Descriptions

Humidity & Temperature transmitters are designed for environment monitoring and controlling in industrial, commercial and other buildings. These transmitters can be used for indoor air temperature and humidity monitoring in various industrial plant, clean room, lab, machine room, office and commercial building, airport, station, library and stadium. The modbus interface is documented and integrator friendly. They also have transducer outputs for connecting as analog inputs to all popular control systems. Various models are available:Duct Mount,Wall Mount,Room Mount and 2 meter cable.BACnet MS/TP and Modbus RTU protocols over RS485,with an ethernet port.



HUM-D1

Highlights

- High performance digital sensors and circuits, ensure accurate measurement and temperature compensation
 - Good long term stability and reliability
- 100% field changeable sensors, no re-calibration needed
 - Fast response
- Multiple output signals selectable: 4-20mA, 0-5V or 0-10V
- Display in degrees Fahrenheit or Celsius (connection to Modbus)
- HUM-C1 is same as HUM-W1 but with extended cable to connect the sensor
 - · Featured as pluggable sensor pipe
- Dew point and enthalpy can be configured by register list
- BACnet MS/TP and Modbus RTU protocols over RS485, with an ethernet port.



HUM-W1 HUM-C1

Specifications

General	
Power	15 to 24V AC or DC, ±10%
Current Output Load	< 500Ω
Display	LCD screen for wall outdoor / room mount and duct mount
Display Resolution	0.1°C, 0.1% RH
Temperature Limit	-30~70°C, 0~95% RH(Non condensing)
Plastic Housing	Flammability rating UL 94HB
Connector	UL File E365137, Vol. 1
Protection	IP65, outdoor rated for duct and wall mount models; IP30 for room mount
Filter	Sintered Stainless steel, 60um pore size
Relative humidity ac-	up to ±1.5 %RH
curacy	
Temperature accu-	up to ±0.1 °C
racy	
Supply voltage	1.08 V 3.6 V
Average current	0.4 μA (at meas. rate 1 Hz)
Idle current	80 nA
Operating range	0100 %RH, -40125 °C

Relative Humidity

Parameter	Conditions	Value	Units
RH accuracy	typ	±1.8	%RH
	max.	See Figure 3	-
Repeatability	high	0.08	%RH
	medium	0.15	%RH
	low	0.25	%RH
Resolution	-	0.01	%RH
Hysteresis	-	±1	%RH
Specified range	extended	0 to 100	%RH
Response time	t63%	6	S
Long-term drift	typ	<0.25	%RH/y

Temperature

Parameter	Conditions	Value	Units
T Accuracy	typ	±0.2	°C
	max.	See Figure 7	-
Repeatability	high	0.04	°C
	medium	0.07	°C
	low	0.1	°C
Resolution	-	0.01	°C
Specified range	-	-40 to +125	°C
Response time	t63%	2	S
Long-term drift	typ	<0.03	°C/y

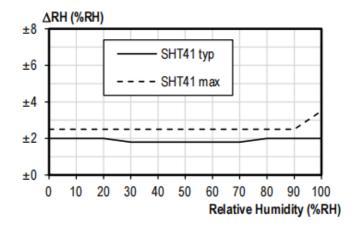


Figure 3: SHT41 typical and maximal relative humidity accuracy at 25 °C.

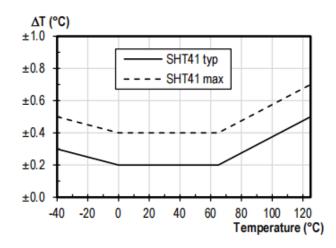


Figure 7: SHT41 typical and maximal temperature accuracy.

A typical application circuit for SHT4x is shown on the left-hand side of Figure 1. After reaching the minimal supply voltage and allowing for the maximal power-up time of 1 ms the sensor is ready for I2C communication. The quickest way to measure humidity and temperature is pseudo-coded on the right-hand side of Figure 1. Together with the conversion formulae given in equations (1), (2), and (3), the digital signals can be translated into relative humidity and temperature readings.

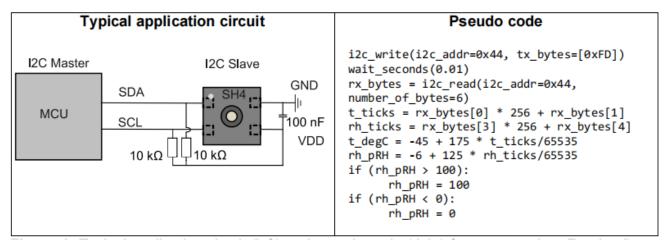


Figure 1: Typical application circuit (left) and pseudo code (right) for easy starting.

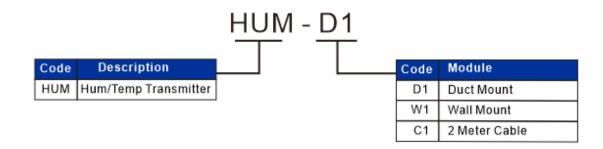
Note:

1. The default setting for the transducers is 0 to 10V, over the range 0 to 100 Degrees C. If you're using the 10V transducer output signal, the sensor needs to be powered with at least 15V AC or DC. 2.For application not using the 10V transducer output signal, using 4-20ma signal, 0-5V transducers, or Modbus/Ethernet only, in this case you can use 12V AC or DC.

Approvals

Plastic Enclosure	PA66 UL 94 V0 file E194560
Connectors	PA66 UL 94V0 file E3651 37
PCB	FR-4 Epoxy Glass Cloth UL E360179

Part Number Scheme



Introduction to Power over Ethernet (POE)

Power over Ethernet (POE) is a technologythat enables the simultaneous transmission of data and electricity over Ethernet cables. Here is an introduction to it:

Working Principle:

The POE power supply system mainly consists of a Power Sourcing Equipment (PSE) and a Powered Device (PD). The PSE is responsible for injecting electricity into the Ethernet cable, typically installed in devices such as network switches. The PDon the other hand, is a device capable of receiving electricity, such as wirelessaccess points and IP cameras. The PSE identifies whether a device is a POE- supported device by detecting itscharacteristics. Once confirmed, it supplies the corresponding amount of electricity according to the PD's requirements.

Power Supply Methods:

Mid-span Powering: A POE injector isadded in the middle of the Ethernet cableto iniect electricity into the cable without affecting data transmission. This method is suitable for existing network cablingand does not require the replacement of switches and other devices.

End-span Powering: A switch with POEfunctionality is used to directly transmitboth electricity and data to the powereddevice. This method is convenient forcentralized management andmaintenance and is a more commonpower supply method.

Advantages

Simplified Cabling: Only one Ethernetcable is needed to transmit both dataand electricity simultaneously, reducing the laying of power cables and lowering the cost and complexity of cabling. Flexibility and Convenience: It enables convenient power supply to devices in the network, without being restricted by the location of power outlets, making iteasier for device installation and movement.

Safety and Reliability: The POE powersupply system has functions such asovercurrent and overvoltage protectionensuring the safe operation of devicesAt the same time,it also reduces potential safety hazards such as electrical fires.

ensuring the safe operation of devices. At the same time, it also reduces potential safety hazards such as

electrical fires.

Application Scenarios

Wireless Networks: Powering wirelessaccess points to provide wider wirelesssignal coverage and facilitating users toachieve wireless network coverage.

Video Surveillance:

Powering IP cameras, which is convenient for installing cameras in different locations achieve remote monitoring. Industrial Automation: Powering devices such as sensors and controllers in industrial fields, improving the reliability and flexibility of industrial automation systems.

Dimensions

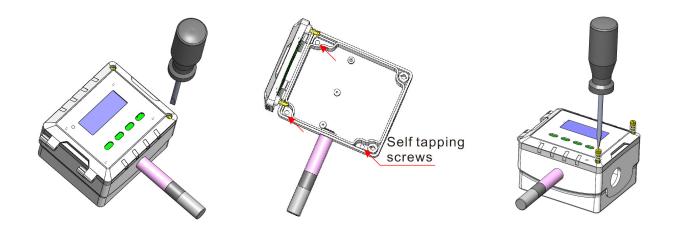


Installation Mounting

HUM-D1 & HUM-W1

1) Unfasten the slotted screw on the enclosure. Turn the slotted screw ½ Use these holes to fasten the unit to the wall with self tapping screws.

Use these holes to fasten the unit to the wall with self tapping screws.



Register List

Modbus

Humidity/Temp Transmitter w/Bacnet uses MODBUS protocol to communicate with others.Below is the register list.

