RCHT 24D

Technical Data

Typical Application	Wall mount indoors
Output Signal Type	Jumper select: 4-20mA, 0-10V, 0-5V
Output Signal Drive	> 500Ω for mA mode, 75mA max output drive for voltage mode
RS485 ports	1
Power	12-24Vac/dc +/- 10%, 1 watt typical
Operating Temp	-30 to +60°C, 0-95% non condensing
Plastic Housing	Flammability rating UL 94V0 file E194560
Display	LCD screen, Resolution 0.1°C, 0.1% rH
Control Features	N/A

CO$_2$	Sensor Type	Dual Beam NDIR
	Range	2000ppm, adjustable
	Accuracy	±70ppm or ±5% of reading
	Drift	<50ppm / year full scale

Hum	Sensor Type	Capacitive
	Range	0-100% Non-Condensing
	Accuracy	5%@25°C, 20 to 80%
	Drift	< 0.5% rH / year

Temp	Sensor Type	10K thermistor
	Range	-40 to 150°C(-60~340°F)
	Accuracy	< ±0.5°C @ 25°C

Size	80.5 x 80.5 x 22.4mm (L x W x H)

Features

- High performance digital sensors and circuits, ensure accurate measurement and temperature compensation

- With calibrating, the latest gear can hold up to 10 user calibration points.

- The factory calibration points are also stored on the device, up to 10 of those as well.

- Easily switch between factory and user calibration using the GUI.

- The output signals and RS485 are hardened up for overvoltage and power supply crossed over.

- Display in degrees Fahrenheit or Celsius(connection to Modbus).

- The LCD is a bitmap so we can show network connectivity.

- The user can configure what they want to show on the display: network activity, baud rate, protocol, etc.

- You can show a user setpoint so you can use it as a room / setpoint display.

- RS485/Bacnet MS/TP for direct digital reading on all models

Description

The CO$_2$ sensor with Humidity & Temperature transmitters is designed for environment monitoring and controlling in industrial, commercial and other buildings.

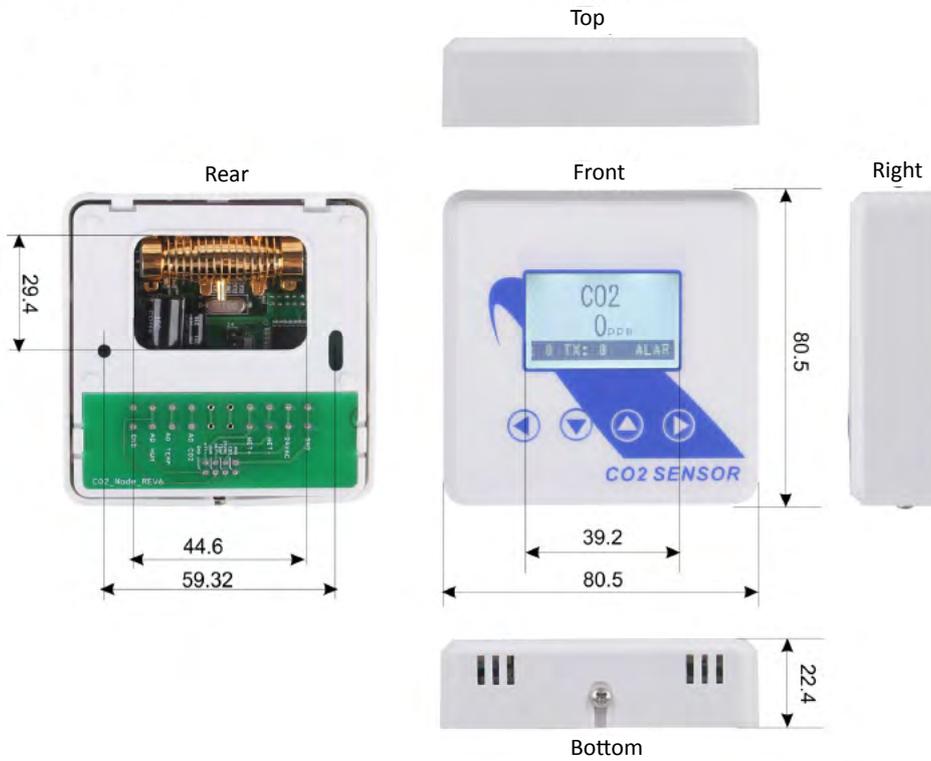These transmitters can be used to monitor CO$_2$ levels which is made the best use of sensor module, air temperature and humidity in various industrial and commercial settings.

