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

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**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Cycles</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>230V</td>
<td>50/60Hz</td>
<td>900W</td>
</tr>
<tr>
<td>120V</td>
<td>50/60Hz</td>
<td>900W</td>
</tr>
</tbody>
</table>

**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. Accurate Thermal Systems 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.

<table>
<thead>
<tr>
<th>Electrical connections:</th>
<th>220V-240V</th>
<th>110V-120V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live</td>
<td>Brown</td>
<td>Black</td>
</tr>
<tr>
<td>Neutral</td>
<td>Blue</td>
<td>White</td>
</tr>
<tr>
<td>Earth ground</td>
<td>Green/yellow</td>
<td>Green</td>
</tr>
</tbody>
</table>

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 \( \square \) to display parameter P0. Set this value to 11.0 for °C and 22.0 for °F operation. Next press \( \square \) 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 \( \square \) 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 \( \square \) 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 \( \square \) 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 = \( \text{PV6A} \) = °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

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

## Spare Parts

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4146</td>
<td>225 watt, 120 volt heater</td>
</tr>
<tr>
<td>4317</td>
<td>Temperature controller</td>
</tr>
<tr>
<td>4147</td>
<td>PRT</td>
</tr>
<tr>
<td>4145</td>
<td>Solid state relay</td>
</tr>
<tr>
<td>4165</td>
<td>4 amp fuse (240 volt units)</td>
</tr>
<tr>
<td>4157</td>
<td>8 amp fuse (120 volt units)</td>
</tr>
<tr>
<td>AD66</td>
<td>Heater block</td>
</tr>
<tr>
<td>4148</td>
<td>120 volt block cooling fan</td>
</tr>
<tr>
<td>4162</td>
<td>240 volt block cooling fan</td>
</tr>
<tr>
<td>4170</td>
<td>120 volt chassis cooling fan</td>
</tr>
<tr>
<td>4171</td>
<td>240 volt chassis cooling fan</td>
</tr>
</tbody>
</table>
EU Declaration of Conformity (No. DC18-DBCL)

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:

<table>
<thead>
<tr>
<th>Reference &amp; Date</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 60519-1:2015</td>
<td>Safety in installations for electroheating and electromagnetic processing. General requirements</td>
</tr>
<tr>
<td>EN 61000-6-2:2005</td>
<td>Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments</td>
</tr>
<tr>
<td>EN 50581:2012</td>
<td>Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances</td>
</tr>
</tbody>
</table>

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: Darren Sager

Rev 5 8/19
Servicing North America:

U.S.A. Headquarters:
Omega Engineering, Inc.
Toll-Free: 1-800-826-6342 (USA & Canada only)
Customer Service: 1-800-622-2378 (USA & Canada only)
Engineering Service: 1-800-872-9436 (USA & Canada only)
Tel: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com

For Other Locations Visit omega.com/worldwide

The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.
OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA’s WARRANTY adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA’s customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA’s Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA’s WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA’s control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a “Basic Component” under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

**RETURN REQUESTS/INQUIRIES**

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA’S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.
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- Data Logging Systems
- Wireless Sensors, Transmitters, & Receivers
- Signal Conditioners
- Data Acquisition Software

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- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

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- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments