

# Temperature Calibrators

## Dry Block Calibrators, Micro Bath Calibrators and Multi-Function Calibrators

A temperature calibrator today needs to be versatile and meet a wide range of requirements. It should be an easily portable device to cope with frequently changing operation locations, as in multiple test bays or in production locations. A calibrator should also be equally suitable for stationary use in the measurement lab or in testing and inspection. To meet these demands, these calibrators are lightweight and easy-to-use at each site. Five temperature calibrators are available to cover the range from -35 to 650°C (-31 to 1202°F) and wet or dry calibration requirements.

- **Dry Block Calibrator:**  
TCL-650S-D, ambient to 650°C (1202°F)
- **Dry Block Calibrator:**  
TCL-165S-D, -35 to 165°C (-31 to 329°F)
- **Micro Bath Calibrator:**  
TCL-M165S-B, -35 to 165°C (-31 to 329°F)
- **Micro Bath Calibrator:**  
TCL-M255S-B, ambient to 255°C (491°F)
- **Multi-function Calibrator:**  
TCL-3M165E, Dry Bath, Micro Bath, Infrared Blackbody, and Surface Temperature

Why calibrate? Temperature sensors are subject to mechanical, thermal and chemical stresses. This results in a drift the longer the sensors are in use. Only the regular calibration of the sensors provides information on the difference between the actual temperature and the measured temperature and makes the specific drift visible. This data can be critical to maintaining a stable process operation.

OMEGA™ Dry block calibrators and micro bath calibrators are one of the best means to check and calibrate a wide range of temperature measuring instruments and temperature sensors. Mechanical, electro-mechanical or electronic measurement equipment can be checked with ease. These compact and durable calibrators are easy to transport, user friendly and offer all the features required for the specific test.



TCL-650S-D shown smaller than actual size.



TCL-M165S-B shown smaller than actual size.



TCL-M255S-B shown smaller than actual size.



TCL-3M165E shown smaller than actual size.

# Temperature Calibrators

## Four Methods of Calibration

### Dry Block Function

The optimum thermal coupling from the block to test item is achieved with the correct adaptor sleeve. Ideally, the internal diameter of the sleeve is 0.5 mm larger than the outer diameter of the test item. With the aid of the adaptor sleeve, straight temperature sensors of virtually any length and diameter can be calibrated. The dry block covers the entire temperature range without the need to change the calibration medium. Viscosity, flash points or outgassing are of no concern.



Dry block function

### Black Body Function

An infrared calibration sleeve is used to calibrate IR pyrometers or thermal imaging cameras. The special surface structure and the asymmetrical shapes create a "cavity radiator" with an emission factor of 0.9994, prevent the reflection of interference radiation and emit the required temperature in an ideal form. The pyrometer is simply held at the specified distance above the measurement opening, thereby forming the desired measurement area on the bottom for the calibration to be performed. A support base can be fitted directly on the unit.



Black body function

### Micro Bath Function

The use of calibration liquids offers certain advantages if temperature sensors with an unusual shape and size are to be tested. The test item is immersed directly into the liquid without an insulating air gap. This results in direct temperature contact between the calibrator and the test item. The liquid, usually silicone oil, is chosen depending on the calibration temperature required. The continuous adjustment of the magnetic stirrer together with the removable sensor basket agitates the calibration liquid to create a large measuring zone. Furthermore, the sensor basket guarantees unhindered stirring and helps protect the tank floor.



Micro bath function

### Surface Temperature Function

Surface temperature sensors are calibrated using special sleeves that are fitted vertically with the required contact force. Switching calibration control to the external reference sensor creates the best possible temperature reference point on the surface of the sleeve. The reference sensor is located directly beneath the abutting face of the sleeve. The sleeve is designed in such a way that the best temperature homogeneity is achieved in the center of the abutting face. The special design of the abutting face enables good thermal contact. There is no need to use a thermally conductive paste or other thermal conduction aids.



Surface temperature function

## Accessories for TCL Series Calibrators

### Adaptor Sleeves

Dry-block calibrators are designed to simplify temperature calibration in the lab and in the field. With the help of adaptor sleeves, straight temperature sensors with almost any length and diameter can be calibrated. The dry block covers the entire temperature range of the calibrator with no need for changing the calibration medium. Viscosity, flash point and outgassing are of no concern.

Every adaptor sleeve can be equipped with a single or several multi bores. Bores with diameters ranging from 0.60 to 1" can be realized in 0.20" steps. Ideally, the internal diameter of the sleeve is 0.2" larger than the outer diameter of the test item.

