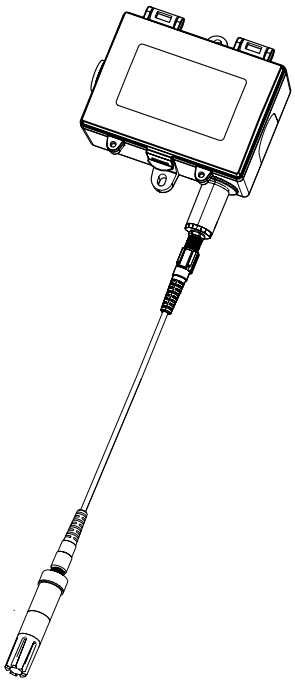
Rough Duty RH/Temperature, Remote Probe Transmitter

HTX1R Series – Installation Instructions



WARNING

Read these installation instructions carefully before commissioning the Rough Duty RH/Temp device. Failure to follow these instructions may result in product damage. Do not use in an explosive or hazardous environment, with combustible or flammable gases, as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

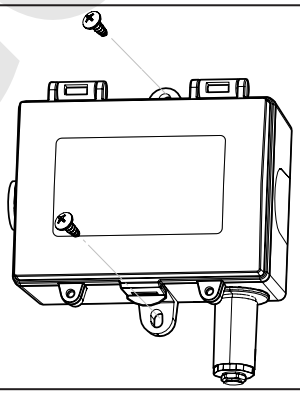
Use electrostatic discharge precautions during installation and do not exceed the device ratings.

MOUNTING

The Rough Duty RH/Temp transmitter has the main PCB inside enclosure and comes equipped with a Remote Probe. Select a suitable location on an interior wall mounted five feet from the floor for easy accessibility to mount enclosure. Place the remote probe in the area you want to measure, ideally at the same height as typical occupancy, keep away from doors, windows, or external walls to avoid false readings. Use wall mounting bracket or ceiling mounting bracket and secure with screws.

Refer Greystone application notes for specific locations Probes should not be painted over or covered; ensure access for cleaning.

Figure 1



INTRODUCTION

The Rough Duty RH/Temp Remote Probe transmitters are designed for use in environmental monitoring and control systems where high performance and stability are essential. Their state-of-the-art design combines digital linearization and temperature compensation with a highly accurate and reliable digital humidity sensor and temperature sensors, ensuring precision and dependability in the most critical applications.

A hinged, gasketed, weatherproof polycarbonate enclosure is included for ease of installation. The remote probe options are available in different cable lengths with compatible mounting accessories. Select the required cable length and mounting accessories as per your application.

1. The enclosure installs directly on an interior wall using the two integrated mounting holes. Select the best mounting technique based on the interior wall material. The 2 mounting holes will facilitate a #10 size screw (not supplied). The sensor fitting must be pointing down.

Figure 2

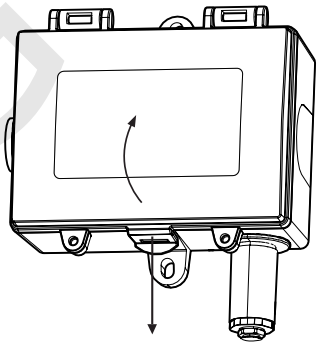
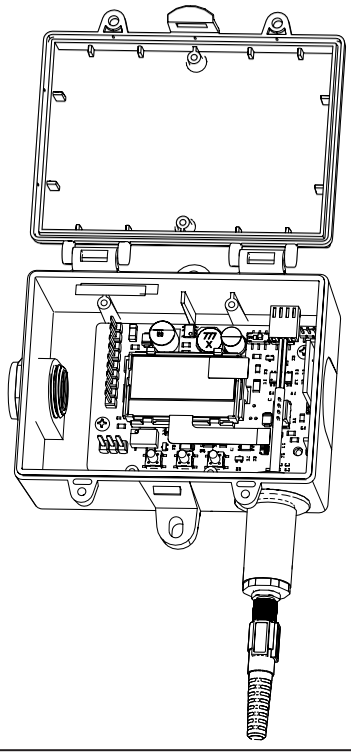


Figure 3



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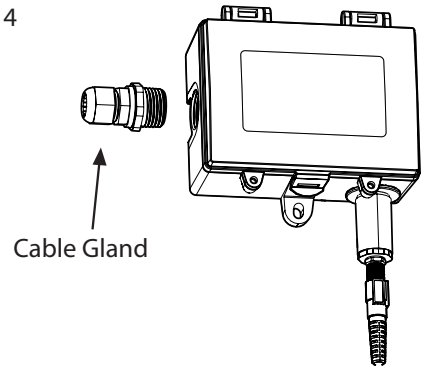
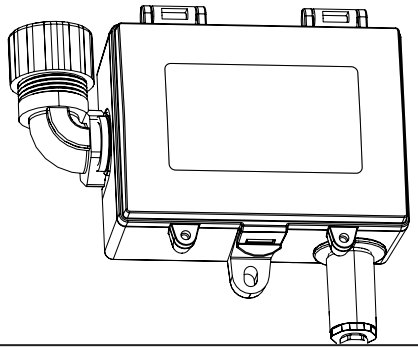
2. The enclosure has a hinged cover with a latch. Open the cover by pulling slightly on the bottom of the enclosure, at the same time pulling on the cover, as illustrated.

Figure 4



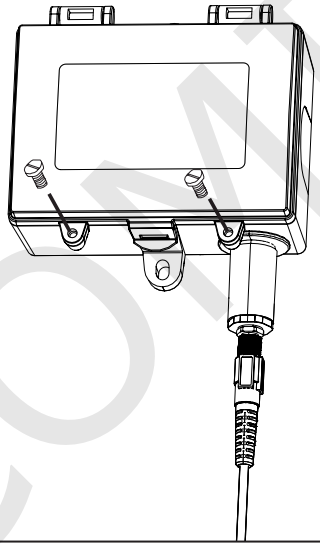
3. A 1/2" NPT threaded connection hole is provided in the side of the enclosure. Screw-in EMT connector or cable gland connector in until tight. A weatherproof conduit or cable gland fitting is recommended.

Figure 5



4. Option F: 1/2" NPT to M16 thread adapter with cable gland fitting is available for left side cable entry.
Option G: 90° angled NPT cable gland fitting is available for Top or Bottom side cable entry.

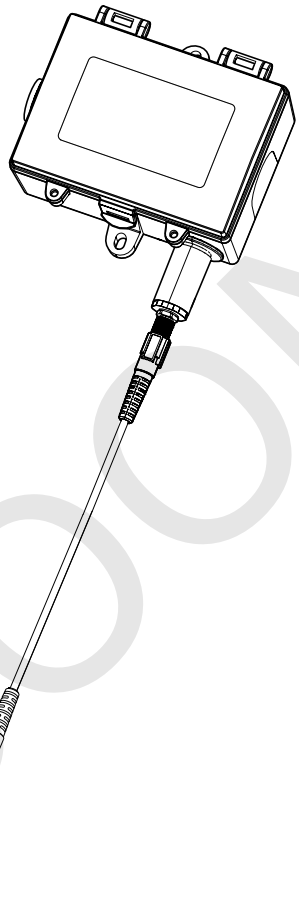
Figure 6



5. Two security screws are provided which can be installed to help secure the cover once settings and wiring connections are complete.

