



# Calibration Equipment

for thermometers & temperature probes



Temperature is a critical measurement for ensuring the safety and quality of many products. Whether monitoring temperature at the point of goods in, throughout production, final product storage or during distribution, thermometer calibration is essential.

The food industry, in particular, is very aware of the critical nature of processing temperatures as part of their HACCP procedures. The importance of thermometer calibration is not just a food safety issue, but also an economic consideration, as thermometer accuracy can affect both quality and productivity.

It is recommended that thermometers and temperature monitoring equipment be calibrated regularly. New equipment should be checked for accuracy upon receipt and before being put into service. Thermometers that are in constant use and used in critical areas should be calibrated more regularly. The definition of a regular calibration check is very much at the discretion of the user, for example, a food processing company may well decide to check thermometers daily before use, whereas a restaurant may decide that once a week is adequate.

## calibration checks

Depending on the instrument and its intended temperature and use, an iced water and boiling water method can be used for checking the accuracy of a thermometer and probe. When used properly and in conjunction with a Reference thermometer, this offers a cost-effective method of calibration and verification.

Other techniques can be employed utilising dry-well and calibration baths in conjunction with a Reference thermometer. These techniques are particularly relevant and often more convenient when several thermometers and temperature probes are to be calibrated at any one time. Dry-wells and calibration baths provide variable and stable heat sources.

A Reference thermometer is a particularly important instrument for checking the calibration of other thermometers and probes. However, it is of paramount importance that this instrument is kept for the sole purpose of verifying the accuracy of thermometers and temperature probes and has a current UKAS Certificate of Calibration.

Temperature simulators are an alternative to real-world temperature checking and are particularly useful for checking thermometers on-site or in-situ. It should be remembered, when using temperature simulators, that you are only checking the calibration of the instrument and not the system.

## UKAS Certificates of Calibration

ETI's in-house UKAS calibration laboratory offers certification for both thermometers and probes either individually or as a system. Each UKAS Certificate of Calibration indicates deviations from standards at five temperature check points.

# Reference Thermometer

±0.05 °C high system accuracy

NEW!

- ✓ range -199.99 to 199.99 °C
- ✓ 5-point UKAS Certificate included
- ✓ ideal for calibration comparison checks
- ✓ supplied complete with high accuracy probe

The Reference thermometer is a high accuracy PT100 instrument that is supplied with a 5-point UKAS Certificate of Calibration. Each certificate indicates deviations from standards at various check points: -18, 0, 40, 70 and 100 °C. Special ranges may be certified by arrangement with the ETI UKAS calibration laboratory.

The Reference thermometer is ideal for comparison checking the calibration and accuracy of other thermometers and probes, when used in conjunction with a stable temperature heat or chill source, see pages 78 and 79. The instrument and probe measures temperature over the range of -199.99 to 199.99 °C with a resolution of 0.01 °C and an accuracy of ±0.05 °C. The unit features a simple on/off push button with low battery and open circuit 'Err' and low battery indication, when applicable.

The Reference thermometer is supplied with a permanently attached, high accuracy probe incorporating a 1/10th DIN PT100 sensor. The probe measures Ø3.3 x 130 mm and is supplied with a one metre PVC lead.



A 5-point UKAS Certificate of Calibration is included with each Reference thermometer



## Comparator

The Reference thermometer (above) is being used in conjunction with an infrared thermometer and the Comparator.

| order code | description |
|------------|-------------|
| 222-055    | Reference   |
| 814-132    | Comparator  |

| specification | Reference                                  |
|---------------|--|
| range         | -199.99 to 199.99 °C                       |
| resolution    | 0.01 °C                                    |
| accuracy      | ±0.05 °C (-30 to 150 °C) otherwise ±0.1 °C |
| battery       | 3 x 1.5 volt AAA                           |
| battery life  | 2000 hours                                 |
| sensor type   | PT100 1/10th DIN                           |
| display       | 10 mm LCD                                  |
| dimensions    | 25 x 56 x 128 mm                           |
| weight        | 210 grams                                  |

a UKAS Certificate of Calibration is included



# 3000 Series Dry-Well

## small & lightweight calibrators

- ✓ portable temperature heat source
- ✓ ideal for checking the accuracy of thermometers

The 3000 dry-well calibrators are small and lightweight heat sources, ideal for checking the accuracy of digital thermometers and temperature probes. The units have a temperature range of 33 to 300 °C with a resolution of 0.1 °C.