### Calibration Liquids

Using a liquid calibration medium is advantageous for checking temperature sensors with unusual shapes or dimensions. The test item is immersed in the liquid without an insulating air gap, resulting in direct contact between the calibrator and the test item. The calibration liquid is chosen according to the desired calibration temperature. The sensor lid with 5 silicone plugs and/or a support base ensures the stable positioning of the test items in the bath:

<b>Demineralized Water</b>	<b>Silicone Oil 10 CS</b>	<b>Silicone Oil 50 CS</b>
<b>Limits</b> 2 to 95°C	-35 to 155°C	50 to 270°C
<b>Flash point</b>	165°C	280°C

## Calibration and Testing Software

The in-house calibration software application is used for temperature calibrators that are equipped with an external interface for programming and evaluating the calibration values. It can be operated easily from an external PC. The following calibration tasks can be performed:

- Programmable ramp functions
- Programmable temperature cycles
- Series tests (e.g. for incoming goods inspection)
- Preparing the test data in graphical and in tabular form
- Incorporating customer data in the certificates
- Programmable temperature gradients

## Tub Insert for Micro Baths

The tub insert is the ideal solution for applications in which a variety of liquids are used. It eliminates the time-consuming task of exchanging the liquids and cleaning the bath. The separate tub insert is just as leak-proof as the bath itself.

The tub insert also provides quick switch - over from micro bath to dry block function - when utilizing a multi-function calibrator.



Tub insert for micro baths

# Precision Dry Block Temperature Calibrator



## High Temperature Dry Block Calibrator to 650°C (1202°F)

**TCL-650S-D**

✓ **Range: Ambient to  
650°C (1202°F)**

Omega dry block calibrators use the most advanced thermal designs to ensure precision, accuracy and repeatability. The internal sensor is tested and cycled until it is virtually drift free. Digital electronics and control algorithms assure long term accuracy. The dual display is °C/°F switchable shows you the set point and the actual temperature so you are always aware of the conditions in the calibrator.



TCL-650S-D shown smaller than actual size.

### Specifications

**Control Sensor:** Internal

**Temperature Range:** Ambient to 650°C (1202°F)

**Tolerance:** ±0.4°C (±0.72°F)

**Stability:** ±0.05°C (±0.09°F)

**Measurement Zone:** 110 to 150 mm (4.33 to 5.91")

**Block:** 28 mm (1.1"), diameter, 150 mm (5.9") depth

**Display:** 2-line, 4-digit display, red/green, unit °C/°F switchable

**Display Range:** 0 to 650°C (32 to 1202°F)

**Resolution:** 0.01°C/0.02°F in ambient range to 99.99°C/ambient to 211.98°F else 0.1°C (0.18°F)

**Dimensions:**

**Width:** 150 mm (5.91")

**Height:** 330 + 70 mm (12.99 + 2.76")

**Depth:** 270 mm (10.63")

**Weight:** Approximately 7.5 kg (16.5 lb)

**Power Supply:** 100 to 240 Vac, ±10%, 50/60 Hz

**Power Consumption:** Approximately 1000 VA

To Order	
Model No.	Description
TCL-650S-D	Precision dry block calibrator, ambient to 650°C (1202°F)
<b>Accessory Sleeves – 1 Required</b>	
TCL-S-DB28150-A	Adaptor sleeve, 2 bores ¼ and ⅛" dia.
TCL-S-DB28150-B	Adaptor sleeve, 3 bores ½, ¼ and ⅛" dia.
TCL-S-DB28150-C	Adaptor sleeve, 4 bores ⅝, ⅜, ¼, ⅜" dia.
TCL-S-DB28150-D	Adaptor sleeve, 7 bores 6 x ¼ and ⅛" dia.
TCL-S-DB28150-E	Adaptor sleeve, 7 bores ⅝ and 2 x ⅜", 2 x ¼", 2 x ⅜" dia.
TCL-S-DB28150-X	Adaptor sleeve, blank

### Accessory

Model No.	Description
TCL-6-CASE2TG	Padded travel case with wheels and handle

*Comes complete with C of C, power cable, insertion tool, and operator's manual.*

# Precision Dry Block Temperature Calibrator



Hot/Cold Dry Block Calibrator, -35 to 165°C  
(-31 to 329°F)

TCL-165S-D

✓ Range: -35 to 165°C  
(-31 to 329°F)

The Omega hot/cold dry block calibrator model TCL-165S-D has all the features of the TCL-650S-D plus a cooling cycle that allows stable temperature calibration down to -35°C (-31°F) and up to 165°C (329°F). The internal sensor is burned specially aged until it is virtually drift free. Digital electronics and control algorithms assure long term accuracy so you are always aware of the conditions in the calibrator.



