

TW PROTOCOL



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Wall Mounted Temperature Sensors with Protocol Communication

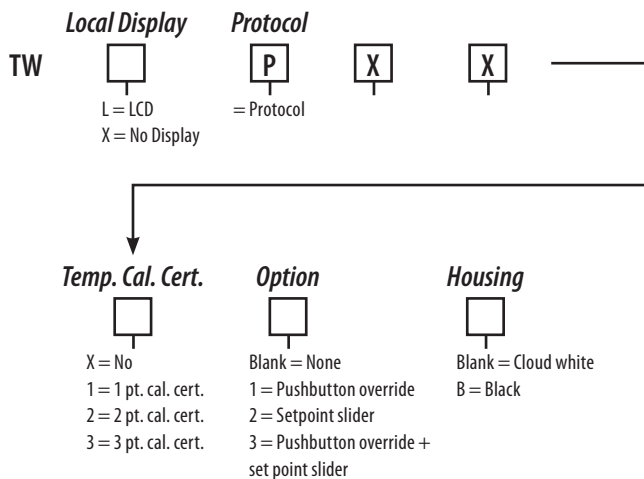
Installer's Specifications

Input Voltage	12 to 30VDC, 24VAC; 100mA max.
Operating Temperature Range	0° to 50°C (32° to 122°F)
Housing Material	High impact ABS plastic, UL 94 V0
Protocol	BACnet or Modbus (selectable)
Connection	2-wire RS-485
Data Rate	9600, 19200, 38400, 57600 (Modbus), bps (selectable) 9600, 19200, 38400, 76800 (BACnet), bps (selectable)
Parity	None/Odd/Even (selectable-Modbus) None (BACnet)
Address Range	1-127
Temperature Transmitter:	
Sensor Type	Solid-state, integrated circuit
Accuracy	±0.5°C (±1°F) typical
Resolution	0.1°C (0.2°F)
Range	10° to 35°C (50° to 95°F)
Setpoint Slider Resolution Option	1% full scale
Override Button Option	Remotely readable and resettable

NOTICE

- This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
- Read and understand the instructions before installing this product.
- Turn off all power supplying equipment before working on it.
- The installer is responsible for conformance to all applicable codes.

PRODUCT IDENTIFICATION



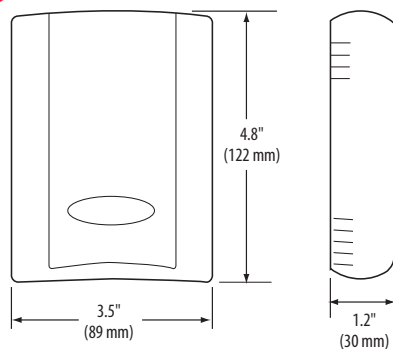
QUICK INSTALL



Observe handling precautions for static sensitive devices to avoid damage to the circuitry which would not be covered under the factory warranty.

1. Select a mounting location away from ventilation sources. The sensor should be mounted on a vertical wall, about 4 1/2 feet above the floor.
2. Affix the backplate to the wall.
3. Wire the device. Refer to wiring diagram.
4. Install Cover.

DIMENSIONS



INSTALLATION

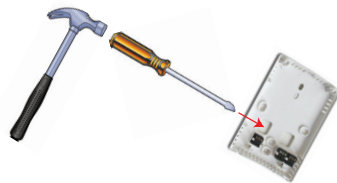
1. Remove the cover by pressing the tab at the top of the sensor while pulling outward from the top of the cover.



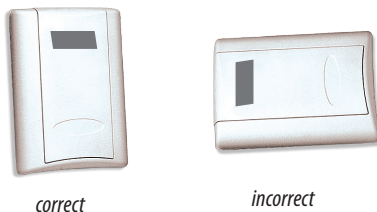
2. Remove the backplate by unfastening the sensor from the bottom of the backplate and pivoting the sensor outward.



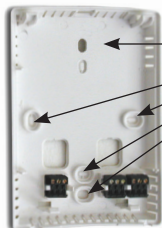
3. Punch out openings in the backplate.