The dry-wells offer a high level of stability ( $\pm 0.5$  °C) and a stabilisation time of five minutes. Plug it in, switch it on, set the verification temperature with the front panel buttons and insert your probe into the correct size well. Compare the temperature reading of your thermometer against the display and the difference is the error.

The 3001 dry-well will accept probe sizes  $\varnothing 3.3$ , 4, 4.76 and 6.35 mm. The 3002 dry-well will accept probe sizes  $\varnothing 3.3$ , 4.76, 6.35 and 9.6 mm. The 3003 dry-well will accept probe sizes  $\varnothing 4.76$  and 12.7 mm.

| order code | description   |
|------------|---------------|
| 271-301    | 3001 dry-well |
| 271-302    | 3002 dry-well |
| 271-303    | 3003 dry-well |



| specification   | 3000 series dry-wells                                       |
|---|---|
| range   | 33 to 300 °C  |
| resolution  | 0.1 °C  |
| accuracy  | $\pm 0.5$ °C (33 to 199.9 °C)<br>$\pm 1$ °C (200 to 300 °C) |
| heating time  | ambient to 300 °C after 10 mins                             |
| well depth  | 100 mm  |
| power   | 230 volt AC (115 volt available)                            |
| dimensions  | 57 x 125 x 158 mm   |
| weight  | 900 grams   |
| <i>FREE traceable certificate of calibration included</i> |   |

# 3004 Dry-Well

## heat source calibrator

- ✓ portable temperature heat source
- ✓ choice of interchangeable inserts

The 3004 dry-well is a small and lightweight heat source with replaceable probe inserts. The unit has a temperature range of 33 to 300 °C with a resolution of 0.1 °C.

The 3004 has a high level of stability and a stabilisation time of five minutes. Set the temperature and insert your probe into the correct size well. Compare the temperature reading of your thermometer against the display temperature and the difference is the error. In addition to the  $\varnothing 3.3$  mm reference hole, the unit will accept a  $\varnothing 13$  mm removable brass insert for probe sizes:  $\varnothing 3.3$ , 4.1, 4.8, 6.4 and 9.6 mm. The 3004 is supplied with an insert of the customer's choice.

| order code | description                       |
|------------|-----------------------------------|
| 271-304    | 3004 dry-well                     |
| 271-321    | $\varnothing 3.3$ mm brass insert |
| 271-322    | $\varnothing 4.1$ mm brass insert |
| 271-323    | $\varnothing 4.8$ mm brass insert |
| 271-324    | $\varnothing 6.4$ mm brass insert |
| 271-325    | $\varnothing 9.6$ mm brass insert |



| specification   | 3004 dry-well   |
|---|---|
| range   | 33 to 300 °C  |
| resolution  | 0.1 °C  |
| accuracy  | $\pm 0.5$ °C (33 to 199.9 °C)<br>$\pm 1$ °C (200 to 300 °C) |
| heating time  | ambient to 300 °C after 10 mins                             |
| well depth  | 100 mm  |
| power   | 230 volt AC (115 volt available)                            |
| dimensions  | 57 x 125 x 158 mm   |
| weight  | 900 grams   |
| <i>FREE traceable certificate of calibration included</i> |   |



# 3101 Dry-Well

## heat/cool source calibrator

- ✓ accepts a wide variety of probe diameters
- ✓ ideal for checking the accuracy of thermometers

The 3101 dry-well features an easy to read LED display with a temperature range of -10 to 110 °C with a resolution of 0.1 °C. Heating time, ambient to 100 °C or cooling time, ambient to 0 °C is 10 minutes for both.

The 3101 is excellent for checking the calibration of a wide range of instrumentation including digital thermometers and temperature probes that need calibration checks, either below or above ambient temperature. The unit incorporates two removable wells/inserts, both Ø13 mm in diameter and will accept probe sizes Ø3.3, 4.1, 4.8, 6.4 and 9.6 mm. Each 3101 is supplied with two inserts of the customer's choice.



