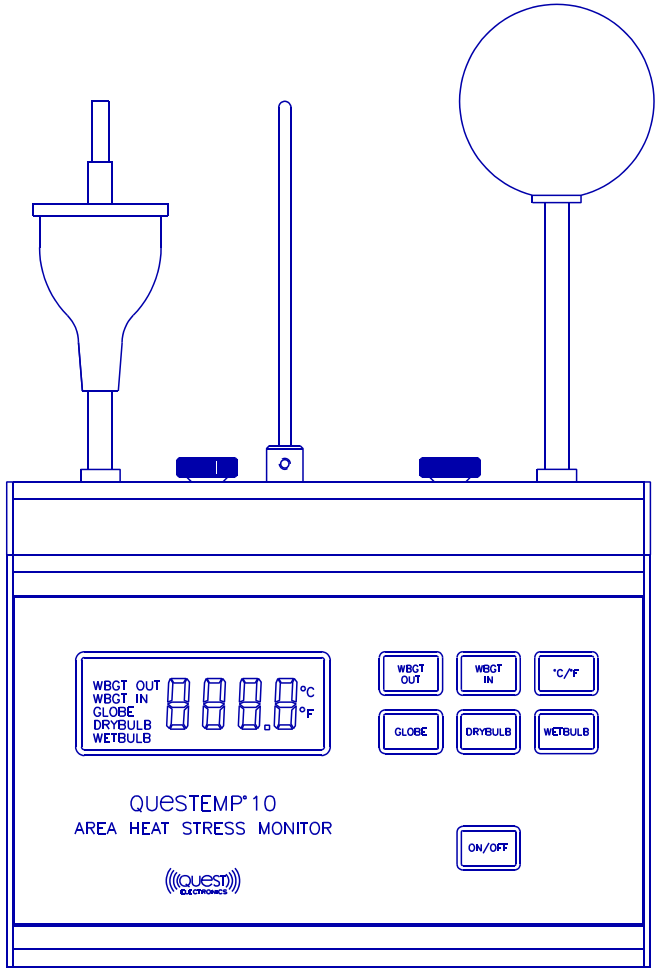
instructions for

QUESTEMP°10

Area
Heat Stress
Monitor

56-069
Rev. B
7/94



INTRODUCTION

The Questemp°10 is a compact, portable area heat stress monitor which computes the WBGT index. The WBGT index is an accepted method for determining the level of heat stress on an individual in a given environment. The Questemp°10 measures three parameters: dry bulb or ambient temperature (DB), natural wet bulb temperature (WB) and globe temperature (G). The WBGT index is a weighted average of these measurements according to the formulas:

WBGT (indoor) = 0.7WB + 0.3G

WBGT (outdoor) = 0.7WB + 0.2G + 0.1DB

The Questemp°10 will display indoor or outdoor WBGT as well as any of the individual sensor temperatures used to compute the WBGT reading. Temperature may be displayed in either degrees Celcius or Fahrenheit. The temperature sensor array is easily removed for remote sensing applications.

FEATURES AND OPERATION

DISPLAY

The large liquid crystal display indicates the selected temperature reading in degrees C or F. Separate annunciators indicate which reading has been selected. A low battery indicator (LOBAT) is also included.

Depressing this key displays the outdoor WBGT index.

Depressing this key displays the indoor WBGT index.

Depressing this key causes the displayed temperature or WBGT index to switch between either degrees Celcius or degrees Fahrenheit.

Depressing this key causes the GLOBE temperature to be displayed. The globe temperature is correlated to that of a 6 inch diameter globe.

Depressing this key causes the DRYBULB (ambient air) temperature to be displayed.

Depressing this key causes the natural WETBULB temperature to be displayed.

Depressing this key will turn power to the Questemp°10 ON. Depressing ON/OFF a second time will turn power to the unit OFF.