4. Position the sensor vertically on the wall, 4 1/2 feet above the floor.



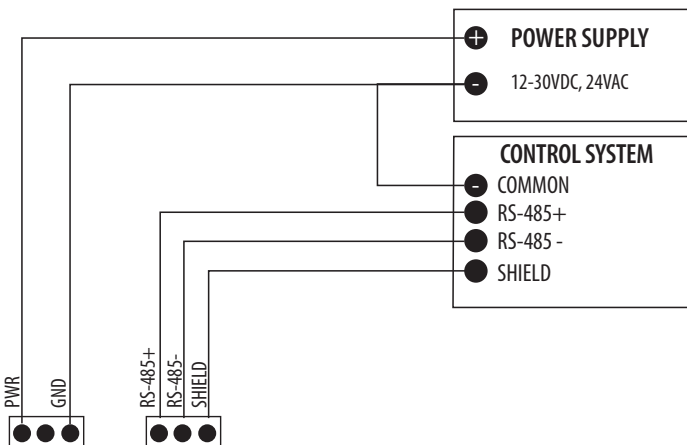
5. Mount the backplate onto the wall using the screws provided.



Five screwholes available; use a minimum of two for secure mounting.

6. Wire the backplate.

Wire the RS-485 connections with shielded, twisted-pair wire, such as Belden Cable 1120A or equivalent. With 2-wire cable, connect the shield at one end only to the RS-485 SHIELD terminal.



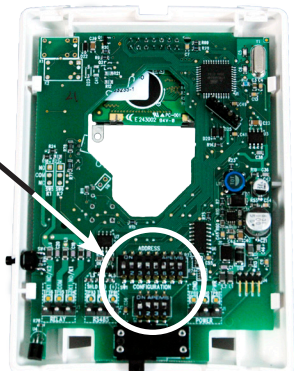
Ground each unit via the power supply GND terminal or the RS-485 SHIELD terminal if the power supply is floating. Grounding is necessary to minimize common mode voltage on the signal lines and to minimize radio frequency emissions that can interfere with the operation of nearby radio equipment.

Daisy-chain devices with 120Ω termination resistors between RS-485+ and RS-485- on the last device at each end of the chain. Maximum of 63 devices on one daisy chain.

7. Configure the sensor.

Set the DIP switches on the backside of the board.

DIP switches, located on backside of board,
Top row: Address switches
Bottom row: Configuration switches



Select Address DIP switches

1. Up for Modbus, Down for BACnet.
2. Up to add 64 to network address.
3. Up to add 32 to network address.
4. Up to add 16 to network address.
5. Up to add 8 to network address.
6. Up to add 4 to network address.
7. Up to add 2 to network address.
8. Up to add 1 to network address.

The network address is the sum of the values selected by placing switches 2 through 8 in their UP position. E.g.: If switches are D D D U D U D D, then BACnet communication is selected, and the address is 16 + 4, for a total of 20. Valid Modbus addresses are 1 to 127, and valid BACnet addresses are 0 to 127. Each device on the daisy chain must have a unique address.

Select Configuration DIP switches

Configuration DIP switches 1 and 2 control the parity settings for Modbus and have no effect on BACnet communication, which never has parity.

Switch 1	Switch 2	Parity
Down	Down	None (2 stop bits)
Down	Up	Odd
Up	Up	Even
Up	Down	None (1 stop bit; common but non-standard)

Configuration DIP switches 3 and 4 control the data rate for both Modbus and BACnet modes.

Switch 3	Switch 4	Data Rate
Down	Down	9600 bps
Down	Up	19200 bps
Up	Down	38400 bps
Up	Up	Modbus: 57600 bps; BACnet: 76800 bps

Modbus Configuration

The list of supported Modbus function codes and the Modbus Point Map are in the Point Map section of this document. The capabilities for controlling the TWxP are identical with those for BACnet. The functions are summarized here.

Function	Description
Coils	Used to set temperature (Fahrenheit scale) and override button coil. *
Input registers	Used to read the sensor options: temperature (in units of 0.1°), and the slider (in units of %full scale).
Holding registers	Used to specify the temperature offset. Initial setting is 0°F. Settings are retained if power is lost.

**The temperature scale is maintained if power is lost. When delivered, temperature in Fahrenheit and calibration lockout is on. Pressing the override button turns the override button coil on. It can only be turned off remotely.*

BACnet Configuration

The list of BACnet objects and their implemented properties is in the BACnet Descriptions section of this document. The capabilities for controlling the CWxP are identical with those for the Modbus configuration. However, BACnet has some additional protocol-related settings.

The Device Object must have a unique name. This is set at the factory to the model name, followed by the device’s serial number. The name can be changed if desired. The device object must also have a unique object identifier number. By default, this is 133nnn where nnn is the current network address. This number can be changed and the new number will be remembered. Setting the number to -1 (normally not allowed) will reset the device to the default.