Address	Register and Description
6	Address. Modbus device address
15	Baudrate. 0=9.6kbaud, 1=19.2kbaud 2=38.4kbaud 3=57.6kbaud 4=115.2kbaud
21	Protocol switch. 3 = MODBUS,0=Bacnet MSTP.
100	Room temperature reading in DegF. Can also write to this register for single point calibration.
373	Relative humidity reading in percentage,the same to register304
482	Dew point in unit C
490	Enthalpy of the air, [kJ/kg]
538	Light sensor value.The resolution is 0.1 lux;

Bacnet

Humidity/Temp Transmitter w/Bacnet also uses Bacnet protocol to communicate with others.Below is the register list.

Variable	Variable and Description
3	Modbus ID
8	Uart BaudRate.0=9.6kbaud, 1=19.2kbaud 2=38.4kbaud 3=57.6kbaud 4=115.2kbaud
10	Protocol
12	Dew point
15	Enthalpy
Input	Input and Description
1	Temperature
2	Humidity
Output	Output and Description
1	Analog output1
2	Analog output2

^{*}For more register list details,please downloaded an excel spreadsheet (03ModbusBacnetRegisterList. xls) at the following link: http://tinyurl.com/ybaj9d3u

Stucture Graphic

*Ethernet Port

Connect

Standard Ethernet Cable

Ethernet Implementation:

A family of computer networking technologies commonly used in local area networks (LANs) and metropolitan area networks. Ethernet has largely replaced competing wired LAN technologies such as token ring, FDDI and ARCNET. Features such as the 48-bit MAC address and Ethernet frame format have influenced other networking protocols. The primary alternative for some uses of contemporary LANs is Wi-Fi, a wireless protocol standardized as IEEE 802.11.

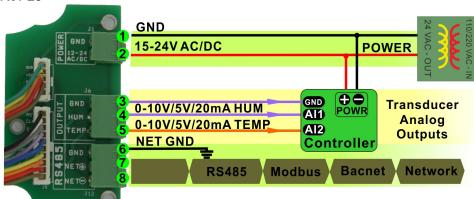
HUM-D1 & HUM-W1



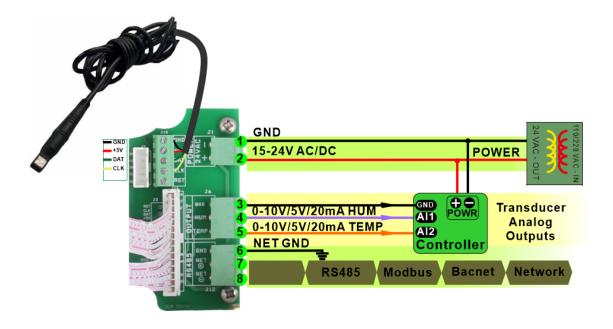
Wiring Diagram

The diagram below shows the wiring for the usual transducer mode of operation for the humidity / temperature transmitter. The transducer outputs connect to a master controller using the traditional analog output signals, 0-5V, 0-10V, 4-20mA.

HUM-D1 & HUM-W1Rev 26

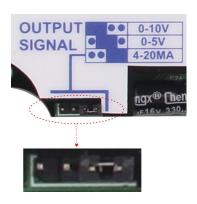


HUM-C1



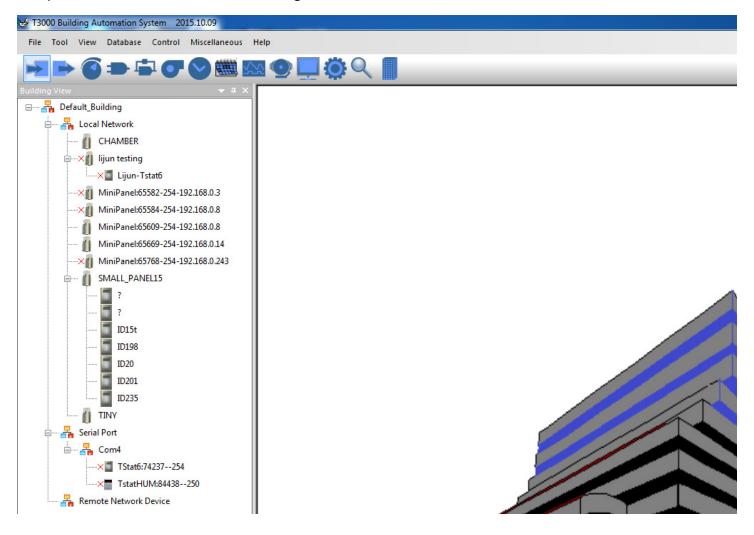
Output Jumper Settings

In this mode the device acts as a traditional transducer where it sends out three analog signals, all you need to do is to set this one single jumper to the appropriate signal type: 4-20mA, 0-10V, or 0-5V.