| order code | description             |
|------------|-------------------------|
| 271-401    | 3101 dry-well           |
| 271-321    | Ø3.3 mm ID brass insert |
| 271-322    | Ø4.1 mm ID brass insert |
| 271-323    | Ø4.8 mm ID brass insert |
| 271-324    | Ø6.4 mm ID brass insert |
| 271-325    | Ø9.6 mm ID brass insert |

| specification | 3101 dry-well   |
|---------------|---|
| range         | -10 to 110 °C   |
| resolution    | 0.1 °C  |
| accuracy      | ±0.5 °C (-10 to 99.9 °C)<br>±1 °C (100 to 110 °C)         |
| heating time  | ambient to 100 °C after 10 mins                           |
| cooling time  | ambient to 0 °C after 10 mins                             |
| well depth    | 100 mm  |
| power         | 230 volt AC (115 volt available)                          |
| dimensions    | 89 x 152 x 186 mm   |
| weight        | 1800 grams  |
|               | <i>FREE traceable certificate of calibration included</i> |

# 3800 Black Body

## heat source calibrator

- ✓ for checking the accuracy of infrared thermometers
- ✓ wide temperature range 50 to 500 °C

The 3800 black body calibrator/heat source features an easy to read LED display. The calibrator controls the black body temperature over the range of 50 to 500 °C with an accuracy of better than 0.5 °C at 100 °C. Heating time, ambient to 100 °C is just 10 minutes.

The 3800 is excellent for checking the calibration of infrared, non-contact, digital thermometers that require regular calibration checks or validation.

Simply set the verification temperature on the digital display of the 3800 calibrator, allow time to stabilise and then point your infrared thermometer at the Ø57 mm black body. Compare the temperature readings on the 3800 display and the infrared thermometer under test, the difference is the error.



| order code | description     |
|------------|-----------------|
| 822-800    | 3800 black body |

| specification | 3800 black body   |
|---------------|---|
| range         | 50 to 500 °C  |
| resolution    | 0.1 °C  |
| accuracy      | ±0.5 °C @ 100 °C  |
| heating time  | 30 to 40 minutes  |
| cooling time  | 30 to 45 minutes  |
| emissivity    | 0.95 fixed  |
| target size   | Ø57 mm  |
| power         | 230 volt AC (110 volt available)                          |
| sensor type   | PT100   |
| dimensions    | 114 x 180 x 233 mm  |
| weight        | 3000 grams  |
|               | <i>FREE traceable certificate of calibration included</i> |



# MicroCal 1 & 1 Plus Calibrator

simulator or simulator & thermometer

- ✓ two models - simulator or simulator/thermometer
- ✓ 12 adjustable temperature points
- ✓ for frequent checking of thermometer accuracies
- ✓ tests thermocouple type K, J, T, R, N, S & E thermometers

The MicroCal 1 and 1 Plus thermocouple simulators help ensure that the frequent checking of thermometer accuracies is a routine operation. Both instruments are designed to simulate a chosen temperature to test thermocouple type K, J, T, R, N, S and E thermometers without the need for specialised equipment or conversion tables. The MicroCal 1 Plus also measures and simulates temperature.

Both models feature a custom 10 mm LCD display with alpha-numeric display line to prompt the user when changing parameters. Selectable parameters include: °C/°F, auto power off - enable/disable, CJC - internal/external and display contrast adjustment.

An optional lead set is also available, that comprises of seven leads, one for each thermocouple type K, J, T, R, N, S and E. Each PVC lead is one metre long and incorporates two miniature thermocouple plugs.

Each MicroCal is supplied with a one metre PVC type K thermocouple lead with miniature connectors and a five-point UKAS Certificate of Calibration which indicates deviations from standards at the various points.



|                     |         |                 |
|---------------------|---------|-----------------|
| Thermocouple type K | - range | -200 to 1372 °C |
| Thermocouple type J | - range | -200 to 1200 °C |
| Thermocouple type T | - range | -270 to 400 °C  |
| Thermocouple type R | - range | 0 to 1768 °C    |
| Thermocouple type N | - range | -200 to 1300 °C |
| Thermocouple type S | - range | 0 to 1768 °C    |
| Thermocouple type E | - range | -140 to 1000 °C |



a 5-point UKAS Certificate of Calibration is included with each MicroCal simulator



| order code | description            |
|------------|------------------------|
| 271-100    | MicroCal 1             |
| 271-101    | MicroCal 1 Plus        |
| 816-100    | lead set (seven types) |
| 830-205    | protective PVC boot    |

| specification | MicroCal 1 & MicroCal 1 Plus                        |
|---------------|---|
| range         | 12 adjustable presets (see table above)             |
| accuracy      | ±0.3 °C (dependent upon thermocouple type)          |
| battery       | 2 x 1.5 volt AAA alkaline                           |
| battery life  | 300 hours   |
| sensor type   | thermocouple type K, J, T, R, N, S & E (selectable) |
| display       | custom LCD  |
| dimensions    | 35 x 73 x 141 mm                                    |
| weight        | 220 grams   |

a UKAS Certificate of Calibration is included

# MicroCal 2 & 3 Calibrators

## temperature simulators

- ✓ 12 variable or 23 fixed temperature points
- ✓ adjustable or pre-set temperature points
- ✓ type K, J or T thermocouple models available
- ✓ five-point UKAS Certificate of Calibration

