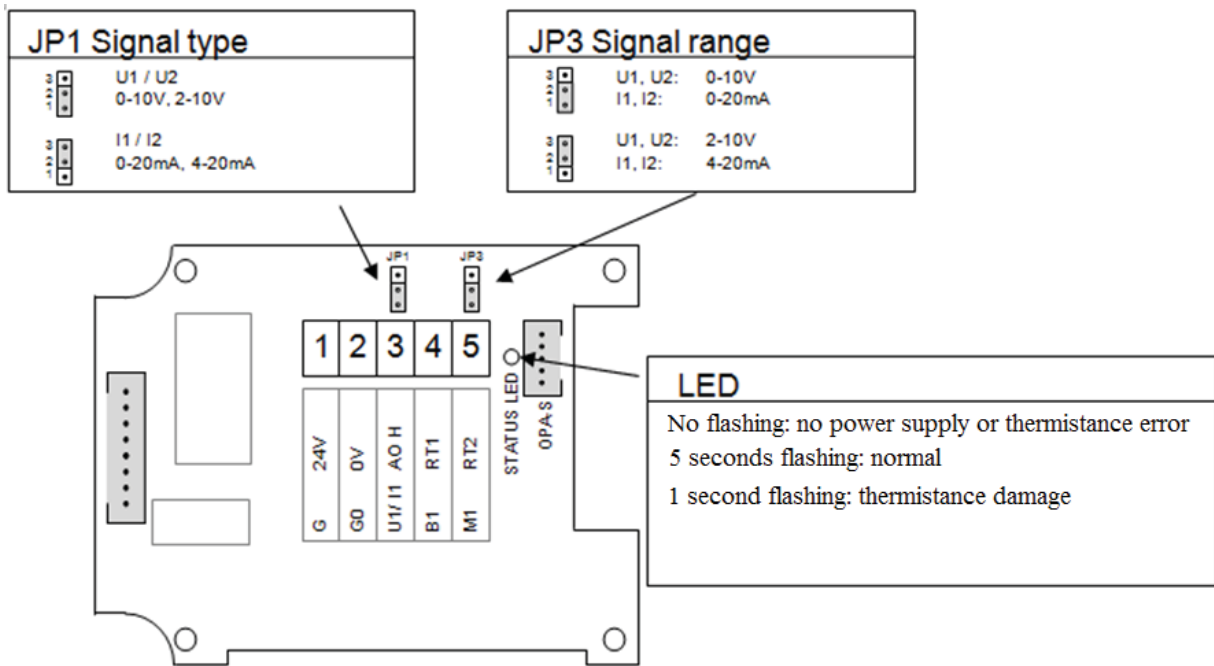
Output signal setting

By use of short cuts, output signal can change in the range of 0...10V, 0...20mA or 2...10V, 4...20mA.

0-10 V is defined as factory settings, and please change to 4...20mA before usage. Below picture shows the position of short cuts.

Signal type	JP1
0 - 10 V	(1-2)
0 - 20 mA	(2-3)

Signal range	JP3
0 - 10 V , 0 - 20 mA	(1-2)
2 - 10 V , 4 - 20 mA	(2-3)



(2) Indoor temperature and humidity sensor SRA-H1TN10



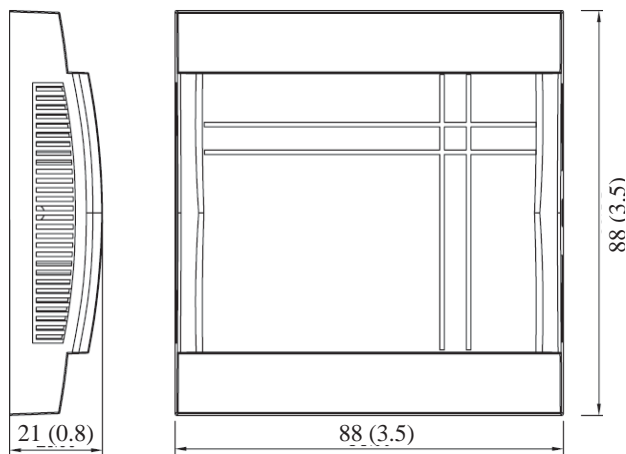
Main features

- Indoor temperature and humidity measurement
- Wide signal range of 0...10V, 0...20mA or 2...10V, 4...20mA by use of short cuts

Technical specifications

Power supply	operating voltage	24V AC 50/60 Hz \pm 10%, 24V DC \pm 10%
	power dissipation	Max 2 VA
Connection	wiring terminal	0.34...2.5 mm ² (AWG 24...12)
Sensing element	humidity sensor scope	Capacitor resin polymer 0...100 % RH
	measurement accuracy	20%...80% \pm 5%
	hysteresis	\pm 1%
	repeatability	\pm 0.1%
	stability	< 0.5% /year
	temperature accuracy	-40...0°C (-40...32°F): 0.5 K 0...50°C (32...122°F): 0.2 K 50...70°C (122...158°F): 0.5 K
Signal output	signal output	DC 0-10V or 0...20mA
	resolution ratio	10 Bit, 9.7 mV, 0.019.5 mA
	maximum load	20 mA, 500 Ω
Enviroment	temperature	0...70°C (32...158°F)
	humidity	<95% RH. non-condensing
	temperature	-40...80°C (-40...176°F)
	humidity	<95% RH. non-condensing
Housing Materials	cover	Fire proof ABS plastic
	mounting Plate	Galvanized Steel
General	dimensions (H x W x D)	21 x 88 x 88 mm (0.8 x 3.5 x 3.5 in)
	weight (including package)	105 g (3.7 oz)

Dimension diagram mm (inch)

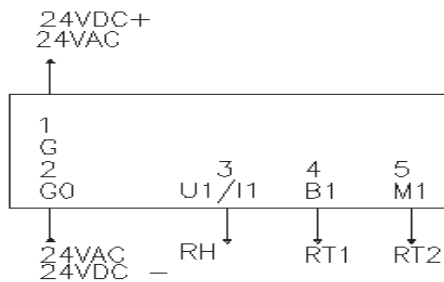


Installation

The sensor is composed of two parts, (a) base plate (b) cover of transmitter. It shall be installed on the indoor wall where there is good air circulation with 1.5 meters height from the floor. Avoid installing the sensor above heater or the place with direct sunlight.

1. Disassemble base plate by loosening mounting screw
2. Install the base plate on the indoor wall
3. Wiring in accordance with wiring diagram
4. fasten wiring connection tightly in order not to have virtual wiring
5. Fix the cover of transmitter to base plate
6. Assemble the cover
7. Use screw driver#2 to fix the screw

Wiring diagram



- 1: G power supply, 0VAC, +24VDC
- 2: G0 power supply, 24VAC, -24VDC
- 3: U1 JP1 = 1-2, humidity voltage output, 0...10V or 2...10V (JP3)
- 3: I1 JP1 = 2-3, humidity voltage output, 0...20mA or 4...20mA (JP3)
- 4: B1 Resistance temperature signal
- 5: M1 Resistance temperature signal

Output signal setting

By use of short cuts, output signal can change in the range of 0...10V, 0...20mA or 2...10V, 4...20mA. 0-10 V is defined as factory settings, and please change to 4...20mA before usage. Please refer to Chapter “Duct temperature and humidity sensor SDB-TN10-20” for detailed short cuts position.

(3) CO₂ sensor EE85-2C65



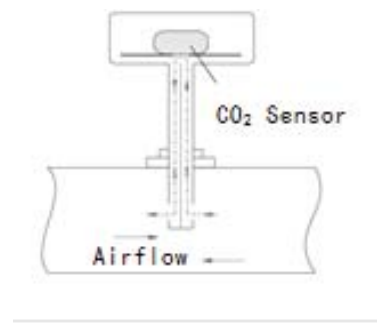
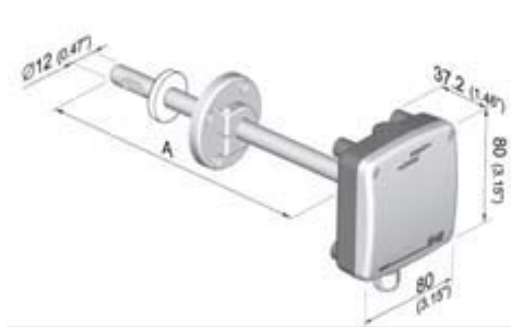
Main features

- CO₂ concentration measurement in air duct
- Easy to install and automatic calibration
- Analog signal output 4~20mA

Technical specifications

Power supply	operating voltage	15-35VDC
	power dissipation	Typical current output 10mA +
Connection	wiring terminal	max1.5 mm ² (AWG 16)
Sensing element	sensor	E+E Dual-source infrared system
	scope	0...2000ppm
	accuracy @25°C, 1013mbar	<±(50ppm+2% * mv)
Signal output	signal output	4...20mA
Environment	temperature	-20...60°C
	humidity	<95% RH. non-condensing
	temperature	-20...60°C
	humidity	<95% R.H. non-condensing

Dimension diagram mm (inch)

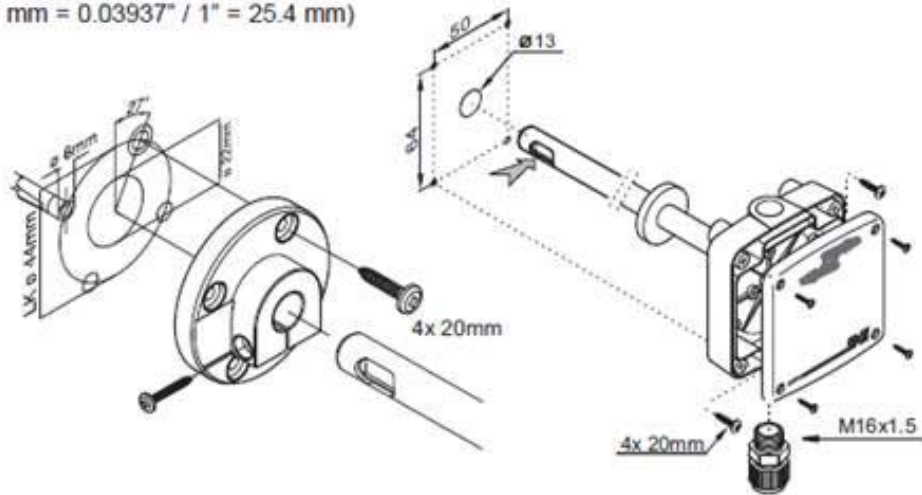


Installation

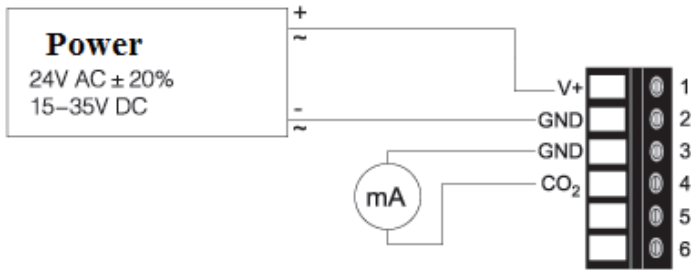
The product is composed of two parts: (a) probe and (b) upper shell. It shall be installed at position with smooth air circulation. Position with 2-3 meters distance from fan or cooling coil is recommended to achieve accurate measurement.

1. Drill diameter 13mm hole on duct and use four tapping screws to fix the shell tightly on duct
2. Open the shell
3. Connecting signals in line with electrical diagrams.
4. Insert the probe in, use two tapping screws to fix the shell tightly on duct
5. Install the shell
6. Fix the screws
7. Screw driver #2, suggest using AMC-2 for cable protection

(1 mm = 0.03937" / 1" = 25.4 mm)



Wiring diagram

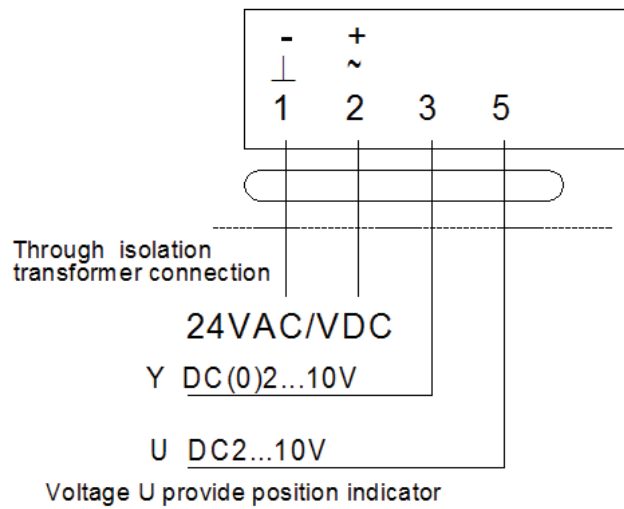


(4) Water valve and damper actuator

Technical specifications

Power supply	AC 24V 50/60HZ DC24V
Connecting cable	1m 4*0.75mm ²
Rotate angle	90°
Rotate direction	Default set as clockwise. Can change to counterclockwise by the switch under black label
Position indication	Mechanical indication
Operating time	90s
IP class	IP54
Control signal Y	DC 2(0)...10V@input resistance 100KΩ
Position feedback U	DC 2...10V @Max output 1mA
Manual operation	Put down manual operation button to unlock actuator. Then keep pressing then button for manual operation.