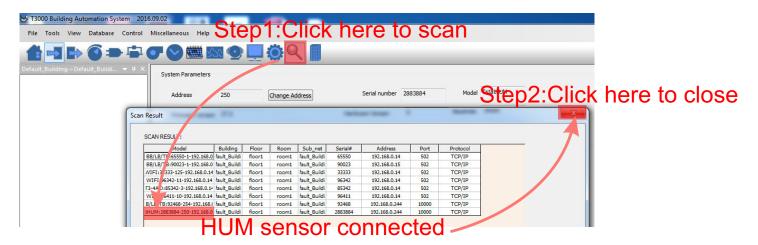


T3000 Operation

- 1. Connect HUM to PC by RS485.
- 2. Open T3000 and it show the following view.

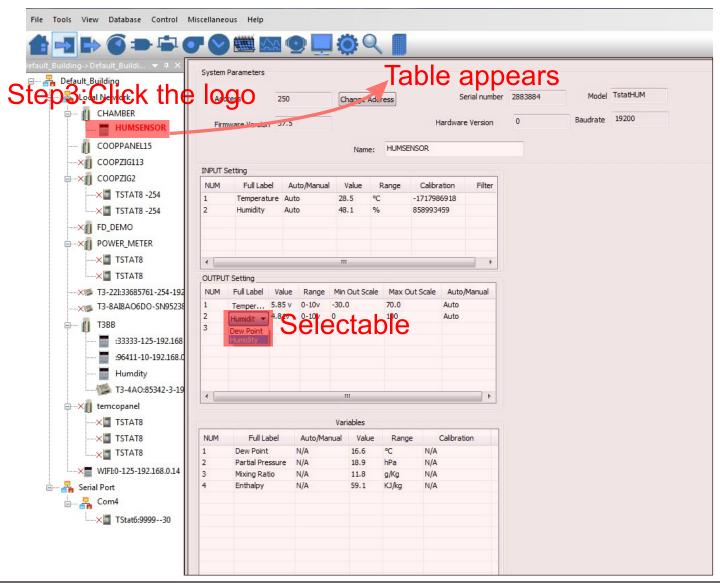


3. Click the button to scan, the following view will appear and close it as the picture shows.



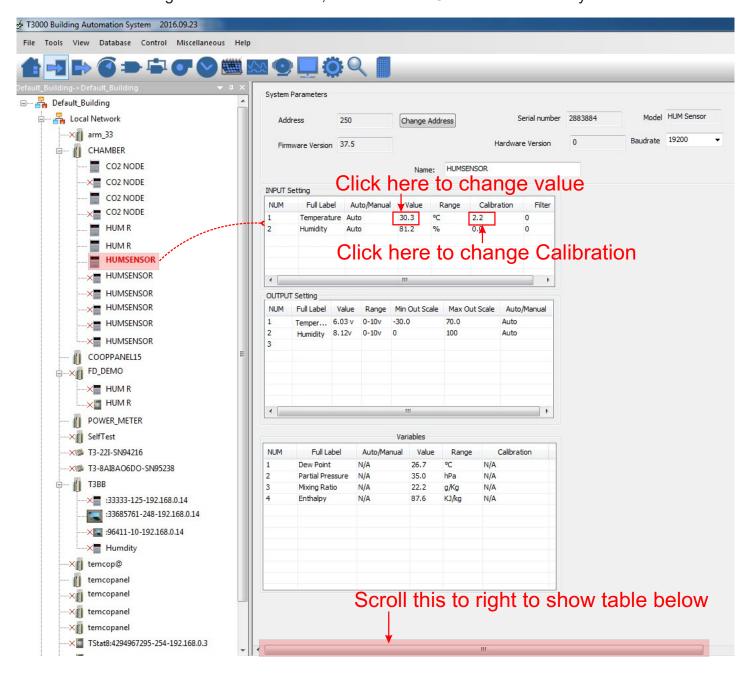
4. Click the HUM log and it will show all the information.

