# Temperature Monitoring Product Presentation

Viamed Ltd

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# Agenda

- Temperature Monitoring
  - What is temperature monitoring?
  - Why is temperature monitoring important?
  - When & where is temperature monitoring used?
  - How do you monitor a patient's temperature?
  - The difference between application sites
  - The difference between types of probes
- Viamed Temperature Probes
  - Series 400-AC
- Summary & Conclusion

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# What is temperature monitoring?

- Temperature monitoring is concerned with maintaining a patient's normal core body temperature.
- Even a 1.5°C loss can compromise patient outcomes.
- It can also be used to monitor the temperature of the environment around the patient; i.e. when treating neonates with a radiant warmer or the temperature of fluids given to or extracted from the patient, i.e. in haemodynamics (blood pressure inside the veins, heart and ateries) and thermodilution (a method of cardiac output determination)

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# Why is temperature monitoring important?

Maintaining normal core temperature (37°C) is important because:

- Heat loss (*hypothermia*) may lead to:
  - Impaired immunity and vasoconstriction, which lower resistance to infection
  - Surgical site infection
  - Wound infection and blood loss

- Producing too much heat (*hyperthermia*) may lead to:
  - Blood pressure may drop significantly from dehydration
  - Heart rate and respiration rate will increase
  - Nausea and vomiting
  - In severe cases unconsciousness and coma will result

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# When & where is temperature monitoring used?

Temperature Monitoring is used in a variety of situations:

- During Surgery – Operating Theatres
- Patient Monitoring – Recovery Wards
- Intensive Care – ICU, CCU
- Neonatal Care – Delivery Wards, NICU

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# How do you monitor a patient's temperature?

A patient's temperature is monitored with the use of temperature probes connected to either a stand-alone temperature monitor or a multi-parameter patient monitor which features built-in temperature monitoring.

Various application sites can be used to monitor a patient's temperature:

- Central/Core
  - Introduce the probe e.g. into the oesophagus (gullet), nasopharynx (nose), the auditory canal (ear), the tympanic membrane (eardrum) or the rectum (final section of the large intestine).

- Skin and Extremity
  - Attach the probe to the finger, toe or chest using adhesive tape

**Note:**

- Different parts of the body may differ significantly in temperature.
- Monitoring temperature from two different sites e.g. oesophagus and extremity provides information on the blood flow.

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# How do you monitor temperature?

- Oesophageal
  - This highly accurate part of the body is considered invasive and is commonly used during surgery or in critical care areas.
  - Due to the length of the oesophagus, the placement of the sensor is critical. Correct placement is in the lower third of the oesophagus which will allow the sensor to be closer to the heart and aorta, and will accurately reflect the core temperature.
  - It also indicates changes in core temperature significantly faster than peripheral sites.

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# How do you monitor temperature?

- Rectal
  - A good approximation of body core temperature only if the patient is in thermal balance. Many studies have however shown that rectal temperatures fail to track rapid changes in body core temperature because the rectum has no thermoreceptors (nerve cells that are able to detect differences in temperatures).
  - Because of the delayed response, core temperature may be changing in the opposite direction, and the lag time may be up to one hour.
  - It is documented that heat passes from the rectum into the blood, not vise versa.
  - The temperature probe requires a three to five minutes dwell time.
  - Possible causes of inaccurate rectal readings include:
    - Heavy exercise of the large muscles in the buttocks and thighs
    - The insulating effect of fecal material in rectum
    - Improper depth of probe

# How do you monitor temperature?

- Skin
  - The difference (Delta T) between core (Tc) and skin temperature (Tsk), interacts physically with total skin blood flow. The greater the (Tc - Tsk) difference, the greater the amount of heat transferred to the body surface.
  - A change in either Tc or Tsk affects heat transfer through the effect on the (Tc - Tsk) difference and also skin blood flow, through the thermo regulatory reflex influence of both Tc and Tsk.
  - A Tsk change that reduces the temperature difference (a change in the direction of reducing heat transfer) would simultaneously induce an increase in skin blood flow (a change in the direction of increasing heat transfer).

Note:

- There are other application sites for monitoring a patient's temperature but the above are the most common.

