

GLOBAL TEMPERATURE SENSOR GT-1 and GT-2

PURPOSE

A globe temperature sensor is used to measure the temperature of the environment in a way that mimics how humans perceive heat.

A globe temperature sensor is often used in conjunction with other sensors to calculate the “Wet Bulb Globe Temperature” (WBGT) to measure the radiant heat component of the environment from the sun or other sources of radiation.

A globe temperature sensor helps indicate how hot it feels to a human body and animals by taking into account factors like air temperature, humidity, and direct sunlight for an assessment of heat stress levels in a given situation.

Such measurements are important for predicting heat stress and related illness for athletes, workers in hot environments, and military personnel. A globe temperature sensor is also used in meteorological stations and climate studies.



Image 1: Mounts to standard 1" NPT pipe



Image 2: GT-1 as a component of Heat Stress Monitor System

FEATURES & FUNCTIONS

- The Globe Temperature sensor consists of black-coated, hollow copper sphere (the globe) that absorbs heat from various sources including radiation from the sun, air temperature, and convection. The black coating helps to absorb heat effectively. This design is in compliance with ISO 7726:2025 Ergonomics of the thermal environment - Instrument for measuring physical quantities.
- Inside the globe is a temperature sensor. The GT-1 is a digital temperature sensor for Modbus communications protocol and the GT-2 incorporates an analog thermistor sensor. The temperature sensor provides an indication of the temperature that combines the effects of both air temperature and radiation.
- The Wet Bulb Globe Temperature (WBGT) index is a measurement calculation to evaluate heat stress in various environments.
 $WBGT = WBT(0.7) + DBT(0.1) + GT(0.2)$
Wet Bulb Temperature (WBT) is a measurement that reflects the cooling effect of evaporation and provides an indication of humidity. Dry Bulb Temperature (DBT) is simply a standard ambient air temperature measurement. Globe Temperature (GT) is the measurement from the Globe Temperature Sensor that accounts for radiant heat.



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TECHNICAL SPECIFICATIONS GT-1

MECHANICAL

Material	Copper globe with polyester coating Aluminum and bronze fittings Emissive (N.95 matte black)
Overall (W x D x H)	15cm x 15cm x 25.9cm 6" x 6" x 10.2"
Total Weight	0.78kg* (1.76lb)
Cable	4 conductor, 24 AWG, stranded foil shield with drain wire. Outdoor rated cable
Mounting	Directly to 3/4" or 1" pipe using standard structural pipe fittings

ELECTRICAL

Power Supply	5 to 24 VDC
Power/current consumption active	15cm x 15cm x 25.9cm 6" x 6" x 10.2"

TEMPERATURE MEASUREMENT

Range	-40°C to 60°C
Resolution	0.05°C
Accuracy (0°C to 60°C)	+/- 0.2 K (sensor element specs. Full response range information available upon request)
Reproducibility	+/- 0.1 K
Time Constant	5.6 min
Long Term Drift	<0.05 K/yr
Sensor Type	PTAT

ENVIRONMENTAL

Operating Temperature	-40°C to 60°C
Storage Temperature	-40°C to 80°C
Water	Direct rain and snow exposure

DATA

Protocols	Modbus RTU slave, RS 485, half-duplex User configurable baud rate, parity, and stop bits. Default: 19200, N, 8, 1. Compatible with Modbus host device, such as a programmable logic controller (PLC) and data logger
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