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Safeguarding public health

EVALUATION

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Thermometer review: UK market survey 2005

Department of Health

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Thermometer review: UK market survey 2005

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Summary

This issue of ‘Evaluation’ surveys the ‘stand alone’ clinical thermometers currently available in the UK market. This is an independent source of information on a wide range of thermometers. Fifty five models are included in this review, obtained from sixteen suppliers. Some UK companies did not wish to participate in this review, particularly those primarily retailing to the general public for home use.

An overview of clinical and procurement issues is provided in the introductory sections of the report. Four distinct measurement methods have been developed for measuring clinical temperature. This report summarises key features of each thermometer type: mercury in glass thermometers (12 models), chemical thermometers (7 models), electronic devices which use the thermal contact method (20 models) and infrared sensing electronic devices which assess body temperature from the electromagnetic emissions from blood vessels beneath the skin surface (16 models).

The information we report has been reproduced in a systematic manner. A product summary page for each model presents key information about each product using information and documentation supplied by participating device manufacturers and/or UK supplier.

Prices quoted on product summary pages are the supplier’s list price. During this review period the NHS Purchasing and Supplies Agency (PaSA) has separately undertaken a contract renewal process for clinical thermometers. Informal consultation between the evaluator and PaSA staff has ensured that most of the thermometers and disposable covers forming part of the 2005/7 contract are included in this review. NHS and other UK organisations eligible to use the national NHS purchasing contract are advised to seek a listing of available products by contacting PaSA using www.pasa.nhs.uk or phoning 01924 328829.

Introduction

Mercury in glass thermometers have been used clinically by the medical profession for over a century, since their introduction by Carl Wunderlich in 1871 [1]. He demonstrated the value of the thermometer as an objective measure of health or progression of disease by systematically recording axillary temperature on 25,000 adults. Since then extensive clinical experience of using mercury in glass thermometers for measuring oral, rectal and axilla temperature has resulted in body temperature being recognised as a vital clinical sign and a keystone of nursing and medical practice and patient record keeping.

More recently, environmental concerns have led some European countries to ban their use [2]. At present there are no plans to restrict the use of mercury in glass clinical thermometers in the UK. However, it is important that staff are trained to ensure safe handling during normal use and in the event of a mercury spillage [3] Alternative technologies for clinical temperature measurement are being purchased.

Diverse technologies have been developed to replace the mercury thermometer. Many are promoted as being quick and simple to use for the clinical practitioner and painless for the patient. However, we are aware of the difficulty experienced by users in obtaining accurate, reliable and cost effective substitute devices. This issue of evaluation:

- provides guidance on relevant procurement issues
- reviews the alternative technologies available for the intermittent measurement of temperature in the human body
- summarises products available in the UK, based on the manufacturer's documentation.

A systematic search for suppliers of 'stand alone' thermometers was undertaken in December 2003, which included informal consultation with the NHS PaSA. Product information was initially requested from the UK distributors in February 2004. Samples of each thermometer were later obtained for photography. During photography a 20mm marker was placed beside each model to provide an indication of size. No technical performance tests have been performed on these samples other than measurement of the dimensions and weight (including batteries). The information we report has been reproduced in a systematic manner from that provided by participating device manufacturers and suppliers.

Normal temperature

The normal body temperature is affected by several factors. Temperature has a diurnal variation and is approximately 0.5C higher in the afternoon. Temperature also varies with extremes of age, and tends to be lower for example in the elderly. Other factors that can affect normal temperature include gender (temperature rises

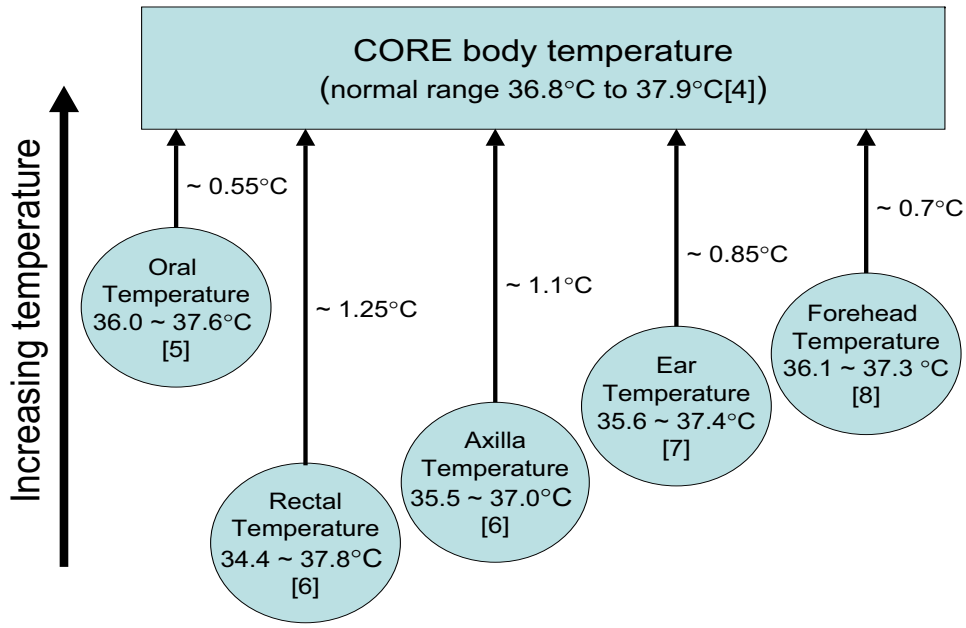


Figure 1 Comparison of the normal temperature ranges by body site

in women around the time of ovulation) and exercise. Consequently, it is best to define normal temperature as a range, rather than a specific value. When measuring temperature in patients, several other factors are also important and will affect the normal range:

- site of measurement (eg oral, axillary, rectal, ear)
- type of thermometer used (eg mercury, infrared, electronic, chemical change)
- clinical reason that temperature is being measured (eg detection of fever in a newborn, monitoring of rewarming after cardiac surgery, etc).

The variation in normal temperature between body sites is probably the key factor in thermometry, and there have been attempts to determine the difference in temperature between different body sites (sometimes called the physiological offsets). **Figure 1** summarises temperatures that can be expected between different sites. This is derived from clinical studies of core temperature [4] and those obtained in the mouth [5], rectum [6], axilla [6], ear [7] and on the forehead [8] in healthy teenagers and adults. Unfortunately the temperature differences noted between body sites are only approximations because the clinical studies on which they are based are often limited.

Some thermometers automatically encode the physiologic offset figure into the thermometer's displayed value, so the temperature at 'familiar' body sites (eg oral) is

predicted from measurements at other sites (eg ear or forehead). Other thermometers do not automatically add the physiologic offset and provide the actual temperature measured at that site. Clearly it is vital to know from the operator's manual for a particular thermometer which process is operating.

Given the variation of 'normal' temperature depending on body site, the threshold for clinical action may need to be adjusted depending on the thermometer being used. Since individual differences also contribute to the variation of normal temperature range, some manufacturers therefore recommend that ideally individual temperature records should be established when in normal health. This is particularly important for patient groups in whom changes in temperature might be of clinical significance, such as young children and patients with immunosuppression. In addition, in hospitalised patients frequent monitoring is important to detect shifts in temperature that might correlate with changes in clinical condition (eg monitoring response to antimicrobial therapy, monitoring rewarming after some types of surgery).

Fever

An evaluation in temperature is part of the normal response to infection and many other disease processes. The precise temperature that is used to define fever varies between clinicians, and may even vary depending on the patient population (eg a lower definition of 'fever' may be used in some immunosuppressed patients). In general, the upper limit of normal temperature varies from 37.0 to 38.0°C, and most clinicians will use fever to be a temperature that exceeds some figure in this range. However review of manufacturer's data reveals that some manufacturers provide specific advice on the normal temperatures that can be expected for their device and some document an upper limit of normal which is different from 37°C.

Hypothermia

Hypothermia can occur accidentally (eg from environment) or intentionally, such as during certain types of surgery. So it can also be important to reliably measure body temperatures well below 36°C. Reviewing the operating range for these thermometers it would appear that only a few devices can match the sub-normal mercury thermometer. The large electrical continuous monitor and three compact electronic models (in monitor mode) could provide accurate readings under these circumstances. Some infrared sensing devices will measure low temperatures but these values may be less accurate as they are beyond the temperature range used for clinical validation.

Accurate measurement of body temperature well below the normal range is likely to be particularly relevant for emergency rescue teams, emergency admissions, staff working in post-operative intensive care and possibly community healthcare workers. It is also important for clinicians to know that different body sites respond at different speeds to rewarming of the body, and for example the rectal site may lag behind the tympanic membrane measurements in some situations.

Procurement issues

The purchase cost of 'stand alone' thermometers identified in this review is highly variable. Prices range from 7 pence each for a disposable chemical thermometer to £400 for some models of electronic contact and infrared sensing thermometers and £356 for a dual channel device for continuous temperature monitoring.

When making a purchasing decision, it is important to consider a range of issues before determining which device is the best choice and achieves best practice. Although there may be a strong marketing drive for certain models of thermometers a structured approach to procurement is advised.

Where possible seek independent evidence of temperature accuracy and measurement repeatability in clinical use and take the time to 'read the small print'. To assist in this process this review summarises published manufacturers' data using a standardised format.

When purchasing new thermometers it is useful to try and standardise on a limited range of models within a single hospital or primary care trust/community health board. Medical and nursing staff can then become familiar with these models and their ‘normal’ temperature ranges, especially trainees in rotational posts. It can also simplify the purchasing and storage of consumable items, maintenance arrangements and staff training programmes.

Careful study of the individual requirements of each speciality using thermometers is an important starting point. This section provides an overview of the issues which may be considered as part of the specification process. Ideally the thermometer which is eventually selected should aim to accommodate all specific requirements, without being over complex.

Clinical issues

Accuracy
Display resolution, especially on a digital readout, does not indicate the accuracy of the temperature reading. Measurements using a water bath at a controlled temperature may be used to ascertain the laboratory accuracy, the figure usually quoted by manufacturers and documented in the comparison tables in this review. Some manufacturers may supply, on request, the physiologic offsets used in their thermometers and results of clinical trials, indicating the expected clinical errors.

Clinical experience of mercury in glass thermometers is extensive and based on:

- laboratory accuracy of mercury in glass thermometers, supported by factory calibration referenced to national standards
- well established clinical measurement protocols embedded within nurse training for decades

Some of the newer technologies have been the subject of independent comparative clinical trials with more established measurement methods. Assessment of the pooled mean difference between measurements and the 95 per cent levels of agreement is more informative than the correlation coefficient as it can distinguish between bias in the results and random error, respectively [9]. This data provides a better indication of the reliability and repeatability of readings in clinical practice.

Several factors can reduce accuracy and increase measurement errors. The most common is incorrect sensor placement. Another is local environmental conditions being outside ambient temperature and humidity range stated by the manufacturer (see comparison tables). Some thermometers check the ambient temperature and produce an error message or prevent measurement if these conditions are not met.

Time to reading

Speed of measurement is often quoted in manufacturing literature and is reproduced in the comparative tables. However, of greater practical value is the total time required to measure and record a reading for a single patient, which may include: installation of the probe cover; electronic self checking; mode selection; cleaning; disposal of consumables; undressing and/or positioning of the patient; checking ears for wax prior to aural measurement etc. A local trial may be useful for objectively comparing this factor for different thermometer types or models.

Cleaning and infection control issues

Infection control issues should be included in the procurement decision. Although general guidance on sterilisation, disinfection and cleaning of medical equipment has been provided by the MHRA Microbiological Advisory Committee [10] it is very important to follow the cleaning and decontamination instructions provided by the manufacturer. Cleaning instructions vary considerably for thermometers in this review, even different models within the same thermometer type have diverse requirements both in methods and materials. A summary of any information provided by the manufacturer can be found in the product summary pages.

Despite the use of sterile covers, some thermometers can only be wiped with a soft dampened cloth. In certain clinical situations this may be considered an unacceptable risk for cross-contamination. Alternative solutions for high risk situations could include:

- mercury devices and a few compact electrical thermometers are waterproof - so they can be immersed in a 70% alcohol solution for up to 24 hours
- chemical thermometers for single patient use which can be safely incinerated
- autoclavable and disposable probes are available for the continuous monitoring device
- one model of infrared sensing thermometer which can be cleaned by gas sterilisation.

Measurement environment

Effect of room (ambient) temperature
The product pages document the manufacturer's recommended temperature and humidity conditions for warehouse storage and transportation. This is frequently a wide range, eg from -25°C to 55°C.

While the thermometer is likely to be required for clinical use it should be stored in the temperature range listed in the comparative tables (ie those appropriate for stated accuracy) as most require between thirty minutes to an hour to acclimatise to the ambient temperature. In particular, most electronic thermometers sample the ambient temperature during the start up checks and use this information to predict the temperature reading of tissue at the measurement site.

Some manufacturers require that specific thermometer models should not be stored under direct sunlight and should also be protected from vibrating shock.

GPs, district nurses and emergency healthcare workers using thermometers in the community or outdoors can encounter problems as they may get very cold or hot, for example when stored in the car boot between domiciliary visits. Although mercury in glass thermometers perform well whatever the weather, infrared sensing and compact electrical thermometers can have lower accuracy under the same conditions. Chemical phase change thermometers may offer a viable alternative, particularly those which permit a storage temperature up to 50°C.

Electromagnetic interference
Another consideration - particularly in hospitals and ambulances - is the risk of false readings when the thermometer is exposed to electromagnetic interference. Possible strong sources include the surgical diathermy generator in theatre or defibrillators. Mobile communication systems including porters and emergency services two-way radios also pose a risk, as outlined in recent MHRA information posted on their website [11].

Mercury and chemical thermometers will be unaffected but interference may cause a fault in some electronic thermometers. Those which comply with the International Standard for electromagnetic compatibility, EN 60601-1-2, are likely to be immune to most sources of interference but may still be affected by surgical diathermy (electrosurgery) equipment.

Lifetime cost

For some models the lifetime cost can more than double the purchase cost of the thermometer. Indeed, some companies will offer the base unit free of charge because they expect to recoup the purchase price through their charges for consumables, maintenance, etc.

User training
Training of clinical staff in the correct use of new models of clinical thermometers is essential and can be included as part of the procurement arrangements. Clinical risk from inaccurate measurements may be reduced by staff undertaking a competency based training programme. Review of assessment and nursing protocols is also advised as manufacturer's instructions may describe specific precautions or preparation of the patient. Staff time for these activities is an additional consequence of choosing a new model.

Disposable/sterile covers
The manufacturers of some thermometers recommend the use of specific disposable covers to help reduce the risk of cross infection for those devices that can not be adequately cleaned.

Depending on the thermometer selected the annual consumable budget cost for probe covers in a 700 bedded hospital could vary from £9,000 (3p each, ex VAT) to £81,000 (27p each, ex VAT), assuming 4 readings per patient, per day.

Batteries
All electronic thermometers listed are battery powered. Product summaries describe the battery type and battery lifetime (usually in terms of the number of measurements) and whether a low battery indicator is provided. Users are advised to remove alkali batteries from thermometers if the thermometer is unused for long periods, eg over month. Lithium and silver oxide batteries are less prone to corrosion so devices powered by these batteries are better suited for intermittent use. All batteries should be disposed of in accordance with local waste management policies.

Re-calibration
Measurement accuracy should be checked regularly and especially if the device has been dropped, or subjected to extremes of temperature or humidity. Some manufacturers of electronic contact thermometers recommend that professional users arrange for a periodic technical inspection for accuracy but frequently no instructions were provided in the information supplied.

Waterproof electronic contact, reusable chemical and mercury in glass thermometers may all be immersed in a well-controlled water bath so the reading can be accurately calibrated (ie compared with a thermometer traceable to national standards for a range of temperatures). A local medical physics /clinical engineering department, a certified test house or the manufacturer may be able to provide this service.

Some manufacturers sell specific electronic devices for checking thermometer accuracy which are designed for use by local medical technologists. A few of these devices will have been checked against thermometers traceable to national standards and so may require recalibration at regular intervals by the manufacturer.

Some manufacturers recommend recalibration at their premises and others offer no advice at all. Recently the UK National Physical Laboratory has developed a calibration device suitable for infrared sensing thermometers which is traceable to their standards and is commercially available [12].

The costs of transportation and any internal or external calibration service should be fully investigated before the procurement decision is finalised. It may be useful to involve the scientists or engineers responsible for medical equipment management in these pre-purchase negotiations.

Maintenance costs
For some models the maintenance costs can be equal to the purchase cost over the life of the thermometer, for others the purchase cost is so low that any repair work is not cost effective. Savings in lifetime equipment cost may be assisted by involving the scientists/engineers responsible for medical equipment management in the pre-purchase negotiations with the manufacturer. Options for maintenance are that the manufacturer:

- requires all maintenance, re-calibration and repair work to be performed at their facilities
- provides service manuals and training to local medical engineering support staff so maintenance, re-calibration and/or repair work can be performed within the local hospital
- intends the thermometer to be discarded if a fault occurs, other than when covered by the warranty period.

Theft
Most thermometers are small portable medical devices which are prone to loss through theft. Each product summary identifies those models which offer anti-theft options.

Manufacturing standards

CE marking
Manufacturers of medical devices placed on the market in Europe are required to meet the relevant European Union Medical Devices Directive and be labelled with CE marking. A classification of medical devices has been established denoting the risk of the device for the patient, Class III having the highest risk. Differences in their mode of operation, and the consequent risk to the patient will alter the appropriate classification for the thermometer. More specifically:

- class I (with a measuring function) is usual for mercury in glass and chemical thermometers

- class IIa for most electronic and infrared sensing thermometers
- class IIb for continuous surveillance of temperature in anaesthesia, intensive care or emergency care.

The routes to CE marking chosen by most manufacturers were through full quality assurance (ie the manufacturer's design and manufacturing process) audited and certified by a Notified Body. Most have used the general quality system standard such as ISO9001 [13] and others comply with additional requirements important for medical device manufacturers as outlined in ISO 13485 [14] or ISO 13488 [15], Where a manufacturer has taken a structured approach to environmental management they can also seek ISO 14001 registration [16].

Notified body
This is an organisation authorised by their national Competent Authority. In the UK the Competent Authority is the MHRA. The same system operates in all EU countries and a number of Notified Bodies have branches in the USA, Japan, etc.

International safety and performance standards
Where papers have been received which document compliance with relevant international standards these are listed in the Product Summary. These may be internal documents from the manufacturer claiming compliance, based on their own assessment tests, or copies of certificates from an independent test house declaring the outcome of type testing.

International standard EN 12470 comprises five parts each covering a specific thermometer type [17, 18, 19, 20, 21]. Some products in this review were designed to these standards during their development (prEN12470) or in compliance with earlier standards, eg those of the American Society of Testing and Materials (ASTM) [22, 23, 24, 25].

EN60601-1 [26] is the relevant standard for all electrical medical devices, in particular, electronic contact thermometers and those performing infrared sensing. Compliance with EN 60601-1-2 [27] demonstrates that electromagnetic compatibility has been tested, demonstrating that performance of the thermometer will not be affected by electrical interference from most types of medical and communication equipment, eg mobile phones, and does not generate significant electromagnetic interference for other devices.