Use in the traditional mode for analog output to other controllers or use Modbus RS485/Bacnet MS/TP to integrate over the network.

Ordering Code

RCHT 24D	Combined CO$_2$, RCHT - 0 - 2000 ppm Other range on request

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Dimensions (mm):

Top

Rear   Front   Right

29.4

44.6

59.32

80.5

39.2

80.5

22.4

Bottom

Jumper Settings:

1
2
3
4

0 - 10V   0 - 5V   4 - 20mA
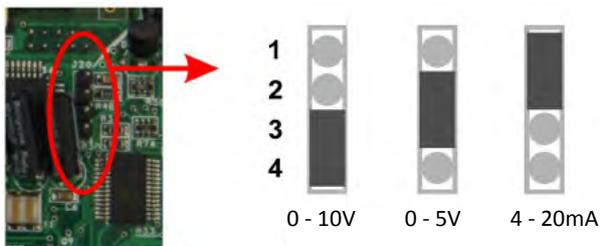
Backplate Features:

RCHT 24D wiring
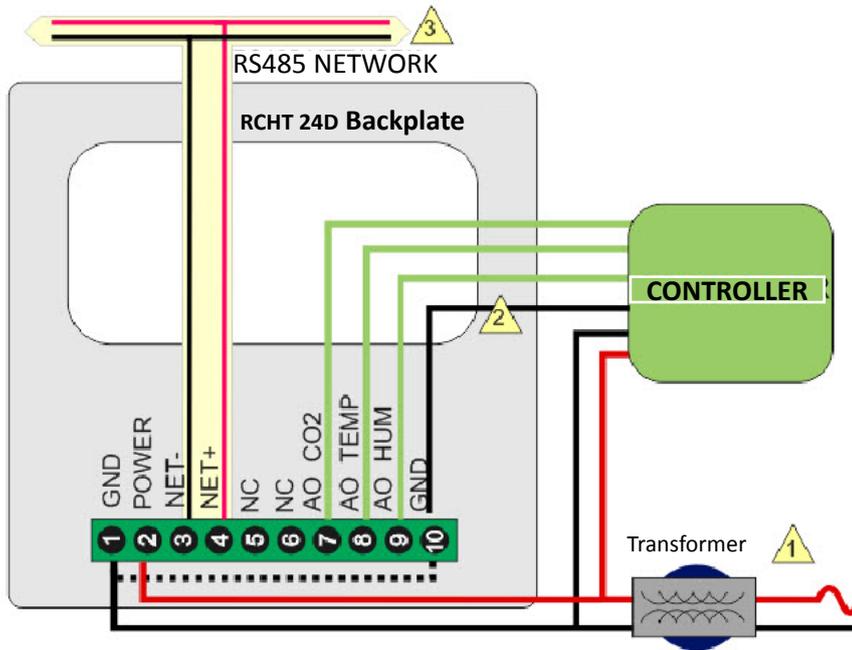
| 1	Power Supply, 12/24 Vac/dc
2	Suggested GND from sensor to controller for signal return path
3	RS485 Net. 18Ga twisted pair typical, optional ground & shield

Wiring Diagram:

The diagram below shows the wiring for the usual transducer mode of operation for the RCHT 24D.