AC ADAPTER JACK

This jack accepts an optional AC adapter (Quest model 056-067) to power the Questemp°10 from 115 VAC power. The jack is a miniature phone type (1/8") and accepts 9 to 12VDC. The jack polarity is tip positive. Use of the adapter automatically disconnects the battery.

SENSORS

Natural Wet Bulb Thermometer

The natural wet bulb thermometer gives an indication of the effects of humidity on an individual. Relative humidity and wind speed are taken into account by measuring the amount of evaporative cooling taking place at a thermometer covered with a moistened wick. The Questemp°10 uses a cotton wick immersed into a reservior which must be kept filled with distilled water. Ordinary tap water should not be used as the contaminants that are left behind after evaporation will shorten the life of the wick and cause high readings. If the wick is discolored it should be replaced. To replace the wick, slide the old wick and sponge off the top of the sensor. Place a new wick over the sensor, making sure that the bottom of the wick is down in the reservoir. Slide the sponge over the wick and into the reservoir.

Globe Thermometer

The globe thermometer gives an indication of the radiant heat exposure to an individual due to either direct light or hot objects in the environment. This is accomplished by placing a temperature sensor inside a blackened copper sphere and measuring the temperature rise. The WBGT index is based on the response of a 6 inch diameter globe. The Questemp°10 uses a 2 inch diameter globe for a faster response time. The temperature of the 2 inch globe is correlated to match that of a 6 inch globe.

As an option, a sensor array with a 6 inch diameter globe is also offered. Dry Bulb Thermometer

The dry bulb thermometer measures the ambient air temperature.
This measurement is used in the outdoor WBGT calculation when a high solar radiant heat load may be present.

USING THE QUESTEMP°10

When making an area heat stress measurement the Questemp°10 should be placed at a height of 3.5 feet (1.1m) for standing individuals or 2 feet (.6m) for seated individuals in the area. Tripod mounting is recommended to get the unit away from anything that might block radiant heat or airflow. A 1/4"-20 threaded bushing is available on the bottom of the Questemp°10 for mounting to a standard photographic tripod. Do not stand close to the unit during sampling.

Make sure that the wetbulb reservior is filled with distilled water. After adding water or placing the unit in a new environment, allow ten minutes for the globe and wetbulb readings to stabilize.

Turn on the Questemp°10 by depressing the ON/OFF key. All display segments will momentarily turn on, after which the display will briefly show the software revision. Check the display for the low battery indicator and replace the battery if LOBAT is displayed. Select the desired temperature display by depressing the appropriate key. Select the temperature units by depressing the °C/°F key.

REMOTE MONITORING

In some applications it may be desirable to have the sensors remote from the Questemp°10. An example might be a high ambient temperature environment. The sensors may be removed from the Questemp°10 and connected via an extension cable or cables. A 25 foot shielded extension cable is available from Quest (model 056-924). The Questemp°10 will operate with up to 100 feet of cable with no loss of accuracy. The user should be cautioned that using long lengths of cable in environments with a high amount of electrical noise may cause interference.

To remove the sensor array, unscrew the knurled knobs on the top of the array. Pull the sensor array straight up from the body of the Questemp°10 to disengage the connector between the two. The extension cable may now be connected between the 9 pin connector on the bottom of the sensor array and that on the top of the Questemp°10. A 1/4"-20 threaded bushing is available on the bottom of the sensor array for tripod mounting.

BATTERY REPLACEMENT

The LOBAT indicator on the display shows that the battery should be replaced. The battery compartment is located on the rear of the Questemp°10. To replace the battery, open the compartment by lifting one end of the cover. This will expose the battery and connector. Replace only with a standard 9 volt alkaline battery (NEDA 1604A). If the Questemp°10 will be stored for an extended period it is best to remove the battery from the unit. For operation from the AC line the battery doesn't need to be in the unit.