TCL-165S-D shown smaller than actual size.

## Specifications

**Control Sensor:** Internal

**Temperature Range:** -35 to 165°C  
(-31 to 329°F)

**Tolerance:** ±0.2°C (±0.36°F)

**Stability:** ±0.05°C (±0.09°F)

**Measurement Zone:** 110 to 150 mm  
(4.33 to 5.91")

**Block:** 28 mm (1.1"), diameter,  
150 mm (5.9") depth

**Display:** 2-line, 4-digit display, red/  
green, unit °C/°F switchable

**Display Range:** -50 to 165°C  
(-58 to 329°F)

**Resolution:** 0.01°C/0.02°F in range of  
-9.99 to 99.99°C/4.02 to 211.98°F  
else 0.1°C (0.18°F)

**Dimensions:**

**Width:** 210 mm (8.27")

**Height:** 330 + 50 mm (14.96 + 1.97")

**Depth:** 300 mm (10.63")

**Weight:** Approximately 10 kg (22 lb)

**Power Supply:** 100 to 240 Vac,  
50/60 Hz

**Power Consumption:** Approximately  
400 VA

## To Order

Model No.	Description
TCL-165S-D	Precision dry block calibrator, -35 to 165°C (-31 to 329°F)
<b>Accessory Sleeves – 1 Required</b>	
TCL-S-DB28150-A	Adaptor sleeve, 2 bores ¼ and ⅛" dia.
TCL-S-DB28150-B	Adaptor sleeve, 3 bores ½, ¼ and ⅛" dia.
TCL-S-DB28150-C	Adaptor sleeve, 4 bores ⅛, ⅜, ¼, ⅜" dia.
TCL-S-DB28150-D	Adaptor sleeve, 7 bores 6 x ¼ and ⅛" dia.
TCL-S-DB28150-E	Adaptor sleeve, 7 bores ⅛ and 2 x ⅜", 2 x ¼", 2 x ⅜" dia.
TCL-S-DB28150-X	Adaptor sleeve, blank

## Accessory

Model No.	Description
TCL-6-CASE4TG	Padded travel case with wheels and handle

Comes complete with C of C, power cable, insertion tool, and operator's manual.

# Precision Micro Bath Temperature Calibrator



## Micro Bath Calibrator with -35 to 165°C (-31 to 329°F) Range

### TCL-M165S-B

✓ -35 to 165°C (-31 to 329°F)

The TCL-M165S-B Micro Bath uses a calibration liquid to immerse the unit being calibrated and has both heating and cooling to offer a range of -35 to 165°C (-31 to 329°F). This offers certain advantages if temperature sensors with an unusual shape and size are to be tested. The test item is immersed directly into the liquid without an insulating air gap. This results in direct temperature contact between the calibrator and the test item. The liquid, usually silicone oil, is chosen depending on the calibration temperature required. The continuous adjustment of the magnetic stirrer together with the removable sensor basket agitates the calibration liquid to create a large measuring zone. Furthermore, the sensor basket guarantees unhindered stirring and helps protect the tank floor.



Silicon plugs included.



TCL-M165S-B shown smaller than actual size.

### Specifications

**Control Sensor:** Internal

**Temperature Range:** -35 to 165°C (-31 to 329°F)

**Tolerance:** ±0.1°C (±0.18°F)

**Stability:** ±0.05°C (±0.09°F)

**Measurement Zone:** 110 to 150 mm (4.33 to 5.91")

**Block:** 60 mm (2.36") diameter, 170 mm (6.69") depth

**Display:** 2-line, 4-digit display, red/green, unit °C/°F switchable

**Display Range:** -50 to 165°C (-58 to 329°F)

**Resolution:** 0.01°C/0.02°F in range of -9.99 to 99.99°C/14.02 to 211.98°F else 0.1°C (0.18°F)

**Dimensions:**

**Width:** 210 mm (8.27")

**Height:** 380 + 50 mm (14.96 + 1.97")

**Depth:** 300 mm (11.81")

**Weight:** Approximately 12.5 kg (27.6 lb)

**Power Supply:** 100 to 240 Vac, 50/60 Hz

**Power Consumption:** Approximately 400 VA

To Order	
Model No.	Description
TCL-M165S-B	Precision micro bath calibrator, -35 to 165°C (-31 to 329°F)
Required Accessories	
TCL-S-M5-MB60	Micro bath tub insert
TCL-M16-L155C	Calibration liquid (10 cS)