Wiring diagram for water valve and damper actuator



IV Human-computer Interface of AHU control system

1. Feature

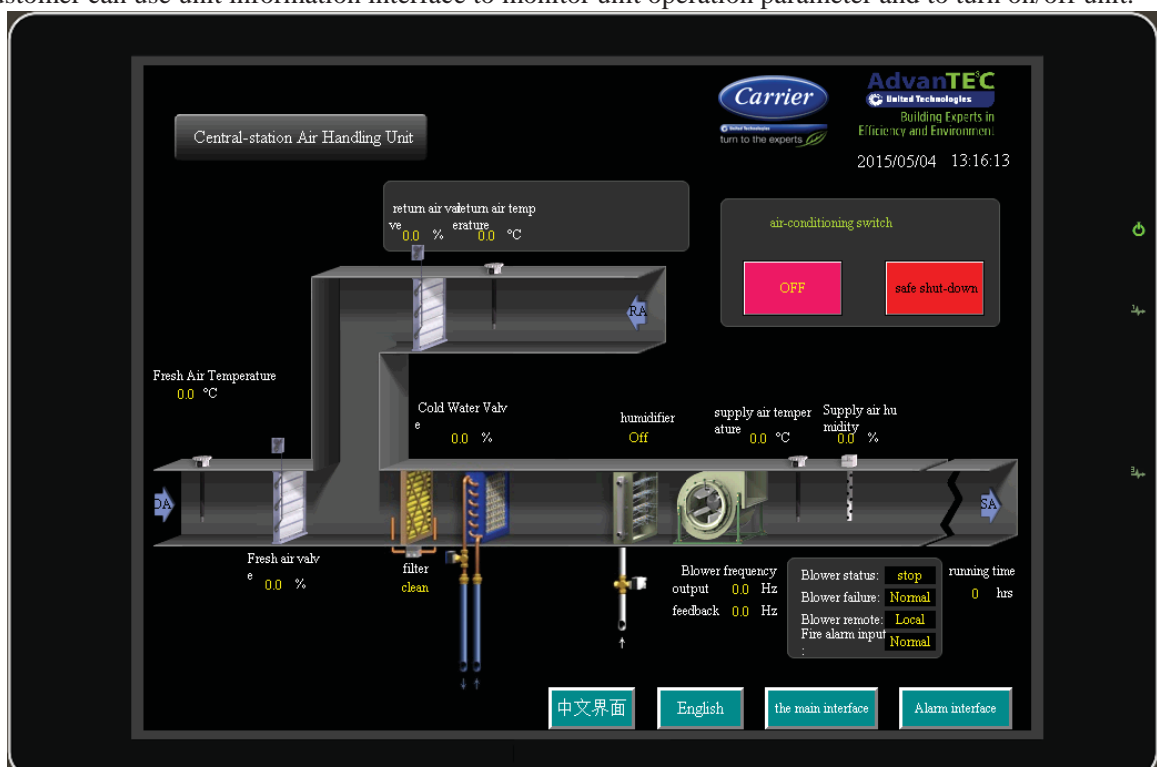
An 8 inches touch screen is selected as human-computer interface of AHU control system, with function indicated buttons to provide user-friendly interface for customer.

2. Instructions to use HMI

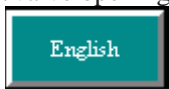
HMI of 39CQ control system is composed of unit information interface and parameter setting interfaces.

(1) Unit information interface

Customer can use unit information interface to monitor unit operation parameter and to turn on/off unit.



Unit information interface is shown above, in which customer can find sensor measurement, damper /valve opening and fault information. Two languages are available and easy for transferring. Touch button



or



to transfer between English and Chinese language.


Touch button  to enter alarm interface if there is any fault on unit operation, shown in below.



Customer can easily find fault unit information in alarming interface, i.e. the time fault occurs and fault

type, so as to solve fault at the first time. Touch button  and go back to main interface.

