3M Personal Safety Division
3M™ QUESTEMP° II Personal Heat Stress Monitor

Personal monitor

From the Market Leader

QUESTemp° II User Manual

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Introduction

The QUESTEMP°II is an easy to use personal heat stress indicator which monitors the human body's temperature via the ear canal. Any offset between the ear and body temperatures is adjusted for by calibrating directly to the individual's oral temperature.

The QUESTEMP°II personal monitor is intended to be a part of a well managed heat stress program. It is an alerting device which warns the user that their body temperature has risen above the "safe" level and that action should soon be taken to allow the body to cool. The QUESTEMP°II monitor acts as an aid and does not replace the individuals own feelings and judgment.

The hypothalamus, located at the base of the brain, is the body's temperature controller. The ear canal borders the hypothalamus and will track its temperature changes once the canal is isolated from the outside environment. A small sensor is placed in the ear canal, via an E.A.R.® earplug, which will monitor the change in the body's temperature and set off an audible alarm when the level reaches a preset limit. The recommended limit is 38°C according to the WORLD HEALTH ORGANIZATION and has been accepted by the ACGIH, NIOSH, and the International Organization for Standardization. These organizations also recognize that closely monitored, acclimatized individuals may have a higher tolerance limit of up to 39°C. As the temperature rises above the limit, the risk of heat related problems occurring increases. The QUESTEMP°II has the capability of setting the initial alarm level between 38°C and 39°C and it will automatically produce a secondary alarm if the temperature exceeds 0.5°C above the initial alarm level.

Many people who work in hot and humid areas, particularly those enclosed in protective suits, are in danger of overheating and becoming heat stressed. Heat stress can occur when the body's cooling system can not keep up with the heat induced by the activity or environment of the worker. Some symptoms of overheating are dizziness, exhaustion, heat cramps, dehydration, heat collapse, or, in extreme cases, heat stroke or death. Workers in steel mills, asbestos cleaning, power plants and heavy machine operators are examples of people who may often find themselves in environments posing a risk for heat related illnesses.

The QUESTEMP°II consists of a belt or pocket worn electronic assembly with a thin flexible cable leading up to a small earmold which contains the sensor and a small speaker for an audible alert. The sensing device protrudes from the earmold and a disposable E.A.R.® foam earplug slides over the sensor providing a comfortable vehicle for inserting and maintaining the sensor. The speaker and earmold remain just outside of the ear to completely avoid any possible damage or injury to the ear canal.

Functions

Ambient Compensation

Unique to the QUESTEMP°II, a second sensor, located in the earmold, will sense and compensate for any non-drastic changes (less than +/-10°C) in the thermal environment. This is necessary because changes in the thermal environment will have an effect on the outer tissues of the body including the ear canal. By compensating for these changes, error induced by the environment is notably reduced.

The earmold temperature is data logged and included in the printout as an indicator of the changing thermal environment.

If the thermal environment changes drastically (greater than +/- 10°C), then the QUESTEMP°II should be recalibrated in that environment.

Keypad Functions

A desired function is activated by simply depressing and releasing the corresponding key. For the functions C**AL, PRINT, CLOCK, PRINT RATE,** and **ALARM LEVEL**, when the key is pressed once the current value or setting will appear in the display. Pressing the same key a second time (consecutively) will allow that setting to be changed.

CAL

If an oral thermometer is plugged into to the **CAL jack**, then the oral temperature will be displayed and updated. If the thermometer is not plugged in or if the temperature is below 29.5°C then "o---" will be displayed.

Pressing **CAL** a second time will display the value of 'ORAL minus EAR' if the thermometer is in place. Otherwise, it will display a temperature, which can be adjusted by pressing the **ARROW key**, to represent an oral (or core) temperature. In either case, pressing **ENTER** will store the calibration data.

- See the section on **CALIBRATION** for more details.

PRINT/ DATA

The default baud rate will appear in the display. If the **ENTER** key is pressed then serial ASCII RS232-formatted data will be sent from the output jack and 'prn' will appear in the display. If the **PRINT/DATA** key is pressed a second time, the displayed baud rate will blink indicating that a new rate may be selected with the **ARROW** and **ENTER keys**. The baud rate options are 300, 600, 1200, 2400, 4800, and 9600 baud. After pressing **ENTER** the data will be sent out and 'prn' will appear in the display.