Mercury in glass thermometers

How they measure temperature

Mercury in glass maximum thermometers have been around for well over 100 years. Heat expands mercury in the bulb pushing it along a capillary tube so reading the scale markings at the leading edge of the mercury column will provide the temperature reading. At least four minutes is needed for the mercury temperature in the bulb to match the surrounding tissues and produce an accurate reading. A constriction just above the bulb means mercury remains in position in the capillary tube by the scale markings as the thermometer cools so the temperature can be easily read.

Clinical mercury thermometers sold to UK hospitals have been calibrated on a batch sampling basis for many years - using a water bath and a reference thermometer which is traceable to a national standard. In 2000 this practice was incorporated into the international standard EN 12470 part 1 [17]. Some manufacturers may claim compliance with earlier national standards, for example ASTM E667 [22] or BS 691 [28]. Following harmonisation some configurations of clinical mercury thermometers traditionally used in the UK were not described in the international standard so BS 6985 [29] was published to cover these.

Manufacturer's advice on clinical use

The key issues in the use of mercury in glass maximum thermometers are:

- Shake the thermometer to return all the mercury to the bulb before each patient reading.
- Do not use within 30 minutes of patient taking exercise, bathing, eating, drinking or smoking.
- During oral measurement ensure the thermometer tip is placed in the left or right sublinguial pocket, as other areas in the mouth are cooler and the diagnosis of fever may be missed. Hold mouth closed for at least 4 minutes during oral measurement to obtain an accurate measurement.
- During axilla measurement place the thermometer bulb high in the armpit and hold arm to chest for 10 minutes.
- Place the thermometer bulb at a depth of 2.5 cm (1 inch) within the rectum for 5 minutes to achieve a stable accurate temperature reading.
- Although a rare occurrence thermometers can be bitten or accidentally broken during patient measurement. Consequently their oral use in infants, young children and confused adults is contraindicated.

Overall comparison of manufacturer's data

All mercury in glass thermometers in this review have a laboratory accuracy of +0.1°C/-0.15°C and an operating range of 35°C to 42°C except the sub-normal thermometers which have an extended operating range, usually 25°C to 40°C at a lower accuracy of +0.2°C/-0.3°C (see **Table 1**). These thermometers all operate effectively regardless of the ambient temperature and humidity, but in some circumstances additional measurement time may be required to enable the mercury to achieve thermal equilibrium with surrounding tissues.

Electronic interference, which can be generated by some hospital medical devices or radio-communications equipment (eg mobile phones) does not affect mercury-in-glass thermometers.

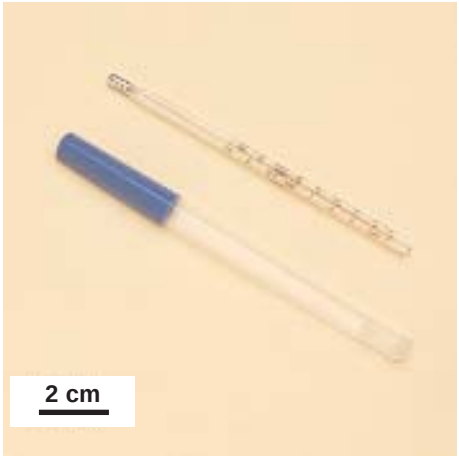
Accuracy in clinical use can be similar to the quoted laboratory accuracy providing users follow general advice on clinical use and allow sufficient measurement time.

Table 1 Mercury in glass thermometers - Accuracy** and Temperature Display

Mercury in glass thermometers	Manufacturer's Stated Accuracy (highest)				Are all readings at highest stated accuracy?	Warning if reading is outside display range	Lowest accuracy (eg outside operating range)	Thermometer display		Typical time to reading (oral)
	Highest accuracy (°C)	Operating range (°C)	Ambient temperature range (°C)	Ambient humidity RH				Display resolution	Display range(°C)	
Brannan Dual scale	+0.1 / -0.15	35 ~ 42	< 42	0 ~ 100%	BD	G	n/a	0.1°C	35 ~ 42	4 min
Brannan Easy-Read	+0.1 / -0.15	35 ~ 42	< 42	0 ~ 100%	BD	G	n/a	0.1°C	35 ~ 42	4 min
Brannan Ovulation	+0.1 / -0.15	35 ~ 42	< 42	0 ~ 100%	BD	G	n/a	0.1°C	35 ~ 42	4 min
Brannan Solid Stem	+0.1 / -0.15	35 ~ 42	< 42	0 ~ 100%	BD	G	n/a	0.1°C	35 ~ 42	4 min
UN507 (Rectal)	+0.1 / -0.15	35 ~ 42	< 42	0 ~ 100%	BD	G	n/a	0.1°C	35 ~ 42	4 min
UN 508	+0.1 / -0.15	35 ~ 42	< 42	0 ~ 100%	BD	G	n/a	0.1°C	35 ~ 42	4 min
UN5081 (Dual Scale)	+0.1 / -0.15	35 ~ 42	< 42	0 ~ 100%	BD	G	n/a	0.1°C	35 ~ 42	4 min
UN509 (Subnormal)	+0.2 / -0.30	25 ~ 40	< 42	0 ~ 100%	BD	G	n/a	0.2°C	25 ~ 40	4 min
Zeal M0110	+0.1 / -0.15	35 ~ 42	< 50	0 ~ 100%	BD	G	n/a	0.1°C	35 ~ 42	3 min
Zeal M1010	+0.1 / -0.15	35 ~ 42	< 50	0 ~ 100%	BD	G	n/a	0.1°C	35 ~ 42	not supplied
Zeal M2010	+0.2 / -0.30	24 ~ 40	< 50	0 ~ 100%	BD	G	n/a	0.2°C	24 ~ 40	3 min
Zeal M2510	+0.2 / -0.30	24 ~ 40	< 50	0 ~ 100%	BD	G	n/a	0.2°C	24 ~ 40	3min

**	Measurement accuracy can often be much better than measurement repeatability in clinical use.
B	Highest accuracy is obtained for all/ most displayed values.
C	Some displayed temperatures are not at the highest stated accuracy.
D	Minimal restrictions on the ambient temperature before or during measurement.
E	Extended ambient temperature range may reduce problems and inaccuracies when used in the community.
F	Ambient temperatures need to be at a comfortable room temperatue for correct function and/ or highest accuracy.
G	Display indicating when the temperature reading is beyond the measurement range.

Mercury in glass: Brannan dual scale (11/455/3)



Mercury in glass thermometer with a peak hold (maximum) device for measuring temperature under all circumstances.
Intended use: Hospital, community and home use
Measurement site: Oral
Patient group: All ages except young children
Size (LWD): 110mm x 6mm x 5mm
Weight: 4 gm

User information

Shake thermometer well to ensure all mercury has returned to the bulb. Care should be taken to avoid breakage, especially within the mouth or rectum.

Special features

Protective case
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory calibration of batch samples - tested for accuracy using method stated in BS691 (+0.1 / -0.15°C).

Thermometer care

Cleaning probe tip: Wipe with light disinfectant prior to use
Cleaning body: As for probe tip
Storage conditions: Store below 42°C

Maintenance and ongoing costs

Disposable covers not required
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO9001:2000 Manufacturer claims compliance to BS691
CE mark: Yes Code: 0088
Notified Body: LRQA, Coventry, UK

Price (ex VAT):	**£1.27**
Supplier:	S Brannan & Sons Ltd
Address:	Leconfield Indsutrial Estate, Cleator Moor CA25 5Q
Telephone:	01946 816600
Fax:	01946 816625
Website:	www.brannan.co.uk
e-mail:	sales@brannan.co.uk
Manufacturer:	
Manufactured in:	

Mercury in glass: Brannan Easy Read (11/456/3)

Mercury in glass thermometer with a peak hold (maximum) device for measuring temperature under all circumstances.
Intended use: Hospital, community and home use
Measurement site: Oral and axilla
Patient group: All ages except young children
Size (LWD): 130mm x 12mm x 9mm
Weight: 8 gms

User information

Shake thermometer well to ensure all mercury has returned to the bulb. Care should be taken to avoid breakage, especially within the mouth.

Special features

Easy to read temperature scale; protective case.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory calibration of batch samples - tested for accuracy using method stated in BS691 (+0.1 / -0.15°C).

Thermometer care

Cleaning probe tip: Wipe with light disinfectant prior to use
Cleaning body: As for probe tip
Storage conditions: Store below 42°C

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO9001:2000 Manufacturer claims compliance to BS691.
CE mark: Yes Code: 0088
Notified Body: LRQA, Coventry, UK

Price (ex VAT):	**£1.86**
Supplier:	S Brannan & Sons Ltd
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Fax:	01946 816625
Website:	www.brannan.co.uk
e-mail:	sales@brannan.co.uk
Manufacturer:	
Manufactured in:	

Mercury in glass: Brannan ovulation (11/020/3)

Mercury in glass thermometer with a peak hold (maximum) device for measuring daily variations in temperature.
Intended use: Home use
Measurement site: Oral
Patient group: Women
Size (LWD): 130mm x 12mm x 9mm
Weight: 8 gm

User information

Shake thermometer well to ensure all mercury has returned to the bulb. Care should be taken to avoid breakage, especially within the mouth.

Special features

Easy reading broad scale plate; charts for monitoring periodic changes in temperature during ovulation; protective case.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory calibration of batch samples - tested for accuracy using method stated in BS691 (+0.1 / -0.15°C)

Thermometer care

Cleaning probe tip: Wipe with light disinfectant prior to use
Cleaning body: As for probe tip
Storage conditions: Store below 42°C

Maintenance and ongoing costs

Disposable covers: not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

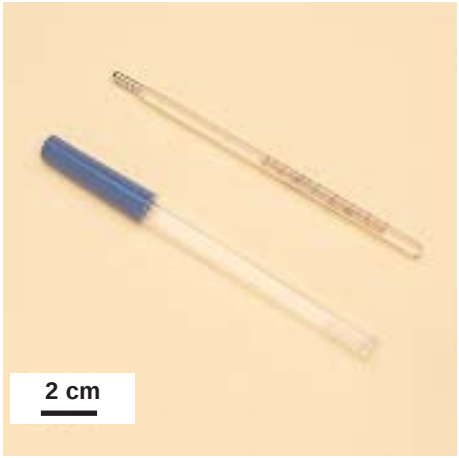
Manufacturing standards

ISO9001:2000 Manufacturer claims compliance to BS691.
CE mark: Yes Code: 0088
Notified Body: LRQA, Coventry, UK

Price (ex VAT):	**£5.35**
Supplier:	S Brannan & Sons Ltd
Address:	Leconfield Indsutrial Estate, Cleator Moor CA25 5Q
Telephone:	01946 816600
Fax:	01946 816625
Website:	www.brannan.co.uk
e-mail:	sales@brannan.co.uk
Manufacturer:	
Manufactured in:	

Mercury in glass: Brannan solid stem (11/455/2)

Mercury in glass thermometer with a peak hold (maximum) device for measuring temperature under all circumstances.
Intended use: Hospital, community and home use
Measurement site: Axilla
Patient group: All ages except young children
Size (LWD): 120mm x 6mm x 5mm
Weight: 4 gm



User information

Shake thermometer well to ensure all mercury has returned to the bulb. Care should be taken to avoid breakage.

Special features

Protective case.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory calibration of batch samples - tested for accuracy using method stated in BS691 (+0.1 / -0.15°C). .

Thermometer care

Cleaning probe tip: Wipe with light disinfectant prior to use
Cleaning body: As for probe tip
Storage conditions: Store below 42°C

Maintenance and ongoing costs

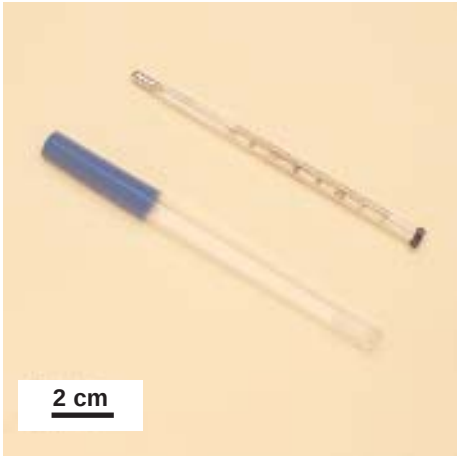
Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO9001:2000 Manufacturer claims compliance to BS691.
CE mark: Yes Code: 0088
Notified Body: LRQA, Coventry, UK

Price (ex VAT):	**£1.27**
Supplier:	S Brannan & Sons Ltd
Address:	Leconfield Indsutrial Estate, Cleator Moor CA25 5Q
Telephone:	01946 816600
Fax:	01946 816625
Website:	www.brannan.co.uk
e-mail:	sales@brannan.co.uk
Manufacturer:	
Manufactured in:	

Mercury in glass: UHS UN507 (Rectal)



Mercury in glass thermometer with a peak hold (maximum) device for measuring temperature under all circumstances. Blue mark at the tip denotes use for rectal temperature measurement
Intended use: Hospital, community and home use
Measurement site: Rectum
Patient group: Adults, children and infants
Size (LWD): 110mm x 6mm x 5mm
Weight: 6 gm

User information

Shake thermometer well to ensure all mercury has returned to the bulb. Care should be taken to avoid breakage, especially within the rectum.

Special features

Protective plastic case.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: information not supplied .

Thermometer care

Cleaning probe tip: Wipe with light disinfectant prior to use
Cleaning body: As for probe tip
Storage conditions: Store below 42°C

Maintenance and ongoing costs

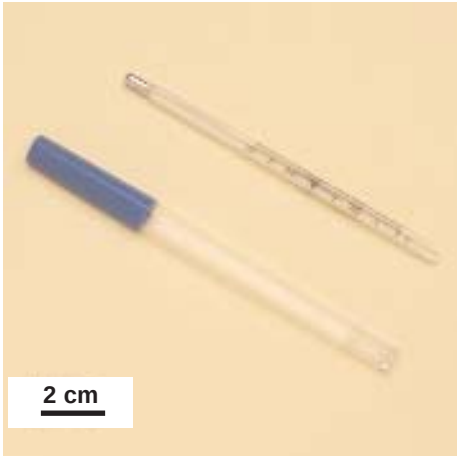
Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO 9001:2000; ISO 13481;5:2003, BS EN 13485:2003. Manufacturer claims compliance with BS691
CE mark: Yes Code: 0197
Notified Body: TUV Rheinland

Price (ex VAT):	**£1.45**
Supplier:	Universal Hospital Supplies
Address:	Unit 6, George House, Millmarsh Industrial Estate, Enfield AN3 7QJ
Telephone:	0845 082 0182
Fax:	0845 082 0180
Website:	sales@uhs.co.uk
e-mail:	www.uhs.co.uk
Manufacturer:	Universal Hospital Supplies
Manufactured in:	China

Mercury in glass: UHS UN508



Mercury in glass thermometer with a peak hold (maximum) device for measuring temperature under all circumstances.
Intended use: Hospital, community and home use
Measurement site: Oral and axilla
Patient group: Adults, children and infants(axilla)
Size (LWD): 111mm x 6mm x 5mm
Weight: 6 gm

User information

Shake thermometer well to ensure all mercury has returned to the bulb. Care should be taken to avoid breakage, especially within the mouth or rectum.

Special features

Protective plastic case.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: information not supplied

Thermometer care

Cleaning probe tip: Wipe with light disinfectant prior to use
Cleaning body: As for probe tip
Storage conditions: Store below 42°C

Maintenance and ongoing costs

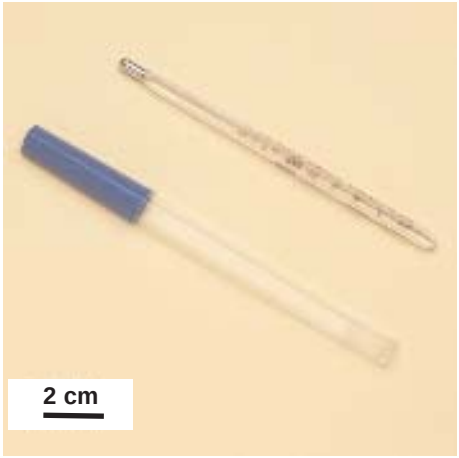
Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO 9001:2000; ISO 13481;5:2003, BS EN 13485:2003. Manufacturer claims compliance with BS691
CE mark: Yes Code: 0197
Notified Body: TUV Rheinland

Price (ex VAT):	**80 pence**
Supplier:	Universal Hospital Supplies
Address:	Unit 6, George House, Millmarsh Industrial Estate, Enfield AN3 7QJ
Telephone:	0845 082 0182
Fax:	0845 082 0180
Website:	sales@uhs.co.uk
e-mail:	www.uhs.co.uk
Manufacturer:	Universal Hospital Supplies
Manufactured in:	China

Mercury in glass: UHS UN5081 (dual scale)



Mercury in glass thermometer with a peak hold (maximum) device for measuring temperature in both Centigrade(Celsius) and Fahrenheit scales.
Intended use: Hospital, community and home use
Measurement site: Oral and axilla
Patient group: Adults, children and infants(axilla)
Size (LWD): 105mm x 6mm x 5mm
Weight: 6gm

User information

Shake thermometer well to ensure all mercury has returned to the bulb. Care should be taken to avoid breakage, especially within the mouth.

Special features

Protective plastic case.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: information not supplied

Thermometer care

Cleaning probe tip: Wipe with light disinfectant prior to use
Cleaning body: As for probe tip
Storage conditions: Store below 42°C

Maintenance and ongoing costs

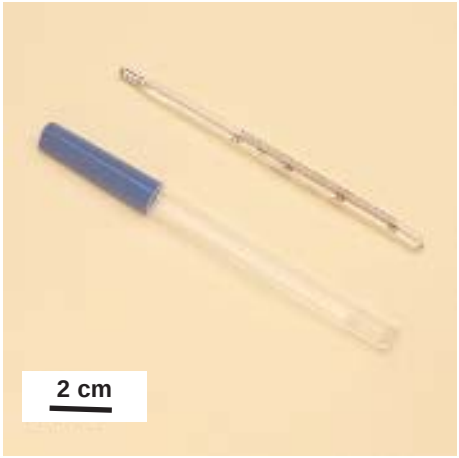
Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO 9001:2000; ISO 13481;5:2003, BS EN 13485:2003. Manufacturer claims compliance with BS691
CE mark: Yes Code: 0197
Notified Body: TUV Rheinland

Price (ex VAT):	**80 pence**
Supplier:	Universal Hospital Supplies
Address:	Unit 6, George House, Millmarsh Industrial Estate, Enfield AN3 7QJ
Telephone:	0845 082 0182
Fax:	0845 082 0180
Website:	sales@uhs.co.uk
e-mail:	www.uhs.co.uk
Manufacturer:	Universal Hospital Supplies
Manufactured in:	China

Mercury in glass: UHS UN509 (subnormal)



Mercury in glass thermometer with a peak hold (maximum) device for measuring temperature under all circumstances.
Intended use: Hospital, community and home use
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants(axilla)
Size (LWD): 105mm x 6mm x 5mm
Weight: 2 gm

User information

Shake thermometer well to ensure all mercury has returned to the bulb. Care should be taken to avoid breakage, especially within the mouth or rectum.

