

# TS210 THERMISTOR STRING

## QUICK START GUIDE



**Figure 1:** NexSens TS210 Thermistor String.

### Overview

The NexSens TS210 Thermistor String features a series of connected sensors containing integral titanium thermistors secured in protective housings. Each sensor is accurate to +/- 0.075°C. Readings stabilize within 60 seconds due to the thermistors direct contact with water. Temperature data is transmitted on a RS-485 Modbus RTU string bus for integration with data loggers and SCADA systems. The sensors are connected via marine-grade cable with a braided Kevlar core and can be suspended vertically in a water column or horizontally along a stream or riverbed. The string is powered by 4-28 VDC for operation on a 12 or 24 VDC power supply.

### Sensor Information

#### Specs

- Dimensions: 13.46 cm L x 3.56cm Dia. (5.3 "L x 1.4" Dia.)
- Range: 0 to 45°C (32 to 113°F)
- Resolution: 0.01°C
- T90 Response Time: 60 seconds
- Maximum Depth: 200m (656 ft.)
- Maximum Length: 1219m (4000 ft.)

#### General

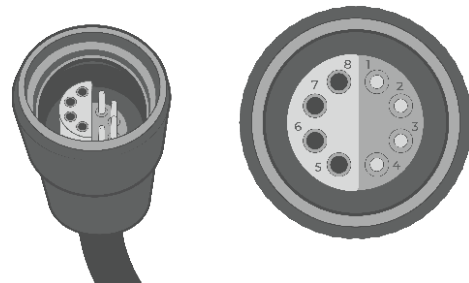
- Power: 5-24 VDC
- Protocol: RS-485 (Modbus-RTU)
- Baud Rate: 19200
- Parity: N81
- Default Starting Address: 1\*
- Format: Big Endian
- Timeout: 500 ms

\*On a T-Node FR string with multiple nodes, the nodes should be addressed in increasing numerical order.

### Wiring Connection

**Table 1:** Wiring Table for UW-FLxR Cable.

Receptacle Pin	Wire Color	TS210 Signal
1	Green	RS485-A
2	Blue	RS485-B
3	Brown	Pass-Through
4	Red	12VDC
5	White	--
6	Yellow	Pass-Through
7	Black	GND
8	Orange	Pass-Through



**Figure 2:** UW-FLxR receptacle cable pinout.

**Note:** The UW-Receptacle to flying lead cable is a separate accessory that may be purchased for integration with a third-party Modbus controller. It is not needed to connect the temperature string to a NexSens X2-Series data logger.

## Modbus-RTU Register Information

**Table 2:** Read temperature.

Function 0x04 (Read Input Registers)			
Registers	Data Type	Data Size	Purpose
0x0006,0x0007	32-bit Float Big-endian	2 Registers	Requests the temperature recorded in °C.

**Example Input:** 01,04,00,06,00,02,91,CA

- Requests the temperature reading from address 1.

**Example Output:** 01,04,04,41,AF,38,1D,0C,50

- Sensor responds with 0x41af381d (21.9024°C).

**Table 3:** Change Modbus address.

Function 0x10 (Write Multiple Registers)			
Registers	Data Type	Data Size	Purpose
0x1000	16-bit integer	1 Register	Changes the Modbus address of the first node on the TS210 string*.

\*Assuming the first node of the string begins with address 1

**Example Input:** 01,10,10,00,00,01,02,00,05,77,92

- Changes Modbus address from 1 to 5.

**Example Output:** 01,10,10,00,00,01,05,09

- Sensor responds acknowledging new address.

**IMPORTANT - BEFORE FIELD DEPLOYMENT:** Ensure to connect a UW-plug on the last node of the string to prevent water intrusion.

For additional information, please reference the TS210 Resource Library on the NexSens Knowledge Base.

[nexsens.com/ts210kb](https://nexsens.com/ts210kb)

## Universal Modbus Address

The TS210 is programmed such that any sensor will respond to Modbus address 251. This is implemented for the event that the sensor's current address is unknown.

**Note:** This address should only be queried with one sensor connected to the data line. If more than one sensor is connected, both will respond and a bad message is likely.

**Table 4:** Read current address using universal address.

Function 0x04 (Read Input Registers)			
Registers	Data Type	Data Size	Purpose
0x1000	16-bit integer	1 Register	Uses the universal address (251) to read the current node address.

**Example Input:** FB,04,10,00,00,01,21,50

- Uses universal address (FB) to read current address.

**Example Output:** FB,04,02,00,07,20,E6

- Current Modbus address is 7 (0x0007).

## NexSens Data Logger Connection

- 1 Setup your data logger on WQData LIVE by:
  - a. Following the included data logger quick start guide with your order.
  - b. Visiting the NexSens Knowledge Base
    - [nexsens.com/knowledge-base-v2](https://nexsens.com/knowledge-base-v2)
- 2 Plug the string into an open sensor port on the data logger for autodetection.
- 3 After the next logger reading:
  - a. Confirm that all temperature nodes on the string have been recognized.
  - b. Ensure that each show valid temperature readings.
  - c. Gather a few readings before deployment.