OMEGA DBCL400 Dry Block Temperature Calibrator User Guide

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OMEGA 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)
- ±0.6°C (400 to 450°C) ±1.0°C (752 to 850°F)
- Stability (after 15 minutes): ±0.050°C (50 to 400°C) ±0.090°C (122 to 752°F)
- Well to well radial uniformity: 0.015°C at 100°C & 0.052°C at 300°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

Electrical supply

- Voltage Cycles Power
- 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: 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.

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.

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. The values will increment faster as you hold down the button.
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.

Temperature scale conversion
To change the temperature scale press to display the “UNIT” parameter and change as needed. Next change the remaining controller values as shown in the table below based on degrees C or F.

Unit serial number =		
Parameter	Operation in Degrees C	Operation in Degrees F
CALO	50	122
CAHI	400	752
OFTL		
OFTH		

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 OFTL 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 DBCL400 is 2.0 degrees low then enter a -2.0. Press to access OFTH which is the span or high end correction. Use a negative value for readings that are low

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

Accessories

The following parts may be obtained directly from Omega Engineering

- Part Number Description
- DBCL-UKCABLE 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, ¼, 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-400-3129 Blackbody Source insert for IR pyrometers
- DBCL-3052 Carrying case

Spare Parts

- Part Number Description
- 4146 225 watt, 120 volt heater
- 4318-C62 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

WARRANTY/DISCLAIMER

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.

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.

DATA ACQUISITION

- Communications-Based Acquisition Systems
- Data Logging Systems
- Wireless Sensors, Transmitters, & Receivers
- Signal Conditioners
- Data Acquisition Software

HEATERS

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

ENVIRONMENTAL MONITORING AND CONTROL

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

Documents / Resources

	OMEGA DBCL400 Dry Block Temperature Calibrator [pdf] User Guide DBCL400, Dry Block Temperature Calibrator, Temperature Calibrator, Calibrator

References

- Omega Engineering \| Sensing, Monitoring and Control Solutions
- Global Presence \| Omega Engineering
- Omega Engineering \| Sensing, Monitoring and Control Solutions