CALIBRATION

A calibration sensor module (Quest model 056-937) is included for verifying the temperature accuracy of the Questemp°10. To check the calibration, remove the sensor assembly and plug the calibration module into the Questemp°10. With the unit set to read in degrees Celcius, depress the GLOBE, DRYBULB and WETBULB keys and verify that the readings match those printed on the module within 0.5°C.

SPECIFICATIONS

Size: 6.5" (165mm)W x 10" (254mm)H x 2" (50.8)D with sensor assembly mounted

Weight: 24 oz. (680 g) with sensor assembly mounted

Temperature Sensors: 1000 ohm platinum RTD, 3.85 ohms/°C

Temperature Sensor Accuracy: +/- 0.5 degree C (0 to 100°C)

Ambient Operating Temperature Range:
Questemp°10: 0 to 60 °C
Sensor Assembly: 0 to 100 °C

Operating Humidity Range:
Electronics: 0 to 95% non condensing.
Sensor Assembly: 0 to 100% (not submersible)

Response Time (typical): Dry Bulb: 2 minutes
Globe: 12 minutes
Wet Bulb: 10 minutes

Display Range: 32 to 199.9 °F in 0.1 degree increments
0 to 101.1 °C in 0.1 degree increments

Power Requirements: One 9 volt alkaline battery or optional AC adapter (2-3 mA typical current drain)

Battery Life: 150 hours typical

Effects Due to External Fields: Tested for RF susceptibility with less than 0.3°C error at full strengths to 10V/m over the frequency range of 10MHz to 500MHz.

ACCESSORIES

SC-25 25 foot shielded remote sensor cable	056-924
Model 920 AC adapter	056-067
TP-1 Tripod	059-045
RWS-1 Replacement wicks (10) and sponges (3)	056-056
CSM-1 Calibration sensor module	056-937
WB-1 Water Bottle 2 oz.	056-068
SA-6 Sensor Array with 6 inch diameter globe	056-945
Carrying Case for Questemp°10 and Accessories	056-938

Appendix A : CONVERSION FORMULAS

°C = 5/9(°F - 32)

°F = 9/5°C + 32

Appendix B : HEAT EXPOSURE TABLES

Permissible Heat Exposure Threshold Limit Values
(Values are given in °C WBGT)

	Work Load		
Work-Rest Regimen	Light	Moderate	Heavy
Continuous Work	30.0	26.7	25.0
75% Work - 25% Rest, each hour	30.6	28.0	25.9
50% Work - 50% Rest, each hour	31.4	29.4	27.9
25% Work - 75% Rest, each hour	32.2	31.1	30.0

from "American Conference of Governmental Industrial Hygienists - Threshold Limit Values and Biological Exposure Indices for 1988-1989"
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QUEST SERVICE POLICY

The Quest product you have purchased is one of the finest acoustic instruments available. It is backed by our full one year warranty which seeks complete customer satisfaction. This is your assurance that you can expect prompt courteous service for your equipment from the entire Quest service organization. Should your Quest equipment need to be returned for repair or recalibra-tion, please contact the Service Department at (800)245-0779 (USA) or Fax (262)567-4047 for a Return Authorization Number. The RA number is valid for 30 days, and must be shown on the shipping label and purchase order/cover letter. If you are unable to return instruments in that time call for a new RA number. Send it prepaid and properly packed in the original shipping carton directly to Quest Technologies, 1060 Corporate Center Drive, Oconomowoc, WI 53066 U.S.A.

Repair or replacement work done under warranty will be performed free of charge, and the instrument will be returned to you prepaid. Your copy or a photocopy of the Quest Registration Card will serve as proof of warranty should the factory require this information.

If for any reason you should find it necessary to contact the factory regarding service or shipping damage, please direct your calls or letters to the attention of the Service Manager, Quest Technologies, (262) 567-9157 or (800) 245-0779. Office hours are from 7 AM to 6 PM (Central Standard Time) Monday through Friday.

For service or recalibration outside the U.S.A., please contact your local Quest Dealer or fax Quest U.S.A. at 1-262-567-4047.