(2) Main interface

Touch button  to enter main interface, in which customer can go into each submenu of control system. There are total five submenus available, Unit information, User settings, System settings, Maintenance information and Alarm interface, shown as below.



(3) User settings

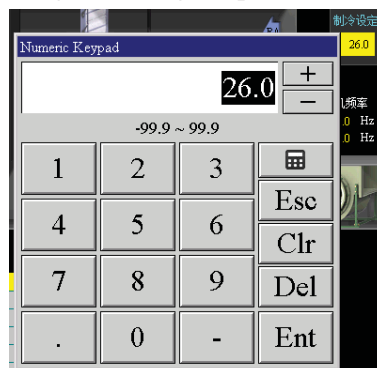
Touch button  to enter below user settings menu with below orders.



Items	Descriptions
On/off	Press on/off key to turn on/off the AHU
Time table	Choose open or close time table function by touching the key below
Fan Speed	Set up fan speed by touching the key below
Cooling/heating mode	When the unit is off, exchange between cooling mode and heating mode by touching the right key
Season switchover	Touch the right key of season switchover, to select manual switchover or automatical switchover.
Constant temperature control	Open or close constant temperature control function by touching the right key
Constant humidity control	Open or close constant humidity control function by touching the right key
Cooling setting	Set up cooling temperature by touching the key below
Heating setting	Set up heating temperature by touching the key below

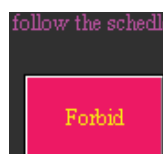
➤ Setting temperature

Touch the key below “cooling setting” and enter below menu. Choose required cooling temperature and touch **Ent** to finish the setting of cooling temperature.






➤ Setting time table

When to use timing on/off function, firstly touch button **Follow the schedule** to enable time table.





Button  will change to  if enable works and touch button  to enter into timing on/off setting menu. In this menu, customer can set unit start time during one day and applied days in one week.

Set Schedule

Schedule ID: 1 OK

Individual Start Day and End Day Cancel

Start Time: [09]:[00]:[00]

End Time: [17]:[00]:[00]

Applied Days:

Sun. Mon. Tue. Wed. Thu. Fri. Sat.

(4) System settings

System parameters can be set in below interface.

The screenshot shows a settings interface for a Carrier HVAC unit. At the top, it displays the date '11/14/14 Friday' and the time '13:55:36'. The title is '39 CQ user parameter Settings interface'. The interface is divided into several sections:

- Control Strategies:** Return air temperature and humidity control (Forbidden), Return air enthalpy control (Forbidden), and Return air temperature and humidity control (Forbidden).
- The fan speed setting:** Fan speed control (AUTO), Fan speed setting (0.0%), and Minimum opening of fan (0.0%).
- the air valve set:** Fresh Air Control (AUTO), Fresh Air valve opening (0.0%), and Minimum air valve opening (0.0%).
- the water valve setting:** Water valve control (AUTO), Cold water valve opening (0.0%), and Minimum opening (0.0%).
- Run time Settings:** Running time reset (Forbidden) and Running time limit (0 hrs).
- the humidifier set:** Humidifier control (AUTO) and Humidifier switch (On).

At the bottom right, there are 'Alarm' and 'Return' buttons.

Items	Descriptions
Control strategy	Set return air temperature & humidity, return air enthalpy and indoor temperature & humidity ⁽¹⁾
Fan speed	Choose manual or auto mode of fan; set fan speed at manual mode
Damper opening	Choose manual or auto mode of damper; set the opening of fresh air damper at manual mode
Water valve opening	Choose manual or auto mode of water valve; set the opening of cold/hot water valve at manual mode
Operating time	Set unit maintenance time
Humidifier opening	Choose manual or auto mode of humidifier; set the opening of humidifier at manual mode

Note: ⁽¹⁾ Controller will collocate temperature and humidity sensor according to the setting of control strategy.