In input setting view, there are temperature, humidity and dew point. In output setting view, when you click the humidity, an arrow appears, you can choose humidity or dew point.

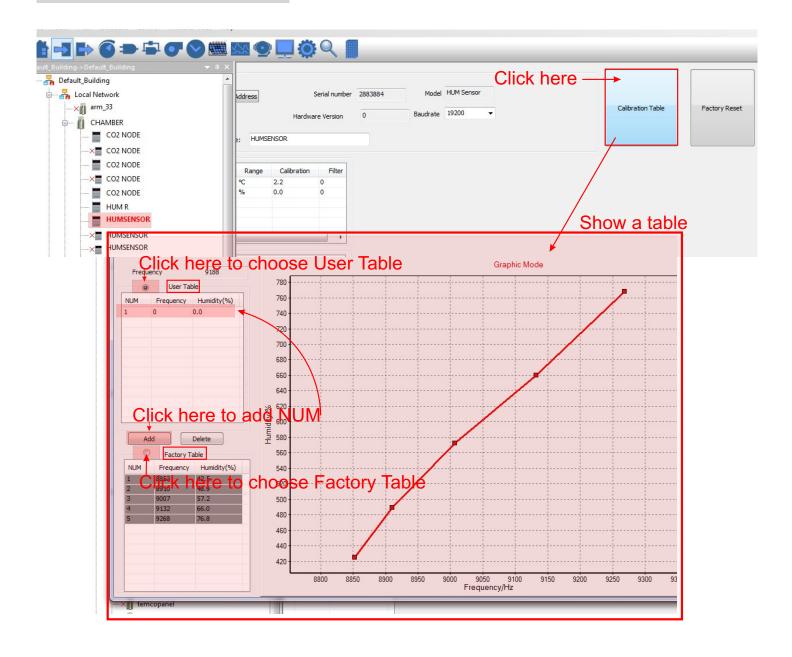


T3000 calibration

The picture shows T3000 calibration of HUM.Do as the follows: You can click to change value or calibration, also to choose User Table or Factory Table:



T3000 calibration

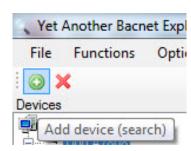


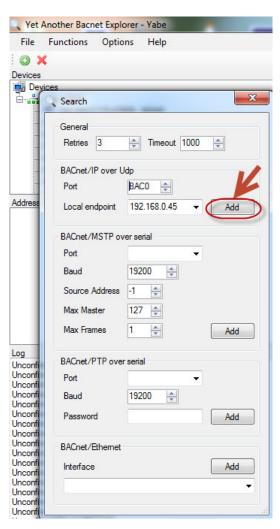
Connecting to the device using Bacnet

The device can be connected using Bacnet.Below are the steps:

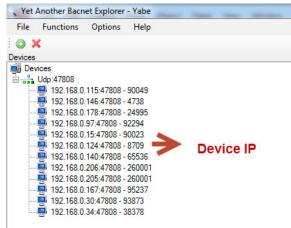
Step1.Download Yabe software as the link: https://tinyurl.com/ycrt9jep and install it.

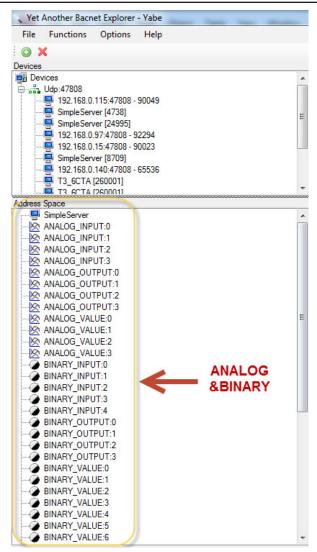
Step2.Connect the device to the computer, select Bacnet protocol. Start the Yabe software, add the device.



