



# ACCURATE THERMAL SYSTEMS ThermCal400 Dry Block Temperature Calibrator Instruction Manual

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ACCURATE THERMAL SYSTEMS ThermCal400 Dry Block Temperature Calibrator Instruction



## Introduction

The ThermCal400 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 430°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
- Ramp rate feature for accurate thermal switch testing

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 ThermCal400 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/870°F
- **Display resolution:** 0.1°
- **Accuracy:** ±0.4°C (50 to 400°C) ±0.7°F (122 to 752°F)
- **Stability (after 15 minutes):** ±0.6°C (400 to 450°C) ±1.0°F (752 to 850°F)
- **Well to well radial uniformity:** ±0.050°C /0.100°F (50/122 to 400°C/752°F )
- **Heat up time 25° C to 400°C:** 0.015°C at 100°C & 0.052°C at 300°C
- **Cool down 400°C to 100°C:** 12 minutes

- **Immersion Depth:** 20 minutes
- **Fan Cooling:** 4.5" (114.3mm)
- **Weight:** Automatic
- **Dimensions\* (H x W x D):** 11 lbs (5 Kg) 8.75 x 8 x 8 inches/222.25 x 203.2 x 203.2 mm

## Electrical supply

- **Voltage** 230V 120V
- **Cycles** 50/60Hz 50/60Hz
- **Power** 900W 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. 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 Accurate Thermal Systems 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 Accurate Thermal Systems, the protection provided by the equipment to the operator may be impaired. All Accurate Thermal Systems 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 Accurate Thermal Systems 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

3. Blow 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.

**C to F temperature scale conversion** To change the temperature scale press to display the "UNIT" parameter and change as needed. Press to display parameter "OFTL". This calibration value must be changed to maintain calibrated accuracy. The default factory value is shown below. When switching from C to F multiply the value by 1.8 and enter into "OFTL". Do the same for "OFTH" which is the offset high parameter. When switching from F to C divide these values by 1.8 and change accordingly. 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 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 ThermCal400 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. The factory calibration values for unit S/N: are OFTL = OFTH = °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. Accurate Thermal Systems 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: Your unit is protected by a fuse. It should only be changed by suitably qualified personnel. If the fuse

blow 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 Accurate Thermal Systems

<b>Part Number</b>	<b>Description</b>
--------------------	--------------------

- |         |   |
|---------|---|
| 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                           |
| 4159    | Instruction manual                                      |
| 4168    | Unit carrying strap                                     |
| 4153    | Insert extractor  |
| ATS3041 | insert 1/8, 3/16, 1/4, 5/16 & 3/8"                      |
| ATS3047 | Blank insert  |
| ATS3043 | Insert 5 x 1/4"   |
| ATS3048 | Insert 1 x 9/16" & 1 x 1/4"                             |
| ATS3044 | Insert 2 x 1/4" & 2 x 3/8"                              |
| ATS3049 | Insert 1 x 5/8" & 1 x 1/4"                              |
| ATS3045 | Insert 2 x 1/4" & 2 x 1/2"                              |
| ATS3050 | Insert 1 x 11/16" & 1 x 1/4"                            |
| ATS3046 | Insert 1 x 1/4"   |
| ATS3051 | Insert 1 x 3/4" & 1 x 1/4"                              |
| ATS3129 | Black body source insert for IR sensors & thermometers  |
| ATS3052 | Carrying case   |

## **Spare Parts**

- | <b>Part Number</b> | <b>Description</b>           |
|--------------------|------------------------------|
| 4146               | 225 watt, 120 volt heater    |
| 4317-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 |

## **Contact Information**

- Accurate Thermal Systems LLC

- 4104 Sylon Blvd
- Hainesport, NJ 08036
- Ph: 609-326-3190
- Fax: 609-479-5124
- Email: [service@accuthermal.com](mailto:service@accuthermal.com)
- Website: [www.accuthermal.com](http://www.accuthermal.com)

## **GUARANTEE**

This product is covered by a 2 year factory parts and labor warranty. It must be clear that Accurate Thermal Systems and our suppliers are not insuring your products/premises or guaranteeing that there will not be damage to your person or property if you purchase our Products. Accurate Thermal Systems or our Suppliers shall not be liable under any circumstances for damage to your person or property or some other person or that person's property by reason of the sale or use of the product we sell, or its failure to operate in the manner in which it is designed. Accurate Thermal Systems and our Suppliers liability, if any, shall be limited to the original cost of the Product only. Use of this Product is at your own risk. Buyer assumes full responsibility in determining the suitability of these items for buyers intended use. It must be clear that the Warrantors are not insuring your products/premises or guaranteeing that there will not be damage to your person or property if you use products purchased from Accurate Thermal Systems. **WARRANTORS' OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT ONLY. THIS WARRANTY DOES NOT COVER PAYMENT OR PROVIDE FOR THE REIMBURSEMENT OF PAYMENT FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

## **EU Declaration of Conformity**

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 ThermCal400 & ThermCal130
- Batch/serial no. S/N: 619-2993 & onward

### **2. Manufacturer**

- Name Accurate Thermal Systems LLC
- Address 4104 Sylon Blvd, Hainesport, NJ 08036

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

### **4. Object of the declaration:**

- Product Dry Block Temperature Calibrator
- Specification Model ThermCal400 operating range ambient +5 to 450°C
- Model ThermCal130 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 harmonized 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: Accurate Thermal Systems
- Place of issue: Hainesport, NJ, USA
- Date of issue: July 8, 2019
- Name: Darren Sager
- Signature: Darren Sager

### Documents / Resources

	<p><a href="#">ACCURATE THERMAL SYSTEMS ThermCal400 Dry Block Temperature Calibrator</a> [pdf] Instruction Manual ThermCal400, Dry Block Temperature Calibrator</p>
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### References

- [Accurate Thermal Systems – Unique solutions for thermal applications](#)