

Product Overview

The AX-RHT-SM015 is a high accuracy Room Relative Humidity & Temperature transmitter with Modbus RTU output. Wiring is simplified with connections all made on the back-plate, and a plug-in electronics housing. Communication parameters can be configured locally using dipswitches or over the network.

Suitable for use in air conditioned rooms.



Products Features

- 0.1°C Typical Temperature Accuracy
- 1% Typical RH Accuracy
- Isolated RS-485 output
- Easy wiring with detachable back plate

Product Specifications

Power supply :	24Vac/dc $\pm 10\%$ @ 1W max
Sensor type:	Digital
<u>Temperature</u>	
Range:	-20°C to 70°C
Typical accuracy:	$\pm 0.1^\circ\text{C}$ (10°C to 60°C) , $\pm 0.15^\circ\text{C}$ (-20°C to 10°C, 60°C to 70°C)
Maximal accuracy:	$\pm 0.3^\circ\text{C}$
Response time (t63%):	2 seconds
Typical long-term drift:	< 0.03°C / year
<u>Relative Humidity</u>	
Range:	0 to 100% RH
Typical accuracy:	$\pm 1\%$ (20% to 70%RH), $\pm 1.5\%$ (0% to 20%RH), $\pm 1.8\%$ (80% to 100%RH)
Maximal accuracy:	$\pm 2\%$ (0% to 90%RH), $\pm 3\%$ (90% to 100%RH)
Response time (t63%):	4 seconds
Typical long-term drift:	< 0.2%RH / year
Communication	
	Protocol: Modbus RTU protocol over RS485
	Electrical interface: RS485 2W-cabling
	Address range: 1-63 (settable using dipswitch), 1-247 (settable using configuration register)
	Baud rates supported: 9600bps, 19200bps, 38400bps, 57600bps, 115200bps
	Parity: None Odd, Even (default), (odd, none selectable via configuration register)
	Number of stop bits: 1(default), 2 (2 is selectable via configuration register)
	Isolation: 1500VDC (60sec, <1mA leakage current) between Power and Output
	120Ohms termination : Available on board. Enabled using jumper
	Recommended cable: 24AWG twisted pair shielded cable (1 pair for data and 1 conductor for common)
	Maximum devices on a network: 32
LED Indications:	Unit status, Communication status
Terminals :	Two part pluggable connectors. Suitable for 28~12AWG wires.
Ambient working conditions :	-20°C to 70°C, 0-100% RH Non condensing
Dimensions, Weight & Ingress :	133 x 82 x 27 mm, 80g, IP20
Country of origin :	United Kingdom

Product Order codes

Order Code

AX-RHT-SM015

Description

High Accuracy RH & T Transmitter, RS485 Modbus ,0.1°C/1% accuracy

Installation

The sensor should be installed by suitably qualified technician in conjunction with any guidelines for the equipment it is to be connected to and any local regulations. Field wiring should be installed to satisfy the requirements set out by the manufacturer of the equipment that the sensor is being connected to. Anti-static precautions must be observed when handling these transmitters. The PCB contains circuitry that can be damaged by static discharge.

The optimal operating conditions for the sensor are within a temperature range of 5°C to 60°C and a relative humidity range of 20% to 80%. Extended exposure to conditions outside these recommended parameters, particularly high relative humidity, may cause a temporary offset in the RH signal. For instance, after 60 hours of exposure to relative humidity levels exceeding 80%, the RH signal may increase by approximately 3%. Upon returning to the recommended operating conditions, the sensor will self-correct and return to within specified accuracy levels. However, prolonged exposure to extreme conditions may accelerate the sensor's aging process.

The unit should not be mounted where temperatures will exceed the ambient temperature range specified.

Allow 3 minutes after applying power before checking functionality, and allow a further 30 minutes before carrying out pre-commissioning checks.

Chemical vapours at high concentration in combination with long exposure times will offset the sensor reading. This includes transportation before installation.

- Generally, mount the sensor on an indoor wall approximately 4-6 feet above the floor.
- Ensure the sensor is placed in a location where it is not affected by excessive moisture, fumes, vibration, or high ambient temperatures.
- Avoid placing sensors in direct airflow, which can cause

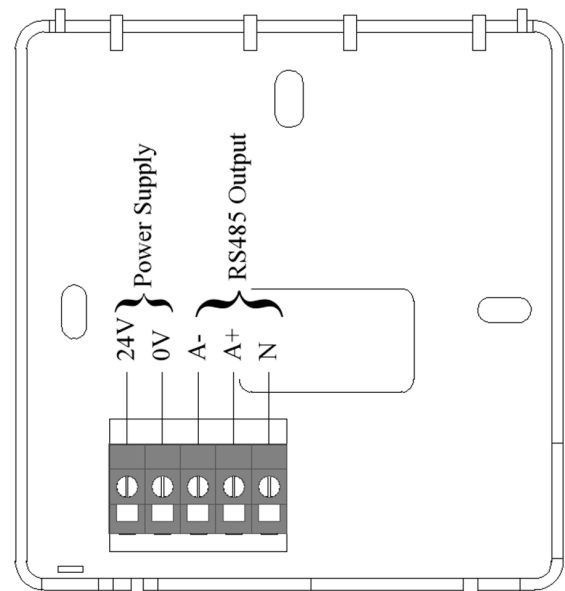
false readings.

- For in-room placement, avoid direct sunlight, doors, and other environmental factors that might affect the sensor's accuracy.
- Trial different locations to find the most stable and reliable reading spot.

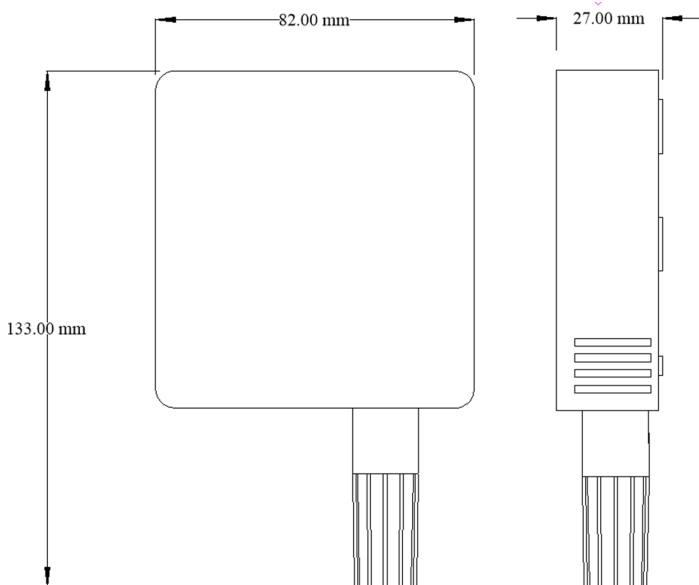
Termination Impedance

If the slave device is at the end of the network, enable 120ohms termination resistor by placing TERM in ENABLE Position. This ensures the proper termination of signals travelling in both directions on the bus. Do NOT use more than two termination impedances in a network.

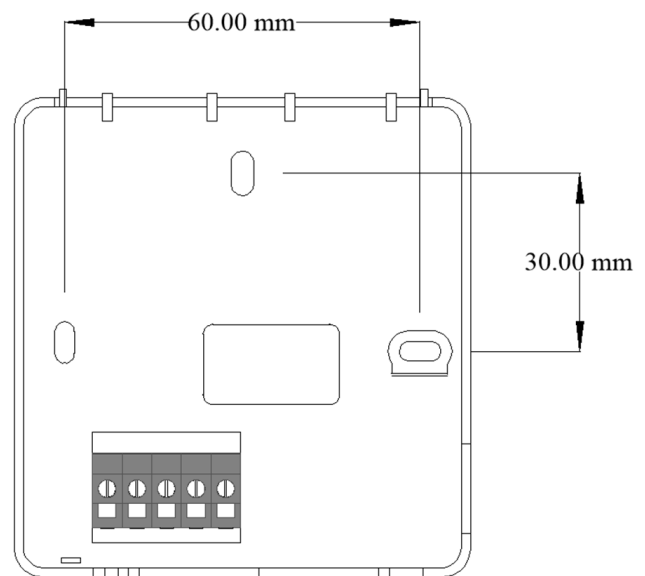
Connections



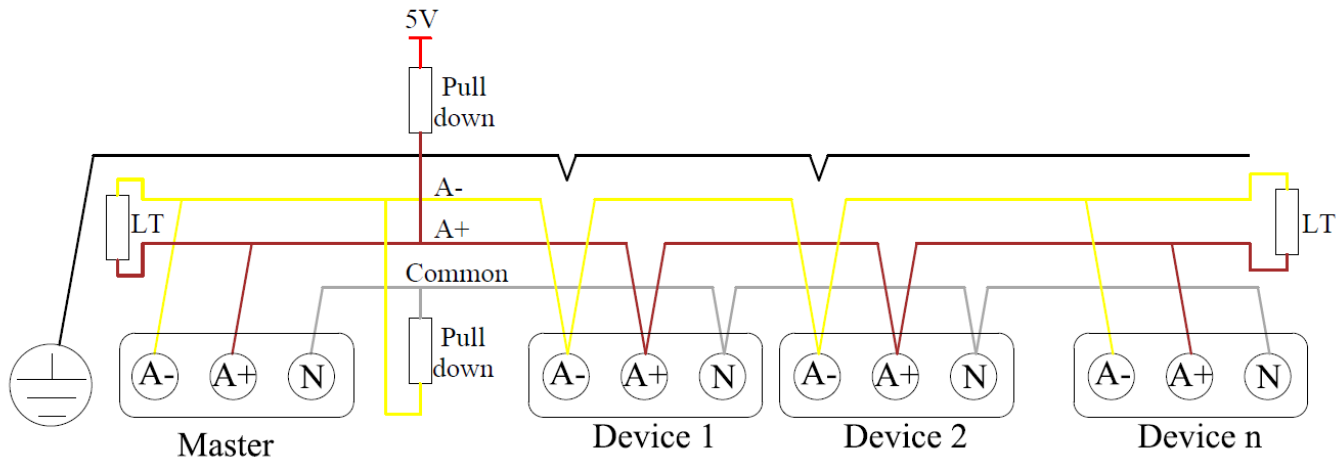
Dimensions



Mounting



RS-485 output wiring



Use twisted pair shielded cables with a characteristic impedance of approximately 120 ohms. A balanced pair must be used for data lines (A+,A-) and a third conductor for the net common (N). The shield should be connected to the earth at one end only, preferably at the master control panel.

The RS485 standard suggests a daisy chain topology. A long trunk with short derivation cables is also acceptable.

A maximum of 32 devices may be connected to the network without using a repeater. This is subject to changes depending on the Unit Load used by other devices on the network and line polarization.

Both ends of the network should be terminated with 120 Ohms to avoid signal reflections. Do not use line termination on a derivation cable. For convenience, unit has the Line Termination (LT) built-in, which may be enabled using the jumper.

Line polarisation might be needed in applications involving noisy environments. A pull-up is connected to a 5V source on A+ circuit. A pull-down resistor to the common is connected on A- circuit. The value of the resistors is chosen between 450 ohms and 650 ohms. Line polarisation will reduce the maximum number of devices that may be connected to a network.

Modbus RTU is a serial protocol. As the number of devices in a network increases, there will be potential delays in updating data from each device. The system designer determines the number of devices connected in a network depending on the required data refresh interval.

Network Configuration

The communication parameters can be set using the Dipswitches or can be programmed over the network.