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# The difference between application sites

| Site | Variation from core temperature | Advantage | Disadvantage | Reliability | Complications | Uses |
|---|---|---|---|---|---|---|
| **Oesophageal** | Core reference | Reflects temperature of body core | Temperature varies according to depth of probe placement | Placement is key | Needs to be in lower third of oesophageal | Used during anaesthesia |
| **Rectal** | <0.3 °C | Preferred by MDs | Lags behind other core sites when temperature is changing rapidly | Reading may be delayed from core temperature changes | Fecal material Care with Neonates | Often requested by medical doctors as the 'Most accurate' site for core temperatures |
| **Skin** | <0.5 °C | Easy placement, non-invasive | Variable with placement | Affected by placement and subcutaneaous blood flow | Blood flow – Ambient temperature, radiation | ICU, Incubators |

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# The difference between types of probes

- Skin contact
  - Adult
    - Enable clinicians to monitor a patient's skin surface temperature during routine surgery and post operative recovery.
  - Paediatric
    - Enables clinicians to monitor the skin temperature of neonates in the delivery room, nursery and NICU.
- Oesophageal/rectal
  - Enables clinicians to monitor a patient's core temperature during routine surgery and post operative recovery.
- Oesophageal stethoscope
  - Provides accurate measurement of a patient's core body temperature and transmits lung sounds to the anaesthetists earpiece.
- Foley catheters (flexible tube passed through the urethra and into the bladder to drain urine)
  - Enable clinicians to accurately monitor urinary output and bladder temperature in addition to facilitating urine drainage.
  - Accurately tracks core body temperature; bladder measurement correlates most closely with pulmonary artery temperature.
- Tympanic probes
  - Provide clinicians with a non-invasive way to monitor a patient's core body temperature with the tympanic membrane through the ear canal

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# How do you monitor a patient's temperature?

- The word 'Thermistor' is used to describe a range of electronic components whose principle characteristic is that their electrical resistance changes in response to changes in their temperature.

- PTC – Positive Temperature Coefficient
  - Devices whose resistance increases as their temperature increases
- NTC – Negative Temperature Coefficient
  - Devices whose resistance decreases as their temperature increases

- A thermocouple (consisting of two wires of different metals connected at two points, a voltage being developed between the two junctions in proportion to the temperature difference) can also be used instead of a thermistor.

Note: The Viamed temperature probes use a NTC Thermistor measuring principle.

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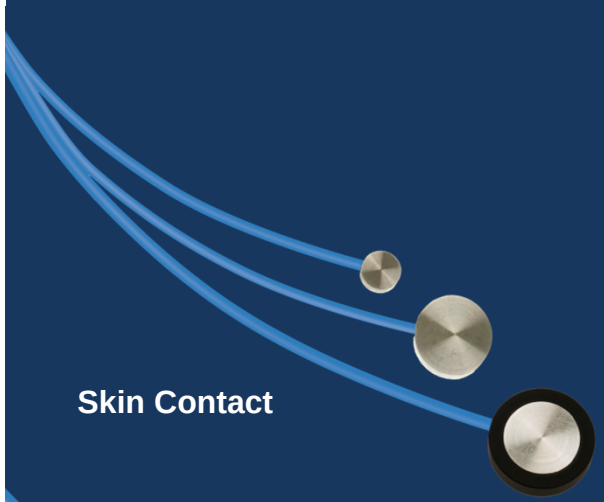
# Series 400-*AC*

## *Reusable and Autoclavable Temperature Probes*



**Skin Contact**

**Oesophageal/Rectal**

- Compatible to:
  - YSI 400 Series
  - Hewlett Packard/Philips
  - Siemens/Dräger
- Autoclavable
- Latex free
- Biocompatible
- Extremely robust yet flexible
- Available for use on:
  - Adult
  - Paediatric
  - Neonates
- Variety of application sites:
  - Skin contact
  - Oesophageal/rectal

**HP/Philips**

**Siemens/Dräger**

**6.35mm (1/4”)**
**Jack (mono)**
**Right angled**

**6.35mm (1/4”)**
**Jack (mono)**

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# Summary & Conclusion

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