V Failure diagnosis and solution

No.	Fault indicated on HMI	Solution
1	supply fan can't start	check wiring and contacts
2	supply fan failure	check converter of supply fan
3	fire alarm	checking fire alarm sensor movement if the fire alarm signal appears
4	filter blocking	remove and clean filter
5	frost-protection	check if the temperature of cold water is too low
6	humidifier failure	check if any humidifier fault with reference to its manual
7	return air temperature sensor failure	replacing the sensor with reference to the manual
8	outlet air temperature sensor failure	replacing the sensor in accordance with the manual
9	supply air humidity sensor failure	replacing the sensor in accordance with the manual
10	indoor temperature sensor failure	replacing the sensor in accordance with the manual
11	indoor humidity sensor failure	replacing the sensor in accordance with the manual
12	supply air humidity sensor failure	replacing the sensor in accordance with the manual
13	CO2 sensor failure	replacing the sensor in accordance with the manual
14	static pressure transducer failure	replacing the sensor in accordance with the manual
15	damper temperature sensor failure	replacing the sensor in accordance with the manual
16	Maintenance alarm	check the fans

Appendix: Wiring Diagram

Fig. 1:

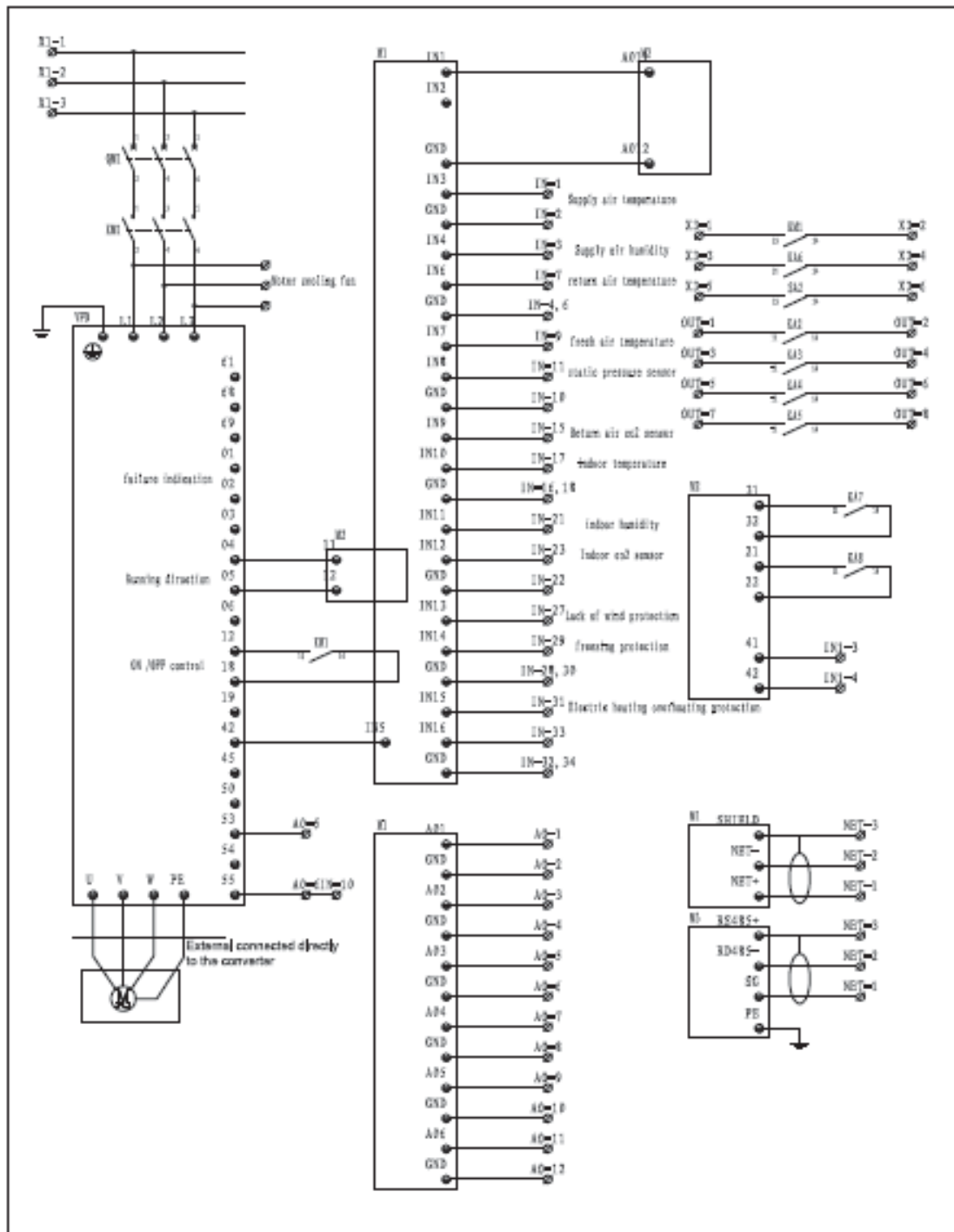
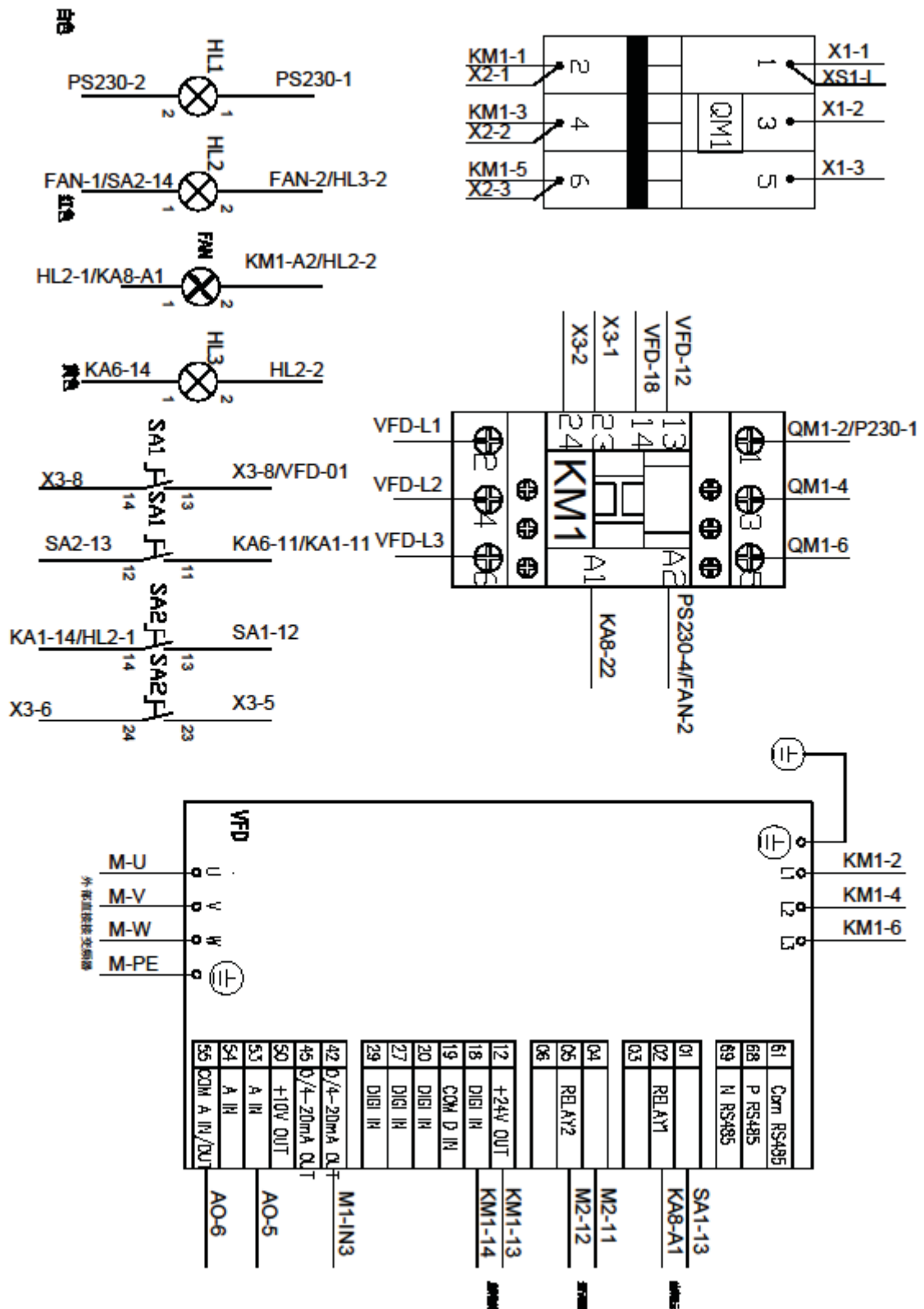


Fig. 2:





2014.03 0099NACQCTLE

Product Manufacturer:

Shanghai Yileng Carrier Air Conditioning Equipment Co.,Ltd.
868 Yangtai Road, Baoshan, Shanghai, China

We will make renovation continuously to make the products better fit the clients.
We reserve the right to change the data without notice.