



# User's Guide



Above items are included with the DBCL400  
Dry Block temperature calibrator. Not shown  
is the calibration certificate and operator manual

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**Model DBCL400**  
**Dry Block Temperature Calibrator**

## ***DBCL400 Dry Block Temperature Calibrator***

### **Introduction**

The DBCL400 calibrator provides a safe, dry, constant temperature source for checking and calibrating a wide range of temperature sensors, systems, indicators and thermometers. It is fast and economical and can be used either on a bench top or as a portable field unit. The weight of the unit is only 11 pounds/5 kilograms. The unit covers the temperature range from 5°C above ambient up to 450°C using a machined aluminum block as the heat transfer medium. The temperature control circuit is built into the unit and includes over-temperature limit protection.

Features include:

- Maximum temperature of 450°C/850°F
- An independent over-temperature cutout

Even though the unit heats up rapidly, highly efficient insulation and an internal cooling fan ensures that the case remains cool enough to handle even at maximum operating temperatures. The DBCL400 calibrator has been designed to comply with all relevant electromagnetic interference and electrical safety regulations.

### **Specification**

Figures quoted are at the base of the well at the time of calibration.

Temperature range:	5°C/9°F above ambient to 450°C/850°F
Over-temperature limit:	470°C/875°F
Display resolution:	0.1°
Accuracy:	±0.4°C (50 to 400°C) ±0.7°F (122 to 752°F) ±0.7°C (400 to 450°C) ±1.3°F (752 to 850°F)
Stability (after 15 minutes):	±0.050°C (50 to 400°C) ±0.090°F (122 to 752°F)
Well to well radial uniformity:	0.020°C at 200°C & 0.030°C at 400°C
Heat up time 25° C to 400°C:	12 minutes
Cool down 400°C to 100°C:	20 minutes
Immersion Depth:	4.5" (114.3mm)
Fan Cooling:	Automatic
Weight:	11 lbs (5 Kg)
Dimensions* (H x W x D):	8.75 x 8 x 8 inches/222.25 x 203.2 x 203.2 mm
*excluding the carrying strap	

### ***Electrical supply***

<i>Voltage</i>	<i>Cycles</i>	<i>Power</i>
230V	50/60Hz	900W
120V	50/60Hz	900W

**Note:** The above specifications are quoted for an ambient temperature range of 10°C/50°F to 30°C/86°F. Outside this range, the quoted figures may deteriorate but the unit will still work safely.

### **Working environment**

The calibrator units are designed to work safely under the following conditions:

Ambient temperature range: 5°C/9°F to 40°C/104°F

Humidity: Up to 95% relative humidity, non-condensing

**Warning**

Warning: HIGH TEMPERATURES ARE DANGEROUS

**HIGH TEMPERATURES ARE DANGEROUS:** They can cause serious burns to operators and ignite combustible material. Omega Engineering has taken great care in the design of these units to protect operators from hazards, but operators should pay attention to the following points:


- USE CARE AND WEAR PROTECTIVE GLOVES TO PROTECT HANDS
- DO NOT put hot objects on or near combustible objects
- DO NOT operate the unit close to inflammable liquids or gases
- DO NOT place any liquid directly in your unit
- At all times USE COMMON SENSE

**Operator Safety**

All operators of Omega Engineering equipment must have available the relevant literature needed to ensure their safety. It is important that only suitably trained personnel operate this equipment in accordance with the instructions contained in this manual and with general safety standards and procedures. If the equipment is used in a manner not specified by Omega Engineering, the protection provided by the equipment to the operator may be impaired. All Omega Engineering units have been designed to conform to international safety requirements and are fitted with a self-resetting over-temperature cutout. If a safety problem is encountered, switch off at the power socket and remove the plug from the supply. Please use caution when removing probes and inserts as burns to the skin can occur if in contact.

**Installation**

1. All Omega Engineering units are supplied with a power cable.
2. Before connecting the power supply, check the voltage against the rating plate. Connect the power cable to a suitable plug according to the table below. Note that the unit must be earth grounded to ensure proper electrical safety.