6. Connect the **probe ribbon cable** in **PCB** before connecting power supply.

Figure 7



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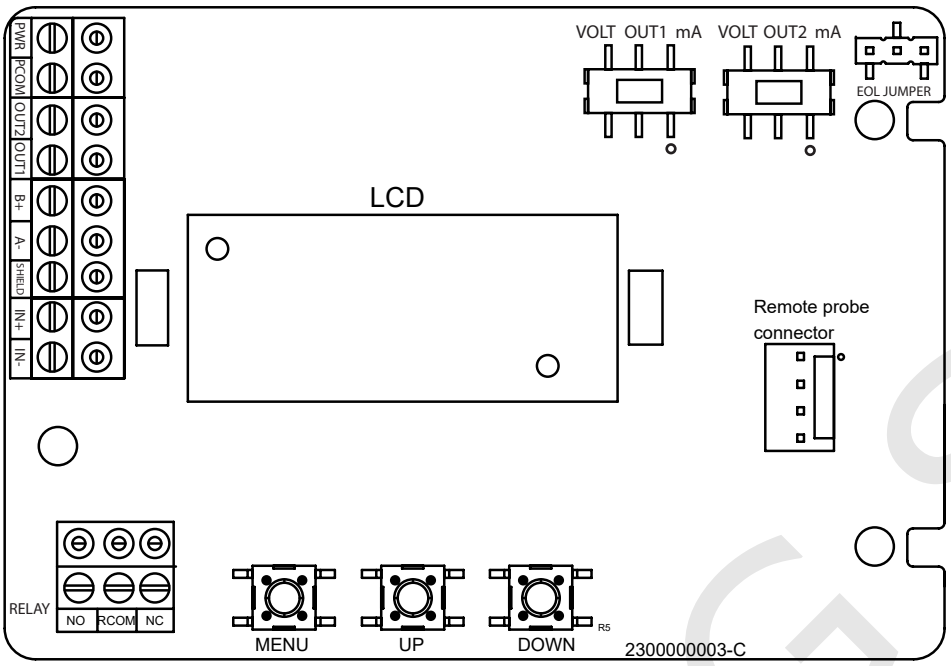
WARNING

Deactivate the power supply until all connections are made to the device to prevent electrical shock or equipment damage. Use 16-28 AWG shielded wire for all connections (only ground the shield at the controller end) and do not locate the device wires in the same conduit with wiring used to supply inductive loads such as motors. Pull at least six inches of wire into the enclosure and complete the wiring connection according to the wiring diagram. The device is reverse voltage protected and will not operate if connected backwards. It has a half-wave power supply so the supply common is the same as the signal common. Several devices may be connected to one power supply and the output signals all share the same common.
Use **caution** when grounding the secondary of a transformer or when wiring multiple devices to ensure the ground point is the same on all devices and the controller.

Figure 8

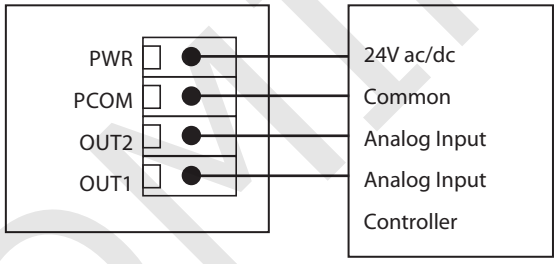


PWR	24 Vac/dc
PCOM	Common
OUT 1	Analog Output
OUT 2	Analog Output
B+	Network Output
A-	Network Output
SHIELD	Network Output
IN+	Digital Input
IN-	Digital Input
NO	Relay Output - Normally Open Contract
RCOM	Relay Output - Common
NC	Relay Output - Normally Close Contract

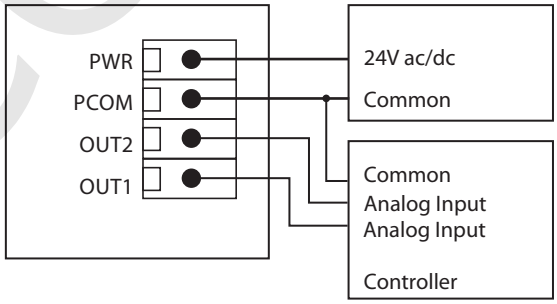
7. Select output type by sliding switch from Volt to mA. See Figure 9.

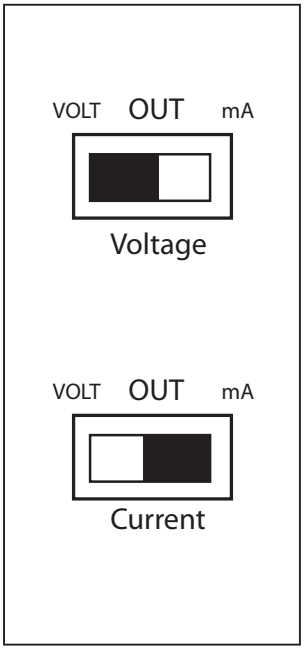
Figure 9

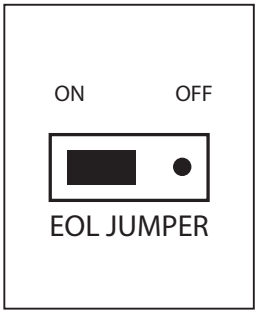
Wiring for output signals and sharing Power from Controller

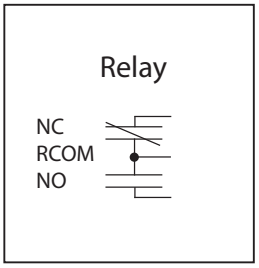


Wiring for output signals with external 24Vac/dc Power and sharing Common with Controller



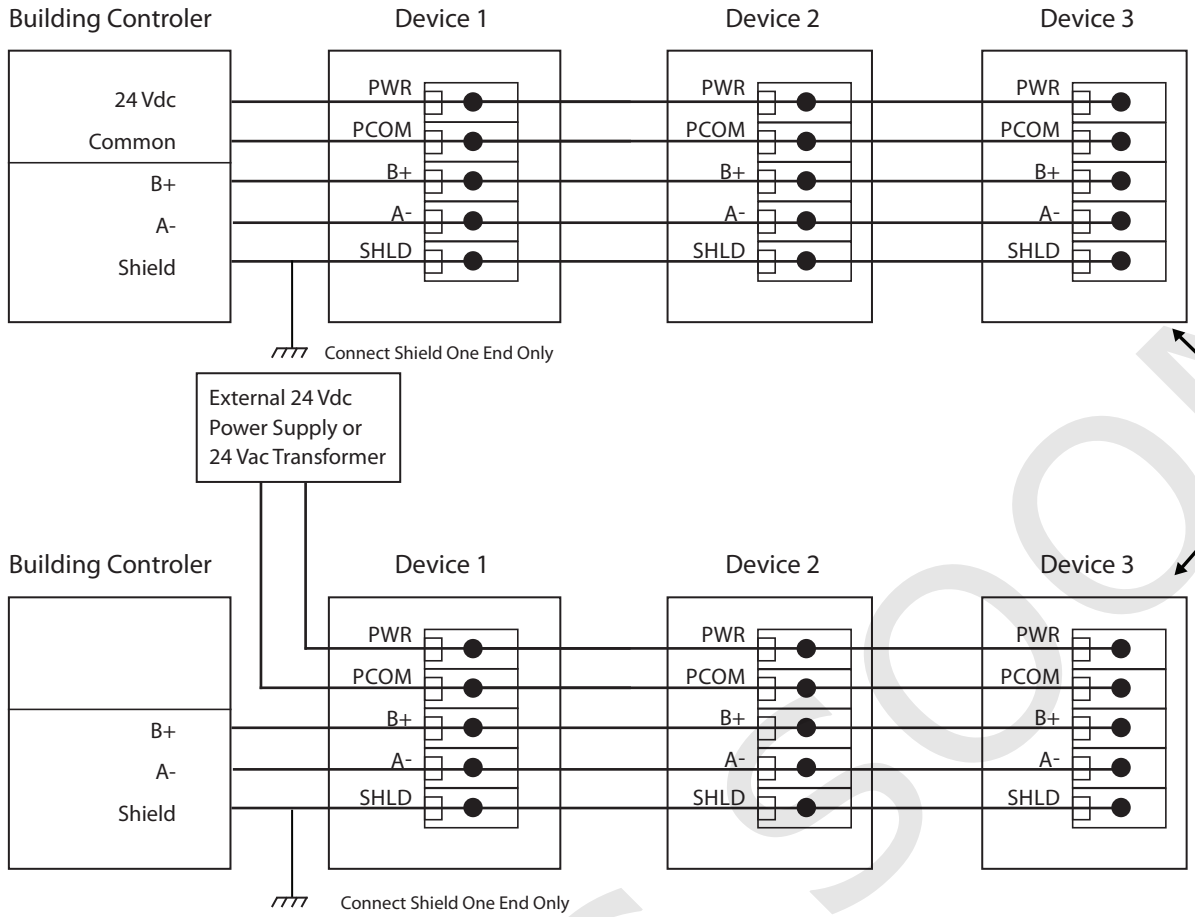






8. This is a 4-wire sourcing device. Connect the plus DC or the AC voltage hot side to the PWR terminal and the common is connected to the PCOM terminal. See Figure 9. The Analog outputs are available on the OUT1 & OUT2 terminals. See Figure 8.

Figure 10



WIRING - COMMUNICATION

• Deactivate the 24 Vac/dc power supply until all connections are made to the device to prevent electrical shock or equipment damage. Follow proper electrostatic discharge (ESD) handling procedures when installing the device or equipment damage may occur.
• Use 22 AWG shielded wiring for all connections and do not locate the device wires in the same conduit with wiring used to supply inductive loads such as motors. Make all connections in accordance with national and local codes.
• Connect the 24 Vac/dc power supply to the terminals labeled POWER and COMMON. Use caution if 24 Vac power is used and one side of the transformer is earth-grounded. See Figure 10.
• The transformer should NOT be connected to earth ground when using devices with RS-485 network connections. The device is reverse voltage protected and will not operate if connected backwards.
• Connect the RS-485 network with twisted shielded pair to the terminals marked A(-), B(+) and SHIELD.
• The positive wire connects to B(+) and the negative wire connects to A(-) and the cable shield must be connected to the SHIELD terminal on each device. See Figure 10.
• If the device is installed at either end of an RS-485 network, an end-of-line (EOL) termination resistor (121 ohm) should be installed in parallel to the A(-) and B(+) terminals.
• This device includes a network termination jumper and will connect the 121 ohm resistor correctly on the PCB. Simply move the jumper to the EOL position and no external resistor is required

9. The ground wire of the shielded pair should be connected to earth ground at the end of the network and the master is not grounded. Do not run bus wiring in the same conduit as line voltage wiring or other wiring that switches power to highly inductive loads such as contactors, coils or motors.

A network segment is a single shielded wire loop run between several devices (nodes) in a daisy chain configuration. The total segment length should be less than 4000 feet (1220 meters) and the maximum number of nodes on one segment is 127. Nodes are any device connected to the loop and include controllers, repeaters and sensors such as this one but do not include the EOL terminators. To install more than 127 devices, or to increase the network length, repeaters will be required for proper communication. The maximum daisy chain length (segment) depends on transmission speed (baud rate), wire size and number of nodes. If communication is slow or unreliable, it may be necessary to wire two daisy chains to the controller with a repeater for each segment.

10. The device has several parameters that can be configured locally via the Setup menu using the keypad and LCD. Any changes made are saved in non-volatile memory and are restored in case of a power loss. The menu can be accessed at any time after the start-up mode and if there is 5 minutes of inactivity the menu will close and normal operation will continue.

11. To enter the menu, press and release the <MENU> key. This will enter the Setup Menu step 1, pressing the <MENU> key a second time saves the setting and advances to step 2. Each press of the <MENU> key saves the current setting and advances the menu item. The <UP> and <DOWN> keys are used to make changes to program variables by scrolling through the available options. The flow chart below shows what will be displayed on the LCD, including the default value.

PCB INDICATION

MENU UP DOWN

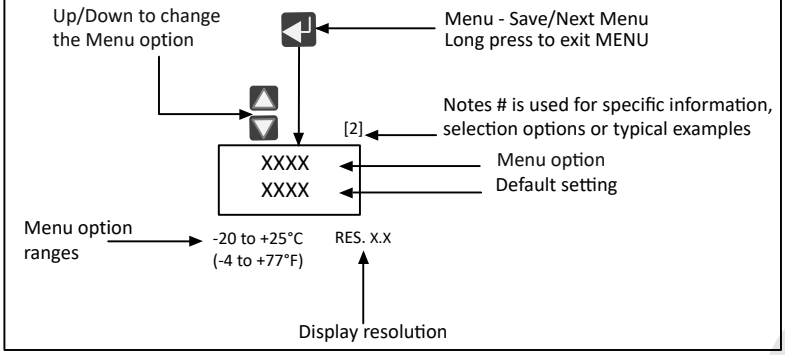
FLOW CHART SYMBOLS

MENU-SAVE/NEXT MENU-LONG PRESS

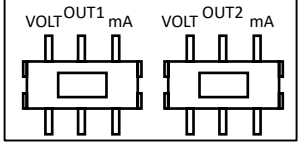
UP

DOWN

TYPICAL FLOW CHART SELECTION INFORMATION



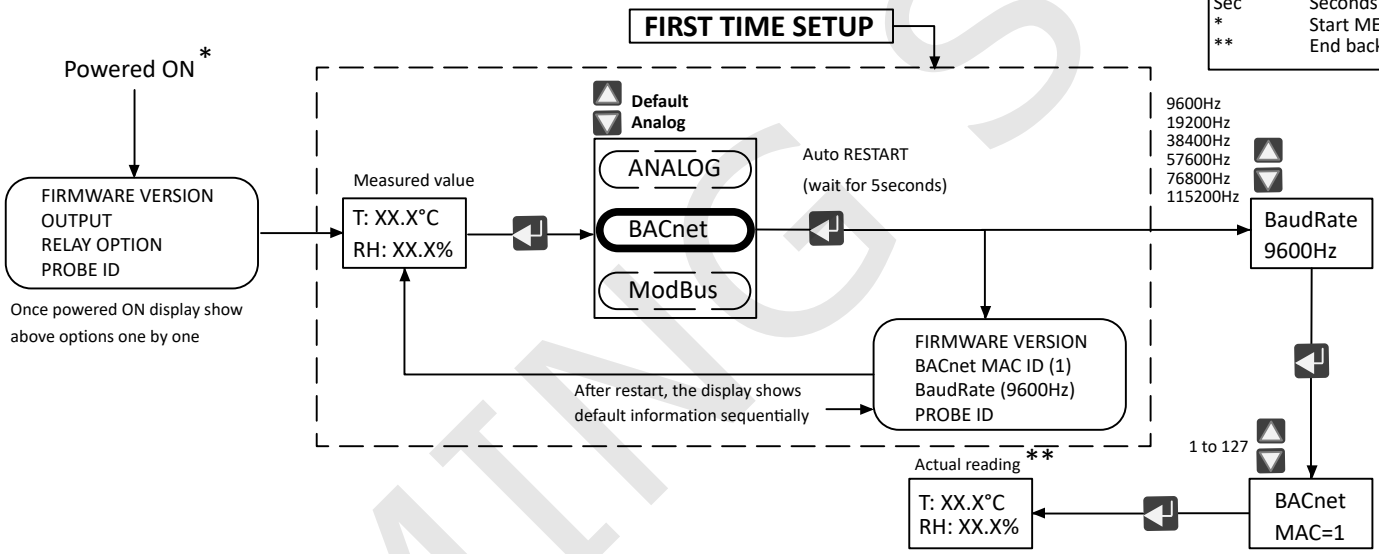
ANALOG SELECTION [2]



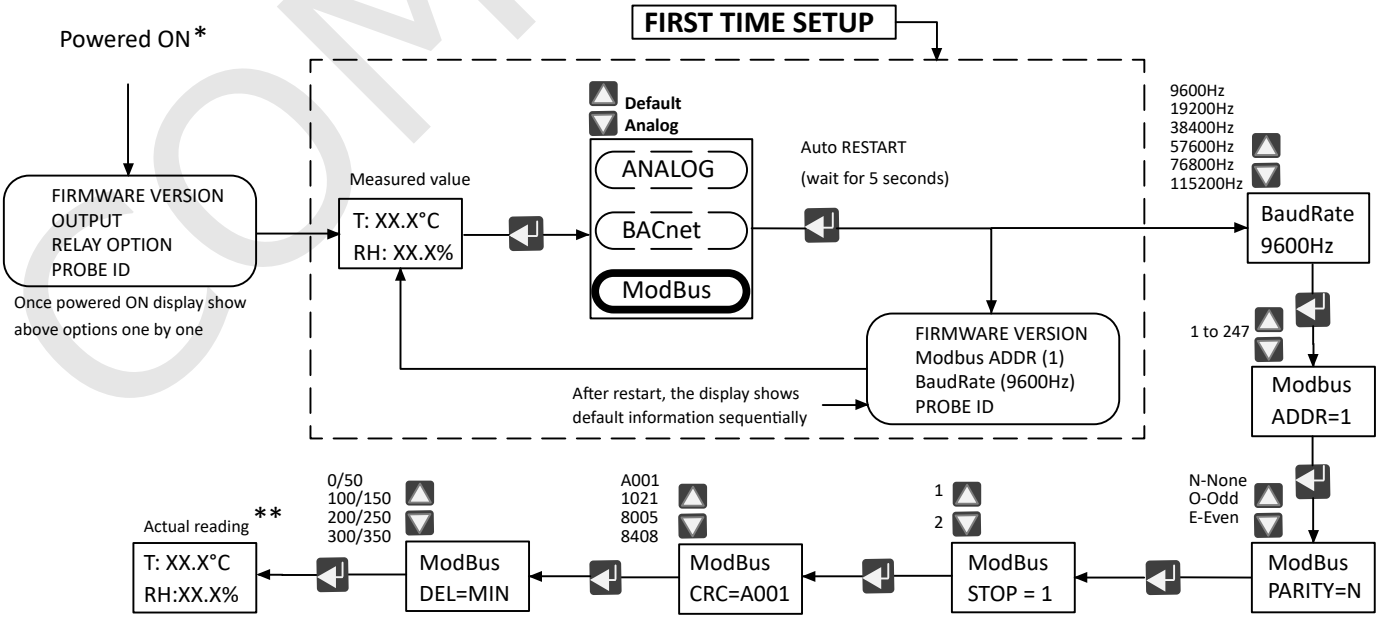
INDEX

T	Temperature
RH	Relative Humidity
OUT	Output
MAC	MAC Address
ADDR	Address
N	Parity None
O	Parity Odd
E	Parity Even
DEL	Modbus Delay
MIN	Minimum
MAX	Maximum
RES	Resolution
RL	Relay
SP	Setpoint
TL	Temperature Low
TH	Temperature High
RL	Relative Humidity Low
RH	Relative Himidity High
HY	Hysteresis
DI	Digital Input
CONTA	Contact
S	Seconds
Sec	Seconds
*	Start MENU
**	End back to MENU

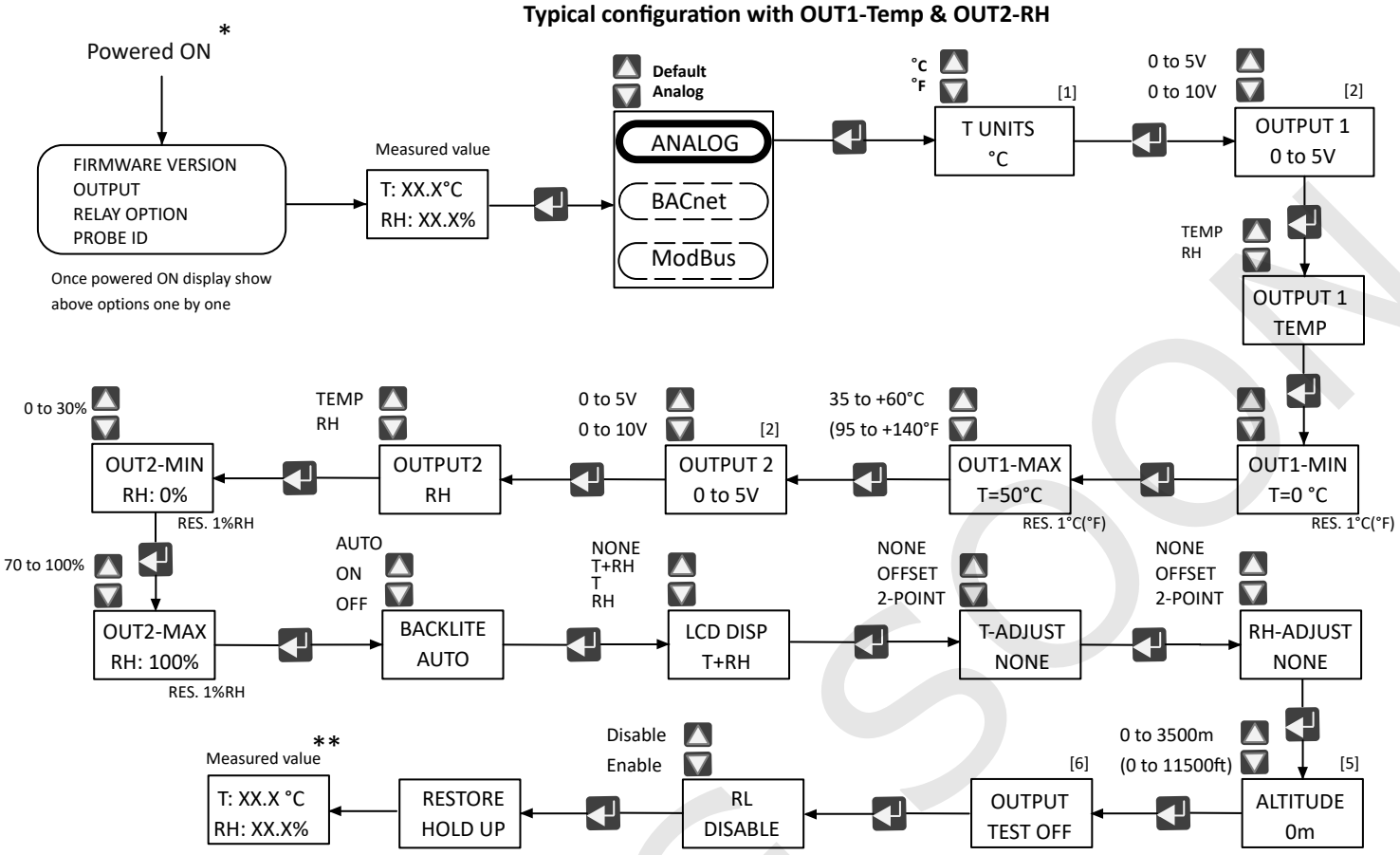
BACnet MSTP - Installation Guide



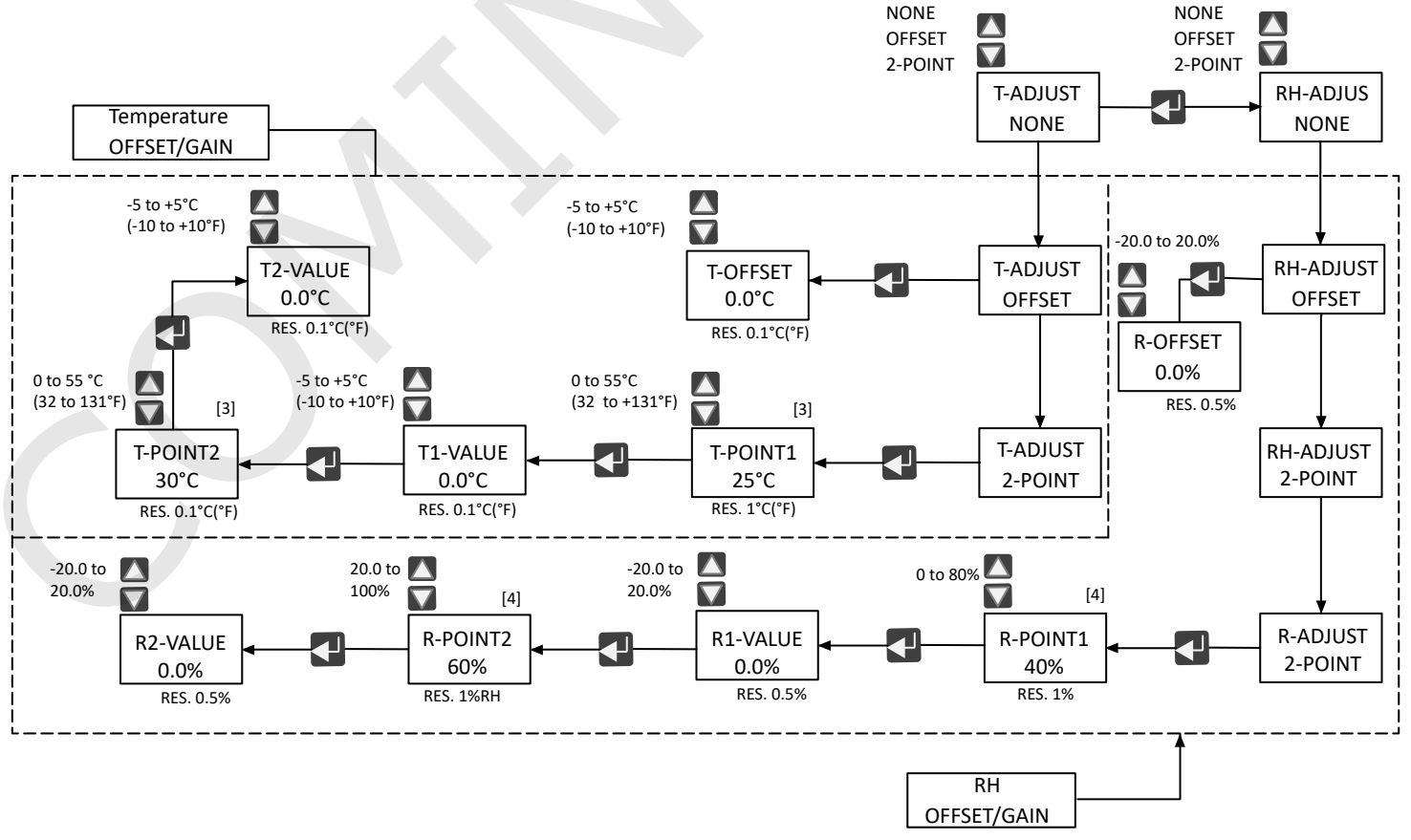
ModBus - Installation Guide



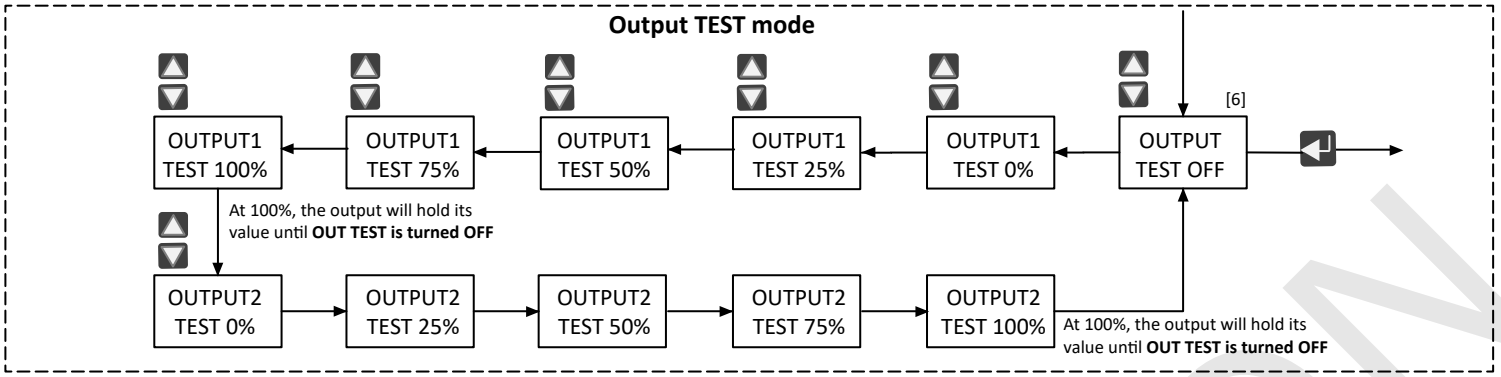
ANALOG- Installation Guide
Typical configuration with OUT1-Temp & OUT2-RH

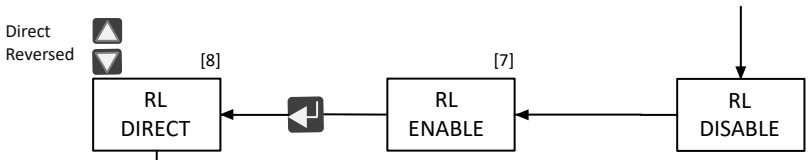


Internal Adjustment - OFFSET/ GAIN

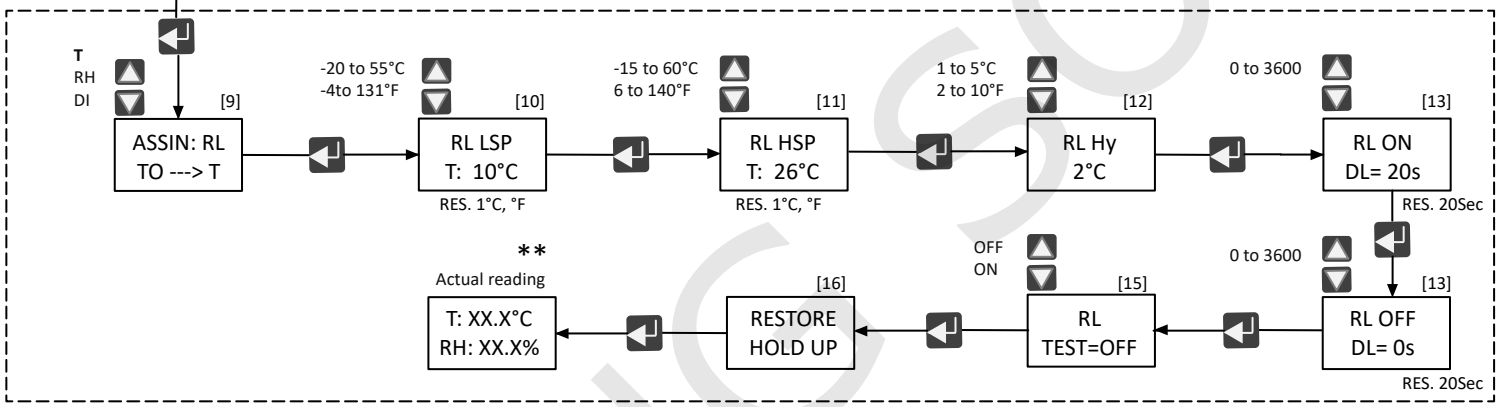


Output TEST mode

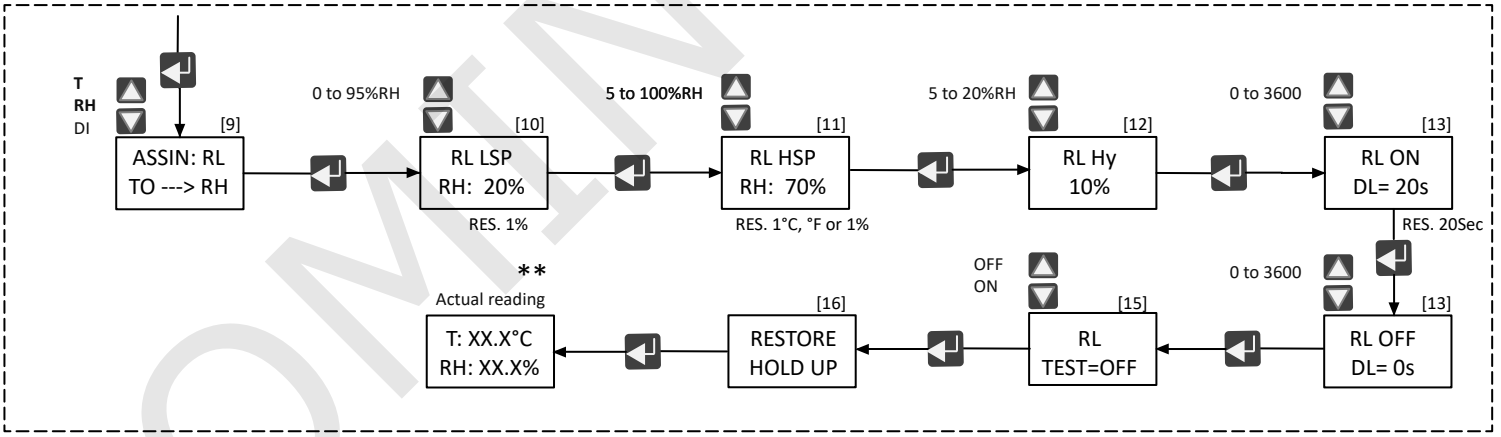




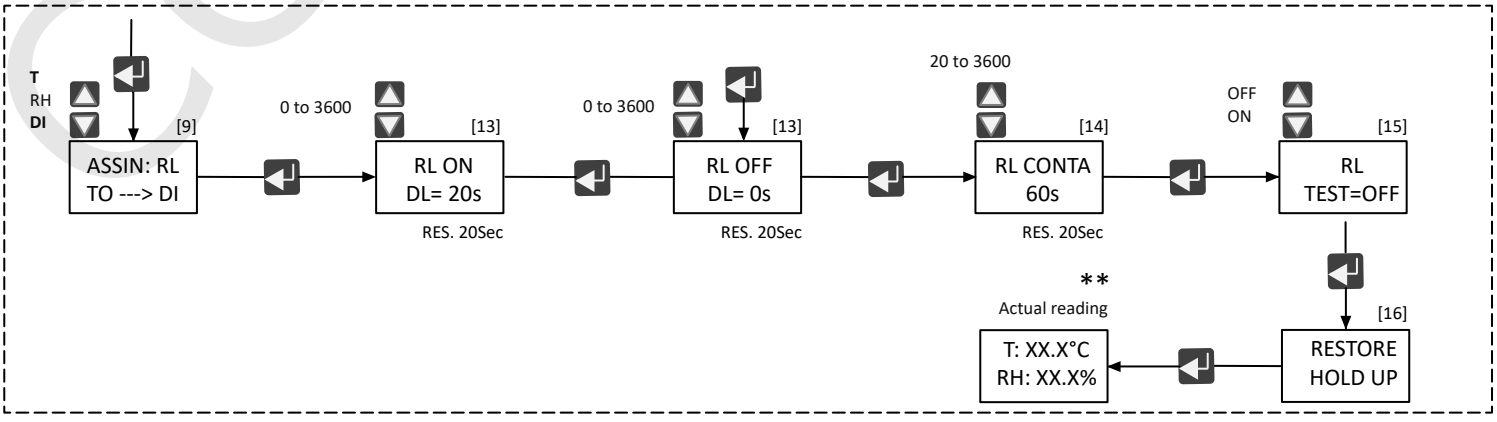
Relay configuration with Temperature



Relay configuration with RH



Relay configuration with DI



ANALOG - INSTALLATION GUIDE NOTES

1: The temperature unit selection(°C/°F) determines the measurement system. By default, the unit is configured for Metric measurements, with temperature displayed in °C and altitude in meters. The user may change the measurement system to Imperial by selecting °F, the altitude unit will automatically change to feet.

2: Output voltage selection is available only when the main PCB DIP switch is configured for Voltage mode.

3: The temperature gain point values must have a minimum difference of 5°C (10°F).
(Point 2 - Point 1 ≥ 5°C (10°F)

4: The relative humidity (RH) gain point values must have a minumum difference of 20%.
(Point 2 - Point 1 ≥20%)

5: The altitude setting will be displayed in feet once the temperature unit is changed to Imperial (°F)

6: The output test option in a Temperature/RH sensors is provided to verify proper sensor operation, refer the below output options.

OUTPUT1 OUTPUT 2	0 to 5V	0 to 10V	4 to 20mA
0%	0V	0V	4mA
25%	1.25V	2.5V	8mA
50%	2.5V	5V	12mA
75%	3.75V	7.5V	16mA
100%	5V	10V	20mA

7: The relay output is used to directly switch external devices ON or OFF based on configurable temperature or relative humidity setpoints, or via a digital input contact, enabling standalone environmental control and alarm functions. The relay output is potential-free (volt-free) and provides Form-C (NO/RCOM/NC) contacts.

8: The relay output default setting is DIRECT, i.e., normally open (NO) contactors remain open under normal conditions and close (short) when the target value (e.g., temperature) exceeds the setpoint. In contrast, when the setting is REVERSED, the NO contactors are closed (short) under normal conditions and open when the target value exceeds the setpoint.

9: The relay can be assigned to operate based on Temperature, Relative Humidity (RH), or a Digital Input (DI). When assigned to Temperature or RH, the relay parameters that can be configured include the setpoint, hysteresis, and ON/OFF delay. When assigned to a Digital Input, only the relay contact time is configurable. This allows flexible control of external devices depending on the selected input type.

10: The relay low setpoint is used to enable a relay when the measured temperature or Humidity falls below a specified threshold.
HSP-LSP ≥ 5°C, 10°F or 5%RH

11: The relay high setpoint is used to enable a relay when the measured temperature or Humidity rises above a specified threshold
HSP-LSP ≥ 5°C, 10°F or 5%RH