The Reliability property of the analog inputs for temperature, relative humidity, and slider can be read to determine whether the device has these options installed.

8. Install the sensor onto the backplate.



9. When installation is complete, install the cover and snap into place.



VISUAL INDICATORS

The RX light will flash while data is being received. If it isn’t blinking, it can indicate a bad connection or that the RS-485+ and RS-485– wires are connected backwards.

The TX light will flash while data is being transmitted. For Modbus, if this light isn’t blinking it can mean that the device isn’t being selected (wrong address) or the communication parity or bit rate is set improperly.

In a BACnet installation, both the RX and TX lights will flash repeatedly even if no communication is being performed. In a Modbus installation, no lights will flash if there is no communication activity.

MODBUS POINT MAP

Function code	Function
01	Read coils
03	Read holding registers
04	Read input registers (if any sensor is not installed, the reading for that sensor will be 0)
05	Write single coil
06	Write single register
07	Diagnostics (sub-function 00 returns query data)
15	Write multiple coils
16	Write multiple registers
17	Report slave ID (returns manufacturer, model name, and serial number)

All of these values correspond to BACnet objects with the same name. See the BACnet Descriptions section for definitions.

Coils	
1	Fahrenheit (else Celsius)
2	Override (use override button to turn on)
Input Registers	
1	Temperature (in tenths of a degree; units set by coil 1)
2	Slider (in percent)
Holding Registers	
1	Temp Offset (in tenths of a degree, current units)

BACNET DESCRIPTIONS

All properties read-only unless otherwise noted. Preserved means it is non-volatile.

Present_Value Range Restrictions

Object Name	Minimum Value	Maximum Value
Device_Instance	0 (but see description, above)	4,194,302
Temp_Offset	-5	5

Standard Object Types Supported

Object Type	Supported Optional Properties	Writable Properties
Analog Input -- AI	Description*, Reliability	
Analog Value -- AV	Description*	Present_Value
Binary Value - BV	Description*	Present_Value
Device -- DEV	Description*, Location	APDU_Timeout, Description, Location, Max_Master, Object_Identifier, Object_Name

* Description is the same as the Object_Identifier. Reliability is "No Sensor" if no sensor is installed (applies to humidity, temperature, and slider).

Objects Table

Object Name	Type and Instance	Description of Present_Value Property
Temperature	AI 1	Temperature in Fahrenheit or Celsius
Slider	AI 2	Slider position in percent.
Device_Instance	AV 1	Alternative way to change object_identifier property of device. A negative value will restore the default device instance (133nnn). Fractional values are truncated.
Temp_Offset	AV 2	Temperature offset. Value rounded to nearest tenth of a degree. Units are current units. Initial value is zero.
Fahrenheit	BV 1	1 if temperature in Fahrenheit, 0 if in Celsius. Initially 1
Override	BV 2	1 if override button pressed. Store 0 to reset. Initially 0. Volatile

Device Objects Table

Object Name	Type and Instance	Object Property	Description
TWxPxxx	Device 133nnn	Object_Identifier (R/W)	Unique value where nnn initially is MS/TP
		Object_Name (R/W)	Unique name, initially a combination of model and serial number. Maximum length is 64 characters
		APDU_Timeout	Default is 3000, maximum value is 60000
		Max_Master	Default is 127
		Description	Maximum length is 64 characters
		Location	Maximum length is 64 characters

CONFORMANCE STATEMENT

Vendor Name: Veris Industries

Product Name: Veris TWxP Environmental Sensor

Product Model Number: TWxPxxx

Application Software Version: 1

Firmware Revision: x.x

BACnet Protocol Revision: 2

Product Description: Environmental Sensor

BACnet Standardized Device Profile (Annex L): BACnet Application Specific Controller (B-ASC)

List all BACnet Interoperability Building Blocks Supported (Annex K):

DS-RP-B,DS-RPM-B,DS_WP-B,DM-DDB-B,DM-DOB-B,,DM-DCC-B

Segmentation Capability: Segmentation not supported

Standard Object Types Supported:

No dynamic creation or deletion supported

No proprietary properties or object types

(other information about objects on preceding pages)

Data Link Layer Options: MS/TP master (Clause 9), baud rates: 9600, 19200, 38400, 76800

Device Address Binding: Static device binding is not supported. (No client functionality is included).

Networking Options: None

Character Sets Supported: ANSI X3.4