The MicroCal 2 and 3 thermocouple simulators help ensure that the frequent checking of thermometer accuracies is a routine operation. Both instruments are designed to simulate a chosen temperature, allowing standard K, J or T thermocouple thermometers to be tested or recalibrated simply and quickly, without the need for additional specialised equipment or conversion tables.

Both models feature a custom 10 mm LCD display with alpha-numeric display line to prompt the user when changing parameters. Selectable parameters include; °C/°F, auto power off - enable/disable, CJC - internal/external and display contrast adjustment.

The MicroCal 2 has 12 preset temperatures for type K thermocouple -20, -10, 0, 10, 30, 50, 100, 195, 250, 500, 800 and 1000 °C, any of these temperatures can be modified and saved by the user. The factory default temperatures can be recalled at any time.



The MicroCal 3 has 23 fixed temperature points for type K thermocouple -100, -50, -20, -10, 0, 10, 20, 30, 40, 50, 60, 80, 100, 150, 195, 250, 300, 400, 500, 600, 800, 1000 and 1200 °C.

Each MicroCal is supplied with a one metre PVC lead with a miniature thermocouple connector and a five-point UKAS Certificate of Calibration. Each certificate indicates deviations from standards at the various points.



a 5-point UKAS Certificate of Calibration is included with each MicroCal simulator



| order code | description         |
|------------|---------------------|
| 271-200    | MicroCal 2 - type K |
| 271-201    | MicroCal 2 - type J |
| 271-202    | MicroCal 2 - type T |
| 271-210    | MicroCal 3 - type K |
| 271-211    | MicroCal 3 - type J |
| 271-212    | MicroCal 3 - type T |
| 830-205    | protective PVC boot |

| specification | MicroCal 2                                    | MicroCal 3            |
|---------------|---|-----------------------|
| range         | 12 adjustable presets                         | 23 fixed temperatures |
| accuracy      | ±0.3 °C                                       | ±0.5 °C               |
| battery       | 2 x 1.5 volt AAA alkaline                     |                       |
| battery life  | 300 hours                                     |                       |
| sensor type   | dedicated type K, J or T thermocouple         |                       |
| display       | custom LCD                                    |                       |
| dimensions    | 35 x 73 x 141 mm                              |                       |
| weight        | 220 grams                                     |                       |
|               | a UKAS Certificate of Calibration is included |                       |



# MicroCheck

## three-point checker/simulator

- ✓ three-point UKAS Certificate of Calibration
- ✓ for regular checking of thermometer accuracies

The MicroCheck temperature checkers have been developed to verify the continuing accuracy of type K thermocouple thermometers with a 0.1 or 1 °C resolution and an accuracy of ±0.5 °C.

The MicroChecks simulate three fixed temperatures, enabling users to check the accuracy of each instrument at three known points without the need for specialist equipment.

Each MicroCheck is supplied with a one-metre PVC lead, two miniature thermocouple connectors and a three-point UKAS Certificate of Calibration.



| specification | MicroCheck                |
|---------------|---------------------------|
| range         | 3 fixed temperatures      |
| accuracy      | ±0.5 °C                   |
| battery       | 2 x 1.5 volt AAA alkaline |
| battery life  | 300 hours                 |
| sensor type   | type K thermocouple       |
| display       | custom LCD                |
| dimensions    | 35 x 73 x 141 mm          |
| weight        | 220 grams                 |

*a UKAS Certificate of Calibration is included*

### order code description

|         |                                  |
|---------|----------------------------------|
| 271-011 | MicroCheck 0 °C, 100 °C, 500 °C  |
| 271-012 | MicroCheck -20 °C, 20 °C, 200 °C |
| 271-014 | MicroCheck -20 °C, 0 °C, 220 °C  |
| 271-015 | MicroCheck -20 °C, 0 °C, 100 °C  |

# Test Caps

## supplied with a UKAS certificate of calibration

### PT100 single-point test caps

Calibration PT100 test caps are suitable for checking the accuracy of the Precision PT100 thermometer or any platinum resistance thermometer fitted with a Binder connector.