12: The relay Hysteresis is used with the relay temperature low and high setpoints to prevent rapid Enable/Disable of the relay near the setpoints. For the low setpoint, the relay remains Enabled until the temperature rises above the setpoint plus the hysteresis value. For the high setpoint, the relay remains Enabled until the temperature falls below the setpoint minus the hysteresis value.

13: The relay ON/OFF delay prevents rapid switching and ensures stable operation of connected devices by applying a configurable delay before the relay is enabled or disabled.

14: The relay contact option is available only when the relay is assigned to a Digital Input (DI). The relay contact time determines how long the relay remains active when triggered by the DI.

15: The relay test ON/OFF function is used to manually activate and deactivate the relay to verify correct relay operation, wiring, and connected device response during installation. When performing a RELAY TEST ON, the relay operates without any conditions/parameters such as relay ON delay, OFF delay, and contact time are all ignored.

16: To RESET the transmitter, the user should hold the UP button for 5 seconds until the function activates and the system returns to normal operation. This action will reset both the main PCB and probe PCB settings, it will restore the factory settings mode.

TYPICAL EXAMPLE OF RELAY LOW AND HIGH SETPOINT FOR TEMPERATURE

Relay control shall be based on configurable Low Setpoint (LSP) and High Setpoint (HSP) values, with adjustable hysteresis and time delays, to ensure stable and reliable relay operation. The difference between the High Setpoint and the Low Setpoint shall not be less than 5°C(HSP-LSP should be ≥ 5°C).

1: The Low Setpoint means that the relay will activate when the target value lower than low setpoint.

Low Setpoint: 20°C
Hysteresis: 2°C
Relay ON Delay: 20 seconds
Relay OFF Delay: 40 seconds

Relay ON Condition: When the temperature drops to ≤ 20°C (≤ Low Setpoint of 20°C) and remains at or below this value for 20 seconds (Relay ON Delay = 20s), the relay turns ON.
If T ≤ LSP (20°C) → Wait 20s → Relay ON

Relay OFF Condition: When the relay is ON, it will remain enabled until the temperature reaches ≥ 22°C (Low Setpoint + Hysteresis) and remains at or above 22°C for 40 seconds (Relay OFF Delay = 40s), after which the relay will switch OFF.
If T ≥ (LSP + Hyst) = ≥ 22°C → Wait 40s → Relay OFF

2: The High Setpoint means that the relay will activate when the target value higher than high setpoint.

High Setpoint: 30°C
Hysteresis: 2°C
Relay ON Delay: 20 seconds
Relay OFF Delay: 40 seconds

Relay ON Condition: When the temperature raises to 30°C (≥ High Setpoint of 30°C) and remains at or above this value for 20 seconds (Relay ON Delay = 20s), the relay turns ON.
If T ≥ HSP (20°C) → Wait 20s → Relay ON

Relay OFF Condition: When the relay is ON, it will remain enabled until the temperature drops to 28°C (High Setpoint 30°C - Hysteresis 2°C) and remains at or below 28°C for 40 seconds (Relay OFF Delay = 40s), before switching OFF.
If T ≤ (HSP - Hyst) = ≤ 28°C → Wait 40s → Relay OFF