Special features

Protective plastic case.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: information not supplied

Thermometer care

Cleaning probe tip: Wipe with light disinfectant prior to use
Cleaning body: As for probe tip
Storage conditions: Store below 42°C

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO 9001:2000; ISO 13481;5:2003, BS EN 13485:2003. Manufacturer claims compliance with BS691
CE mark: Yes Code: 0197
Notified Body: TUV Rheinland

Price (ex VAT):	**£1.60**
Supplier:	Universal Hospital Supplies
Address:	Unit 6, George House, Millmarsh Industrial Estate, Enfield AN3 7QJ
Telephone:	0845 082 0182
Fax:	0845 082 0180
Website:	sales@uhs.co.uk
e-mail:	www.uhs.co.uk
Manufacturer:	Universal Hospital Supplies
Manufactured in:	China

Mercury in glass: Zeal M0110

Traditional re-usable thermometer designed to be placed under the arm or used orally for taking normal body temperatures, range 35/ 42°C
Intended use: Hospital, community and home use
Measurement site: Oral, axilla
Patient group: Children and adults
Size (LWD): 100mm x 5mm
Weight: 20 gms

User information

Shake down the thermometer to ensure mercury is below the last reading on the scale. Place thermometer tip in the usual oral cavity or axilla position. Take care to avoid breakage when using orally. Leave in place (3 minutes orally or 8 minutes for axilla readings), remove and read. Clean as laid down by the infection control protocol then store in a clean area for re-use.

Special features

Protective plastic case.
Antitheft device: not applicable
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Every thermometer is tested at two temperatures using a reference thermometer traceable to national standards.

Thermometer care

Cleaning probe tip: Use either an alcohol swab or wash with soapy water and dry
Cleaning body: As for probe tip
Storage conditions: Store in a sterile/ clean area

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO 9001:2000 Manufacturer claims compliance with BS EN 12470-1:2000
CE mark: Yes Code: 0086
Notified Body: BSI Product Services.

Price (ex VAT):	**75 pence (£7.50 pack 10)**
Supplier:	GH Zeal Ltd
Address:	8 Deer Park Road, Merton, LONDON SW19 3UU
Telephone:	020 8542 2283
Fax:	020 8543 7840
Website:	www.zeal.co.uk
e-mail:	scientific@zeal.co.uk
Manufacturer:	ZEAL Group
Manufactured in:	information not supplied

Mercury in glass: Zeal M1010

Traditional re-usable thermometer designed to be used rectally for taking normal body temperatures, range 35/ 42°C
Intended use: Hospital, community and home use
Measurement site: Rectum
Patient group: Children and adults
Size (LWD): 100mm x 5mm
Weight: 20 gms

User information

Shake down the thermometer to ensure mercury is below the last reading on the scale. Place thermometer tip in the rectum, taking care to avoid breakage. Leave in place for 3 minutes, remove and read. Clean as laid down by the infection control protocol then store in a clean area for re-use.

Special features

Protective plastic case.
Antitheft device: not applicable
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Every thermometer is tested at two temperatures using a reference thermometer traceable to national standards

Thermometer care

Cleaning probe tip: Use either an alcohol swab or wash with soapy water and dry
Cleaning body: As for probe tip
Storage conditions: Store in a sterile/ clean area

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO 9001:2000 Manufacturer claims compliance with BS EN 12470-1:2000
CE mark: Yes Code: 0086
Notified Body: BSI Product Services

Price (ex VAT):	**£1.01 (£10.08 pack 10)**
Supplier:	GH Zeal Ltd
Address:	8 Deer Park Road, Merton, LONDON SW19 3UU
Telephone:	020 8542 2283
Fax:	020 8543 7840
Website:	www.zeal.co.uk
e-mail:	scientific@zeal.co.uk
Manufacturer:	ZEAL Group
Manufactured in:	information not supplied

Mercury in glass: Zeal M2010

Traditional re-usable thermometer designed to be used orally for taking sub normal (hypothermia) body temperatures, range 24/ 40°C
Intended use: Hospital, community and home use
Measurement site: Oral
Patient group: Children and adults
Size (LWD): 100mm x 5mm
Weight: 20 gms

User information

Shake down the thermometer to ensure mercury is below the last reading on the scale. Place thermometer tip in the usual oral cavity, taking care to avoid breakage. Leave in place for 3 minutes, remove and read. Clean as laid down by the infection control protocol then store in a clean area for re-use.

Special features

Protective plastic case.
Antitheft device: not applicable
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Every thermometer is tested at two temperatures using a reference thermometer traceable to national standards

Thermometer care

Cleaning probe tip: Use either an alcohol swab or wash with soapy water and dry
Cleaning body: As for probe tip
Storage conditions: Store in a sterile/ clean area

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO 9001:2000 Manufacturer claims compliance with BS EN 12470-1:2000
CE mark: Yes Code: 0086
Notified Body: BSI Product Services

Price (ex VAT):	**95 pence (£9.50 pack 10)**
Supplier:	GH Zeal Ltd
Address:	8 Deer Park Road, Merton, LONDON SW19 3UU
Telephone:	020 8542 2283
Fax:	020 8543 7840
Website:	www.zeal.co.uk
e-mail:	scientific@zeal.co.uk
Manufacturer:	ZEAL Group
Manufactured in:	information not supplied

Mercury in glass: Zeal M2510

Traditional re-usable thermometer designed to be used rectally for sub normal (hypothermia) body temperatures, range 24/ 40°C
Intended use: Hospital, community and home use
Measurement site: Rectum
Patient group: Children and adults
Size (LWD): 100mm x 5mm
Weight: 20 gms

User information

Shake down the thermometer to ensure mercury is below the last reading on the scale. Place thermometer tip in the rectum, taking care to avoid breakage. Leave in place for 3 minutes, remove and read. Clean as laid down by the infection control protocol then store in a clean area for re-use.

Special features

Protective plastic case.
Antitheft device: not applicable
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Every thermometer is tested at two temperatures using a reference thermometer traceable to national standards.

Thermometer care

Cleaning probe tip: Use either an alcohol swab or wash with soapy water and dry
Cleaning body: As for probe tip
Storage conditions: Store in a sterile/ clean area

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO 9001:2000 Manufacturer claims compliance with BS EN 12470-1:2000
CE mark: Yes Code: 0086
Notified Body: BSI Product Services

Price (ex VAT):	**95 pence (£9.50 pack 10)**
Supplier:	GH Zeal Ltd
Address:	8 Deer Park Road, Merton, LONDON SW19 3UU
Telephone:	020 8542 2283
Fax:	020 8543 7840
Website:	www.zeal.co.uk
e-mail:	scientific@zeal.co.uk
Manufacturer:	ZEAL Group
Manufactured in:	information not supplied

Chemical (phase change) thermometers

How they measure temperature

A chemical (phase change) thermometer comprises a piece of plastic with small cavities, each containing a chemical mixture of slightly different proportions. Some devices on the market comprise a mixture of two organic chemicals which are soluble in each other (each having a distinct melting point). By altering the ratio of the two chemicals and incorporating a dye the colour will change at the precise temperature the mixture melts. Other manufacturers of chemical thermometers use three cholesteric liquid crystal compounds and vary the concentration of a soluble additive to achieve a visual change at specific temperatures.

These chemical dots are covered with a clear polymeric film which allows observation of their changing colour, prevents user contact with the chemicals and provides a robust contact thermometer suitable for most clinical measurement sites. Most are low cost and may be designed for single use or multiple use for a single patient. The time taken to achieve thermal equilibrium is less than for mercury in glass so measurement time is usually about a minute. Some incorporate a 'temperature offset' which compensates for the difference in heat-transfer characteristics between sublingual tissues and a water bath.

The international standard EN 12470 part 2 [18], published 4 years ago, details appropriate accuracy and calibration methods for these clinical thermometers. This standard requires the maximum error measured in the laboratory to be +0.1°C and -0.2°C over a minimum operating temperature range 35.4°C to 40.4°C. Some chemical thermometers were already on the market so manufacturers may state compliance with ASTM E 825 [23], which requires the maximum laboratory error to be ±0.1°C from 37°C to 39°C and ±0.2°C from 35.8°C to 36.9°C and 39.1°C to 41.0°C.

Manufacturer's advice on clinical use

- Do not use within 30 minutes of patient taking exercise, bathing, eating, drinking or smoking.
- During oral measurement, if applicable, ensure the thermometer tip is placed in the left or right sublingual pocket, with the dot side under the patient's tongue. Other areas in the mouth are cooler and the diagnosis of fever may be missed. The patient should hold their tongue down on the strip and keep their mouth closed for 1 minute.
- For axilla measurement, if applicable, hold arm to chest for 3 minutes after placing the chemical thermometer high in the armpit.
- Read within 30 seconds after removal from the measurement site.

Overall comparison of manufacturer's data

Currently on the UK market there are several different configurations including thermometers for oral use and strips for application to the forehead or axilla.

Several chemical thermometer models have equivalent laboratory accuracy (±0.1°C) to the mercury-in-glass maximum thermometers (see **Table 2**). One model has a lower accuracy (±1.0°C), but this is only intended for first line assessment of fever status, not for clinical diagnosis or monitoring temperature changes. Typical time to reading is one minute, considerably less than for mercury-in-glass thermometers.

Appropriate storage conditions vary considerably but some models offer a 5 year shelf life and can tolerate temporary storage at extreme temperatures, quickly returning to normal operation when they are returned to be within the manufacturer's stated ambient range. Some models may need to 'reset' by storage in a refrigerator.

None are prone to error from electronic interference, which can be generated by hospital or radio-communications equipment (eg mobile phones).

Measurement accuracy in clinical use can be similar to the quoted laboratory accuracy and that of mercury in glass thermometers provided users follow the manufacturer's advice on clinical use.

Table 2 Chemical thermometers - Accuracy** and Temperature Display

Chemical thermometers	Manufacturer's Stated Accuracy (highest)				Are all readings at highest stated accuracy?	Warning if reading is outside display range	Lowest accuracy (eg outside operating range)	Thermometer display		Typical time to reading (oral)
	Highest accuracy (°C)	Operating range (°C)	Ambient temperature range (°C)	Ambient humidity RH				Display resolution	Display range (°C)	
3M Tempa.DOT	+0.1/ -0.2	35.5 ~ 40.4	<35	0% - 100%	BF		n/a	0.1°C	35.5 ~ 40.4	1 min
EZEtemp Disposable	±0.1	35.5 ~ 40.4	<50	0% - 100%	BE		n/a	0.1°C	35 ~ 40.4	1 min
EZEtemp Traxit	±0.1	35 ~ 41.9	<50	0% - 100%	BE		n/a	0.1°C	35 ~ 41.9	@ 5 sec ~ 3 min
Forehead Thermometer	±1.0	35 ~ 40	18 - 27	0% - 100%	BF		n/a	1.0°C	35 ~ 40	15 sec (forehead)
Insight Traxit	±0.1	35 ~ 41.9	<50	0% - 100%	BE		n/a	0.1°C	35 ~ 41.9	2 - 3 min (axila)
Nextemp	±0.1	35.5 ~ 40.4	<50	0% - 100%	BE		n/a	0.1°C	35 ~ 40.4	1 min
Spot Check	±0.1	35.5~ 41.9	<50	0% - 100%	BE		n/a	0.1°C	35 ~ 41.9	1 min

**	Measurement accuracy can often be much better than measurement repeatability in clinical use.
B	Highest accuracy is obtained for all/ most displayed values.
C	Some displayed temperatures are not at the highest stated accuracy.
D	Minimal restrictions on the ambient temperature before or during measurement.
E	Extended ambient temperature range may reduce problems and inaccuracies when used in the community.
F	Ambient temperatures need to be at a comfortable room temperatue for correct function and/ or highest accuracy.
G	Display indicating when the temperature reading is beyond the measurement range.
@	Adhesive thermometer for axilla readings. Time taken is 3 minutes for the first reading and 5 seconds for subsequent readings.

Chemical: 3M™ Tempa.DOT™ Single-Use

Thin flexible plastic strip with heat responsive indentations which turn from orange to blue when they exceed their designated temperature.
Intended use: Hospital and primary care
Measurement site: Oral and axilla
Patient group: Adults, children and infants
Size (LWD): 91mm x 9mm
Weight: <1 gm

User information

Do not use within 15 minutes of exercise. Place the sensor (dots) in the usual oral position or in the axilla with tab parallel with the body, so the sensor is surrounded by warm tissue. Ten seconds after removal read the last blue dot, ignore skipped dots. Discard immediately after use.

Special features

Stored in individual sterile packaging; shorter time to reading than mercury in glass thermometers, designed for single use, ambient temperature must be less than 35°C, preferably less than 30°C.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory calibration - tested for accuracy Do not use after expiry date on package.

Thermometer care

Cleaning probe tip: not applicable
Cleaning body: not applicable
Storage conditions: Shelf life 2yrs from date of manufacture. Store at less than 30°C. Can be reset when exposed to temperatures above 35°C by placing in freezer for at least an hour and then placing in room temperature for one day.

Maintenance and ongoing costs

Disposable covers: not applicable
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO 9001:2000; ISO 13485:1996
Manufacturer claims compliance with ASTM E 825-87
CE mark: Yes Code: 0086
Notified Body: British Standards Institute

Price (ex VAT):	**7.0 pence each** (£174.67 per 2500)
Supplier:	3M Health Care Ltd
Address:	3M House, Morley Street, Loughborough LE11 1EP
Telephone:	01509 611611
Fax:	01509 613326
Website:	www.3mhealthcare.co.uk
e-mail:	innovation@uk.mmm.com
Manufacturer:	3M Co
Manufactured in:	USA

Chemical: EZEtemp Disposable

Thin flexible plastic strip with heat responsive indentations which turn from green to black when they exceed their designated temperature.
Intended use: Hospital, primary care and home
Measurement site: Oral and axilla
Patient group: Adults and children
Size (LWD): 90mm x 10mm
Weight: <1gm

User information

Place thermometer's sensor area in usual oral or axilla position so it is surrounded by warm tissue. Remove the tab after 1 ~ 3 minutes and read immediately. Last black dot indicates temperature reading.

Special features

Non-toxic; mercury free; not affected by ambient temperature changes therefore measurements can be repeated; thermometer and wrapper is latex free; individually wrapped; designed for single patient use; light and easily portable; with proper care can be reused during the course of an illness for a single patient.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory quality assurance check from each batch in accordance with BS EN ISO 9001:2000. Calibration traceable to UKAS certified Master Standards.

Thermometer care

Cleaning probe tip: Wipe with an alcohol-swab or wash with hot soapy water, rinse, wipe dry.
Cleaning body: As for 'cleaning probe tip'
Storage conditions: 5 year expiry date from date of manufacture (printed on wrapper). Store in dry conditions.

Maintenance and ongoing costs

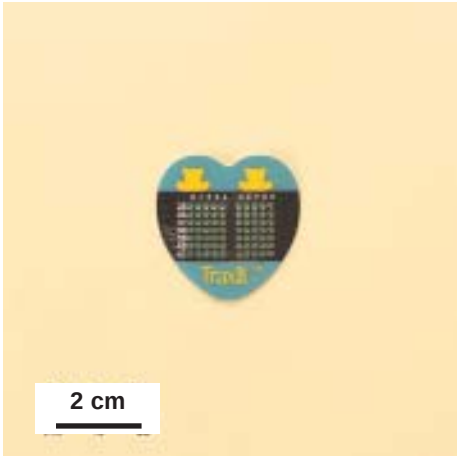
Disposable covers not applicable
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

BS EN ISO 9001:2000 Manufacturer claims compliance with ASTM E1299-96;
CE mark: Yes Code: 0086
Notified Body: BSI Product Services

Price (ex VAT):	**14 pence (£140 per 1000)**
Supplier:	GH Zeal Ltd
Address:	8 Deer Park Road, Merton, LONDON SW19 3UU
Telephone:	020 8542 2283
Fax:	020 8543 7840
Website:	www.zeal.co.uk
e-mail:	scientific@zeal.co.uk
Manufacturer:	Medical Indicators
Manufactured in:	USA

Chemical: EZEtemp Traxit



Adhesive plastic thermometer designed to be placed under the arm for up to 48 hours. Heat responsive indentations which turn from green to black when they exceed their designated temperature.
Intended use: Hospital, primary care and home
Measurement site: Axilla
Patient group: Newborns, children, patients in ICU and recovery.
Size (LWD): 33mm x 32mm
Weight: <1gm

User information

Place adhesive surface in usual axilla position, cover with arm for three minutes. Lift arm to read. Last black dot indicates temperature.

Special features

Can remain in place for 48 hours for repeated reading; extended range (31.6°C to 41.9°C) suitable for hypothermic patients; constant wearable source of temperature measurement in hairless or shaved axilla, causing minimal patient disturbance; hypoallergenic and non-toxic; easy to read.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory quality assurance check from each batch in accordance with BS EN ISO 9001:2000

Thermometer care

Cleaning probe tip: not applicable
Cleaning body: Patient bathing is tolerated
Storage conditions: 5 year expiry date from date of manufacture (printed on wrapper). Store in dry conditions. Carefully controlled environment not required.

Maintenance and ongoing costs

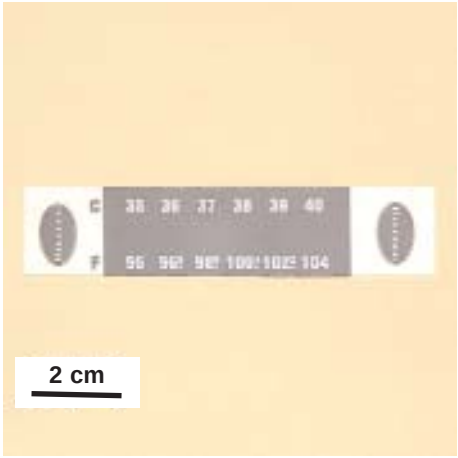
Disposable covers: not applicable
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

BS EN ISO 9001:2000. Manufacturer claims compliance with ASTM E1299-96.
CE mark: Yes Code: 0086
Notified Body: BSI Product Services

Price (ex VAT):	**70 pence (£70 per 100)**
Supplier:	GH Zeal Ltd
Address:	8 Deer Park Road, Merton, LONDON SW19 3UU
Telephone:	020 8542 2283
Fax:	020 8543 7840
Website:	www.zeal.co.uk
e-mail:	scientific@zeal.co.uk
Manufacturer:	Medical Indicators
Manufactured in:	USA

Chemical: Forehead Thermometer



Reusable plastic strip comprising a liquid crystal display and scale markings for fever assessment when placed on the skin. Zone showing green colour indicates the temperature.
Intended use: Hospital and home use
Measurement site: Forehead
Patient group: Adults, children and infants
Size (LWD): 92mm x 20mm
Weight: <1gm

User information

Use fingers to hold the strip at both ends onto the forehead after they have been seated or lying for over 5 minutes. Self reading is possible when facing a mirror. Use in air temperatures between 18°C and 27°C. Note normal temperatures for comparison when illness is suspected. Use a more accurate thermometer if fever is indicated.