Simply plug in the test cap and the display on the thermometer should show the same temperature as the certified value.

Each test cap is supplied with a UKAS Certificate of Calibration with a guaranteed uncertainty of ±0.1 °C.



### order code description

|         |                       |
|---------|-----------------------|
| 282-001 | PT100 test cap -18 °C |
| 282-002 | PT100 test cap 0 °C   |
| 282-003 | PT100 test cap 3 °C   |
| 282-004 | PT100 test cap 70 °C  |
| 282-005 | PT100 test cap 100 °C |

*a UKAS Certificate of Calibration is included*

### thermistor single-point test caps

Calibration thermistor test caps are suitable for checking the accuracy of the Therna 20, Therna 22 or any equivalent thermistor thermometer.

Simply plug in the desired test cap and the display on the thermometer should show the same temperature as the certified value.

Each test cap is supplied with a UKAS Certificate of Calibration with a guaranteed uncertainty of ±0.1 °C.



### order code description

|         |                            |
|---------|----------------------------|
| 286-001 | thermistor test cap -18 °C |
| 286-002 | thermistor test cap 0 °C   |
| 286-003 | thermistor test cap 3 °C   |
| 286-004 | thermistor test cap 70 °C  |
| 286-005 | thermistor test cap 100 °C |

*a UKAS Certificate of Calibration is included*

# Stirred Water Bath

## high level of stability

- ✓ stainless steel bath with a 10-litre capacity
- ✓ temperature heat source ambient to 100 °C

This low cost water bath is ideal for checking the calibration of a wide range of instrumentation including thermometers and data-loggers. The unit incorporates a temperature controller with a LED display, heater and circulation pump.

The water bath offers a high level of stability ( $\pm 0.5$  °C) and a stabilisation time of 30 minutes. Switch it on, set the verification temperature and insert your probe into the bath. Compare the temperature reading of your thermometer to the display and the difference is the error.

The stirred water bath will control the temperature of the water or oil over the range of ambient to 100 °C. The seamless stainless steel tank gives a large open workspace with a capacity of 10-litres. Each bath is supplied complete with a stainless steel cover.



### specification stirred water bath

|              |   |
|--------------|---|
| range        | ambient to 100 °C (above 70 °C use oil) |
| resolution   | 0.1 °C                                  |
| accuracy     | $\pm 0.5$ °C                            |
| heating time | ambient to 60 °C takes 30 minutes       |
| power        | 230 volt AC (115 volt available)        |
| dimensions   | 180 x 260 x 315 mm                      |
| weight       | 7500 grams                              |

*FREE traceable certificate of calibration included*

| order code | description        |
|------------|--------------------|
| 822-900    | stirred water bath |

# Mini Calibration Bath

## temperature checker

- ✓ compact, portable & economical
- ✓ cools to 0 °C & heats to 56 °C

The mini temperature calibration bath is a safe, compact, no frills, tabletop device that can cool water to 0 °C ( $\pm 0.5$  °C) or heat water to a temperature of 56 °C ( $\pm 0.5$  °C), avoiding the need to use a kettle of boiling water. The bath is a simple, easy to use device to aid in the comparison calibration of temperature probes. A regular everyday calibration check of a thermometer and probe as a system is essential to maintain confidence in your readings.

Depending on the instrument and its intended temperature and use, the mini temperature calibration bath provides iced water and hot water, which can be used for checking the accuracy of a thermometer and probe. When used properly and in conjunction with a Reference thermometer, this offers a cost-effective method of calibration and verification.



### specification mini water bath

|                   |  |
|-------------------|--|
| range - cool      | 0 °C (20 °C below ambient)                           |
| range - heat      | 56 °C  |
| accuracy          | $\pm 0.5$ °C (in a stable 20 °C ambient temperature) |
| power             | 12 volt DC or 100 to 240 volt AC with adaptor        |
| power consumption | 20 watts cooling - 18 watts heating                  |
| bath/cup capacity | 300 millilitres                                      |
| dimensions        | 110 x 130 x 150 mm                                   |
| weight            | 600 grams  |

| order code | description     |
|------------|-----------------|
| 822-950    | mini water bath |

