

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 human 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 help indicate how hot it feels to a human body 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 is important for predicting heat stress and related illnesses for athletes, workers in hot environments, and military personnel. A globe temperature sensor is also used in meterological 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 consist of black-coated, hollow cooper sphere (the globe) that absorbs heat from various sources including radiation from the sun, air temperature, and convection. The black coating helps to aborb heat effectively.
- Inside the globe is a temperature sensor. The GT-1 is a digital temperature sensor for Modbus communicaitons 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 evalate heat stress in various environments.

$$WBGT = WBT(0.7) + DBT + GT(0.2)$$

Wet Bulb Temperature (WBT) is a temperature sensor that reflects the cooling effect of evaporation and provides an indication of humidity
Dry Bulb Temperature (DBT) is simply standard air temperature measurement
Globe Temperature (GT) is the measurements from the Globe Temperature Sensor that accounts for radiant heat.



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TECHNICAL SPECIFICATIONS

MECHANICAL

Material	Copper globe with polyster coating Aluminum and bronze fittings
Overall (W x D x H)	15 cm x 15 cm x 25.9 cm 6" x 6" x 10.2"
Total Weight	0.78 kg *(1.76 lb)
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
Accuracy	+/- 3mm (<=10m) 1 cm (>10m)

ELECTRICAL

Power supply	5 to 24 VDC
Power /current consumption active	1.4 mA avg at 12 VDC full continuous full run mode, reading 200 range register, 60 uAavg in sleep mode

TEMPERATURE MEASUREMENT

Range	-40°C to 80°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 Modus host device, such as a programmable logic controller (PLC) and data logger
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