The transducer outputs connect to a master controller using the traditional analog output signals.
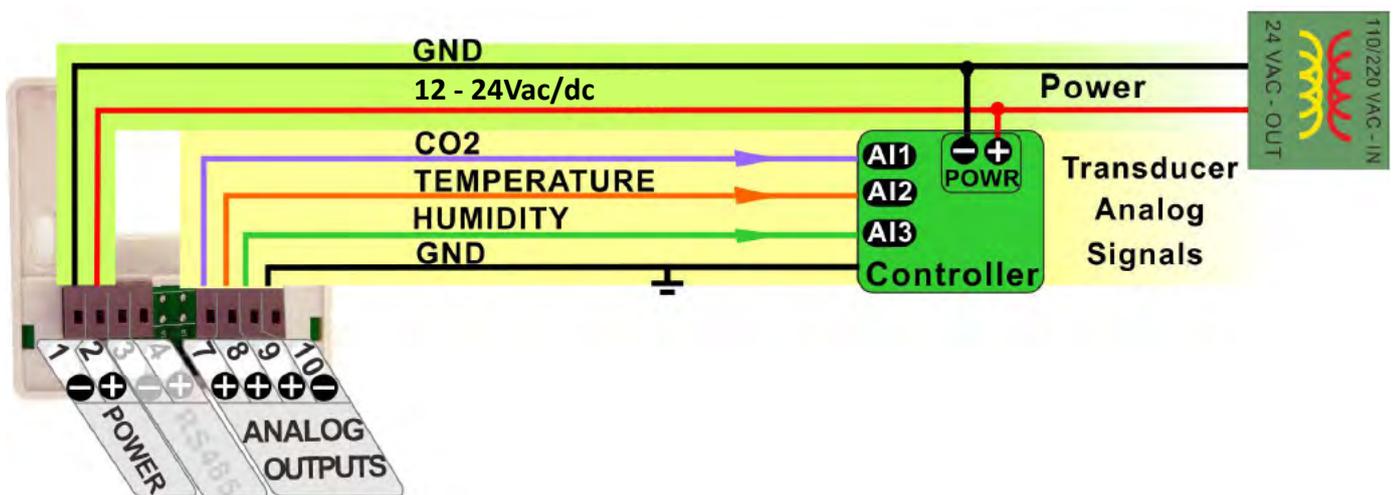
The next diagram shows the RCHT 24D working in the RS485 network, the node quantity can be 255. A group of sensors distributed through the building can cooperate friendly through net. The RS485 network is available for transmitting the same values digitally to other controllers.
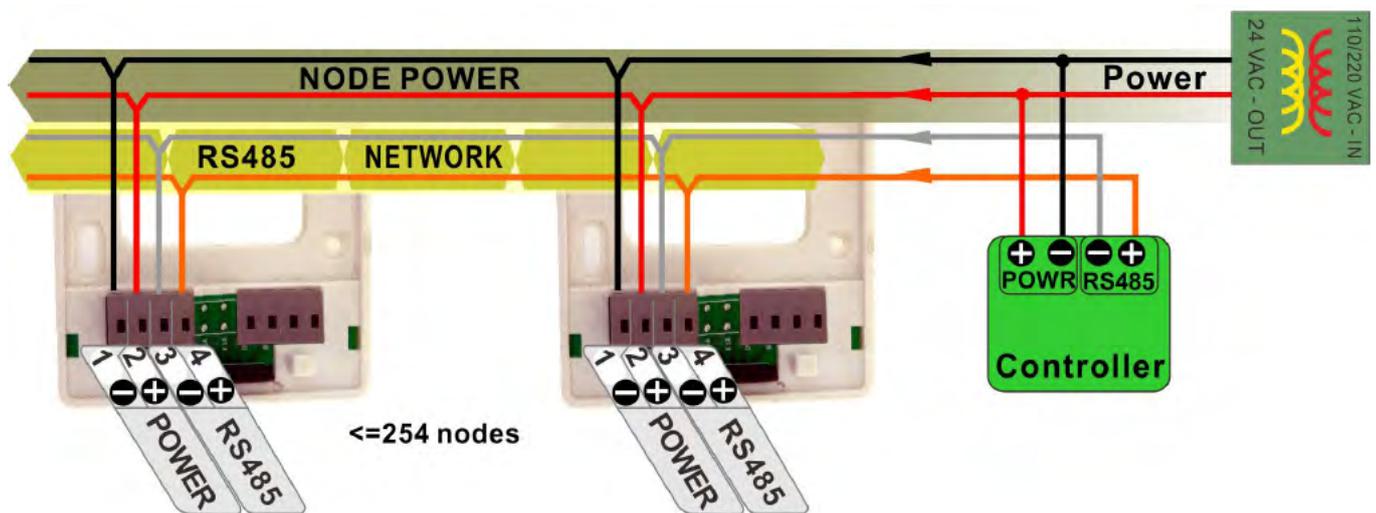
In this mode the device acts as a traditional transducer where it sends out three analog signals which is humidity, temperature readings. All you need to do is to set this one single jumper to the appropriate signal type: 4-20mA, 0-10V, or 0-5V.