Electrical connections:		<b>220V-240V</b>	<b>110V-120V</b>
	Live	Brown	Black
	Neutral	Blue	White
	Earth ground	Green/yellow	Green

The fused plug supplied with the power lead for use in the UK is fitted with the following value fuse to protect the cable: 230V UK 4 AMP. The fuse in the unit protects the unit and the operator. Note that units marked 230V on the rating plate work at 220V; units marked 120V work at 110V. In both cases, however, the heating rate will degrade by approximately 8%. The rating plate is on the rear of the unit.

3. Plug the power cable into the socket on the rear of the unit.
4. Place the unit on a suitable bench or flat workspace, or in a fume cupboard if required, ensuring that the air inlet vents on the underside are free from obstruction.

After use, when you have finished calibrating devices, remember that the insert and your probe/thermometer may be very hot. Take the precautions listed earlier.



## **OPERATION**

### **Preparation**





1. The heater design, temperature sensor and control circuit give good temperature control and uniformity, but make sure that there is a close fit of the probes in the block to allow efficient heat transfer. Contact us about an insert that more closely fits your probe or device being calibrated.
2. Plug the power cable into the socket in the back of the unit. Connect the power cable to the electrical supply and switch the power on. 1 = power on, 0 = power off.
3. Clean the heater block cavity out with shop or canned air to remove any particulate. Next place the probe insert into the heater block as shown using the supplied insert extractor to minimize the risk of damaging the heater block and/or probe insert. Never place a hot insert into a cold heater block or vice versa as the insert may become jammed which will damage both parts. Always use the insert extractor to both install and remove the probe insert.
4. To prevent damage to the heater block, insert, heaters and PRT block sensor DO NOT use the following in or around the block;  
Oil, Thermal grease, Water  
Aluminum oxide sand,  
Ceramic fiber insulation or Kaowool






### **Setting the operating temperature**

1. To set the operating temperature required, press and hold either the up or down arrow button to increment to the value required. Alternatively you can press the  key to move over to individual digits to set higher values much quicker. Press  to accept the set value.
2. When you have the correct set temperature displayed the unit will start to heat or cool to that value.
3. Once the process value/actual temperature reaches the set point, allow the block to fully stabilize for at least 15 minutes before performing a calibration.
4. Upon completion of your work set the temperature to 50°C/122°F or less and allow it to cool before transporting or moving. The block fan will kick on to provide cooling. After a safe temperature has been reached power can be switched off and the unit unplugged.

### **Display lockout**



To prevent accidental changes to the calibration and temperature scale settings the display has been locked out which is indicated by the key symbol in the display. To unlock the display press the down arrow and  key at the same time. The top line will show KEYP, press the up arrow so all values are zero then press  and the display will unlock. To relock the display press  and then set the LOC parameter to LOC2. Press  to save and exit.

## **C to F temperature scale conversion**

To change the temperature scale press  to display parameter P0. Set this value to 11.0 for °C and 22.0 for °F operation. Next press  until parameter TPUN is displayed and set to C or F. Then change TP-H to 450(°C) or 850(°F). Do not set Tp-H any higher than the values shown or damage may occur. Press  to display parameter PVOF. This calibration value must be changed to maintain calibrated accuracy. The default factory value is shown below. When switching from F to C divide the value by 1.8 and enter into PVOF and multiply by 1.8 for conversion from C to F. Calibration adjustments are discussed below.

## **Calibration**

The unit has been calibrated by the factory to meet specifications. In the event that you want to adjust or correct the calibration use the following parameters with the display unlocked.

Press  and PVOF will display which is the Zero or low end adjustment. Enter a negative value to correct for low readings and vice versa. For example if your reference thermometer is showing that the ThermCal400 is 2.0 degrees low then enter a -2.0. Press  to access PV6A which is the span or high end correction. Use a negative value for readings that are low. In most cases you will only need to adjust PVOF to correct for any errors.