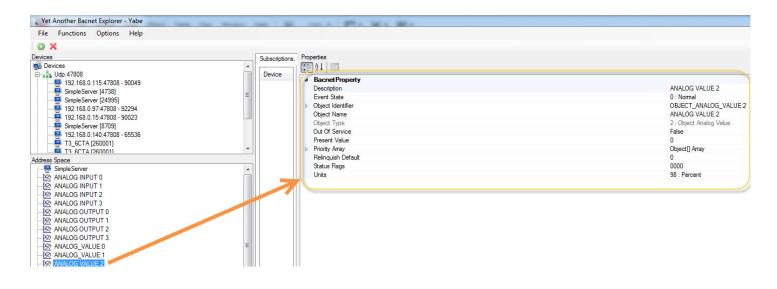


Step3. You can find your device IP as below. Double click the left mouse button, you can find your device and the bacnet information in the "Adress Space" tab.





Step4.In the "Address Space" tab, click the "ANALOG_VALUE", it will show the information of "log ANALOG_VALUE" in the BacnetProperty tab. And it 's the same with "ANALOG_OUTPUT" and other items.



Voltage & Current Formula for HUM-D1/W1(Hardware=Rev9~12)		
0-10V output	Temperature (C) = (Voltage * 100 - offset) / 10	
	Temperature (F) = (DegC) * 9 / 5 + 32	
	Humidity = Voltage / 10	
0-5V output	Temperature (C) = (Voltage * 100 - offset) / 20	
	Temperature (F) = (DegC) * 9 / 5 + 32	
	Humidity = Voltage / 20	
4-20mA output	Temperature (C) = ((Current – 4)/0.16) – offset/10	
	Temperature (F) = DegC * 9 / 5 + 32	
	Humidity = (Current – 4)/0.16	
	Temperature(F): register 100	
	Temperature© : register 101	
Applied for all	Offset : register 443, offset from zero C to adjust temperature range	
	For example 0 = 0-100C; 300 = -30 to +70C (Default setting)	
	Where Voltage is the input voltage in Volts, and Current is in mA, ie 10 = 10mA	

Voltage & Current Formula for HUM-D1/W 1(Hardware=Rev22+)		
0-10V output	Voltage = Temperature (C) / Temperature_Range * 10	
	Voltage = Humidity / Humidity_Range * 10	
0-5V output	Voltage = Temperature (C) / Temperature_Range * 5	
	Voltage = Humidity / Humidity_Range * 5	
4-20mA output	Current = Temperature (C) / Temperature_Range * 16 + 4	
	Current = Humidity / Humidity_Range * 16 + 4	

Temperature (C): Register 101

Humidity: Register 304

Temperature_Range = (Register 286 - Register 285) / 10 Humidity Range = (Register 288 - Register 287) / 1000

Voltage in V Current in mA

Voltage & Current Formula for HUM-R		
0-10V output	Voltage = Temperature (C) / Temperature_Range * 10	
	Voltage = Humidity / Humidity_Range * 10	
0-5V output	Voltage = Temperature (C) / Temperature_Range * 5	
	Voltage = Humidity / Humidity_Range * 5	
4-20mA output	Current = Temperature (C) / Temperature_Range * 16 + 4	
	Current = Humidity / Humidity_Range * 16 + 4	

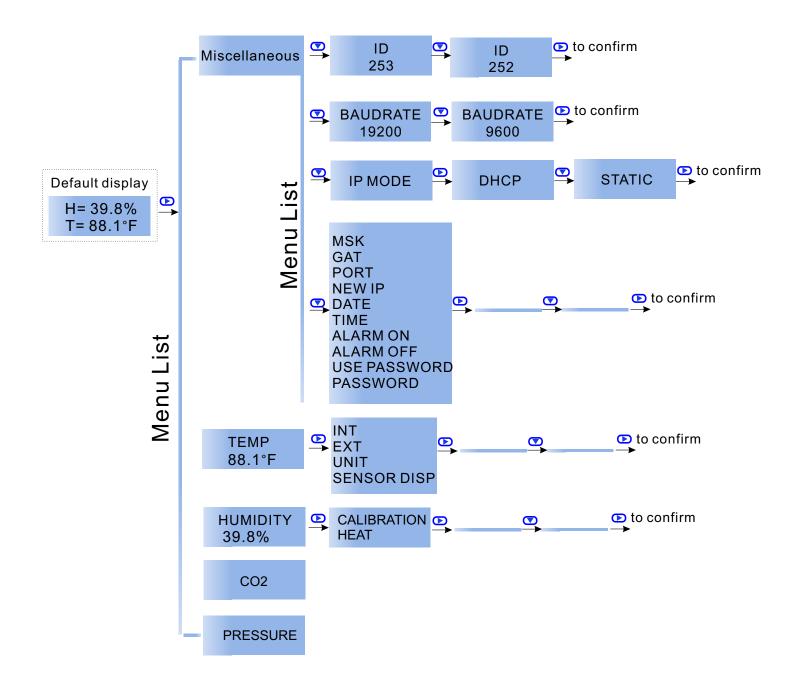
Temperature (C): Register 101

Humidity: Register 102

Temperature_Range = (Register 333 - Register 332) / 10 Humidity_Range = (Register 335 - Register 334) / 1000