### Accessory

Model No.	Description
TCL-6-CASE5TG	Padded travel case with wheels and handle

*Comes complete with C of C, power cable, insertion tool, sensor basket, suction pump, well cover, magnetic lifter, sensor lid with 5 silicon plugs, and operator's manual.*

# Precision Temperature Calibrators



## High Temperature Micro Bath Calibrator, Ambient to 255°C (491°F) Range

### TCL-M255S-B

✓ **Range: Ambient to 255°C (491°F)**

The TCL-M255S-B is a high temperature Micro Bath and has a range of ambient to 255°C (491°F). The TCL-M255S-B uses a calibration liquid to immerse the unit being calibrated and offers certain advantages if temperature sensors with an unusual shape and size are to be tested. The test item is immersed directly into the liquid without an insulating air gap. This results in direct temperature contact between the calibrator and the test item. The liquid, usually silicone oil, is chosen depending on the calibration temperature required. The continuous adjustment of the magnetic stirrer together with the removable sensor basket agitates the calibration liquid to create a large measuring zone. Furthermore, the sensor basket guarantees unhindered stirring and helps protect the tank floor.



TCL-M255S-B shown smaller than actual size.

### Specifications

**Control Sensor:** Internal

**Temperature Range:** Ambient to 255°C (491°F)

**Tolerance:** ±0.2°C (±0.36°F)

**Stability:** ±0.05°C (±0.09°F)

**Measurement Zone:** 110 to 150 mm (4.33 to 5.91")

**Block:** 60 mm (2.36") diameter, 170 mm (6.69") depth

**Display:** 2-line, 4-digit display, red/green, unit °C/°F switchable

**Display Range:** 0 to 255°C (32 to 491°F)

**Resolution:** 0.01°C/0.02°F in range of RT to 99.99°C (211.98°F), else 0.1°C (0.18°F)

#### Dimensions:

**Width:** 150 mm (5.91")

**Height:** 330 + 70 mm (12.99 + 2.76")

**Depth:** 270 mm (10.63")

**Weight:** Approximately 7.5 kg (16.5 lb)

**Power Supply:** 115 Vac, ±10%, 50/60 Hz, optional 230 Vac

To Order	
Model No.	Description
TCL-M255S-B	Precision micro bath calibrator, ambient to 255°C (491°F)
Required Accessories	
TCL-S-M5-MB60	Micro bath tub insert
TCL-M16-L255C	Calibration liquid (50 cS)

#### Accessory

Model No.	Description
TCL-6-CASE3TG	Padded travel case with wheels and handle

*Comes complete with C of C, power cable, insertion tool, sensor basket, suction pump, well cover, magnetic lifter, sensor lid with 5 silicon plugs, and operator's manual.*

# Precision Temperature Calibrators



## Multi-Function Calibrator, -35 to 165°C (-31 to 329°F)

### TCL-3M165E

- ✓ Range: -35 to 165°C (-31 to 329°F)
- ✓ 4-Function Temperature Calibrator
  - Dry Block
  - Micro Bath
  - Black Body
  - Surface Temperature



TCL-3M165E shown smaller than actual size.

### Micro Bath Function

The use of calibration liquids offer certain advantages if temperature sensors with an unusual shape and size are to be tested. The test item is immersed directly into the liquid without an insulating air gap, resulting in direct temperature contact between the calibrator and the test item. The liquid, such as silicone oil, is chosen depending on the calibration temperature required. The continuous adjustment of the magnetic stirrer together with the removable sensor basket agitates the calibration liquid to create a large measuring zone. Furthermore, the sensor basket guarantees unhindered stirring and helps protect the tank floor.

### Dry-Block Function

The optimum thermal coupling from the block to test item is achieved with the correct adaptor sleeve. Ideally, the internal diameter of the sleeve is 0.5 mm larger than the outer diameter of the test item. With the aid of the adaptor sleeve, straight temperature sensors of virtually any length and diameter can be calibrated. The dry block covers the entire temperature range without the need to change the calibration medium. Viscosity, flash points or outgassing are of no concern.

### Black Body Function

A infrared calibration sleeve is used to calibrate IR pyrometers or thermal imaging cameras. The special surface structure and the asymmetrical shapes create a "cavity radiator" with an emission factor of 0.9994, prevent the reflection of interference radiation and emit the required temperature in an ideal form. The pyrometer is simply held at the specified distance above the measurement opening, thereby forming the desired measurement area on the bottom for the calibration to be performed. A support base can be fitted directly on the unit.

### Surface Temperature Function

Surface temperature sensors are calibrated using special sleeves that are fitted vertically with the required contact force. Switching calibration control to the external reference sensor creates the best possible temperature reference point on the surface of the sleeve. The reference sensor is located directly beneath the abutting face of the sleeve. The sleeve is designed in such a way that the best temperature homogeneity is achieved in the center of the abutting face. The special design of the abutting face enables good thermal contact. There is no need to use a thermally conductive paste or other thermal conduction aids.

## Specifications

**Control Sensor:** Switchable internal/external

### MICRO BATH

**Temperature Range:** -35 to 165°C (-31 to 329°F)

**Tolerance:** ±0.1°C (±0.18°F)

**Stability:** ±0.05°C (±0.09°F)

**Measurement Zone:** 110 to 150 mm (4.33 to 5.91")

### DRY BLOCK

**Temperature Range:** -35 to 165°C (-31 to 329°F)

**Tolerance:** ±0.3°C (±0.54°F)

**Stability:** ±0.05°C (±0.09°F)

**Measurement Zone:** 123 to 163 mm (4.84 to 6.42")

### INFRARED

**Temperature Range:** -35 to 165°C (-31 to 329°F)

**Tolerance:** ±0.5°C (±0.9°F)

**Stability:** ±0.05°C (±0.09°F)

**Measurement Zone:** 110 mm (4.33")

### SURFACE

**Temperature Range:** -25 to 150°C (-13 to 302°F)

**Tolerance:** ±1°C (±1.8°F)

**Stability:** ±0.2°C (±0.36°F)

**Block:** 60 mm (2.36") diameter, 170 mm (6.69") depth

**Display:** 178 mm (7") bright color touch screen, 120 to 140° viewing angle

**Units:** C°/F° switchable

**Display Range:** -50 to 165°C (-58 to 329°F)

**Resolution:** 0.1/0.01/0.001°C (0.18/0.02/0.002°F)

#### Dimensions:

**Width:** 210 mm (8.27")

**Height:** 380 + 50 mm (14.96 + 1.97")

**Depth:** 300 mm (11.81")

**Weight:** Approximately 13 kg (28.7 lb)

**Power Supply:** 100 to 240 Vac, 50/60 Hz

**Power Consumption:** Approximately 400 VA

## To Order

### Calibrator Units

<b>TCL-3M165E-B</b>	Precision 4-function calibrator with micro bath function adder
<b>TCL-3M165E-D</b>	Precision 4-function calibrator with dry block function adder
<b>TCL-3M165E-I</b>	Precision 4-function calibrator with infrared function adder
<b>TCL-3M165E-S</b>	Precision 4-function calibrator with surface function adder

### Accessory Sleeves – Order as Required to Support Functions

<b>TCL-M5-MB60</b>	Micro bath tub insert Recommended with multifunction units*
<b>TCL-M16-L155C</b>	Calibration liquid (10 cS) for micro bath
<b>TCL-S-DB60170-A</b>	Adaptor sleeve, 2 bores ¼ and ⅛" dia.
<b>TCL-S-DB60170-B</b>	Adaptor sleeve, 3 bores ½, ¼ and ⅛" dia.
<b>TCL-S-DB60170-C</b>	Adaptor sleeve, 4 bores ⅛, ⅜, ¼, ⅜" dia.
<b>TCL-S-DB60170-D</b>	Adaptor sleeve, 7 bores 6 x ¼ and ⅛" dia.
<b>TCL-S-DB60170-E</b>	Adaptor sleeve, 7 bores ⅛ and 2 x ⅜", 2 x ¼", 2 x ⅜" dia.
<b>TCL-S-DB60170-X</b>	Adaptor sleeve, blank
<b>TCL-S-IR60170</b>	Infrared adaptor sleeve
<b>TCL-B16-SF</b>	Adaptor sleeve, surface measurement

## Accessories

Model No.	Description
<b>TCL-6-CASE5TG</b>	Padded travel case with wheels and handle
<b>TCL-6-SW</b>	Software
<b>TP-6-USB</b>	USB converter
<b>TP-6-RS232</b>	RS232 converter

\* Tub insert aids quick changes (no cleaning). Ordering tub insert with the micro bath includes the tub in the calibration.

To order a calibrator with multiple functions contact our sales team.

To order

**TCL-3M165E-D**, dry block function adder, **TCL-3M165E-B**, microbath function adder, and **TCL-3M165E-I**, infrared black body function adder.