Special features

Supplied with a plastic storage box; store in protective case when dry after cleaning; keep away from ultra-violet/sunlight, dampness and heat.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory calibration of samples from each batch to ±0.2°C.

Thermometer care

Cleaning probe tip: Wipe with a soft cloth or tissue moistened with water
Cleaning body: Wipe with a soft cloth or tissue moistened with water
Storage conditions: Shelf life 5 years. Keep out of heat and direct sunlight.

Maintenance and ongoing costs

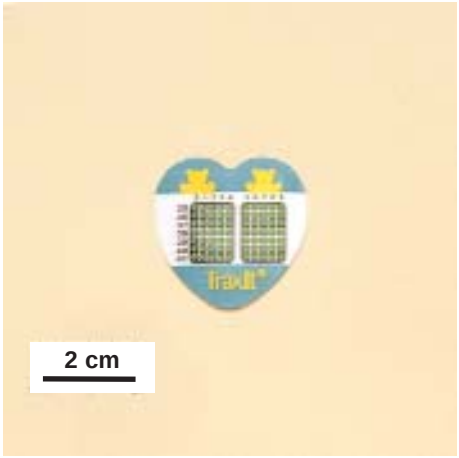
Disposable covers: not applicable
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

ISO9001:2000
CE mark: Yes Code: CE0088
Notified Body: LRQA, Coventry, UK

Price (ex VAT):	**£2.54**
Supplier:	S Brannan & Sons Ltd
Address:	Leconfield Indsutrial Estate, Cleator Moor CA25 5Q
Telephone:	01946 816625
Fax:	01946 816625
Website:	www.brannan.co.uk
e-mail:	sales@brannan.co.uk
Manufacturer:	information not supplied
Manufactured in:	information not supplied

Chemical: Insight Traxit



Adhesive plastic thermometer designed to be placed under the arm for up to 48 hours. Heat responsive indentations which turn from green to black when they exceed their designated temperature.
Intended use: Hospital, primary care and home
Measurement site: Axilla
Patient group: Children and infants
Size (LWD): 33mm x 32mm
Weight: <1gm

User information

Place adhesive surface in usual axilla position, cover with arm for three minutes. Lift arm to read. Last black dot indicates temperature.

Special features

Constant wearable source of temperature measurement; can remain in place for 48 hours for repeated reading; latex free adhesive; subsequent readings almost instantaneous and cause minimal patient disturbance; easy to read.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory calibration of samples from each batch using a reference thermometer traceable to national reference standards.

Thermometer care

Cleaning probe tip: not applicable
Cleaning body: not applicable
Storage conditions: Shelf life of 5 years. Controlled storage conditions not required. Exposure to temperatures over 50°C can be tolerated. Green dots return when the thermometer is placed in a cooler environment.

Maintenance and ongoing costs

Disposable covers: not applicable
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

BS EN ISO 9001:2000.
Manufacturer claims compliance with ASTM E1299-96.
CE mark: Yes Code: 0086
Notified Body: BSI Product Services

Price (ex VAT):	**61 pence each (£2.45 pack of 4)**
Supplier:	Insight Medical Products Ltd
Address:	Units 1-4, Silk Mill Studios, 2 Charlton Road, Tetbury, Gloucester GL8 8DY
Telephone:	01666 500055
Fax:	01666 500115
Website:	wayne@insightmedical.net
e-mail:	www.insightmedical.net
Manufacturer:	Medical Indicators
Manufactured in:	USA

Chemical: Insight Nextemp

Thin flexible plastic strip with heat responsive indentations which turn from green to black when they exceed their designated temperature.
Intended use: Hospital, primary care and home
Measurement site: Oral and axilla
Patient group: Adults and children
Size (LWD): 91mm x 9mm
Weight: <1gm

User information:
Place under tongue like a traditional mercury thermometer. Read temperature immediately after withdrawal. Discard immediately.

Special features
Stored in individual sterile packaging; mercury free; no halgonated nitrobenzines.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory calibration of samples from each batch using a reference thermometer traceable to national reference standards.

Thermometer care
Cleaning probe tip: not applicable
Cleaning body: not applicable
Storage conditions: Shelf life of 5 years. Controlled storage conditions not required. Exposure to temperatures over 50°C can be tolerated. Green dots return when the thermometer is placed in a cooler environment.

Maintenance and ongoing costs
Disposable covers: not required
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards
BS EN ISO 9001:2000. Manufacturer claims compliance with ASTM E1299:96
CE mark: Yes Code: 0086
Notified Body: BSI Product Services

Price (ex VAT):	**£2.40**
Supplier:	Insight Medical Products Ltd
Address:	Units 1-4, Silk Mill Studios, 2 Charlton Road, Tetbury, Gloucester GL8 8DY
Telephone:	01666 500055
Fax:	01666 500115
Website:	wayne@insightmedical.net
e-mail:	www.insightmedical.net
Manufacturer:	Medical Indicators
Manufactured in:	USA

Chemical: Spot Check

Flexible plastic strip with heat responsive indentations which turn from green to black when they exceed their designated temperature.
Intended use: Hospital, community and home
Measurement site: Oral
Patient group: Adults, children and infants
Size (LWD): 78mm x 11mm
Weight: <1gm

User information

Place under tongue like a traditional mercury thermometer but achieves equilibrium more rapidly. Remove the tab after 1 -3 minutes and read immediately. Last black dot indicates temperature reading.

Special features

Reusable as display is reset after 30 seconds at room temperature; with proper storage can be reused during the course of an illness for a single patient; mercury free; supplied in a plastic storage box.
Antitheft device: no
Low battery indicator: not applicable
Self-check on start-up: not applicable
Calibration: Factory calibration of samples from each batch to ±0.2°C using thermometers traceable to national reference standards.

Thermometer care

Cleaning probe tip: Wipe with luke warm water or light disinfectant. Wipe dry before storing in case.
Cleaning body: As for probe tip
Storage conditions: Shelf life 5 years. Keep out of heat and direct sunlight

Maintenance and ongoing costs

Disposable covers not applicable
Battery: not applicable
Battery life: not applicable
Maintenance: not applicable

Manufacturing standards

BS EN ISO 9001:2000. Manufacturer claims compliance with ASTM E1299:96
CE mark: Yes Code: CE 0088
Notified Body: LRQA, Coventry, UK

Price (ex VAT):	**£1.27 per pack**
Supplier:	S Brannan & Sons Ltd
Address:	Leconfield Indsutrial Estate, Cleator Moor CA25 5Q
Telephone:	01946 816625
Fax:	01946 816625
Website:	www.brannan.co.uk
e-mail:	sales@brannan.co.uk
Manufacturer:	Medical Indicators
Manufactured in:	USA

Electronic contact thermometers

How they measure temperature

A resistance thermometer (thermistor) makes use of the change of electrical resistance in a metal wire with temperature; the higher the temperature the greater the resistance. Usually a coil of pure platinum wire is wound onto a ceramic plug and mounted in a steel tube, but other configurations may be used. Electronic circuitry is also required to digitally measure the resistance, calculate the temperature using stored calibration data and display the temperature reading.

In the 1950s large battery powered devices were developed for continuous temperature monitoring. Most are now incorporated into multi-parameter patient monitoring systems but one 'stand alone' device is available on the UK market. This offers simultaneous monitoring of two body sites using detachable wires connected to thermistor sensors. The international standard BS EN 12470 part 4 [20], published 4 years ago, details appropriate accuracy and calibration methods for these clinical thermometers. This standard requires the maximum error measured in the laboratory to be ±0.1°C over the operating temperature range 25°C to 45°C.

Micro-electronics led to the development of compact electronic thermometers in the 1970s. Usually the metal covered thermistor makes skin contact in the mouth, axilla or rectum. These are light and easily portable. In predictive mode they can produce temperature readings in a matter of seconds. Predictive mode samples the temperature rise of the sensor at regular intervals and uses a mathematical algorithm, based on experimental data, to predict the eventual steady state temperature. Some models also offer a monitor mode which continually updates the temperature reading of the sensor. These may default to monitor mode if the ambient temperature is too cool or hot, as predictive mode is prone to greater errors under these conditions. The international standard covering these devices is BS EN 12470 part 3[19] published 5 years ago. In this standard the maximum permitted laboratory error is ±0.1°C for the operating temperature range of at least 35.5°C to 42°C when working in monitor mode. Many of these thermometers were designed earlier than this date and a few manufacturers state compliance with ASTM E 1112 [24] which only requires the maximum laboratory error to be ±0.1°C between 37°C to 39°C. Clinical accuracy may be poorer than these figures when the thermometer is used in predictive mode, especially if the ambient temperature or temperature of the thermometer is outside the manufacturer's specified range (eg after storage in a cold car boot).

Manufacturer's advice on clinical use

The key issues covered in the user instructions for continuous temperature monitoring and compact electronic thermometers are:

- Ensure the self check on start up is error free, some models will not measure temperature if the ambient temperature is outside the specified range.

- Do not use within 30 minutes of patient taking exercise, bathing, eating, drinking or smoking.
- Hold mouth closed for 5 minutes before oral measurement. Hold arm to chest for 5 minutes before axilla measurement.
- During oral measurement ensure the thermometer tip is placed in the left or right sublingual pocket, as other areas in the mouth are cooler and the diagnosis of fever may be missed.

Overall comparison of manufacturer's data

The manufacturers' stated accuracy data for a single model of a dual channel continuous monitoring thermometer and 19 compact electronic thermometers are compared in **Table 3**. All devices achieve a laboratory accuracy of ±0.1°C for the whole or part of their display range. The operating range, ambient temperature and humidity range for which this accuracy applies is wider for the continuous monitoring thermometer than the compact models. Testing the ambient temperature is often included in the electronic self-check. Most models display an error message and may not perform a measurement sequence if the thermometer is too cold or hot to produce the best accuracy. Some models will automatically switch to continuous monitoring mode under these conditions, which can be less frustrating for clinical users who temporarily store or use their diagnostic equipment outdoors, eg a car boot.

Some models may produce reading errors when subject to electronic interference, which can be generated by some types of hospital equipment or radio-communication devices (eg mobile phones).

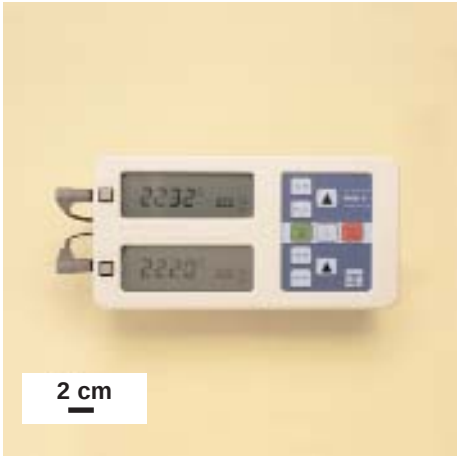
Accuracy in clinical use can be similar to the quoted laboratory accuracy and accuracy of mercury in glass thermometers provided users follow the manufacturer's advice on clinical use and the environment is appropriate.

Table 3 Electronic contact thermometers - Accuracy** and Temperature Display

Electronic contact thermometers	Manufacturer's Stated Accuracy (highest)				Are all readings at highest-stated accuracy?	Warning if reading is outside display range	Lowest accuracy (eg outside operating range)	Thermometer display		Typical time to reading (oral)
	Highest accuracy (°C)	Operating range (°C)	Ambient temperature range (°C)	Ambient humidity RH				Display resolution	Display range (°C)	
YSI 4000A	±0.1	25 ~ 45	0 ~ 50	0 - 95%	BD	n/a		0.1°C	0 ~ 50	continuous
Digitemp (UN518)	±0.1	34 ~ 40	15 ~25	not supplied	CF	G	not supplied	0.01°C	32 ~ 42.99	60 - 90 sec
Filac FasTemp	±0.1	35.5 ~ 42	18 ~ 28	10 ~ 95%	CF	G		0.1°C	30 ~ 43	4 sec
FlexTemp (MC-205-E)	±0.1	34 ~ 42	18 ~ 28	30 ~ 85%	CF	G	not supplied	0.1°C	32 ~ 43.9	1 min
IVAC Temp Plus II	±0.1	35.8 ~ 41	16 ~ 40	15% - 95%	BF		not supplied	0.1°C	26.7 ~ 42.2	not supplied
Microlife MT1671	±0.1	34 ~ 42	18 ~ 28	30 ~ 85%	CF	G	not supplied	0.1°C	32 ~43.9	60 sec
Microlife MT16F1	±0.1	34~ 42	18 ~ 28	30 ~ 85%	CF	G	not supplied	0.1°C	32 ~ 43.9	60 sec
Microlife MT18F1	±0.1	34~ 42	18 ~ 28	30 ~ 85%	CF	G	not supplied	0.1°C	32 ~ 42.9	20 sec
Microlife MT1921	±0.1	34~ 42	18 ~ 28	30 ~ 85%	CF	G	not supplied	0.1°C	32 ~ 42.9	30 sec
Microlife MT1931 Gold	±0.1	34~ 42	18 ~ 28	30 ~ 85%	CF	G	not supplied	0.1°C	32 ~ 43.9	60 sec
Microlife MT1951	±0.1	34~ 42	18 ~ 28	30 ~ 85%	CF	G	not supplied	0.1°C	32 ~ 43.9	20 sec
Microlife MT1961	±0.1	34~ 42	18 ~ 28	30 ~ 85%	CF	G	not supplied	0.1°C	32 ~ 42.9	20 sec
O-Temp	±0.1	32~ 42	18 ~ 28	30 ~ 85%	CF	G	not supplied	0.1°C	32 ~ 42	1 min
Proact ST714	±0.1	32~ 43	5~42	0 ~ 80%	BE	G		0.01°C	32 ~ 43	5 sec
Proact ST8338	±0.1	32~42	5~40	10 ~ 80%	BE	G		0.01°C	32 ~ 43	60 sec
Proact 871	±0.1	32~ 42	5~40	10 ~ 80%	BE	G		0.1°C	32 ~ 43	10 sec
Proact 871(flexible tip)	±0.1	32~ 43	5~40	10 ~ 80%	BE	G		0.1°C	32 ~ 43	10 sec
Suretemp Plus	±0.1	26.7~43.3	10~40	15 ~ 95%	BE	G		0.1°C	26.7 ~ 43.3	6 sec
ThermoTek Instant	±0.1	32~43.4	16~40	not supplied	BF	G		0.01°C	32 ~ 43.4	5 sec
Zeal M5003	±0.1	35.5~42.9	18 ~ 28	0 ~ 100%	CD	G	±0.2	0.1°C	28 ~ 42	1 min

see page 13 for details of the abbreviations used in Table 3

Electronic monitoring: YSI 4000A



Dual channel electronic contact thermometer using thermistors embedded within reusable or disposable probes. Designed for simultaneous continuous monitoring at two sites.
Intended use: Hospital especially surgical, recovery and ICU
Measurement site: Range of internal and external probes available.
Patient group: Adults, children and infants
Size (LWD): 223mm x 76mm x 115mm
Weight: 960 gm

User information

Portable dual channel, dual display device for patient temperature monitoring. User can independently select HI and LO alarm threshold values. An audible alarm can warn users when reading lies outside a pre-selected range. Take normal precautions to avoid alternate site injuries if patient is subject to electrosurgery.

Special features

Able to set normal temperature range for each probe; self calibration (at 37°C) optimises performance at each ambient temperature; visual and then audible alarms are activated if temperatures are too 'Hi' or 'Lo'; 15 second pulse counter; self-test procedure on start-up includes illumination of all segments of the display; supplied with carrying/ pole mounting handle.
Antitheft device: No
Low battery indicator: 'LO battery' illuminates when 25 hours left
Self-check on start-up: Yes
Calibration: Factory calibration using standards traceable to National Institute of Standards and Technology, USA. Recalibration required.

Thermometer care

Cleaning probe tip: Varies, depending on the specification of the detachable probe
Cleaning body: Wipe down with Isopropyl alcohol and soft cleaning cloth
Storage conditions: -50°C to 65°C, 0% to 95% RH

Maintenance and ongoing costs

Disposable covers No, reusable or disposable probes
Battery: Alkaline C size x6 (9V)
Battery life: 900 hours minimum
Maintenance: Return to manufacturer if 'SELF CAL' message does not go away.

Manufacturing standards

ISO9001:2000; ISO14001:1996; EN13485:1996. Manufacturer claims compliance with EN 60601-1; UL2601-1; EN58001; EN50082; EN1441
CE mark: Yes Code: 0336
Notified Body: TNO Certification

Price (ex VAT):	**£356.00 approx (E440)**
Supplier:	Technomed
Address:	Amerikalaan 716199 AE, Maastricht-Airport Netherlands
Telephone:	+31 434086868
Fax:	+31 434086888
Website:	www.technomed.n1
e-mail:	rtilli@technomed.n1
Manufacturer:	YSI
Manufactured in:	USA

Electronic contact: Digitemp (UN518)

Electronic contact thermometer using a thermistor to sense temperature. Audible tone when temperature rise is <0.1°C in 8 seconds.
Intended use: Hospital, community and home use
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 125mm x 20mm x 10mm
Weight: 10 gm

User information:

Press on/off switch to initiate a self check. After 'L' is displayed place probe tip at the measurement site until reading complete (four beeps repeated 8 times).

Special features

Memory of last reading; waterproof unit; supplied with a plastic storage case.
Antitheft device: No
Low battery indicator: '-' is displayed
Self-check on start-up: Yes
Calibration: Factory calibration traceable to national standards

Thermometer care

Cleaning probe tip: information not supplied
Cleaning body: information not supplied
Storage conditions: -10°C to 60°C

Maintenance and ongoing costs

Disposable covers: not required (waterproof) 3p each (£3 for 100)
Battery: type LR41 battery, 1.5V
Battery life: 2000 measurements
Maintenance: information not supplied

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996 Manufacturer claims compliance with ISO 12470-3:2000.
CE mark: Yes Code: 0482
Notified Body: Medcert, Germany

Price (ex VAT):	**£3.85**
Supplier:	Universal Hospital Supplies
Address:	Unit 6, George House,
Millmarsh	Industrial Estate, Enfield
	AN3 7QJ
Telephone:	0845 0820182
Fax:	0845 0820180
Website:	www.uhs.co.uk
e-mail:	sales@uhs.co.uk
Manufacturer:	Microlife
Manufactured in:	Taiwan

Electronic contact: Filac FasTemp

Electronic contact thermometer using a thermistor to sense temperature rise and predict final temperature reading.
Intended use: Hospital or community use
Measurement site: Oral and axilla. Rectal (optional)
Patient group: Adults, children and infants
Size (LWD): 203mm x 81mm x 67mm
Weight: 275 gm

User information
Operators manual, video and CD are available for training users.