Voltage in V Current in mA

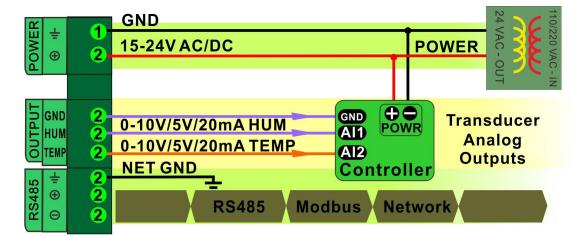
Hardware=Rev22+



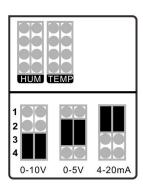
Getting Started HUM-W1

External Inputs

HUM-W1 Rev 12 Wiring Diagram



Jumper Settings



Advanced Menu Item Instructions

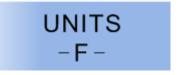
a. Normal state

b. To set the unit's ID, click or to enter the menu mode. Continue clicking or until the screen displays "ID". Use the buttons; and to change the unit's ID. Leave the unit for several seconds upon reaching a desired value to store it.

c. To set the unit's baudrate, click or to enter the menu mode. Continue clicking or until the screen displays "BAUDRATE". Use the buttons; and to change the baudrate. Leave the unit for several seconds upon reaching a desired value to store it.



BAUDRATE 19200



Modbus Register List of HUM-D1/W1/C1

Humidity Sensor uses MODBUS protocol to communicate with others. Below table for HUM-D/HUM-W/HUM-C.

Address	Register and Description
0 to 3	Serial Number -4 byte value. Read-only
4 to 5	Software Version –2 byte value. Read-only
6	ADDRESS. Modbus device address
7	Product Model. This is a read-only register that is used by the microcontroller to determine the product
8	Hardware Revision. This is a read-only register that is used by the microcontroller to determine the hardware Rev
9	PIC firmware version
10	'Plug n Play' address, used by the network master to resolve address conflicts. See VC code for algorithms
15	Bau - Baudrate, 0=9.6kbaud, 1=19.2kbaud 2=38.4kbaud 3=57.6kbaud 4=115.2kbaud
16	Firmware Update Register, used to show the status of firmware updates
21	Protocol switch. 3 = MODBUS,0=MSTP.
17-39	Blank, for future use
40 to 45	reg40, MAC address, read only normally
46	reg46, IP mode. 0=static IP; 1= DHCP
47 to 48	reg47, upper two bytes of IP address
49 to 50	reg49, lower two bytes of IP address
51 to 52	reg51, right two bytes of SUBNET MASK address
53 to 54	reg53, left two bytes of SUBNET MASK address
55 to56	reg55, right two bytes of GATEWAY address
57 to 58	reg57, left two bytes of GATEWAY address
59	reg59, 0, TCP server, (NO USE)
60	reg60, listen port at TCP server mode
61~75	buffer mirror for changing to a new IP address, copy of reg 46 to 60
76	write 1 to set the ghost settings to the system and start new settings, then clear the ghost registers.
93	Enable for MAC setting. It should be set as 1 before write the new MAC to the MAC registers(100-105), and it will be cleared automatically after setting the MAC address.
100	ROOM TEMPERATURE reading in DegF. Can also write to this register for single point calibration.
101	ROOM TEMPERATURE reading in DegC. Can also write to this register for single point calibration.
113	Not used
121	LCD temperature will show C or F, 0 =C, 1=F