Hardware Instruction:

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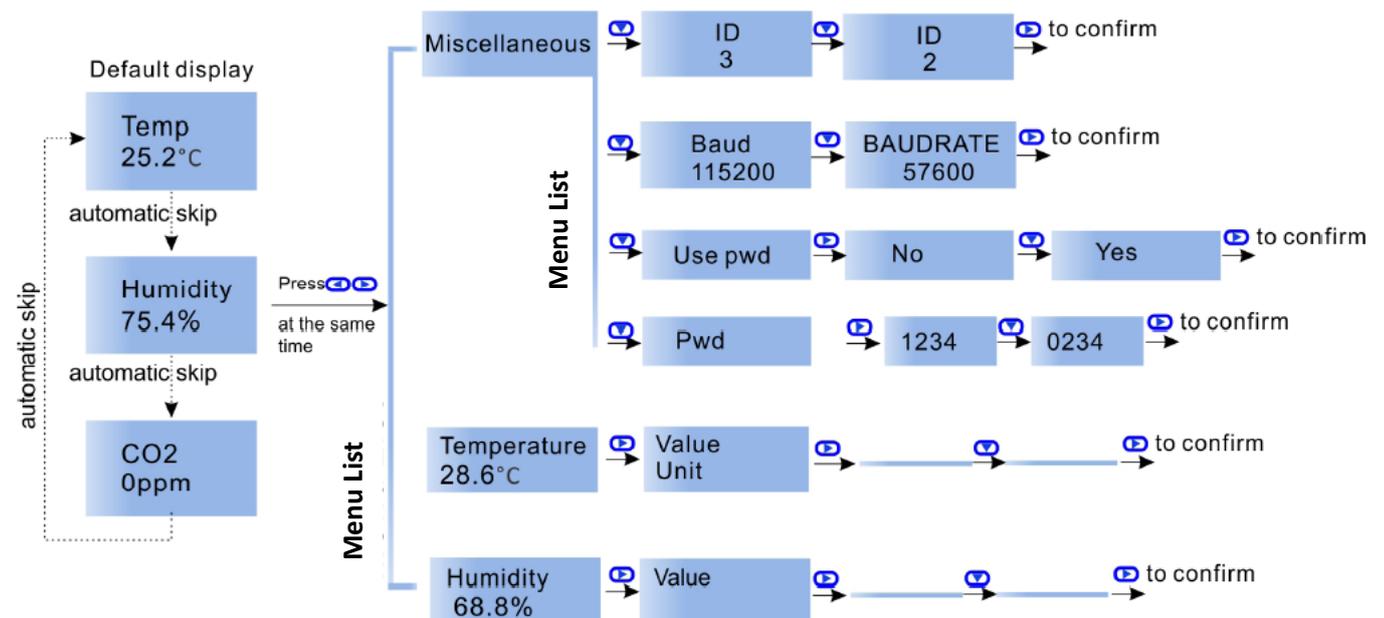
Modbus/Bacnet switch:

To select the protocol as Modbus or Bacnet, Press ◀ ▶ at the same time to choose Miscellaneous, then press ▶ to choose Protocol switch, press ▶, it reads Mstp, which means you have seclected Bacnet; if you want to switch to Modbus, press ▼, or ▲ back to Bacnet.
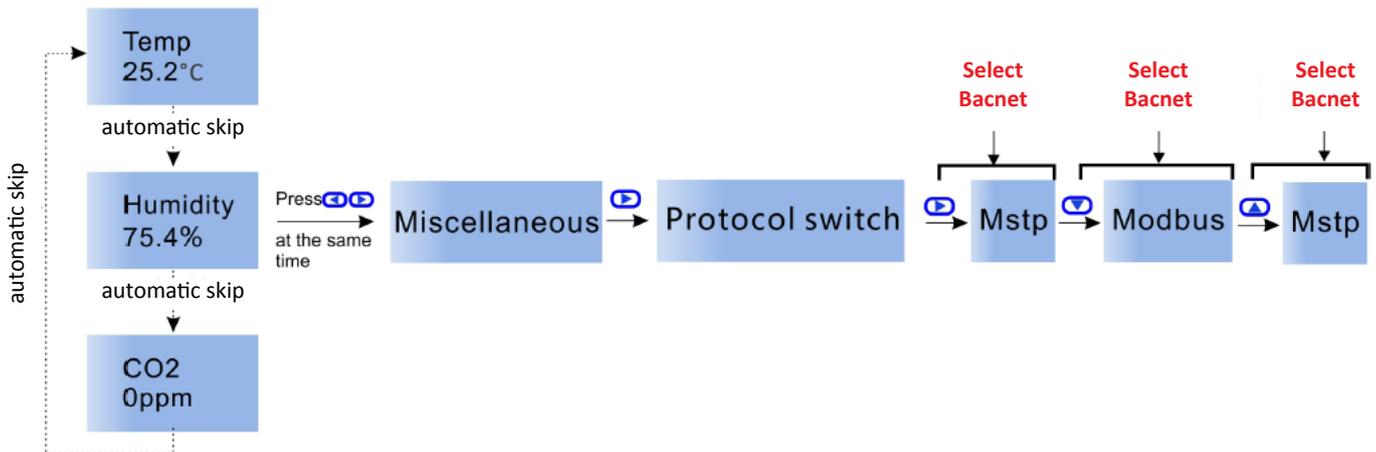
Besides, you can check the **Modbus Register List** below, No.21: Protocol switch. 3 = MODBUS, 0=MSTP.
Or **Bacnet Resgister List**, No.9: Protocol switch. 0 = MODBUS, 1=MSTP.

Modbus Register List

Address	Bytes	Register Description
0 to 3	4	Serial Number - 4 byte value. Read-only
4 to 5	2	Software Version – 2 byte value. Read-only
6	1	ADDRESS. Modbus device address
7	1	Product Model. This is a read-only register that is used by the microcontroller to determine the product
8	1	Hardware Revision. This is a read-only register that is used by the microcontroller to determine the hardware rev
9	1	PIC firmware version
10	1	PLUG_N_PLAY_ADDRESS, 'plug n play' address, used by the network master to resolve address conflicts. See VC code for algorithms
15	1	Baudrate Setting: 0 = 9600bps, 1 = 19200bps
16	1	Firmware Update Register, used to show the status of firmware updates
17 to 99		Blank, fgor future use
100	2	adc value of CO$_2$ voltage output, not used, read only
101	2	adc value of temperature voltage output, not used, read only
102	2	adc value of humidity voltage output, not used, read only
103	2	adc value of CO$_2$ current output, not used, read only
104	2	adc value of temperature current output, not used, read only
105	1	adc value of humidity current output, not used, read only
106	2	adc value of on board thermistor sensor, read only
107	2	adc value of on board light sensor, read only
108	2	CO$_2$ value (ppm). It will be calibrated if write to it.
109	2	CO$_2$ calibration offset. User can change it to calibrate the CO$_2$ ppm. It will be changed also if user write the data to register CO$_2$ ppm
110	1	Delta value for eliminating the pulse ppm value. The default value is 200.
111	2	Fitler times, make the ppm value go smooth. The default value is 5.
112	2	The fair alarm ppm setpoint of CO$_2$ sensor.
113	2	The poor alarm ppm setpoint of CO$_2$ sensor.
114	1	CO$_2$ alarm status:
		0b'xxxx 1xxx': CO$_2$ poor
		0b'xxxx 01xx': CO$_2$ fair
		0b'xxxx 001x': CO$_2$ good
115	1	the version number of humidity sensor
116	2	the relative humidity
117	2	the frequency value read from humidity sensor, read only
118	1	the number of calibration points of the humidity sensor
119	2	degree celsius temperature value of the humidity sensor
120	2	degree fahrenheit temperature value of the humidity sensor
121	2	celsius degree temperature value of the on board thermistor sensor
122	2	fahrenheit degree temperature value of the on board thermistor sensor
123	2	the offset for calibrating the on board thermistor sensor
124	1	select the temperature direct to analog output: 0: on board thermistor sensor, default setting 1: humidity sensor

Modbus Register List

Address	Bytes	Register Description
125	1	select the temperature unit direct to analog output:
126	2	Lighting value, for feature
127	1	analog output mode, change it by setting the jumper (J20) on the board, read only
128	2	the minimum value of temperature directs to the analog output
129	2	the maximum value of temperature directs to the analog output
130	2	the minimum value of humidity directs to the analog output
131	2	the maximum value of humidity directs to the analog output
132	2	the minimum value of CO$_2$ directs to the analog output
133	2	the maximum value of CO$_2$ directs to the analog output
		e.g. CO$_2$ output: if the CO$_2$ ppm is 1000, the (minimum value, maximum value) = (0, 3000), then
		1. setting J20 to select 0V-10V output mode, so the CO$_2$ output is about ((1000ppm / (3000ppm - 0ppm)) * (10V - 0V)) + 0V = 3.3V
		2. setting J20 to select 0V-5V output mode, so the CO$_2$ output is about ((1000ppm / (3000ppm - 0ppm)) * (5V - 0V)) + 0V = 1.65V
		3. setting J20 to select 4mA-20mA output mode, so the CO$_2$ output is about ((1000ppm / (3000ppm - 0ppm)) * (20mA - 4mA)) + 4mA = 9.3mA
500	1	CO$_2$ automatic compensation background enalbe or disable.0 = Disable,1= Enable.
501	2	"Background C0$_2$", default is 400ppm, minimum is 390, max is 500.
502	1	Maximum adjustment per day" default is 1ppm, max is 10 ppm, minimum is 1.
503	1	"Number of days to watch for minimum" , default is 7 days. Max is 30 days. Minimum is 2 days.
505	2	CO$_2$ background calibration offset.

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Bacnet Register List

Variable	Variable and Description
0	SerialNumber LowByte
1	SerialNumber HighByte
2	SoftWare Version
3	Modbus id
4	Product Model
5	HardWare Version
6	Humdity Version
7	Uart BaudRate 0=9.6kbaud, 1=19.2kbaud 2=38.4kbaud 3=57.6kbaud 4=115.2kbaud
8	Reset to factory set = 143
9	Protocol switch. 0 = MODBUS,1=MSTP.
10	Auto/Manual,Analog output auto/manual control. Bit 0 directs to CO$_2$ output, Bit 1 directs to temperature output, Bit 2 directs to humidity output. 0=Auto, 1=Manual.
11	Humidity Value
12	Temperature Value
13	CO$_2$ Value
14	Dew point
15	Partial Pressure of water at saturation at given temperature, [hPa]
16	Mixing Ratio, the mass of water over the mass of dry gas, [g/kg]
17	Enthalpy of the air, [kJ/kg]
18	OffSet Humdity
19	OffSet Tempeature
20	OffSet CO$_2$
21	Filter Humdity
22	Filter Temperature
23	Filter CO$_2$
24	Temperature Unit:0 =C, 1=F
25	OutMode: 1=0-10V, 2=0-5V, 3=4-20mA
26	Humdity analog output
27	Temperature analog output
28	CO$_2$ analog output
29	Humdity Min Range
30	Humdity Max Range
31	Temperatur Min Range
32	Temperatur Max Range
33	C02 Min Range
34	CO$_2$ Max Range