- To halt printing, simply press the **PRINT/DATA** key again.

RUN

The ear temperature will be displayed and the unit will begin to log the ear (aural) temperature at 10 second intervals along with temperature of the second sensor located within the blue earmold. If there is a thermometer plugged into the **CAL jack** and its temperature is in the range between 30°C and 42°C, then its value will also be logged. All data will be time averaged from 2 second samples. While the instrument is in the **RUN** mode, a small arrow will be displayed in the upper left corner of the display. Turn the unit **OFF** to exit the **RUN mode**.

In the **RUN mode**, the audible alarm will be activated if the EAR temperature exceeds the alarm level.

- Turning the unit OFF or printing will abort the RUN mode.

If any of **CLOCK, PRINT RATE, PRINT,** or **CAL keys** are pressed while in the **RUN mode**, the display will show that function's setting but the unit will continue to data log and check the temperature. To return the aural temperature to the display, press the **RUN key** again.

CLOCK

Shows the current time. Pressing **CLOCK** a second time will cause the right-most digit of the time to flash and allows the clock time to be changed. Cycle through each digit using the **ARROW** and **ENTER keys** (in the same fashion as most digital watches) to change the time.

Time is displayed in 24-hour format and is maintained in the unit even when it is turned off. In addition, a lithium battery backup will maintain the time even when the 9-volt battery is removed.

PRINT RATE

Displays the rate at which sampled temperature data will be printed. Pressing **PRINT RATE** a second time will cause the number in the display to flash and a new rate can be selected using the **ARROW** and **ENTER** keys. Selectable rates are: 10sec, 30sec, 1min, 5min, and 10min. Note that this only affects the quantity of data printed, not the amount of data actually stored in the unit.

ALARM LEVEL

Displays the current alarm level setting. If **ALARM LEVEL** and **ARROW** are pressed simultaneously, the displayed level will flash and can be altered between 38°C and 39°C using the **ARROW** and **ENTER keys**. The alarm level may be changed only if the memory is clear, prior to logging data. Once run time has accumulated, the unit must be reset to change the alarm level setting.

In the **RUN** mode, the audible alarm will be activated if the EAR temperature exceeds the set alarm level. In addition, a secondary alarm will sound if the temperature exceeds 0.5°C above the initial chosen alarm level.

°C/°F

Toggles between Celsius and Fahrenheit while in the **RUN mode**. Calibration and alarm levels operate in Celsius only.

BAT/ TEST

Shows the battery voltage strength in the display while sounding the audible alarm. The actual battery voltage is displayed until the level falls below 7.5 volts. Below 7.5V "Lo" appears in the display indicating that the battery should be replaced with a new 9V alkaline.
The unit will operate for at least 8 hours from the time that "Lo" first appears. Once the battery voltage falls below 7.2 volts the alarm will sound continuously and data logging will cease. If this occurs, turn the unit OFF and replace the battery with a new 9V alkaline.

->

ARROW key used to change a parameter for the following functions: **PRINT** (baud rate), **CLOCK, PRINT RATE, ALARM**, and **CAL** when manually entering the calibration data.

ENTER

Enters a change in parameters when one of the following functions is selected and flashing: **PRINT, CLOCK, PRINT RATE, ALARM,** or **CAL**.

RESET

When held down for 3 seconds, it will clear all logged and calibration data. All other unit settings remain unaltered.

ON/OFF

Toggles between **ON** and **OFF**. **OFF** will have a 3 second count down and is used to exit the RUN mode. Note that turning the unit **OFF** will NOT reset or erase any of the logged data.

When the QUESTEMP°II is turned **ON**, the internal programming version number is displayed until a key is depressed.

Defaults

The factory settings for the QUESTEMP°II are as follows:

CLOCK	= U.S. Central Time
PRINT baud rate	= 1200 Baud
PRINT RATE	= 10 Seconds
ALARM LEVEL	= 38.0ºC
CALibration LEVEL	= 0°C
Temperature units	= Celsius

The default settings for the **CLOCK, PRINT baud rate, PRINT RATE**, and **ALARM LEVEL** can be changed by the user. When the unit is powered **OFF**, the settings at that time will be stored as the new default values. Temperature, however, will always default to Celsius and the CALibration level will be reset to 0°C whenever the unit is **RESET** (at power **OFF**, the last value of CALibration is stored).