Modbus Register List of HUM-D1/W1/C1

Address	Register and Description
185	Bau - Baudrate, 0=9600, 1=19.2k baud
186	The factory default is 1. Temperature Transducer output range, 1=0-10V, 2=0-5V, 3=4-20mA
187	The factory default is 1. Humidity Transducer output range, 1=0-10V, 2=0-5V, 3=4-20mA
285	The minimum degree of temperature range corresponding to the temperature output
286	the maximum degree of temperature range corresponding to the temperature output
287	the minimum percent of humidity range corresponding to the humidity output
288	the maximum percent of humidity range corresponding to the humidity output
304	Relative Humidity reading. Writing a humidity value to the register will do calibration, for details, refer to Humidity Calibration.
370	Auto/Manual output calibrate set. 0 : default value 1 : user manual. Bit 0 :temperture bit1 :humidity
371	Temperature manual output value input, releative with register 370
372	Humidity manual output value input, releative with register 370
373	Relative humidity in percentage,the same to register304
374	sensor frequency on time
375~380	spare for futher function
381	Factory 1st Calibration point. RH
382	Factory 1st Calibration point. Frequency
383	Factory 2nd Calibration point. RH
384	Factory 2nd Calibration point. Frequency
385	Factory 3rd Calibration point. RH
386	Factory 3rd Calibration point. Frequency
387	Factory 4th Calibration point. RH
388	Factory 4th Calibration point. Frequency
389	Factory 5th Calibration point. RH
390	Factory 5th Calibration point. Frequency
391	Factory 6tht Calibration point. RH
392	Factory 6th Calibration point. Frequency
393	Factory 7th Calibration point. RH
394	Factory 7th Calibration point. Frequency
395	Factory 8th Calibration point. RH
396	Factory 8th Calibration point. Frequency
397	Factory 9th Calibration point. RH
398	Factory 9th Calibration point. Frequency
399	Factory 10th Calibration point. RH

Modbus Register List of HUM-D1/W1/C1

Address	Register and Description
400	Factory 10th Calibration point. Frequency
450	Temperature Calibration Offset for sensor
451	Humidity Calibration Offset for sensor
452	the filter of temperature
453	the filter of humidity
454	calibrate table select,default tabel =0 or customer table = 1
455	user calibrate points number
456 ~ 475	user calibrate points
476	K line
477	B line
478	humidity sensor serial number
479	spare for futher function
480	spare for futher function
481	spare for futher function
482	dew point in unit c
483	dew point in unit F
484	heat control
485	spare for futher function
486	dewpoint output min range
487	dewpoint output max range
488	Partial Pressure of water at saturation at given temperature, [hPa]
489	Mixing Ratio, the mass of water over the mass of dry gas, [g/kg]
490	Enthalpy of the air, [kJ/kg]
491	Modbus reply delay time (ms)
492	Modbus receive delay time(ms)
500	PID1 MODE: 0=COOL MODE,1=HEAT MODE
501	PID1 SetPoint
502	PID1 Pterm
503	PID1 Iterm
504	PID1 Value
510	PID2 MODE:0=COOL MODE,1=HEAT MODE
511	PID2 SetPoint
512	PID2 Pterm
513	PID2 Iterm
514	PID2 Value

Bacnet Register List of HUM-D1/W1/C1

Humidity Sensor uses BACNET protocol to communicate with others. Below table is for HUM-D/HUM-W1/HUM-C1

Variable	Variable and Description
0	SerialNumber LowByte
1	Product Model
2	SerialNumber HighByte
4	SoftWare Version
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, Bit 0 :temperture bit1 :humidity
11	Humidity Value
12	Temperature Value
13	
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	
21	Filter Humdity
22	Filter Temperature
23	
24	
25	Temperature Unit:0 =C, 1=F
26	
27	OutMode: 1=0-10V, 2=0-5V, 3=4-20mA
28	Humdity analog output
29	Temperature analog output
30	Co2 analog output
31	Humdity Min Range
32	Humdity Max Range
33	
34	

Bacnet Register List

Variable	Variable and Description
35	PID/Transmit select
36	PID1 MODE: 0=COOL MODE,1=HEAT MODE
37	PID1 SetPoint
38	PID1 Pterm
39	PID1 Iterm
40	PID1 Value
41	PID2 MODE:0=COOL MODE,1=HEAT MODE
42	PID2 SetPoint
43	PID2 Pterm
44	PID2 Iterm
45	PID2 Value

Note: HUM-W adjustable baud rate from around 9600 baud on up to 115200 baud. No parity, 8 bits, no stop bit (N81)