The factory calibration values for unit S/N:                      are PVOF =                      PV6A =                      °C

## **Operator maintenance**

NOTE THAT THIS EQUIPMENT SHOULD ONLY BE DISMANTLED BY PROPERLY TRAINED PERSONNEL. REMOVING THE FRONT OR REAR PANELS EXPOSES POTENTIALLY LETHAL VOLTAGES. THERE ARE NO OPERATOR MAINTAINABLE PARTS WITHIN THE EQUIPMENT.



In the unlikely event that you experience any problems with your unit which cannot easily be remedied, you should contact your supplier and return the unit if necessary. Please include any details of the fault observed and remember to return the unit in its original packing. Omega Engineering will accept no responsibility for any damage to units that are improperly packed for shipment. If in doubt, contact your supplier.

1. Cleaning: Before cleaning your unit, ALWAYS disconnect it from the power supply and allow it to cool below 50° C. Your unit can be cleaned by wiping with a damp soapy cloth. Care should be exercised to prevent water from running inside the unit. Do not use abrasive cleaners.
2. Fuse: The unit is protected by a fuse. It should only be changed by suitably qualified personnel. If the fuse blows persistently, a serious fault is indicated and you may need to return the unit to your supplier for repair.

**Accessories**

The following parts may be obtained directly from Omega Engineering

<u>Part Number</u>	<u>Description</u>
4163	UK 240 volt power cable with 13amp UK plug (5 amp fuse)
4164	Euro style 240 volt power cable with R/A Schuko plug
4150	US style 120 volt power cable
4168	Unit carrying strap
4153	Insert extractor
DBCL-400-3041	Multiwell insert 1/8, 3/16, 1/4, 5/16 & 3/8" holes
DBCL-400-3047	Blank insert
DBCL-400-3043	Insert 5 x 1/4" holes
DBCL-400-3048	Insert 1 x 9/16" & 1 x 1/4" holes
DBCL-400-3044	Insert 2 x 1/4" & 2 x 3/8" holes
DBCL-400-3049	Insert 1 x 5/8" & 1 x 1/4" holes
DBCL-400-3045	Insert 2 x 1/4" & 2 x 1/2" holes
DBCL-400-3050	Insert 1 x 11/16" & 1 x 1/4" holes
DBCL-400-3046	Insert 1 x 1/4" hole
DBCL-400-3051	Insert 1 x 3/4" & 1 x 1/4" holes
DBCL-3052	Carrying case

**Spare Parts**

<u>Part Number</u>	<u>Description</u>
4146	225 watt, 120 volt heater
4317	Temperature controller
4147	PRT
4145	Solid state relay
4165	4 amp fuse (240 volt units)
4157	8 amp fuse (120 volt units)
AD66	Heater block
4148	120 volt block cooling fan
4162	240 volt block cooling fan
4170	120 volt chassis cooling fan
4171	240 volt chassis cooling fan

## **EU Declaration of Conformity (No. DC18-DBCL)**

In accordance with European Parliament and Council Decision No 768/2008/EC Annex III

**1. Product model / product:**

Product	Dry Block Temperature Calibrator
Model/type	DBCL400 & DBCL130
Batch/serial no.	S/N: 619-2993 & onward

**2. Manufacturer**

Name	Omega Engineering
Address	800 Connecticut Ave, Norwalk, CT 06854

**3. This declaration is issued under the sole responsibility of the manufacturer.**

**4. Object of the declaration:**

Product	Dry Block Temperature Calibrator
Specification	Model DBCL400 operating range ambient +5 to 450°C Model DBCL130 operating range -25 to 130°C (20°C ambient)

**5. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:**

2014/35/EU	The Low Voltage Directive
2014/30/EU	The Electromagnetic Compatibility Directive
2011/65/EU	The Restriction of Hazardous Substances Directive

**6. References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:**

Reference & Date	Title
EN 60519-1:2015	Safety in installations for electroheating and electromagnetic processing. General requirements
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007 + A1:2011	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
EN 50581:2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

**7. Additional information:**

Signed for and on behalf of:	Omega Engineering
Place of issue:	Hainesport, NJ, USA
Date of issue:	July 8, 2019
Name:	Darren Sager
Signature:	<i>Darren Sager</i>