Special features
Liquid crystal illuminated display; predictive mode for fast temperature readings; direct mode for monitoring and hypothermic patients; last temperature recall; 30 second pulse timer; push button probe removal; graphic icons (eg turtle icon for indicating continuous monitoring mode - called direct mode); arrow icons indicate reading is outside measurement range; wall mounting base; rectal probes and isolation chamber available as optional extras
Antitheft device: Yes, if selected in Biotech mode
Low battery indicator: Yes
Self-check on start-up: Yes
Calibration: Factory calibration of each unit uses thermometers traceable to national standards. Accuracy checks are recommended every 6 months and after suspected damage. Calibration plug (202099) which is traceable to national standards may be purchased for users to check accuracy.

Thermometer care
Cleaning probe tip: Use damp cloth with diluted detergent
Cleaning body: Use a cloth or sponge soaked in a mild detergent solution
Storage conditions: Not to exceed 30 days at storage temperature 20-55°C/10-95% relative humidity, non condensing.

Maintenance and ongoing costs
Disposable covers: required 4.7p each (£235.07 for 5,000)
Battery: Alkaline 9V battery
Battery life: 2000 readings
Maintenance: Technical IFU manual and training for medical technologists is available. No user serviceable parts.

Manufacturing standards
ISO9002, ISO 13485 Manufacturer claims compliance with, EN60601-1-2:1993; ASTM E1112:1998
CE mark: Yes Code: 0123
Notified Body: TUV Product Service

Price (ex VAT):	**£198.85**
Supplier:	Tyco Healthcare
Address:	154 Fareham Road, Gosport PO13 OAS
Telephone:	01329 224114
Fax:	01329 224334
Website:	
e-mail:	marketinguk@tycohealth.com
Manufacturer:	Tyco Healthcare (Kendall)
Manufactured in:	USA

Electronic contact: FlexTemp (MC-205-E)

Electronic contact thermometer using a thermistor to sense temperature rise. Audible tone when temperature rise is <0.1°C in 16 seconds. Display continues for 10 minutes and then turns off.
Intended use: Home use
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 178mm x 60mm x 14mm
Weight: 11 gm

User information:

Compact user information booklet provided. Only use within acceptable ambient conditions. See general advice for measuring oral, axilla and rectal temperature.

Special features

Flexible probe tip; waterproof; last measurement memory; displays 'L' or 'H' if measured temperature is below or above the stated operating range (see Table 3); supplied with plastic storage case.
Antitheft device: No
Low battery indicator: '▼' symbol displayed
Self-check on start-up: Yes
Calibration: Factory calibration traceable to national reference standards. Verify accuracy in an authorised laboratory at least every two years.

Thermometer care

Cleaning probe tip: For home use wipe with damp cloth (water or alcohol). For professional use immerse in 70% isopropyl alcohol (95% dilution), gigasept FF(5% dilution), lysoforium 3000 (6% dilution) or aseptisol (4% dilution) for up to 24 hours
Cleaning body: As for probe tip
Storage conditions: -10°C to +60°C, 10% to 95% RH

Maintenance and ongoing costs

Disposable covers: not required (waterproof). Available at 21p each (£4.21 for 20)
Battery: IEC type SR41 silver oxide high drain (1.55V)
Battery life: 200 hours usage
Maintenance: Uneconomical to repair. Manufacturer will replace if a fault occurs during 2 year warranty period.

Manufacturing standards

ISO9001:2000; EN ISO 13488:2000; Manufacturer claims compliance with EN 60601-1:1998; prEN12470-3:1997; EN60601-1-2; EN 980; EN 1041; EN 1441
CE mark: Yes Code: 0197
Notified Body: TUV, Rheinland

Price (ex VAT):	**£8.95**
Supplier:	Omron Healthcare UK Ltd
Address:	Opal Drive, Fix Milne Milton Keynes MK15 0DG
Telephone:	01908 258 285
Fax:	01908 258 286
Website:	www.omron-healthcare.com
e-mail:	info.omronhealthcare.uk@eu.omron.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan and China

Electronic contact: IVAC Temp Plus II

Electronic contact thermometer using a thermistor to sense temperature rise and predict the final reading, indicated by an audible beep. Monitor mode also provided.
Intended use: Hospital and primary care
Measurement site: Oral, axilla(monitor only) & rectal
Patient group: Adults, children and infants
Size (LWD): 175mm x 73mm x 57mm
Weight: 341 gm

User information
Detailed user manual includes advice on probe positioning.

Special features
Liquid crystal illuminated display; separate holders for oral and rectal probes; loading probe starts measurement; rotating pinwheel icon indicates good tissue contact; pulse timer (15, 30 and 60 seconds); push button probe removal; recalls last reading; stated accuracy applies in monitor mode not the predictive (default) mode; supplied with probe cover dispenser, set of covers and wall mounting home base.
Antitheft device: Home base system. Regular return is needed for continued usage
Low battery indicator: 'Battery Low' display then 'Replace battery'
Self-check on start-up: Yes
Calibration: Factory calibration uses ALARIS probe simulator. Re-calibration is advised using a water bath or electronic probe simulator (6 display readings) obtainable from the manufacturer.

Thermometer care
Cleaning probe tip: See 'cleaning body'
Cleaning body: Clean instrument surface with 10% chlorine bleach solution, 3% hydrogen peroxide, cidex betadine or a mild detergent in warm water. Apply with dampened sponge, brush or cloth and wipe dry with a clean cloth/towel
Storage conditions: -31°C to 60°C, 5-95% RH

Maintenance and ongoing costs
Disposable covers required: 4.7p each (£237.38 for 5000)
Battery: Alkaline AA size x3 (4.5V)
Battery life: 1 year
Maintenance: Daily inspection for damage. Annual preventative maintenance recommended. Service manual and training for medical engineers is available.

Manufacturing standards
9001:2000. Manufacturer claims compliance with EN 601-1:1977; EN 55011:1991; EN60601-1-2:1993
CE mark: Yes Code: 0526
Notified Body: British Standards Institute

Price (ex VAT):	**£400.00**
Supplier:	Alaris
Address:	The Crescent, Jays Close, Basingstoke, Hampshire RG22 4BS
Telephone:	01256 388284
Fax:	01256 388860
Website:	www.alarismed.co.uk
e-mail:	(see website)
Manufacturer:	Alaris Medical Systems Inc
Manufactured in:	USA

Electronic contact: Microlife MT1671

Electronic contact thermometer using a thermistor to continually monitor the temperature. Audible tone when temperature rise is <0.1°C in 16 seconds.
Intended use: Hospital and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 120mm x 16mm x 10mm
Weight: 8gm

User information

Press On/off switch to display last reading and initiate a self check. When 'L' is displayed place probe tip at the measurement site until reading completed (four beeps repeated 10 times). Turn off by pressing the end button briefly. Replace thermometer when 'ERR' is displayed.

Special features

Waterproof; memory for last maximum reading; automatic switch off after 10 minutes non use; self-test includes a check for ambient temperature <32°C and displays 'L' to indicate that measurement can proceed; a reading of 'H' or 'L' indicates that the temperature is above or below the measurement range (see Table 3).
Antitheft device: No
Low battery indicator: '▼' displayed
Self-check on start-up: Yes
Calibration: Factory calibration traceable to national standards. Waterbath calibration check is possible (do not exceed 60°C)

Thermometer care

Cleaning probe tip: Immerse in 70% isopropyl alcohol (95% dilution with water) for up to 24 hours then wipe with a moist towel
Cleaning body: As for probe tip if thermometer is intact
Storage conditions: -10°C to 60°C

Maintenance and ongoing costs

Disposable covers: not required (waterproof)
Battery: IEC type SR41 silver oxide high drain (1.55V)
Battery life: 3000 uses
Maintenance: Technical inspection to verify accuracy is recommended every two years for professional users.

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. Manufacturer claims compliance with prEN12470-3:1997
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£3.36**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Electronic contact: Microlife MT16F1

Electronic contact thermometer using a thermistor to continually monitor the temperature. Audible tone when temperature rise is <0.1°C in 16 seconds.
Intended use: Hospital, community and home use
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 128mm x 20mm x 13mm
Weight: 8gm

User information

Press on/off switch to display last reading and initiate a self check. When 'L' is displayed place probe tip at the measurement site until reading completed (four beeps repeated 10 times). Turn off by pressing the on/off button again.

Special features

Memory for last maximum reading; automatic switch off after 10 minutes non use; supplied with a plastic storage case; self-test includes a check for ambient temperature <32°C and displays 'L' to indicate that measurement can proceed; a reading of 'H' or 'L' indicates that the temperature is above or below the measurement range (see Table 3).
Antitheft device: No
Low battery indicator: '▼' displayed
Self-check on start-up: Yes
Calibration: Factory calibration of each unit prior to dispatch. Waterbath calibration check is possible (do not exceed 60°C)

Thermometer care

Cleaning probe tip: Wipe in cotton swab moistened with 70% isopropyl alcohol (95% dilution with water)
Cleaning body: As for probe tip
Storage conditions: -10°C to 60°C

Maintenance and ongoing costs

Disposable covers: not required (waterproof)
Battery: 1.5V IEC type SR41 silver oxide high drain
Battery life: 3000 uses
Maintenance: Technical inspection to verify accuracy is recommended every two years for professional users.

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. Manufacturer claims compliance with prEN12470-3:1997
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£3.36**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Electronic contact: Microlife MT18F1

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature. Audible tone when temperature rise is <0.1°C in 8 seconds.

Intended use: Hospital, primary care and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 125mm x 20mm x 13mm
Weight: 12 gm

User information:

On/off switch at thermometer end. During measurement the current temperature is displayed continuously and a flashing 'C' is displayed. Audible tone (10 beeps) when temperature rise is >0.1°C in 8 seconds. Turn off by pressing the end button briefly. Replace thermometer when 'ERR' is displayed.

Special features

Waterproof; illuminated display/ backlight; memory for last maximum reading; automatic switch off after 10 minutes non use; 'H' or 'L' indicates that the temperature is above or below the measurement range (see Table 3); supplied with a plastic storage case.

Antitheft device: No
Low battery indicator: '▼' displayed
Self-check on start-up: Yes
Calibration: Factory calibration of each unit prior to dispatch.

Thermometer care

Cleaning probe tip: Immerse in 70% isopropyl alcohol (95% dilution with water) for up to 24 hours
Cleaning body: As for probe tip if thermometer is intact
Storage conditions: -10°C to 60°C

Maintenance and ongoing costs

Disposable covers: not required (waterproof)
Battery: IEC type SR41 silver oxide high drain (1.55V)
Battery life: 3000 uses
Maintenance: Technical inspection to verify accuracy is recommended every two years for professional users.

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. Manufacturer claims compliance with prEN12470-3:1997
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£5.06**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Electronic contact: Microlife MT1921

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature. Audible tone when temperature rise is <0.1°C in 8 seconds.
Intended use: Hospital, primary care and home
Measurement site: Oral and axilla
Patient group: Adults, children and infants
Size (LWD): 130mm x 18mm x 10mm
Weight: 10 gm

User information

On/off switch at thermometer end. During measurement the current temperature is displayed continuously and a flashing 'C' is displayed. Audible tone (10 beeps) when temperature rise is > 0.1°C in 8 seconds. Turn off by pressing the on/off button again. Replace thermometer when 'ERR' is displayed.

Special features

Flexible probe tip; waterproof; illuminated display/ backlight; memory for last maximum reading; automatic switch off after 10 minutes non use; 'H' or 'L' indicates that the temperature is above or below the measurement range (see Table 3); supplied with a plastic storage case.
Antitheft device: No
Low battery indicator: '▼' displayed
Self-check on start-up: Yes
Calibration: Factory calibration of each unit prior to dispatch

Thermometer care

Cleaning probe tip: Immerse in 70% isopropyl alcohol (95% dilution with water) for up to 24 hours (see data sheet for other cleaners)
Cleaning body: As for probe tip if thermometer is intact
Storage conditions: -10°C to 60°C

Maintenance and ongoing costs

Disposable covers: not required (waterproof)
Battery: IEC type SR41 silver oxide high drain (1.55V)
Battery life: 3000 uses
Maintenance: Technical inspection to verify accuracy is recommended every two years for professional users.

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. Manufacturer claims compliance with prEN12470-3:1997
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£5.91**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Electronic contact: Microlife MT1931 Gold

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature. Audible tone when temperature rise is <0.1°C in 8 seconds.
Intended use: Hospital, primary care and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 125mm x 20mm x 12mm
Weight: 8 gm

User information:

Press on/off switch. Information on normal temperature range at three sites is provided. Turn off by pressing the on/off button again. Automatic turn off after 10 minutes.

Special features

Gold tip avoids potential allergic reactions, eg. to nickel; flexible probe tip; waterproof; illuminated display/ backlight; memory for last maximum reading; 'H' or 'L' indicates that the temperature is above or below the measurement range (see Table 3); supplied with a plastic storage case.
Antitheft device: No
Low battery indicator: '▼' displayed
Self-check on start-up: Yes
Calibration: Factory calibration of each unit prior to dispatch.

Thermometer care

Cleaning probe tip: Immerse in 70% isopropyl alcohol (95% dilution with water) for up to 24 hours
Cleaning body: As for probe tip if thermometer is intact
Storage conditions: -10°C to 60°C

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: 1.5V IEC type SR41 silver oxide high drain
Battery life: 3000 uses
Maintenance: Technical inspection to verify accuracy is recommended every two years for professional users.

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. Manufacturer claims compliance with prEN12470-3:1997
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£5.91**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Electronic contact: Microlife MT1951

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature. Audible tone when temperature rise is <0.1°C in 8 seconds.
Intended use: Hospital, primary care and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 145mm x 22mm x 15mm
Weight: 15 gm

User information

On/off switch at thermometer end. During measurement the current temperature is displayed continuously and a flashing 'C' is displayed. Audible tone (10 beeps) when temperature rise is > 0.1°C in 8 seconds. Turn off by pressing the end button briefly.

Special features

Waterproof; illuminated display/ backlight; memory for last maximum reading; automatic switch off after 10 minutes non use; 'H' or 'L' indicates that the temperature is above or below the measurement range (see Table 3); supplied with a 'push on' plastic cover to protect sensor.
Antitheft device: No
Low battery indicator: '▼' displayed
Self-check on start-up: Yes
Calibration: Factory calibration of each unit prior to dispatch. Waterbath calibration check is possible (do not exceed 60°C)

Thermometer care

Cleaning probe tip: Immerse in 70% isopropyl alcohol (95% dilution with water) for up to 24 hours then wipe with a moist towel
Cleaning body: As for probe tip if thermometer is intact
Storage conditions: -10°C to 60°C

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: IEC type SR41 silver oxide high drain (1.55V)
Battery life: 3000 uses
Maintenance: Technical inspection to verify accuracy is recommended every two years for professional users.

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. Manufacturer claims compliance with prEN12470-3:1997
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£5.06**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Electronic contact: Microlife MT1961

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature. Audible tone when temperature rise is <0.1°C in 8 seconds
Intended use: Hospital, primary care and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 145mm x 25mm x 20mm
Weight: 15 gm

User information:

On/off switch at thermometer end. During measurement the current temperature is displayed continuously and a flashing 'C' is displayed. Audible tone (10 beeps) when temperature rise is >0.1°C in 8 seconds Turn off by pressing the end button briefly.

Special features

Flexible probe tip; waterproof; illuminated display/ backlight; memory for last maximum reading; automatic switch off after 10 minutes non use; 'H' or 'L' indicates that the temperature is above or below the measurement range (see Table 3); supplied with a 'push on' plastic cover to protect sensor.
Antitheft device: No
Low battery indicator: '▼' displayed
Self-check on start-up: Yes
Calibration: Factory calibration of each unit prior to dispatch. Waterbath calibration check is possible (do not exceed 60°C)

Thermometer care

Cleaning probe tip: Immerse in 70% isopropyl alcohol (95% dilution with water) for up to 24 hours
Cleaning body: As for probe tip if thermometer is intact
Storage conditions: -10°C to 60°C

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: IEC type SR41 silver oxide high drain (1.55V)
Battery life: 3000 uses
Maintenance: Technical inspection to verify accuracy is recommended every two years for professional users.

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. Manufacturer claims compliance with prEN12470-3:1997
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£5.91**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Electronic contact: O-Temp II (MC-204-E)

Electronic contact thermometer using a thermistor to sense temperature. Audible tone when temperature rise is <0.1^{0}C in 16 seconds. Display continues for 10 minutes and then turns off.
Intended use: Hospital, community and home use
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 124mm x 19mm x 12.5mm
Weight: 15 gm

User information Compact user information booklet provided. Only use within acceptable ambient conditions. See general advice for measuring oral, axilla and rectal temperature.

Special features

Waterproof; last measurement memory; displays 'L' or 'H' if measured temperature is below or above the stated operating range (see Table 3); supplied with plastic storage case.
Antitheft device: No
Low battery indicator: '▼' symbol displayed
Self-check on start-up: Yes
Calibration: Factory calibration traceable to national reference standards. Verify accuracy in an authorised laboratory at least every two years.

Thermometer care

Cleaning probe tip: For home use wipe with damp cloth (water or alcohol). For professional use immerse in 70% isopropyl alcohol (95% dilution), gigasept FF(5% dilution), lysoforium 3000 (6% dilution) or aseptisol (4% dilution) for up to 24 hours
Cleaning body: As for probe tip
Storage conditions: -10°C to 60°C.

Maintenance and ongoing costs

Disposable covers: not required (waterproof). Available at 21p each (£4.21 for 20)
Battery: IEC type SR41 silver oxide high drain (1.55V)
Battery life: 200 hours usage
Maintenance: Uneconomical to repair. Manufacturer will replace if a fault occurs during 2 year warranty period.

Manufacturing standards

ISO9001:2000; EN ISO 13488:2000; Manufacturer claims compliance with EN 60601-1:1998; EN12470-3; EN60601-1-2;
CE mark: Yes Code: 0197
Notified Body: TUV, Rheinland

Price (ex VAT):	**£5.95**
Supplier:	Omron Healthcare UK Ltd
Address:	Opal Drive, Fox Milne, Milton Keynes, MK15 0DG
Telephone:	01908 258 285
Fax:	01908 258 286
Website:	www.omron-healthcare.com
e-mail:	info.omronhealthcare.uk@eu.omron.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan and China

Electronic contact: Proact ST714

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature reading. Visually resembles tympanic ear thermometers but DO NOT insert into ear canal.
Intended use: Hospital, community and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 165mm x 37mm x 50mm
Weight: 65 gm

User information

Press on/off switch to initiate a self check and display last reading. Place probe tip at the measurement site until reading complete (four beeps). Switch off to conserve battery.

Special features

Memory of last reading; auto shutdown after 10 minutes non-use; audible fever alarm when measured temperature >37.5°C; user selectable display units °F or °C; waterproof unit; supplied with a set of probe covers.
Antitheft device: No
Low battery indicator: Battery icon is displayed
Self-check on start-up: Yes
Calibration: Factory calibration.

Thermometer care

Cleaning probe tip: Gently wipe with cotton bud slightly moistened with water. Allow to dry before attaching a probe cover and taking temperatures.
Cleaning body: Gently wipe with a cloth slightly moistened with water
Storage conditions: Home - ideally store inside original packaging when not in use. Store at room temperature or less.