Data Logging

In the **RUN mode**, every ten seconds the QUESTEMP°II will store the ear and earmold temperature data as well as oral temperature data if the thermometer is plugged in to the **CAL jack**. The numbers stored represent the average value for the previous 10 seconds. The data can be transmitted to a computer or printer (see the section PRINTING).

The logged information can be cleared from memory by pressing the **RESET key** for a count down of 3 seconds. Turning the unit **OFF** will not effect the memory. If the unit is put in the **RUN mode** multiple times without **RESET**, data will be stored following the information already in memory.

12.5 hours of data can be logged. Once the memory is full, the unit can no longer store data but it will continue to operate.

Printing

Logged information can be sent to a computer or serial printer using an RS232 serial protocol. The amount of data printed is determined by the instrument's **PRINT RATE key**.

7 Printing

☑ ***Note**: if the unit is in the RUN mode when printing is initiated, the RUN mode will be canceled and data logging will cease.*

COMPUTER CABLES: Connect the meter to a computer using cable #58-867 for a 25 pin serial port. *[The standard for a computer's serial port is a 25 pin or a 9 pin male (pins) connector. Do not connect to the computer's printer output port which is a 25 pin female (holes) connector. If you have cable #58-867 but your computer's serial port has only 9 pins, then you may use a 25 to 9 pin converter available at most computer or electronic stores. No other cables should be used.]*

PRINTER CABLES: Connect the meter directly to a serial printer using cable #58-847. *[A serial printer's input is typically a 25 pin female (holes) connector. Do not use cable #58-847 in conjunction with a computer's printer cable because that connects into the printer's parallel input port. Many printers are parallel only and can not accept data from the Questemp°II. For printers that have both serial and parallel inputs, refer to the printer's manual for configuring the serial port.]*

☑ ***Note**: Cables #58-867 and #58-847 are internally wired the same. The only difference between them is the gender. A straight through 25 pin gender converter available at most computer or electronic stores can allow you to use one cable for either a computer or printer.*

To initiate printing, use the following sequence:

1. With the unit **ON,** plug the printer cable into the **OUTPUT port** of the QUESTemp°II.
2. Be sure the desired **PRINT RATE** is selected (see the key function **PRINT RATE**).
3. Press the **PRINT/DATA key**. If the default baud rate (speed of data transmission) in the display is not the desired baud rate, press the **PRINT/DATA key** a second time and use the **ARROW key** to select a new rate.*[If you are downloading to a computer, be sure that it is ready to accept data prior to moving to step #4.]*
4. Press **ENTER** and the data will be sent. "**Prn**" will appear in the display until all of the data has been sent.
5. To halt printing, simply press the **PRINT/DATA key** while "**Prn**" is still in the display.

Computer Downloading using DOS

The **MODE** and **COPY commands** can be used directly from the DOS prompt to download the information. Type the following commands at the DOS prompt.

MODE COM*x*:*baud*,N,8,2,P <enter>

- After typing the MODE command, the computer should respond with the "RESIDENT PORTION OF MODE LOADED". If the computer responds with an error message, then there is a good chance that the COM port selected is not valid.

COPY COM*x*: *filename* <enter>

- After typing the COPY command, the cursor will move to the next line on the screen and blink. If you receive an error message, retry the COPY command.

x refers to which com port is being used. Typically this is COM1 or COM2.
baud refers to the baud rate and must match the Questemp°II's settings.
filename refers to any DOS filename the user makes up.

At this point, the user should have the Questemp°II print. Nothing will happen on the screen until all of the information has been sent. When the instrument is done sending the information, the PC will respond with "1 FILE COPIED". There now exists a file called *filename* in the current directory in the computer.

- The user can print this out by typing: **PRINT *filename*** <enter>

Computer Downloading Using Windows™

There is a variety of commercially available software that accepts data from the Questemp°II. These software packages are usually termed "communications software". Microsoft® Windows™ has a communications program under the ACCESSORIES icon called **TERMINAL**. Instructions on how to use **TERMINAL** are located in the Windows™ manuals.

Using any of these communications programs, the user must select the com (serial) port and the baud rate. The Quest cable must be plugged into the selected com port and the baud rate on the unit must match the rate selected in the software. The PC programs also need the following information in their setup:

data bits = 8	stop bits = 2
parity = none	handshaking (flow control) = hardware

For **TERMINAL**, the settings are found by first selecting **SETTINGS**, then **COMMUNICATIONS**.