SPECIFICATIONS

Sensor Type: Temperature (T): Bipolar transistor sensor chip
Relative Humidity (RH): Thermoset Polymer-based Capacitive Sensor Chip
Measurement Range: Temperature (T): -20 to 60°C (-4 to 140°F)
Relative Humidity (RH): 0 to 100 %RH
Accuracy: Temperature (T):
±0.1°C (±0.18°F) @ 0 to 60°C (32 to 140°F) Typical
Relative Humidity (RH):
±1% (20 to 70 %RH) @ 25°C Typical
±1.5% (0 to 20 %RH and 70% to 90% RH) @ 25°C Typical
LCD Display Values: Temperature (T): -20.0 to 60.0°C (0.1°C resolution) or -4 to 140°F (0.2°F resolution)
Relative Humidity (RH): 0 to 100 %RH
Output: Analog Signals: 2X 4-20mA (Active) or 0-5 / 0-10 Vdc, (selectable)
Network Communication: BACnet® /Modbus (selectable)
Relay Output: Form-C (NO/RCOM/NC) max 24v AC/DC, 3A contact rating
Programmable from Temperature/RH/Digital Input/ MODBUS soft point
Output Drive @24VDC: Current: 550 Ω maximum
Voltage: 10K Ω minimum
Output Parameters: Temperature: -20 to 60°C (-4 to 140°F)
Relative Humidity: 0 to 100%
Internal Adjustment: Temperature OFFSET:
±5.0°C or ±10.0°F programmable
Relative Humidity OFFSET:
±20 %RH, programmable
2 point GAIN for Temperature & RH
Power Supply: 24 Vac/dc ±10% (non-isolated half-wave rectified)
Consumption: 75mA
Protection Circuitry: Reverse voltage protected, and output limited
BACnet® Protocol:
MS/TP, 2-wire RS-485
Baud rate - 9600, 19200, 38400, 57600, 76800 & 115200
0-127 slave address range (Factory default is 1, 127 devices max on one daisy chain)
Modbus Protocol:
RTU, 2-wire RS-485
Baud rate - 9600, 19200, 38400, 57600, 76800 & 115200
1-247 slave address range (Factory default is 1, 247 devices max on one daisy chain)
Programming / Selection:
Via internal push buttons and on-screen menu
Operating Conditions:
-20 to 60°C (-4 to 140°F), 0 to 95 %RH non-condensing
Storage Conditions:
-40 to 70°C (-40 to 158°F), 0 to 95 %RH non-condensing
Enclosure: Material:
B: Grey polycarbonate, UL94-V0, IP65 (NEMA 4X)
F: Same as B, includes thread adapter (1/2" NPT to M16) and liquid tight cable gland fitting cord grip 1.7 to 5.8mm (0.067 to0.228")
G: 90° Angled Cable Gland
Dimensions: 112.5mm W x 116.5mm H x 53.7mm D (4.43" x 4.58" 2.11")
Display Units: Symbols: °C, °F, %RH
Display Size: 37mm x 13mm
Digit Height: 5mm
Backlight: AUTO/ON/OFF
Sensor Remote Probe: SS316, 75mm (2.95"), 16mmø (0.63")
M8 Electrical connector
FT6 remote cable - 1m (3.3'), 3m (9.8'), 5m (16.4') & 10m (32.8')
Wiring Connection: Removable screw terminal block, 16 AWG to 28 AWG
Optional Calibration Certificate: NIST traceable 1-Point or 3-Point
Approval: Pending (CE / UKCA / UL / BTL)
Certification: Pending (UL 60730 & CSA E60730)
Protection Class: II
Purpose of Control: Operating Control
Type of Action: Type 1
Impulse Voltage: 330V
Pollution Degree: 2
Country of Origin: Canada

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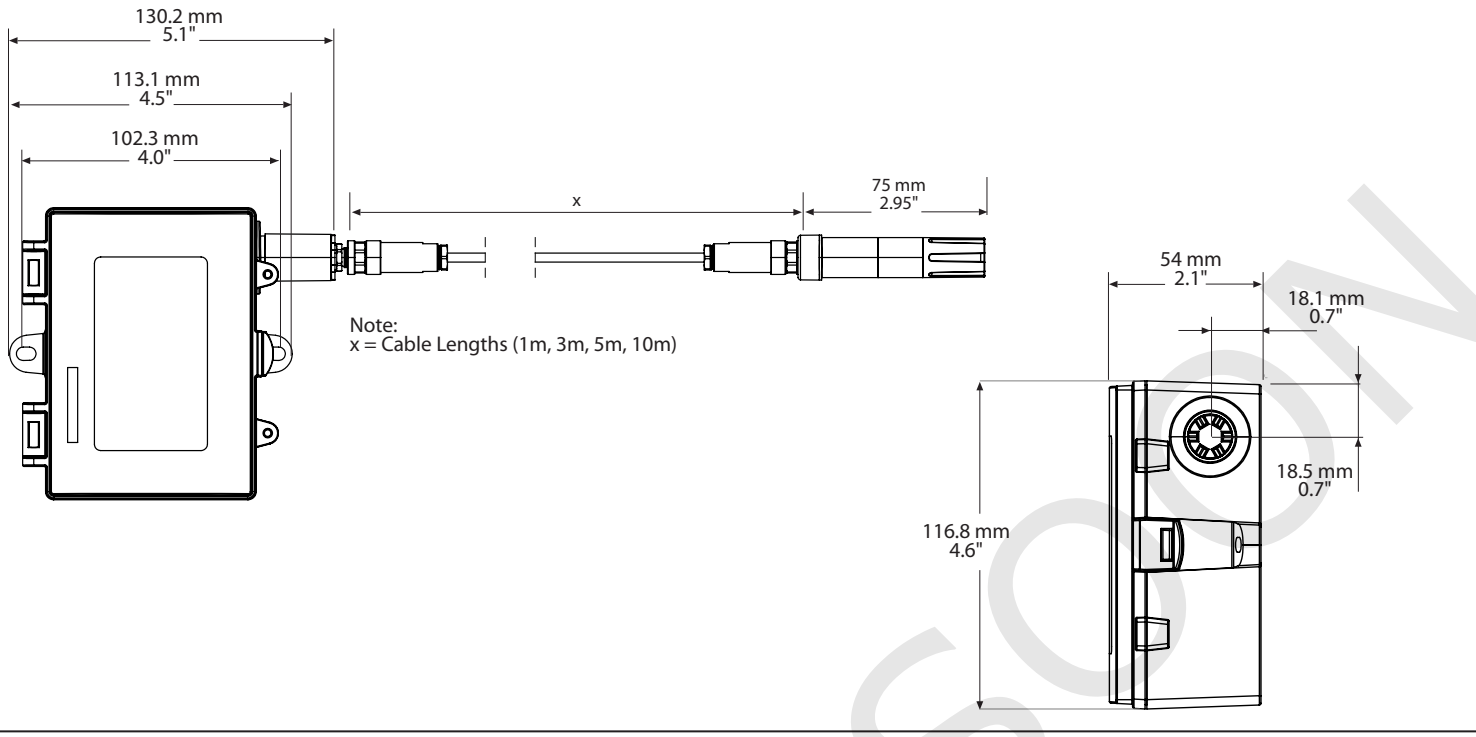
PRODUCT DIMENSIONS



NETWORK SETUP GUIDE

The network setup guide describes the implementation of the BACnet® or Modbus protocol. It is intended to assist control system programmers who may need to add support to their systems to communicate with this device.

BACnet® and Modbus setup guide downloads are available online.

BACnet® PROTOCOL

https://downloads.greystoneenergy.com/SG/SG-HTX1XXXBAC-001.pdf

MODBUS PROTOCOL

https://downloads.greystoneenergy.com/SG/SG-HTX1XXXMOD-001.pdf

TECHNICAL TIDBITS DOCUMENT

https://downloads.greystoneenergy.com/TidBits/TT-HTX1RXXX-001.pdf