Maintenance and ongoing costs

Disposable covers available: 4.5p each (£45 for 1000)
Battery: Alkaline AAA size x2 batterries (3V)
Battery life: 1800 measurements (approx.)
Maintenance: No maintenance required

Manufacturing standards

ISO9001:2000; EN ISO 13488:2000.
Manufacturer claims compliance with EN60601-1:1990; EN60601-1-2:1992; EN 12470-3:1998.
CE mark: Yes Code: 0434
Notified Body: DNV, Norway

Price (ex VAT):	**£13.95**
Supplier:	Proact Medical Ltd
Address:	9-13 Oakley Hay Lodge, Great Folds Road, Oakley Hay Business Park, Northants NN18 9AS
Telephone:	0870 909 7400
Fax:	0870 909 7500
Website:	www.proactmedical.co.uk
e-mail:	sales@proactmedical.co.uk
Manufacturer:	MSR
Manufactured in:	Taiwan

Electronic contact: Proact ST8336

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature reading.
Intended use: Hospital, community and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 125mm x 19mm x 11mm
Weight: 11.4 gm

User information

Press on/off switch to display last reading and initiate a self check. When 'L' is displayed place probe tip at the measurement site until reading complete (four beeps). Switch off to conserve battery. Clean before and after each patient measurement. Factory set display units, either °F or °C.

Special features

Fixed or flexible probe tip versions available; memory of last reading; audible fever alarm when measured temperature >37.5°C; auto shutdown after 10 minutes non-use; waterproof unit; supplied with a plastic storage case.
Antitheft device: No
Low battery indicator: Triangle symbol displayed
Self-check on start-up: Yes
Calibration: Factory calibtration

Thermometer care

Cleaning probe tip: Clean with soapy water. It can be submerged but not soaked. Do not clean with alcohol.
Cleaning body: As for probe tip
Storage conditions: Ideally store inside original packaging when not in use. Store at room temperature or less.

Maintenance and ongoing costs

Disposable covers no covers available
Battery: type SG3 silver oxide battery (1.55V)
Battery life: 200 hours or 18 months
Maintenance: No maintenance required

Manufacturing standards

EN ISO 13485:2003. Manufacturer claims compliance with EN60601-1:1990; EN60601-1-2:1992; EN 12470-3:1998.
CE mark: Yes Code: 0434
Notified Body: DNV, Norway

Price (ex VAT):	**£3.00**
Supplier:	Proact Medical Ltd
Address:	9-13 Oakley Hay Lodge, Great Folds Road, Oakley Hay Business Park, Northants NN18 9AS
Telephone:	0870 909 7400
Fax:	0870 909 7500
Website:	www.proactmedical.co.uk
e-mail:	sales@proactmedical.co.uk
Manufacturer:	MSR
Manufactured in:	Taiwan

Electronic contact: Proact ST871

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature reading.
Intended use: Hospital, community and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 135mm x 24mm x 13mm
Weight: 13 gm

User information

Press on/off switch to display last reading and initiate a self check. When 'L' is displayed place probe tip at the measurement site until reading complete (four beeps). Switch off to conserve battery. Clean before and after each patient measurement.

Special features

Memory of last reading; audible fever alarm when measured temperature >37.5°C; auto shutdown after 10 minutes non-use; user selectable display units °F or °C; waterproof unit; supplied with a plastic storage case.
Antitheft device: No
Low battery indicator: Continuous full flashing screen display
Self-check on start-up: Yes
Calibration: Factory calibration

Thermometer care

Cleaning probe tip: Wipe with swab moistened with a soapy solution but do not soak. Do not clean with alcohol.
Cleaning body: As for probe tip
Storage conditions: Ideally store inside original packaging when not in use. Store at room temperatue or less

Maintenance and ongoing costs

Disposable covers no covers available
Battery: type SG3 silver oxide battery (1.55V)
Battery life: 200 hours or 18 months
Maintenance: no maintenance required

Manufacturing standards

ISO9001:2000; EN ISO 13488:2000. Manufacturer claims compliance with EN60601-1:1990; EN60601-1-2:1992; EN 12470-3:1998.
CE mark: Yes Code: 0434
Notified Body: DNV, Norway

Price (ex VAT):	**£3.50**
Supplier:	Proact Medical Ltd
Address:	9-13 Oakley Hay Lodge, Great Folds Road, Oakley Hay Business Park, Northants NN18 9AS
Telephone:	0870 909 7400
Fax:	0870 909 7500
Website:	www.proactmedical.co.uk
e-mail:	sales@proactmedical.co.uk
Manufacturer:	MSR
Manufactured in:	Taiwan

Electronic contact: Proact ST871(flexible tip)

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature reading.
Intended use: Hospital, community and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 135mm x 25mm x 13mm
Weight: 16 gm

User information

Press on/off switch to display last reading and initiate a self check. When 'L' is displayed place probe tip at the measurement site until reading complete (four beeps). Switch off to conserve battery. Clean before and after each patient measurement.

Special features

Flexible tip; memory of last reading; audible fever alarm when measured temperature >37.5°C; auto shutdown after 10 minutes non use; user selectable display units, either °F or °C; waterproof unit; supplied with a plastic storage case.
Antitheft device: No
Low battery indicator: Continuous full flashing screen display
Self-check on start-up: Yes
Calibration: Factory calibration

Thermometer care

Cleaning probe tip: Wipe with swab moistened with a soapy solution but do not soak. Do not clean with alcohol.
Cleaning body: As for probe tip
Storage conditions: Ideally store inside original packaging when not in use. Store at room temperature or less.

Maintenance and ongoing costs

Disposable covers no covers available
Battery: type SG3 silver oxide battery (1.55V)
Battery life: 200 hours or 18 months
Maintenance: no maintenance required

Manufacturing standards

ISO9001:2000; EN ISO 13488:2000. Manufacturer claims compliance with EN60601-1:1990; EN60601-1-2:1992; EN 12470-3:1998.
CE mark: Yes Code: 0434
Notified Body: DNV, Norway

Price (ex VAT):	**£4.00**
Supplier:	Proact Medical Ltd
Address:	9-13 Oakley Hay Lodge, Great Folds Road, Oakley Hay Business Park, Northants NN18 9AS
Telephone:	0870 909 7400
Fax:	0870 909 7500
Website:	www.proactmedical.co.uk
e-mail:	sales@proactmedical.co.uk
Manufacturer:	MSR
Manufactured in:	Taiwan

Electronic contact: SureTemp Plus

Electronic contact thermometer using a thermistor to sense temperature. Predict mode (default) estimates final temperature for one of four body sites in approximately 4 - 15 seconds, depending on specific body site. Monitor mode (snail icon) needs 3 to 5 minutes for an accurate reading.
Intended use: Hospital and primary care
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 215mm x 81mm x 62mm
Weight: 357 gm

User information

Detailed user manual provided. Many different options are available to the user. User must become familiar with the device and user manual. Stated accuracy in monitor mode only.

Special features

Liquid crystal illuminated display; separate probe (red) required for rectal readings; pulse timer; last temperature recall in predictive mode; indicator of poor tissue contact; heater warms probe before applying to patient; displays last reading on switch on; four different sites can be selected; Biotech mode controls programmable options; not waterproof; not suitable for use with flammable anaesthetics.
Antitheft device: Three security options available
Low battery indicator: Battery symbol continually indicates voltage level
Self-check on start-up: Yes
Calibration: Calibration in factory using reference thermometer traceable to national standards. Recalibration every 6 months is advised (at two temperatures) using Model 9600 calibration tester available from the manufacturer.

Thermometer care

Cleaning probe tip: As needed, clean the thermometer and probe with 70% isopropyl alcohol solution, 10% chlorine bleach solution or a non-staining disinfectant.
Cleaning body: Wipe with damp cloth (warm water or mild detergent solution)
Storage conditions: -25°C to 55°C, 15% to 95% RH

Maintenance and ongoing costs

Disposable covers required: 2.75p each (£27.50 per 1000)
Battery: Alkaline AA size x3, 4.5V
Battery life: 5000 measurements
Maintenance: Checks every six months are recommended

Manufacturing standards

ISO 9002:1994; EN ISO 13485; Manufacturer claims compliance with IEC 601-1:1985, EN60601-1-2:2000; ASSTM-E1112-00
CE mark: Yes Code: 0050
Notified Body: NSAI, Ireland

Price (ex VAT):	**£150.00**
Supplier:	Welch Allyn UK Ltd
Address:	Cublington Road, Aston Abbots, Buckinghamshire HP22 4ND
Telephone:	01296 689900
Fax:	02023 659694
Website:	
e-mail:	welchallynuk@mail.welchallyn.com
Manufacturer:	Welch Allyn
Manufactured in	The United States

Electronic contact: Thermotek Instant

Electronic contact thermometer using a thermistor to sense temperature rise and an algorithm to predict final temperature. Beeps when temperature reading is displayed.
Intended use: Hospital, primary care and home
Measurement site: Oral, axilla and rectal
Patient group: Adults, children and infants
Size (LWD): 165mm x 35mm x 18mm
Weight: 16gm

User information

Compact user information booklet provided. Only use within acceptable ambient conditions.

Special features

Flexible soft tip with thermistor covered by a chromium plated cup; pre-reading display of room temperature denoted by 'r'; measurement start is automatic; LCD display in °C or °F; memory function can store up to 4 temperatures and the measurement time for up to 64 hours; automatic shut off after 1 minute; use only within acceptable ambient conditions; supplied with a protective cap for the sensor.
Antitheft device: No
Low battery indicator: Battery symbol displayed
Self-check on start-up: Yes
Calibration: May be tested in a water bath.

Thermometer care

Cleaning probe tip: Clean after each measurement using a cotton swab soaked in 70% alcohol solution.
Cleaning body: As for probe tip
Storage conditions: -20°C to +55°C, 5-95% RH

Maintenance and ongoing costs

Disposable covers not required
Battery: Silver oxide 1.5V battery
Battery life: 2 years
Maintenance: Maintenance and servicing information is not provided. User manual contains a basic fault finding procedure. Supplier provides an 'as required' repair and maintenance service. Faulty units must be returned to the supplier. Turn around is typically 5 days.

Manufacturing standards

ISO9001:2000; EN ISO 13488:2000; Manufacturer claims compliance with EN60601 ; ASTM E1965-98; ASTM E-1112-98
CE mark: Yes Code: 0120
Notified Body: TUV Product Service

Price (ex VAT):	**£13.99**
Supplier:	PMS Instruments Ltd
Address:	Waldeck House, Waldeck Road, Maidenhead, Berkshire
Telephone:	01628 773233
Fax:	01628 770562
Website:	www.pmsinstruments.co.uk
e-mail:	sales@pmsinstruments.co.uk
Manufacturer:	SAAT Ltd
Manufactured in:	Israel

Electronic contact: Zeal M5003

Electronic contact thermometer using a thermistor to sense temperature rise to predict the final temperature reading. Extended display range 28~ 42°C.
Intended use: Hospital and primary care
Measurement site: Oral, axilla and rectal
Patient group: Adults and children
Size (LWD): 129mm x 18mm x 10mm
Weight: 20 gm

User information

Press on/off switch to initiate self test, including a check if ambient temperature is less than 28°C. When 'Lo' is displayed and '°C' is flashing place in the correct measurement position (brief guidance provided) until an audible beep indicates the thermometer is ready for reading. Press on/off switch briefly to turn off the thermometer after use. To briefly display the last temperature reading start by pressing the on/off switch for more than 3 seconds.

Special features

Waterproof; last measurement memory; automatic turn off after 8 minutes; supplied with plastic storage case.
Antitheft device: No
Low battery indicator: '-' symbol appears in lower right of display
Self-check on start-up: Yes
Calibration: Batch samples are calibrated using reference thermometers traceable to national standards. Manufacturer recommends user verifies accuracy every 2 years .

Thermometer care

Cleaning probe tip: Use either alcohol swab or wash with soapy water and dry. Alternatively immerse in a specified commercial disinfectant for 30 minutes.
Cleaning body: As for probe tip
Storage conditions: -20 °C to + 55°C

Maintenance and ongoing costs

Disposable covers not required (waterproof)
Battery: type LR41 battery 1.5V
Battery life: 200 hours continuous use
Maintenance: 2 year warranty

Manufacturing standards

EN12470-3:2000 Quality management to BS EN ISO 9001:2000
CE mark: Yes Code: 0118
Notified Body: Thuringen Office for Measurement and Calibration, Germany

Price (ex VAT):	**£4.05**
Supplier:	GH Zeal Ltd
Address:	8 Deer Park Road, Merton, LONDON SW19 3UU
Telephone:	020 8542 2283
Fax:	020 8543 7840
Website:	www.zeal.co.uk
e-mail:	scientific@zeal.co.uk
Manufacturer:	Geratherm
Manufactured in:	Germany

Infrared sensing thermometers

How they measure temperature

An infrared (IR) thermometer contains an optical sensor, usually a thermopile, which can detect the infrared emissions from any hot object. The magnitude and spectrum of infrared energy emitted depends on:

- internal temperature of the body
- temperature of the thermometer, which is also radiating IR energy
- emissivity, which describes the efficiency of the surface for radiating electromagnetic radiation and is a dimensionless number between 0 (smooth shiny surface) and 1 (dark rough surface)
- filtering effect of optical components, including the probe cover.

Infrared ear thermometers are designed to sense the temperature of the tympanic membrane within the ear. The measured temperature is an average across the visualised area. The field of view may encompass adjacent ear structures, approximately 2°C cooler than the tympanic membrane (typically 37.3°C). An instrumentation offset is usually applied which incorporates information about the thermometer's temperature and filtering effect of the optical components. Some devices also try to correct for the effect of averaging (making assumptions about the relative size of the tympanic membrane in the field of view).

Most models display the temperature of the tympanic membrane but an 'infrared ear thermometer' may be designed to predict the temperature reading for another body site, usually oral, by applying a physiologic offset based on data obtained by the manufacturer in clinical testing, [25].

Surface temperature of regions of peripheral skin or other objects may also be measured using models with a wide display range (see comparison table). These direct readings will have a lower measurement accuracy but will incorporate an instrumentation offset to compensate for the thermometer's internal temperature.

Forehead thermometers repeatedly sample the skin temperature seeking peak values, caused by the presence of the temporal artery lying under the surface. Instrumentation offset values and physiological offset values are then applied to predict the temperature at another site, usually oral. All these devices use computational software to rapidly predict the temperature but the algorithms will vary between manufacturers as they are based on their own clinical trials.

In the relevant international standard EN 12470 part 5 [21] manufacturers need to achieve a laboratory accuracy of ±0.2°C in the operating range 35.5~42°C, perform clinical testing at a room temperature between 18 and 24°C and conduct repeatability studies in the same ear. Some manufacturers claim compliance with

ASTM E 1965-98 [25] which requires the laboratory error to be better than ±0.2°C, in the range 37~39°C and over the ambient range 16°C to 40°C, unless otherwise specified by the manufacturer. Both standards require the manufacturer to verify clinical repeatability in a representative group of patients by comparing their results with a reference thermometer in another site. EN 12470 - 5 specifies the patient group should comprise at least 100 patients covering the intended age range - at least 30% being febrile. These clinical tests may legitimately exclude patients on medications known to affect body temperature (eg antipyretics, barbiturates, thyroid preparations and antipsychotics) or recently immunised.

Currently no specific international standards have been published for infrared forehead thermometers, which are new innovations but ASTM 1965-98 [25] includes testing procedures for skin thermometers which some manufacturers may consider applicable to their product.

Manufacturer's advice on clinical use

The key issues covered in the user instructions for **infrared ear thermometers** are:

- Check the ear canal is clean, dry and normal in appearance and is not obstructed or containing vernix, inflammation, blood or excessive earwax. Note the general angle of the ear canal.
- Ensuring the thermometer lens is clean and covered with a new intact probe cover, if required. Only use the probe cover recommended by the manufacturer.
- Straighten the ear canal, giving a clear view of the eardrum and position the thermometer head so the sensor will be directed at the tympanic membrane and not cooler ear structures. For children <1 year the ear lobe should be pulled straight back. For older patients pull the ear lobe up and back. Incorrect placing can give falsely low temperature readings [30].
- Failing to seal the ear canal opening may result in a lower reading.
- Do not use excessive force to insert the probe into the ear as this may injure the ear canal or ear drum.
- The patient should not exercise or talk during temperature taking.
- Do not measure in the ear which has just been lying on a pillow or mattress.
- Do not take a patient reading within 30 minutes of a bath/shower or swimming.
- Always wait two minutes before repeating a measurement in the same ear.

- Always compare measurements from the same ear.

- Using the maximum of three repeated measurements is recommended for infants less than 100 days old, children under three years with compromised immune system and when the user is learning to use the thermometer.

The key issues important for **forehead and skin thermometers** are:

- Do not use on a perspiring forehead or if covered with makeup, etc. The presence of oils and perspiration on the skin can decrease emissivity and lower the temperature reading, potentially missing the presence of fever.

- Avoid environments with moving air, from air conditioning or a draught, as these can artefactually lower skin temperature.

- Avoid measuring when the patient's skin is close to a lamp, warmer or exposed to sunlight through a window as this can increase skin temperature and may falsely predict a raised body temperature

- Wait several minutes before taking a temperature if the patient has recently been exposed to any activity which could affect the normal temperature of the head, eg. exercising, bathing, showering, shampooing or drying hair, recently been wearing a hat or scarf or had a cold sponge or compress on their head.

- Move hair away to avoid it obstructing the skin reading.

Comparison of manufacturer's data - ear thermometers

Ten infrared ear thermometers have been included in this review, eight provide a reading of ear temperature, one converts the measurement into an oral temperature and another offers users the option of predicting the oral (default), rectal or axilla temperature.

Measurement accuracy of ±0.2°C for an operating range of 35.8°C to 41°C or greater is obtained from manufacturers laboratory measurements (**Table 4**). Clinical factors (see manufacturer's advice above) can cause additional errors and usually lead to an underestimation of body temperature. All models need a restricted ambient temperature range so it would be inappropriate to use these when they have been temporarily stored outside these temperatures, eg in a car boot during a UK winter or on a windowsill on a hot summer's day.

Some models may produce reading errors when subject to electronic interference, which can be generated by radio-communications equipment (eg mobile phones) or some types of hospital equipment (eg surgical diathermy generators)

Fast reading time of a few seconds is promoted as a major advantage for users of this type of thermometer. A few models also offer an extended measurement range but these readings are less accurate (eg ±0.3°C or ±1.0°C)

Comparison of manufacturer's data - forehead thermometers

Six infrared forehead thermometers have been included in this review. One of these is designed to be positioned 3cm from the skin surface, the others need to be moved over the skin surface to achieve a reading,

Laboratory accuracy of ±0.1°C is stated for one model and ±0.2°C for the other five. However, this level of accuracy is achieved under fairly restrictive ambient temperature conditions to (see **Table 5** for details). Consequently most infrared forehead thermometers may be unsuitable for routine use for 'home visits' or outdoors as the thermometer could easily be exposed to ambient temperatures below or above this range. Clinical factors (see manufacturer's advice on Page 61) can cause additional errors and will reduce accuracy in clinical use.