QUESTEMP° II Personal Temperature Monitor

Serial Number: JU1030001 **Software Version Number: 1.1**

Name: Date:

Location:

---

[1] Start Time: 11:34 [2] End Time: 13:32 [3] Total Run Time: 01:58

[4] Alarm Level Setting: 38.0 °C
[5] Print Rate: 1 Min.

[6] High Temperature: 38.1 °C At Time: 13:32
[7] Low Temperature: 36.1 °C At Time: 11:34

[8] CAL in degree C @ Time
--- ---
0.4 11:41:20

SAMPLED DATA

Time	[9] Ear Temp.		[10] Mold Temp.		[11] Oral Temp.		[12] Alarm
Hr:Min	°C	°F	°C	°F	°C	°F	
11:34	36.1	97.0	32.7	90.9			
11:35	36.1	97.0	32.7	90.9			
11:36	36.2	97.2	32.8	91.1			
11:37	36.3	97.4	32.9	91.3			
11:38	36.3	97.4	33.0	91.5			
11:39	36.4	97.5	33.1	91.7	36.7	98.1	
11:40	36.4	97.5	33.1	91.7	36.9	98.5	
11:41	36.4	97.5	32.9	91.3	36.9	98.5	
11:42	36.9	98.4	33.0	91.5			
11:43	36.9	98.4	33.0	91.5			
13:29	37.9	100.2	27.6	81.7			
13:30	37.9	100.2	27.4	81.3			

Figure 1: Sample Printout

Printout summary

1. Start time refers to the clock time when the RUN mode was initiated.
2. End time refers to the clock time when the last RUN was halted by either turning the unit **OFF** or **PRINTING**.
3. Total run time is the difference between the start and end times. If there were multiple runs an asterisk will appear after the total run time indicating that there is a break in the run time data.
4. The current alarm level setting is printed.
5. The current sample rate indicates the amount of time between each set of data printed.
6. The highest ear temperature logged is printed along with its time of occurrence.
7. The lowest ear temperature logged is printed along with its time of occurrence.
8. The calibration value is that of '**ORAL minus EAR**' at the time the calibration sequence was completed. If the unit is calibrated more than once, each additional value and time will be printed.
9. Ear temperature data (including the calibration offset if the unit was calibrated) is printed in both Celsius and Fahrenheit.
10. Earmold temperature data is printed in both Celsius and Fahrenheit. This refers to the second sensor located in the blue earmold and is an 'indicator' of what was occurring in the environment. The values are not exact ambient temperatures because they may be affected by the close proximity to the head.
11. If the oral thermometer probe is in the **CAL jack** and its temperature is in the range of 32°C to 42°C then the data will be recorded. Typically, this would provide calibration information of the oral temperature.
12. Asterisks appear in the alarm column next to the data if alarm had gone off during that particular time period. Multiple asterisks appear for each tenth of a degree Celsius above the set alarm level. (For example: when the alarm is set to 38.0°C, 1 asterisk indicates 38.0°C, 2 asterisks indicates 38.1°C, etc.)

Low Battery

The battery condition should be checked each time before using the QUESTEMP°II. Pressing the **BAT/TEST key** will display the actual battery voltage. When the level falls below 7.5-volts, "**Lo**" appears in the display indicating that the battery should be replaced. The unit will continue to function until the battery falls below 7.2-volts. At that time, the alarm will sound continuously and the unit will no longer read or store data. If

this occurs, turn the unit **OFF** and replace the battery before its next use.

Under normal use, the QUESTEMP°II will function for an addition 8 hours from the time when the battery voltage first hits its "Lo" condition at 7.5-volts.

An on-board 3-volt lithium battery will retain the memory of the QUESTEMP°II even when the 9-volt battery is removed. This will not, however, power the unit for operation. Replace dead batteries with 9-volt ALKALINE, type NEDA 1604A or equivalent.

Audible Alarm

The speaker located in the ear assembly will sound under three conditions.

1. When the 10-second-average temperature in the ear canal exceeds the set alarm level, the speaker will give two pulses every second.

2. When the 10-second-average temperature in the ear canal exceeds 0.5°C above the set alarm level, the speaker will give four pulses every second.