If any switches are ON, switches A5 to A0 sets the device address and B1 and B0 sets the baud rate. The Parity will be

Even, and the Number of Stop bits will be 1 in this mode. If changes are made after powering up, new values will not be updated until either the unit is re-powered or a software reset is executed.

If the dipswitches A5 to A0 are set to OFF, the communication parameters will be loaded from the internal configuration registers. When these registers are modified, the updated values will not be stored until a Non Volatile Memory Update command has been executed and will not be used until either a Force Reset command or a re-power of the unit.

A unique address for each device is essential for the proper operation of the serial bus. If two devices have the same address, the Master will not be able to communicate with any slave on the bus, causing a malfunction. The address assignment must be checked carefully before the procedure.

Dipswitch configuration

A5	A4	A3	A2	A1	A0	
OFF	OFF	OFF	OFF	OFF	OFF	Comms. set by Modbus registers
						Address
OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	ON	OFF	2
↓	↓	↓	↓	↓	↓	↓
ON	ON	ON	ON	ON	ON	63

B1	B0	Baud Rate	Parity	No of Stop Bits
OFF	OFF	9600	Even	One
OFF	ON	19200		
ON	OFF	38400		
ON	ON	57600		

Modbus Registers

ADDRESS	DESCRIPTION	DATA TYPE	DATA	ACCESS	NVM
30001	RELATIVE HUMIDITY (%) (x100)	UINT16	0-10000	R	
30002	TEMPERATURE (°C) (x100)	INT16	-2000 - 7000	R	
30003	TEMPERATURE (°F) (x100)	INT16	-400 - 15800	R	
30004	RESERVED	UINT16	0-65535(DEFAULT:0)	R	
30005	RESERVED	UINT16	0-65535(DEFAULT:0)	R	
30006	UNIT_STATUS	UINT16	0: NORMAL 1: ERROR	R	
30007	RESERVED	UINT16	0-65535(DEFAULT:0)	R	
40001	MODBUS ADDRESS (NETWORK)	UINT16	1-247(DEFAULT:1)	R/W	*
40002	BAUD RATE (NETWORK)	UINT16	0: 9600 1:19200(DEFAULT) 2:38400 3:57600 4:115200	R/W	*
40003	PARITY (NETWORK)	UINT16	0:NONE 1:ODD 2:EVEN(DEFAULT)	R/W	*
40004	NO OF STOP BITS (NETWORK)	UINT16	0:1 STOP BIT (DEFAULT) 1:2 STOP BITS	R/W	*
40005	FORCE_RESET	UINT16	1:RESET	R/W	
40006	NON_VOLATILE_MEMORY_UPDATE	UINT16	1:UPDATE	R/W	
40007	FORCE_FACTORY_DEFAULTS	UINT16	1:FORCE DEFAULTS	R/W	
40008	RESERVED_1	UINT16	DO NOT MODIFY	R/W	
40009	RESERVED_2	UINT16	DO NOT MODIFY	R/W	
40010	RESERVED_3	UINT16	DO NOT MODIFY	R/W	

Common exceptions

- Exception code :01 ILLEGAL FUNCTION
Reason: Function code in the query is not supported by this device.
- Exception code : 02 ILLEGAL DATA ADDRESS
Reason: Starting address or starting address+ number of registers is outside the acceptable range.
- Exception code : 03 ILLEGAL DATA VALUE
Reason: The value in the request data field is not an authorized value for the slave.

Datasheet Contents

Every effort has been taken in the production of this data sheet to ensure accuracy. Annicom do not accept responsibility for any damage, expense, injury, loss or consequential loss resulting from any errors or omissions. Annicom has a policy of continuous improvement and reserves the right to change this specification without notice.

Supported function codes

03	READ HOLDING REGISTERS (4XXXX BANK)
04	READ INPUT REGISTERS (3XXXX BANK)
06	WRITE SINGLE REGISTER(4XXXX BANK)
16	WRITE MULTIPLE REGISTERS(4XXXX BANK)