Probe covers are optional for two and not required for four of these models. Fast reading time is also promoted as a major advantage for users. However, some temporal artery thermometers are contraindicated when the forehead is sweaty or covered with lotions. For an accurate measurement the patient must be resting in a comfortable room environment, away from draughts, air-conditioning and heat sources. A local clinical assessment should be made as to whether this is feasible in practice.

Table 4 Infrared sensing ear thermometers - Accuracy** and Temperature Display

Infrared sensing ear thermometers	Manufacturer's Stated Accuracy (highest)				Are all readings at highest-stated accuracy?	Warning if reading is outside display range	Lowest accuracy (eg outside operating range)	Thermometer display		Typical time to reading (oral)
	Highest accuracy (°C)	Operating range (°C)	Ambient temperature range (°C)	Ambient humidity RH				Display resolution	Display range (°C)	
Braun Thermoscan	±0.2	35.5 ~ 42	10 ~ 40	15 - 95%	CE	G	±0.3°C	0.1°C	20 ~ 42.2	3-7 sec
First Temp Genius	±0.2	15.6 ~ 43.3	15.6 ~35	0 - 95%	CF	G	±0.3°C	0.1/ 0.01°C	15.6 ~ 43.3	2 sec
Gentle Temp	±0.2	34 ~ 42.2	10 ~ 40	30 ~ 80%	BE	G		0.1°C	34 ~ 42.2	1 sec
IVAC Core Check	±0.2	35.8 ~ 41	18.3 - 32.2	15 ~ 90%	CF	G	±0.3°C	0.1°C	25 ~ 43.3	3 esc
LCT-200(11/420/3)	±0.2	36 ~ 39	10 ~ 40	0% - 95%	CE	G	±1.0°C	0.1°C	0 ~ 50	varies
Microlife IR1DA1	±0.2	32 ~ 42.2	10 - 40	not stated	CF	G	±1.0°C	0.1°C	0 ~100	1 sec
Microlife IR1DE1	±0.2	32~ 42.2	5 ~ 40	not stated	CE	G	±1.0°C	0.1°C	0 ~ 100	1 sec
Proact ST613	±0.2	32~ 42.2	5 ~ 40	10 ~ 80%	BE	G		0.1°C	32 ~ 43	1 sec
TB-100 (Thermobuddy)	±0.2	32~ 42.2	5 ~ 40	40 ~ 85%	CE	G	±1.0°C	0.1°C	0 ~ 50	1 sec
Thermo Tek Plus 718	±0.2	34.6 ~ 42.4	16 ~ 40	??	BF			0.1°C	34.6 ~ 42.4	1 sec

**	Measurement accuracy can often be much better than measurement repeatability in clinical use.
B	Highest accuracy is obtained for all/ most displayed values.
C	Some displayed temperatures are not at the highest stated accuracy.
D	Minimal restrictions on the ambient temperature before or during measurement.
E	Extended ambient temperature range may reduce problems and inaccuracies when used in the community.
F	Ambient temperatures need to be at a comfortable room temperatue for correct function and/ or highest accuracy.
G	Display indicating when the temperature reading is beyond the measurement range.

Infrared sensing: Braun Thermoscan Pro

Infrared detector measures emitted radiation from the inner ear and predicts ear temperature.
Intended use: Hospital and primary care
Measurement site: Ear
Patient group: Adults, children and infants
Size (LWD): 155mm x 35mm x 45mm
Weight: 120 gm

User information

Detailed user manual provided. Information on range for normal temperature readings is supplied for site and patient age group.

Special features

Displays last reading on switch on; switch off after 1 minute of non-use; error when probe cover is absent; flashing 'POS' is displayed if detector cannot find a temperature equilibrium within the ear; light display changes from flashing to continuous when reading is completed; 'Err' is displayed if ambient temperature is >40°C or <10°C or fluctuating; repeat after thermometer remains in room temperature for 30 minutes; immune to most electromagnetic fields; supplied with a set of 20 probe covers and thermometer stand for storing the covers.
Antitheft device: Optional as part of a recharging base station
Low battery indicator: Battery symbol 'C' symbol and '---' displayed. The thermometer will still operate correctly.
Self-check on start-up: Yes
Calibration: Calibration in factory using reference thermometers traceable to national standards. Accuracy can be verified using their special calibration tester.

Thermometer care

Cleaning probe tip: Gently wipe probe window with cotton swab slightly moistened with alcohol. Allow to dry for 5 minutes before taking temperatures.
Cleaning body: Wipe with a soft cloth moistened with alcohol. Do not submerge in water.
Storage conditions: -20°C to 50°C

Maintenance and ongoing costs

Disposable covers required (£8.43 per 200)
Battery: Alkaline AA size x2 (3V)
Battery life: 6 months/ 1000 measurements
Maintenance: Not required

Manufacturing standards

ISO 9002:1994 & ISO 13488:2000.
Manufacturer claims compliance with EN60601-1:1988; EN60601-1-2:2001; EN60601-1-4:2000; ASTM E1965-98 and others.
CE mark: Yes Code: 0297
Notified Body: DQS, Germany

Price (ex VAT):	**£67.00**
Supplier:	Welch Allyn UK Ltd
Address:	Cublington Road, Aston Abbots, Buckinghamshire HP22 4ND
Telephone:	01296 689900
Fax:	02023 659694
Website:	
e-mail:	welchallynuk @mail.welchallyn.com
Manufacturer:	Braun GmbH
Manufactured in:	Germany

Infrared sensing: First Temp Genius

Infrared detector measures emitted radiation from inner ear detecting peak value to predict the temperature at one of three body sites. Oral is default.
Intended use: Hospital and primary care
Measurement site: Ear
Patient group: Adults, children and infants
Size (LWD): 216mm x 56mm x 76mm (base 24mm x 69mm x 51mm)
Weight: 200 gm (base 312 gm)

User information

Operators manual, video and CD are available for training users. No adjustment of external ear is required. Three beeps and 'DONE' is displayed when measurement is complete.

Special features

Tympanic mode predicts the temperature reading at one of three sites, oral, rectal or core, or a direct reading (CAL); medical technologists can adjust the default site; surface mode continually updates the reading for skin assessment; extended range with ± 0.3°C accuracy; 15 second TIMER mode; storage case available for purchase; supplied with a thermometer holder incorporating a probe cover dispenser.
Antitheft device: No
Low battery indicator: Yes, two stage warning - battery icon
Self-check on start-up: Yes.
Calibration: Factory calibration of each unit uses reference thermometers traceable to national standards. Recalibration after potential damage and every six months is recommended. A user calibration system (Genius calibrator 3000PC) is available for purchase and use by medical technologists. .

Thermometer care

Cleaning probe tip: Wipe using isopropanol on a cotton bud, dry with lint free soft cloth and dry for 45 minutes
Cleaning body: Wipe with mild detergent or bleach (10%) solution. Dry for 45 mins.
Storage conditions: -20°C to 50°C.

Maintenance and ongoing costs

Disposable covers required: 4.7p each (£59.24 for 1260)
Battery: Alkaline 9V battery
Battery life: 5,000 measurements (approx)
Maintenance: Six month checks are recommended. Full refurbishment and calibration outside 3 year warranty period costs £50.00

Manufacturing standards

ISO 9002: ISO13485 Manufacturer claims compliance with EN60601-1:1990; ASTM E1112-86
CE mark: Yes Code: 0123
Notified Body: TUV Product Service

Price (ex VAT):	**£249.49**
Supplier:	Tyco Healthcare
Address:	154 Fareham Road, Gosport PO13 OAS
Telephone:	01329 224114
Fax:	01329 224334
Website:	
e-mail:	marketinguk@tycohealth.com
Manufacturer:	Tyco Healthcare (Kendall)
Manufactured in:	USA

Infrared sensing: GentleTemp (MC-510-E)

Infrared detector measures emitted radiation from inner ear and uses to predict ear temperature.
Intended use: Hospital, primary care and home
Measurement site: Ear
Patient group: Adults, children and infants
Size (LWD): 93mm x 46mm x 57mm
Weight: 50 gm

User information

Movement of unit in the ear enables the maximum temperature to be detected. Three repeated measurements warms the device so ten minutes must elapse before further readings. Do not use a portable phone near the unit. Avoid getting liquid in the unit.

Special features

Two measurement modes; fast (1-3 seconds) and one for difficult measurement conditions; automatically turns off after 1 minute; readings in °F or °C (default); supplied with carrying case and a set of probe covers.
Antitheft device: No
Low battery indicator: Battery symbol displayed
Self-check on start-up: Yes
Calibration: Factory calibration traceable to national reference standards. Calibration recommended annually when used professionally. Testing equipment (MC-510MS) is available for purchase.

Thermometer care

Cleaning probe tip: Wipe lightly with a soft dry cloth or cotton swab, then attach a probe cover and store in storage case.
Cleaning body: Wipe with a soft dry cloth
Storage conditions: -20°C to 60°C; 30% to 95% RH

Maintenance and ongoing costs

Disposable covers required: 21p each (£4.21 for 20)
Battery: Lithium [CR2032] 3V battery
Battery life: 5000 measurements (approx)
Maintenance: User manual contains a basic fault finding procedure. Supplier provides an 'as required' repair and maintenance service. Faulty units must be returned to the supplier. Turn around is typically 7 days.

Manufacturing standards

ISO9001:2000; EN ISO 13488:2000;. Manufacturer claims compliance with ASTM E-1965-98; EN12470-5:2003
CE mark: Yes Code: 0197
Notified Body: TUV, Rheinland

Price (ex VAT):	**£39.95**
Supplier:	Omron Healthcare UK Ltd
Address:	Opal Drive, Fox Milne, Milton Keynes, MK15 0DG
Telephone:	01908 258 285
Fax:	01908 258 286
Website:	omron-healthcare.com
e-mail:	info.omronhealthcare.uk@eu.omron.com
Manufacturer:	Microlife AG
Manufactured in	Taiwan and China

Infrared sensing: IVAC Core Check

Infrared detector measures emitted radiation from inner ear and calculates ear temperature reading.
Intended use: Hospital and primary care
Measurement site: Ear
Patient group: Adults, children and infants
Size (LWD): 190mm x 38mm x 76mm
Weight: 266 gm

User information

User manual includes a diagram of correct placement in the ear. Contra-indicated when an examinsation reveals the infection or damage within the ear. Use near electrosurgery/cauterising devices causes reading errors.

Special features

New measurement not displayed unless cover is replaced; unit detects replacement of new probe cover; temperature displayed for up to four minutes; supplied with thermometer holder, incorporating a set of probe covers and dispenser.
Antitheft device: Return to base unit after 40 measurements
Low battery indicator: 'Batt Low' then '---' when replacement needed
Self-check on start-up: Yes
Calibration: No information supplied about factory calibration. Recalibration after suspected damage, every 10000 readings or six months is advised. IVAC CORECHECK calibrator (two infrared sources at 26°C and 38°C) can be purchased.

Thermometer care

Cleaning probe tip: Gently wipe probe window with cotton swab slightly moistened with alcohol. Allow to dry for 45 minutes before taking temperatures.
Cleaning body: Clean with 70% isopropanol solution (not on display window), <40% chlorine bleach solution, gluteraldehyde or a mild detergent or a disinfectant.
Storage conditions: -35°C to 60°C, 15% to 95% RH

Maintenance and ongoing costs

Disposable covers required: 6.7 p each (£334.92 for 5000)
Battery: Alkaline 9V battery
Battery life: 8000 measurements (approx)
Maintenance: Daily inspection for damage to the sensor and display. Technical service manual and training is available for medical engineers. Fixed price manufacturer repair is £95.00.

Manufacturing standards

ISO90001:2000 Manufacturer claims compliance with EN60601-1; EN60601-1-2; EN55011;
CE mark: Yes Code: 0086
Notified Body: BSI Product Services

Price (ex VAT):	**£400.00**
Supplier:	Alaris
Address:	The Crescent, Jays Close, Basingstoke, Hampshire RG22 4BS
Telephone:	01256 388284
Fax:	01256 388860
Website:	www.alarismed.co.uk
e-mail:	(see website)
Manufacturer:	Alaris Medical Systems
Manufactured in:	USA

Infrared sensing: LCT-200 Ear Thermometer

Infrared detector measures emitted radiation from inner ear and calculates an ear temperature reading. Beeps when reading is displayed .
Intended use: Home use
Measurement site: Ear
Patient group: All ages especially babies, children and elderly.
Size (LWD): 150mm X 35mm x 45mm
Weight: 55 gm

User information

Instructions include advice to straighten ear canal and correct placement of probe. Note the highest of three readings in the same ear for critical situations as variations ±0.2~0.3°C are to be expected. Beep indicates measurement is complete.

Special features

Display backlight for easy reading; bleeps when temperature reading completed; automatically stores last 5 readings to monitor temperature trends; automatic switch off after 1 minute of non-use; optional fever alarm; optional music playing during measurement; supplied with carrying case and a set of 20 disposable, hygienic probe covers
Antitheft device: No
Low battery indicator: Battery symbol displayed
Self-check on start-up: Yes
Calibration: Factory calibration of batch samples.

Thermometer care

Cleaning probe tip: Gently wipe with cotton bud slightly moistened with alcohol. Allow to dry for 1 hour before taking temperatures
Cleaning body: Use soft dry cloth to clean the body of the thermometer
Storage conditions: -20°C to 50°C.

Maintenance and ongoing costs

Disposable covers required: 13p each (£2.57 for 20)
Battery: Lithium [CR2032] 3V battery
Battery life: 1000 measurements (approx)
Maintenance: See instructions for use, 1 year warranty

Manufacturing standards

ISO9001:2000; Iso 113485:1996
Manufacturer claims compliance with ASTM 1965-98.
CE mark: Yes Code: 0434
Notified Body: DNV, Norway.

Price (ex VAT):	**£29.77**
Supplier:	S Brannan & Sons Ltd
Address:	Leconfield Indsutrial Estate, Cleator Moor CA25 5Q
Telephone:	01946 816625
Fax:	01946 816625
Website:	www.brannan.co.uk
e-mail:	sales@brannan.co.uk
Manufacturer:	
Manufactured in:	

Infrared sensing: Microlife IR1DA1

Infrared detector measures emitted radiation from the inner ear and converts this into an ear temperature reading (indicated by an audible beep).
Intended use: Hospital, primary care and home
Measurement site: Ear
Patient group: Adults, children and infants
Size (LWD): 141mm x 26mm x 20mm
Weight: 45 gm

User information

Instructions include advice to straighten ear canal and correct placement of probe. Position probe and press 'start' button. Audible beep when reading is displayed. Wait at least 30 seconds after 3-5 readings. Do not twist the cone containing the probe.

Special features

Memory of last reading displayed for 2 seconds when switched on; automatic switch off after 1 minute; audible fever alarm when temperature >37.5°C; illuminated display for 5 seconds after unit is turned on and after measurement; error 'H' when ambient is too high and 'L' when ambient is too low; extended temperature measurement range for bath water, etc; supplied with a set of probe covers and thermometer stand for loading the covers.
Antitheft device: No
Low battery indicator: Battery symbol displayed
Self-check on start-up: Yes
Calibration: Factory calibration of each unit prior to dispatch

Thermometer care

Cleaning probe tip: Wipe with swab moistened with 70% isopropyl alcohol
Cleaning body: Wipe with swab moistened with 70% isopropyl alcohol
Storage conditions: -25°C to 55°C

Maintenance and ongoing costs

Disposable covers required: 8 pence (£3.50 for 40 pieces)
Battery: Lithium [CR2032] 3V battery
Battery life: 1000 measurements (approx)
Maintenance: None required except replacement of probe covers

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. Manufacturer claims compliance with prEN12470-5:2000
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£25.00**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Infrared sensing: Microlife IR1DE1

Infrared detector measures emitted radiation from the inner ear and converts this into a temperature reading (indicated by an audible beep). Probe cover not required.
Intended use: Hospital
Measurement site: Ear
Patient group: Adults, children and infants
Size (LWD): 153mm x 40mm x 31mm
Weight: 53 gm

User information

Instructions include advice to straighten ear canal and correct placement of probe. Position probe and press 'start' button. Audible beep when reading is displayed. Clean probe tip with alcohol to avoid build up of ear wax and avoid cross-infection between patients (wait 5 minutes to dry).

Special features

Memory of 12 readings; last reading displayed for 2 seconds when switched on; automatic switch off after 1 minute; audible fever alarm when temperature >37.5°C; audible alarm if reading is too high or low; illuminated display for 5 seconds after unit is turned on and after measurement; error 'H' when ambient is too high and 'L' when ambient is too low; extended temperature measurement range for bath water, etc; supplied with plastic storage case and supply of alcohol wipes.
Antitheft device: No
Low battery indicator: Two stage battery warning. Low and Battery icon will flash
Self-check on start-up: Yes
Calibration: Factory calibration of each unit prior to dispatch

Thermometer care

Cleaning probe tip: Wipe with alcohol swab or cotton tissue moistened with 70% iso-propyl alcohol.
Cleaning body: As for probe tip but ensure no liquid enters the case
Storage conditions: -25°C to 55°C

Maintenance and ongoing costs

Disposable covers No probe cover
Battery: Lithium [CR2032] 3V battery
Battery life: 1000 measurements (approx)
Maintenance: None, except cleaning of probe

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. Manufacturer claims compliance with ASTM E-1965-98
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£25.00**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Infrared sensing: Proact ST613

Tympanic Infrared detector measures emitted radiation from inner ear and predicts the core temperature of the body.
Intended use: Hospital, community and home
Measurement site: Ear
Patient group: Adults, children and infants
Size (LWD): 137mm x 37mm x 51mm
Weight: 91 gm + batteries

User information

One button operation. User information includes a list of precautions during use. Use of a mobile phone near the thermometer may cause a reading error.

Special features

Movable probe tip to improve placement in the ear canal; switch off after 1 minute of non-use; displays last reading on switch on; error warning when ambient temperature is out of range; supplied with protective cap and a set of disposable covers.
Antitheft device: No
Low battery indicator: Battery icon is displayed (flashing)
Self-check on start-up: Yes
Calibration: Factory calibration for 1 year. Return to Proact for calibration for a black body calibration check is recommended after an abnormal event (eg impact)

Thermometer care

Cleaning probe tip: Gently wipe with cotton bud slightly moistened with water. Allow to dry for 5 minutes before attaching a probe cover and taking temperatures.
Cleaning body: Use soft dry cloth to clean the body of the thermometer
Storage conditions: Ideally store inside original packaging when not in use. Store at room temperature or less.