3. When the battery voltage falls below 7.2-volts, the speaker will sound continuously warning that the unit has stopped reading temperature data and the battery should be immediately replaced.

Calibration

The purpose of calibration is to compensate for the difference between an individual's ear and body temperatures. The QUESTEMP°II accomplishes this by taking an oral temperature with the QUESTEMP° CALPROBE I thermometer and comparing it to the ear temperature. [***NOTE:*** *When taking an oral temperature, the person should be rested and should not have had anything to eat or drink in the past 15 minutes. The probe should be kept under the tongue with the mouth closed.*] Although typical oral to ear temperature differentials can be found over a several degree range, each individual's differential will remain stable provided that the ambient temperature does not change drastically from the time of calibration.

At the time of calibration, an offset is added to the ear temperature to equate it to the oral temperature. This offset will remain in effect until modified by the next calibration or until the unit is reset. The time and amount of offset will be listed on the printout.

The calibration procedure should be followed before each use. After the initial calibration, if the worker's environment changes by more than 10°C, then the QUESTEMP°II should be recalibrated in the new environment. Calibration can be done at any time and will not disturb the data logging in the RUN mode.

Calibration Method 1

Use the following sequence to calibrate the QUESTEMP°II using the QUESTEMP° CALPROBE I thermometer.

1. Insert the ear sensor and allow 3 - 5 minutes for it to stabilize to the correct temperature.

2. Turn the unit **ON**; **RESET** it to clear old data if desired; and press **RUN** to record calibration data.

3. Place the **CALPROBE** under the tongue and plug it into the **CAL jack** on the unit. Allow 3 - 5 minutes for it to stabilize. (A total of 6 - 10 minutes for the ear sensor.)

4. Pressing **CAL** once will display (and update) the oral temperature. The temperature should be stable before continuing.

5. Pressing **CAL** a second time will blink (and update) the value of '**ORAL minus EAR**' in the display. When this value is stable (if the above sequence and timing was followed, it should be stable already), press **ENTER** to complete the calibration sequence. 'CAL' will momentarily appear in the display to indicate that the '**ORAL minus EAR**' value was obtained and will now be added as an offset to the **EAR** temperature.

Calibration Method 2

Use this alternative procedure to calibrate the QUESTEMP°II by manually entering the core temperature. [The core temperature could be obtained rectally or by infrared tympanic measurement for example.]

1. Insert the ear sensor and allow 6 - 10 minutes for it to stabilize to the correct temperature.
2. Turn the unit **ON**; **RESET** it to clear old data if desired; and press **RUN** to record calibration data.
3. Pressing **CAL** once will display '**o---**' indicating that the oral thermometer is not in place.
4. Pressing **CAL** a second time will blink '**36.0**' representing the core temperature. Adjust this value between 36.0 and 39.0 by pressing the **ARROW key** until it displays the core temperature. Then press **ENTER** to complete the calibration sequence. '**CAL**' will momentarily appear in the display to indicate that the entered **CORE** temperature minus the **EAR** temperature value was obtained and will now be added as an offset to the **EAR** temperature.

Ear Sensor Use

Ear Sensor Insertion

1) Roll the disposable yellow E.A.R.® foam ear plug, containing a black protruding tube, back and forth with the fingers until it forms a small crease-free cylinder. See Figures 2 and 3.

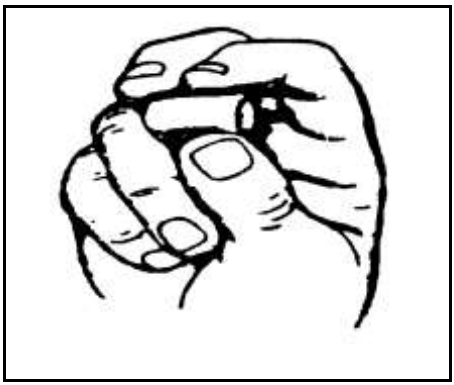

Figure 2

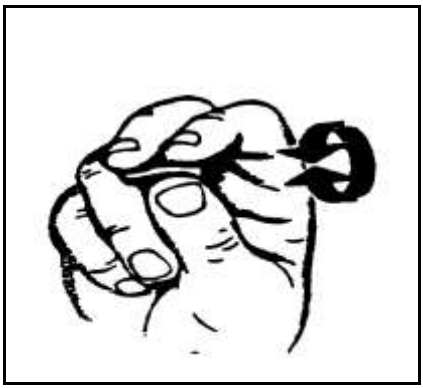

Figure 3

2) Using only light pressure to keep the E.A.R.® plug rolled tight, gently slide it over the sensor of the earmold assembly. The black tube should slide into the earmold leaving only the yellow foam plug visible. The sensor should fill the black tube of the E.A.R.® plug with the tip lying flush with, or just inside of, the outer end of the tube.

3) With the E.A.R.® plug still rolled tight, hold on to the blue earmold and quickly insert the rolled up plug into the ear canal and hold it in place until it expands. The yellow portion of the earplug should be completely contained within the ear canal without any danger of hurting the inner ear. Fitting is easier if the outer ear is pulled outward and upwards during insertion as shown in Figure 3. Once the plug has expanded, pushing or twisting will not improve its fit therefore, if the initial fit is inadequate, remove the plug and repeat the process.

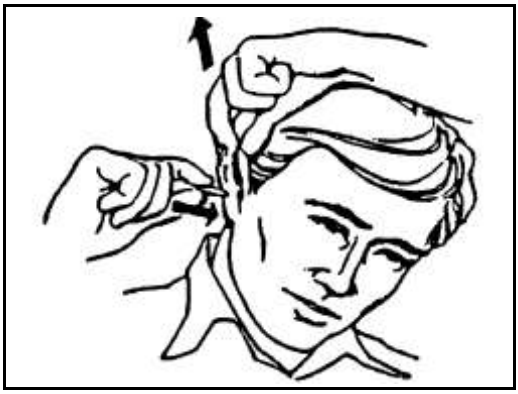

Figure 4

4) Maneuver the ear hanger over the ear. The ear hanger will help to hold the assembly in place throughout the day.

(This procedure may feel awkward at first but it will become very easy with continued usages.)

A properly fit E.A.R.® plug will be comfortable and should hold snug and secure in the ear canal. It also provides good noise attenuation for those who would typically use hearing protection.

Ear Sensor Removal

To remove the ear assembly after use, simply grab the blue earmold, slide the ear hanger off of the ear, and pull the assembly out from the ear. If the E.A.R.® plug separates from the assembly and remains in the ear canal, then simply grab the black tube and pull it out.

The E.A.R.® earplug can easily be removed from the earmold assembly by gently holding the tip of the plug and sliding it off. Do not squeeze the middle of the plug to remove or the sensor may be damaged.

Use care when removing or handling the ear sensor assembly. Do not remove by pulling on the cable and always be careful when handling the temperature sensor because it can be damaged if mishandled.

E.A.R.® Plug Care

The E.A.R.® foam earplugs can be washed with soap and water and reused or they can simply be thrown away and replaced. (Remove the E.A.R.® plug from the blue ear mold prior to washing.)

- If the black tube separates from the yellow foam or if the plug does not slide properly over the temperature sensor, discard the plug and try another.

Operating

1. Insert the ear sensor assembly as described in Section IV and allow 5 minutes for the temperature to stabilize. [It may be beneficial to run the sensor cable under clothing or fasten it to keep it from being snagged.]
2. Turn the QUESTEMP°II **ON**. **RESET** to clear old data if desired. Put the unit in the RUN mode.
3. Check the battery strength by pressing the **BATTERY/TEST key**. Replace the ALKALINE battery if **'Lo'** appears in the display.
4. Calibrate the unit following the guidelines in **CALIBRATION** section, page 12.
5. If your situation requires it, attach the front cover.
6. Clip the QUESTEMP°II housing to your belt or pocket and wear it throughout the work day or as needed.
7. After use, remove the earplug, print out the data if desired, and turn the unit **OFF**.

Indicators and Action

ALARM - If the alarm activates, indicating that the body temperature has exceeded the set alarm level, take appropriate measures to allow the body to cool itself and properly regulate its temperature. Lowering the work load, moving into a cooler environment, and drinking cool liquids are all methods to help cool the body and avoid heat related injuries.
LOW BATTery - If this indicator comes on, replace the 9-volt ALKALINE battery as soon as possible.

- To preserve battery life, be sure to turn the unit **OFF** when not in use.

Specifications

ACCURACY
The QUESTEMP°II temperature sensor has an electronic accuracy of better than +/- 0.1°C over the temperature range of 32°C to 40°C. (Body temperature range.)

The QUESTEMP° CALPROBE I Oral Temperature Probe calibrators are interchangeable between units and have an accuracy of better than 0.05°C over the range of 30°C to 40°C.

BATTERY LIFE
Using one 9-volt ALKALINE (type NEDA 1604A) battery, the QUESTEMP°II, under normal usage, should last approximately 60 hours. It will also continue to operate for a minimum of 8 hours after the LOW BATTery indicator first comes on.

A 3 -volt lithium battery is used as backup power for the real-time clock and the memory.

WORKING TEMPERATURE RANGE
Both the oral probe and aural sensor are meant to operate at body temperature in the range of 32°C to 40°C. The unit itself has an operating temperature range of 0°C to 70°C.

STORAGE
If the unit is to be stored for prolonged periods, the battery should be removed.

OPERATING HUMIDITY
Operate between 0% - 95% humidity (non-condensing).

SIZE
2.5 x 5.1 x 1.0 inches (64 x 130 x 25mm)

WEIGHT
Housing: 10 ounces (283 grams)
Ear Sensor Assembly: 0.15 ounces (4.2 grams)

CONSTRUCTION

The electronics are housed in a rugged cast aluminum case. The ear mold is constructed from an FDA approved GEON.

Accessories

Part No.

56-902	CALPROBE I: oral temperature probe with cable
56-099	Replacement E.A.R.® inserts (package of 50)
58-453	Replacement earloops (package of 10)
56-010	Sheaths for Calprobe (package of 100)
58-867	QUESTEMP°II serial computer cable (RS232)
58-847	QUESTEMP°II serial printer cable
56-904	Carrying case - holds 6 units
56-905	Carrying case - holds 10 units

Warranty & Contact

Customer service

Contacting 3M Detection Solutions

Should your 3M equipment need to be returned for repair or for recalibration, please contact the service department at the following number or access the online form via the website. For technical issues, please contact Technical Support.

Service Department and **Technical Support**: 1 (800) 245-0779.
Fax: 1 (262) 567-4047. Office hours are 8:00 a.m. to 5:00 p.m. United States Central.

- **E-mail**: 3Mdetectionmail@mmm.com
- **Internet:** www.3M.com/detection

International customers

Contact your local, factory-authorized distributor from whom the product was purchased. You can obtain the name and contact information of your local factory-

authorized distributor from 3M by using the e-mail, telephone, or fax information given under “Contacting 3M Detection Solutions” above.

Warranty

3M warrants our instruments to be free from defects in materials and workmanship for one year under normal conditions of use and service. For United States customers, we will replace or repair (our option) defective instruments at no charge, excluding batteries, abuse, misuse, alterations, physical damage, or instruments previously repaired by other than 3M. Microphones, sensors, printers, and chart recorders may have shorter or longer warranty periods. This warranty states our total obligation in place of any other warranties expressed or implied. Our warranty does not include any liability or obligation directly resulting from any defective instrument or product or any associated damages, injuries, or property loss, including loss of use or measurement data.

For warranty outside the United States, a minimum of one year warranty applies subject to the same limitation and exceptions as above with service provided or arranged through the authorized 3M distributor or our 3M European Service Laboratory. Foreign purchasers should contact the local 3M authorized sales agent for detail.

3M Detection Solutions

3M Detection Solutions is a world class manufacturer of rugged, reliable instrumentation and software systems that help monitor and evaluate occupational and environmental health and safety hazards, including noise dosimetry, sound level monitoring, heat stress, indoor air quality and select toxic/combustible gases. The 3M Detection brand of instrumentation is used by safety and industrial hygiene professionals to help comply with applicable occupational standards and regulations.

About 3M Personal Safety

3M offers a comprehensive, diverse portfolio of Personal Safety solutions providing respiratory protection, hearing protection, fall protection, reflective materials for high visibility, protective clothing, protective eyewear, head and face protection, welding helmets, and other adjacent products and solutions such as tactical safety equipment, detection, monitoring equipment, active communications equipment and compliance management. In 2012, 3M celebrated 40 years of safety leadership – recognizing the company's respiratory and hearing protection solutions introduced in 1972. Visit www.3M.com/PPESafety or http://m.3m.com/PPESafety

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