Maintenance and ongoing costs

Disposable covers required: 4.5p each (£45 for 1000)
Battery: Alkaline AAA size x2 batterries (3V) are supplied
Battery life: 5000 measurements (approx.)
Maintenance: Annual calibration check £5.00 per unit + VAT + p&p

Manufacturing standards

EN ISO 13485:2003. Manufacturer claims compliance with EN60601-1:1990; EN60601-1-2:1992; EN 12470-5:2000.
CE mark: Yes Code: 0434
Notified Body: DNV,Norway

Price (ex VAT):	**£20.38**
Supplier:	PROACT Medical Ltd
Address:	9-13 Oakley Hay Lodge, Great Folds Road, Oakley Hay Business Park, Northants NN18 9AS
Telephone:	0870 909 7400
Fax:	0870 909 7500
Website:	www.proactmedical.co.uk
e-mail:	sales@proactmedical.co.uk
Manufacturer:	MSR
Manufactured in:	Taiwan

Infrared sensing: TB-100 (Thermo Buddy)

Infrared detector samples maximum emitted radiation from ear to predict ear temperature. Other objects can be measured.
Intended use: Primary care and home use
Measurement site: Ear and surface temperature of a range of objects (bath, feed, etc)
Patient group: Adults, children and infants
Size (LWD): 160mm x 41mm x 30mm
Weight: 68 gm

User information

Normal temperature range information provided. Repeat reading three times for infants <90 days and children <3 years with abnormal temperature readings. Do not use near fire.

Special features

Last measurement displayed on initial activation; measures 12 times per second to obtain peak value; night light illumination; memory function can store up to 8 temperatures; automatically turns off after 30 seconds; melody heard through patient's ear during measuring sequence to calm infants and children; extended temperature measurement range for bath water, etc; supplied with carrying case and set of probe covers.
Antitheft device: No
Low battery indicator: Yes, battery icon
Self-check on start-up: Yes
Calibration: Information not supplied.

Thermometer care

Cleaning probe tip: Gently wipe with cotton bud slightly moistened with alcohol. Allow to dry for 1 hour before taking temperatures.
Cleaning body: Use soft dry cloth to clean the body of the thermometer
Storage conditions: 20°C to 50°C, 0% to 95% RH

Maintenance and ongoing costs

Disposable covers required: 7.6 p each (£3.05 for 40)
Battery: Lithium [CR-2032] 3V battery
Battery life: 6000 measurements
Maintenance: Information not supplied. Warranty period 1 year

Manufacturing standards

EN45001. Manufacturer claims compliance with EN 60601-1:1998; EN60601-1-2:1993; prEN12470-5; EN61000-4-3; EN61000-4-4; EN61000-4-5
CE mark: Yes Code: 0120
Notified Body: SGS United Kingdom

Price (ex VAT):	**£18.32**
Supplier:	Healthbrands Ltd.
Address:	Curlews, Boarley Lane, Sandling, Maidstone ME14 3BS
Telephone:	01795 520101
Fax:	01795 520052
Website:	www.hubdic.com
e-mail:	jmerrett@healthbrands.co.uk
Manufacturer:	HuBDIC Co Ltd
Manufactured in:	S Korea

Infrared sensing: ThermoTek Plus 718

Infrared detector measures emitted radiation from inner ear and converts this into an oral equivalent temperature reading.
Intended use: Hospital, primary care & home use
Measurement site: Ear
Patient group: Adults, children and infants
Size (LWD): 165mm x 38mm x 25mm
Weight: 78 gm

User information

Gently pull middle ear back and up straighten ear canal. Keep holding ear during measurement. Use same ear for all measurements. Wait two minutes between readings in the same ear. Check room temperature (indicated by 'r') is less than 33°C before positioning probe in the ear.

Special features

Long beep when temperature measurement is completed; automatically turns off 1 minute after last measurement; memory function can store up to 8 temperatures and the measurement time for up to 64 hours; supplied with protective cap and set of probe covers.
Antitheft device: No
Low battery indicator: Battery symbol displayed
Self-check on start-up: Yes
Calibration: Information not supplied

Thermometer care

Cleaning probe tip: Do not touch the probe tip with fingers
Cleaning body: Use soft dry cloth to clean the body of the thermometer
Storage conditions: Information not supplied.

Maintenance and ongoing costs

Disposable covers required: 7p each (£70 for 1000)
Battery: Lithium [CR2032] 3V battery
Battery life: 5 years
Maintenance: User manual contains a basic fault finding procedure. Supplier provides an 'as required' repair and maintenance service. Faulty units must be returned to the supplier. Turn around is typically 5 days.

Manufacturing standards

ISO9001:2000; EN ISO 13488:2000; Manufacturer claims compliance with EN60601; ASTM E-1965-98; ASTM E-1112-98; GMP
CE mark: Yes Code: 0123
Notified Body: TUV Product Service

Price (ex VAT):	**£34.00**
Supplier:	PMS Instruments Ltd
Address:	Waldeck House, Waldeck Road, Maidenhead, Berkshire
Telephone:	01628 773233
Fax:	01628 770562
Website:	www.pmsinstruments.co.uk
e-mail:	sales@pmsinstruments.co.uk
Manufacturer:	SAAT Ltd
Manufactured in:	Israel

Table 5 Infrared sensing forehead thermometers - Accuracy** and Temperature Display

Infrared sensing forehead thermometer	Manufacturer's Stated Accuracy (highest)				All readings at highest stated accuracy	Warning if reading is outside display range	Lowest accuracy (eg outside operating range)	Thermometer display		Typical time to reading (oral)
	Highest accuracy (°C)	Operating range (°C)	Ambient temperature range (°C)	Ambient humidity RH				Display resolution	Display range (°C)	
Exergen Temporal Scanner 2000	±0.2	15.5 ~ 42	15.5 ~ 40	up to 90%	BF	G		0.1°C	15.5 ~ 42	0.03 sec
Exergen Temporal Scanner 5000	±0.1	16 ~ 43	16 ~ 40	up to 90%	BF	G		0.1°C	16 ~ 43	0.1 sec
FS-100(ACORN)	±0.2	20 ~ 42.2	10 ~ 40	not stated	BE	G		0.1°C	20 ~ 42.2	5 sec
Microlife FR1DM1	±0.2	36 ~ 39	16~ 40	not stated	CF	G	±0.3°C	0.1°C	34 ~42.2	1 sec
Thermofocus	±0.2	36 ~ 39	16 ~ 40	not stated	CF		±1.0°C	0.1°C	1 ~55	1 sec
ThermoTek NoTouch 960	±0.2	16 ~ 36	16 ~ 40	not stated	BF	G		0.1°C	3.64 ~42.4	3 sec

**	Measurement accuracy can often be much better than measurement repeatability in clinical use.
B	Highest accuracy is obtained for all/ most displayed values.
C	Some displayed temperatures are not at the highest stated accuracy.
D	No restrictions on the ambient temperature before or during measurement.
E	Extended ambient temperature range may reduce problems and inaccuracies when used in the community.
F	Ambient temperatures need to be at a comfortable room temperatue for correct function and/ or highest accuracy.
G	Display indicating when the temperature reading is beyond the measurement range.

Infrared sensing: Exergen Temporal Scanner 2000

Infrared detector measures maximum emitted radiation from skin over a superficial artery and predicts arterial temperature. When button is released the maximum reading will be displayed.
Intended use: Community.
Measurement site: Forehead, behind ear
Patient group: Adults, children and infants
Size (LWD): 178mm x 45mm x 32mm
Weight: 120 gm

User information

Place probe on the skin centrally in the forehead, depress button and slowly move laterally to the hairline. Then lift the probe and touch on the neck, moving the probe upwards just behind the ear lobe, and release the button to read the temperature. Core (arterial) body temperature is displayed if the temperature is between 34.5°C to 42°C. Outside this range the skin surface temperature is displayed. Keep the lens clean

Special features

Automatically shuts down after 30 seconds of non use; error meassages when electromagnetic interference is detected; error messages when target temperature is <42°C or >15.5°C.
Antitheft device: No
Low battery indicator: Battery icon is displayed (flashing)
Self-check on start-up: Yes
Calibration: Calibration uses thermometers traceable to national standards. Certificate is provided with the new unit. Accuracy can be checked using a portable black body (available from the company costing £230) which operates at two temperatures (36°C and 40°C).

Thermometer care

Cleaning probe tip: Wipe with alcohol prep or swab moistened with alcohol or water.
Cleaning body: Wipe with disinfectant, alcohol or bleach solutions. Prevent liquids from entering the sensor area. Do not immerse.
Storage conditions: -20°C to 50°C

Maintenance and ongoing costs

Disposable covers optional: caps 3.5p each (£175 for 5000), sheaths 14p (£35 for 250)
Battery: Alkaline 9V battery
Battery life: 7500 measurements
Maintenance: Repairs during 3 year warranty period are free of charge.

Manufacturing standards

EN 46003:1999 Manufacturer claims compliance with EN60601-1:1990; EN6061-1-2:2001; EN12470-5:2003;
CE mark: Yes Code: 0197
Notified Body: TUV, Rheinland

Price (ex VAT):	**£95.00**
Supplier:	Actamed
Address:	Calder Island Way, Wakefield WF2 7AW
Telephone:	01924 200550
Fax:	01924 200518
Website:	www.actamed.co.uk
e-mail:	sales@actamed.co.uk
Manufacturer:	Exergen
Manufactured in:	USA

Infrared sensing: Exergen Temporal Scanner 5000

Infrared detector measures maximum emitted radiation from skin over a superficial artery and predicts core arterial temperature. Each click emitted indicates a rise in the maximum reading.
Intended use: Hospital, community
Measurement site: Forehead and behind the ear
Patient group: Adults, children and infants
Size (LWD): 200mm x 50mm x 30mm
Weight: 235 gm

User information

Place probe on the skin centrally in the forehead, depress button and slowly move laterally to the hairline. Then lift the probe and touch on the neck, moving the probe upwards just behind the ear lobe, and release the button to read the temperature. Core (arterial) body temperature is displayed if the temperature is between 34.5°C to 42°C. Outside this range the skin surface temperature is displayed. Keep the lens clean..

Special features

Automatically shuts down after 30 seconds of non use; error messages when electromagnetic interference is detected; copper shielding can protect the electronics from most high electromagnetic sources found in a hospital; pulse timer.
Antitheft device: Physical restraints available for purchase.
Low battery indicator: Battery icon is displayed (flashing)
Self-check on start-up: Yes
Calibration: Calibration uses thermometers traceable to national standards. Certificate is provided with the new unit following any recalibration. Accuracy can be checked using a portable black body 'master', available from the company (£495). Manufacturer can perform re-calibration of thermometer and master.

Thermometer care

Cleaning probe tip: Wipe down with alcohol or any hospital approved disinfectant. Do not immerse.
Cleaning body: Device is suitable for ethylene oxide gas or gas plasma sterilisation
Storage conditions: -20°C to 50°C

Maintenance and ongoing costs

Disposable covers optional: caps 5p (£50 for 1000); sheaths 14p (£35 for 250); probe wraps 2.8p each
Battery: Alkaline 9V battery
Battery life: 15000 measurements
Maintenance: Repairs during 6 year warranty period are free of charge

Manufacturing standards

EN 46003:1999 Manufacturer claims compliance with EN 60601-1:1990; EN60601-1-2:2001; EN12470-5:2003
CE mark: Yes Code: 0197
Notified Body: TUV, Rheinland

Price (ex VAT):	**£375.00**
Supplier:	Actamed Ltd
Address:	Calder Island Way, Wakefield WF2 7AW
Telephone:	01924 200550
Fax:	01924 200518
Website:	www.actamed.co.uk
e-mail:	sales@actamed.co.uk
Manufacturer:	Exergen Corporation
Manufactured in:	USA

Infrared sensing: FS-100 (ACORN)

Infrared detector measures maximum emitted radiation from the skin surface over the temporal artery to predict the core body temperature.
Intended use: Primary care and home use
Measurement site: Forehead
Patient group: Adults, children and infants
Size (LWD): 116mm x 36mm x 32mm
Weight: 50 gm

User information

Place on centre of forehead skin and move laterally for 3-5 seconds. If perspiration on forehead measure skin temperature behind ear, moving probe upwards. Do not use when unit is too hot or cold.

Special features

Last measurement displayed on initial activation; measures 40 times per second to obtain peak value; automatically turns off after 1 minute.
Antitheft device: No
Low battery indicator: Battery symbol displayed
Self-check on start-up: Yes
Calibration: Information not supplied

Thermometer care

Cleaning probe tip: Clean with cotton bud soaked in alcohol and leave for 1 hour.
Cleaning body: Wipe with a soft cloth moistened with water or alcohol.
Storage conditions: Information not supplied

Maintenance and ongoing costs

Disposable covers not required
Battery: Lithium [CR-2032] 3V battery
Battery life: 6000 measurements (approx)
Maintenance: Information not supplied. Warranty period 1 year.

Manufacturing standards

No information about Quality Management Standards was supplied. Manufacturer claims compliance with EN 60601-1:1998; EN60601-1-2; prEN 12470-5
CE mark: Yes Code: 0120
Notified Body: SGS, England

Price (ex VAT):	**£12.22**
Supplier:	Healthbrands Ltd.
Address:	Curlews, Boarley Lane, Sandling, Maidstone ME14 3BS
Telephone:	01795 520101
Fax:	01795 520052
Website:	www.hubdic.com
e-mail:	jmerrett@healthbrands.co.uk
Manufacturer:	HuBDIC Co Ltd
Manufactured in:	S Korea

Infrared sensing: Microlife FR1DM1

Infrared detector measures emitted peak radiation from the forehead and ambient temperature to predict the body temperature (indicated by an audible long beep).
Intended use: Home use
Measurement site: Forehead
Patient group: Adults, children and infants
Size (LWD): 122mm x 42mm x 43mm
Weight: 48 gm

User information

Place thermometer head on patient's forehead and press start button. No probe movement required.

Special features

Audible fever alarm when temperature > 37.5°C; audible alarm if reading is above or below the operating range; automatically turns off after 1 minute; illuminated display/backlight; memory for 12 readings; last reading displayed for 2 seconds on switch on.
Antitheft device: No
Low battery indicator: Yes, battery symbol flashes
Self-check on start-up: Yes
Calibration: Factory calibration of each unit prior to dispatch.

Thermometer care

Cleaning probe tip: clean with swab moistened with 70% isopropyl solution
Cleaning body: clean with swab moistened with 70% isopropyl solution
Storage conditions: -20°C to 50°C

Maintenance and ongoing costs

Disposable covers No probe cover
Battery: Lithium [CR-2032] 3V battery
Battery life: 1000 measurements (approx)
Maintenance: None required

Manufacturing standards

EN ISO 9001:2000; EN 46002:1996. No information supplied on compliance with international standards
CE mark: Yes Code: 0044
Notified Body: RWTUV

Price (ex VAT):	**£25.00**
Supplier:	Microlife Health Management
Address:	Units 6 & 7, Henfield Business Park Shoreham Road, Henfield, West Sussex, BN5 9SL
Telephone:	01273 494401
Fax:	01273 493986
Website:	www.microlife.com
e-mail:	Derek.Tyrell@microlife.uk.com
Manufacturer:	Microlife AG
Manufactured in:	Taiwan

Infrared sensing: Thermofocus

Non-contact infrared detector measures emitted radiation to predict the oral or rectal temperature. Correct distance (3cm from the forehead) is indicated by optical aiming lights.
Intended use: Hospital, primary care and home
Measurement site: Forehead
Patient group: Adults, children and infants
Size (LWD): 165mm x 40mm x 20mm
Weight: 99 gms

User information

Press 'face' button for forehead measurements. Press 'house' button for other measurement sites, eg navel. Do not use on a perspiring forehead. Changing the point of measurement will obtain different results. Use in a draught free room at a constant temperature (away from air conditioning vents). Keep sensor clean and undamaged. Low ambient temperatures (5°C to 16°C) increase measurement errors, indicated by ‘low 5’ warning.

Special features

Skin near the infant's navel may also be used for measurement; turns off after 20 seconds non-use; multiple uses for assessing the surface temperature of other body sites, bath, food, etc; supplied with protective cap for probe tip.
Antitheft device: No
Low battery indicator: Battery symbol displayed
Self-check on start-up: Yes
Calibration: Factory calibration performed on each device prior to dispatch. Recalibration is only possible on the manufacturers premises..

Thermometer care

Cleaning probe tip: Clean using a cotton swab soaked in 70% alcohol solution.
Cleaning body: Wipe with a soft clean cloth moistened with alcohol or soapy solution
Storage conditions: Store in a dry and clean place at a room temperature between -10°C and +60°C

Maintenance and ongoing costs

Disposable covers not applicable, non-contact device
Battery: Alkaline AAA size x4 batteries [LR03] 1.5V
Battery life: 10000 measurements or 3 years
Maintenance: Perform accuracy self-check if poor function is suspected. Repair within warranty period requires return to UK supplier.

Manufacturing standards

ISO9002. Manufacturer claims compliance with ASTM-E 1965-98.
CE mark: Yes Code: 0051
Notified Body: CISQ, Italy

Price (ex VAT):	**£60.00**
Supplier:	Henleys Medical Supplies
Address:	Brownfields, Welwyn Garden City, Herts AL7 1AN
Telephone:	01707 333164
Fax:	01707 334795
Website:	www.henleysmed.com
e-mail:	sales@henleysmed.com
Manufacturer:	Tecnimed Srl
Manufactured in:	Italy

Infrared sensing: ThermoTek NoTouch 960

Infrared detector measures emitted radiation from temple to calculate an equivalent oral reading.
Intended use: Primary care and home use
Measurement site: Forehead
Patient group: Adults, children and infants
Size (LWD): 115mm x 62mm x 38mm
Weight: 76 gm

User information

Clean lateral forehead and temple, removing sweat, make up, etc. Do not use within 30 minutes of exercise, or if skin is scarred or affected by skin disorders. Place on one side and up to 1 inch from forehead and move in a circle until long bleep is heard.

Special features

Memory function can store up to 8 temperatures and the measurement time for up to 64 hours; avoid direct sunlight, radiant heat or airflow on skin during measurement; after a 2 minute rest use same measurement area to repeat readings; supplied with a protective stand.
Antitheft device: No
Low battery indicator: Battery symbol displayed
Self-check on start-up: Yes
Calibration: Information not supplied

Thermometer care

Cleaning probe tip: Clean infrared sensor with a dry soft tissue, allow it to dry before covering. Occasionally clean the external part of the soft tip with a 70% alcohol solution (not touching the sensor).
Cleaning body: Occasional clean of external surface with 70% alcohol solution
Storage conditions: Always store in protective stand when not in use.

Maintenance and ongoing costs

Disposable covers not required
Battery: Lithium [CR2032] 3V battery
Battery life: 5 years
Maintenance: User manual contains a basic fault finding procedure. Supplier provides an 'as required' repair and maintenance service. Faulty units must be returned to the supplier. Turn around is typically 5 days.

Manufacturing standards

ISO9001:2000; EN ISO 13488:2000; Manufacturer claims compliance with EN60601; ASTM E-1965-98;
CE mark: Yes Code: 0123
Notified Body: TUV Product Service

Price (ex VAT):	**£34.00**
Supplier:	PMS Instruments Ltd
Address:	Waldeck House, Waldeck Road, Maidenhead, Berkshire
Telephone:	01628 773233
Fax:	01628 770562
Website:	www.pmsinstruments.co.uk
e-mail:	sales@pmsinstruments.co.uk
Manufacturer:	SAAT Ltd
Manufactured in:	Israel

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