



# 3000 Series

dry-well heat source



## User Manual

models 3001, 3002, 3003 & 3004



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## INTRODUCTION

The 3000 Series dry-well heat sources allow users to check the accuracy of thermometers and sensors as a system, on site, without the need for heavy, expensive equipment. The dry-wells are high accuracy portable heat sources that are extremely easy to use. Simply plug in, switch on and set the dry-well to the temperature that you wish to check, insert your probe into the correct size well and take the reading. Compare the temperature reading of your thermometer and probe to the displayed temperature of the dry-well and the difference is the error of your instrument. For optimum accuracy and UKAS traceability use an ETI Reference Thermometer or similar to make comparison measurements.

The 3000 Series dry-wells are controlled by a closed loop microprocessor based digital PID temperature controller system incorporating a heater and a precision platinum RTD sensor housed in the aluminium block. Fan cooling allows rapid changes in well temperature upon demand. The required temperature may be adjusted in 0.1 °C increments across the range of the instrument using the buttons on the front panel.

These units are ideal for use in a variety of industrial and process applications. Each unit is supplied with a traceable certificate of calibration showing actual test data, which can be used as part of quality assurance programmes.

## SAFETY

Operate dry-wells in an ambient temperature between 10 and 30 °C (15 to 25 °C for optimum accuracy) and humidity between 5 to 95 % (non condensing). The fan runs continuously to moderate the internal unit temperature. Always ensure the air vents and fan aperture are clear and have at least 150 mm of space between them and any obstructions. NEVER cover the unit while in operation or operate if the fan stops. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



The calibrator can operate at very high temperatures. Precautions MUST be taken to prevent personal injury or damage to surrounding objects. Probes may be hot when removed from the unit and should be placed on a heat resistant surface. The unit may remain hot for several minutes after switching off. DO NOT switch off at temperatures above 100 °C. Allow to cool before storage.



Care must be taken when removing probes and inserts from the units. If the unit is set at a high temperature the inserts will be very hot and could cause burns to the hands. Please use the insert removal tool supplied. After removal place hot probes and inserts only on a suitable heat proof surface.

Only place temperature probes in dry-well holes. These units are designed to be operated dry. DO NOT introduce any liquid into any of the dry-well holes.

These dry-wells are designed to be rugged and durable but contain electronics. DO NOT operate in dirty, dusty or very damp environments or near liquids that could present a hazard from electric shock.

Connect input power lead to only a 230 volt, 50-60 Hz or 110-115 volt 50-60 Hz (model dependant) grounded AC power supply. The unit requires up to 200 watts of power. Mains plug fuse rating is 3 amps.



The dry-well heat sources are programmed and calibrated at the factory for optimum performance and should not need adjusting. If the unit is out of calibration or is in need of repair please return to the supplier. The dry-wells are equipped with an internal electrical fuse. If a fuse blows, return to the supplier for inspection and repair. THERE ARE NO USER SERVICEABLE PARTS INSIDE.

## **PARTS AND CONTROLS**

### **POWER LEAD**

The power lead is clamped through the rear panel of the unit and is not removable. Plug into a standard 230 volt or 110-115 volt (model dependant) grounded AC power outlet socket.

### **POWER SWITCH**

The power switch is located on the rear panel of the unit and operation is indicated with a 1 and a 0.

### **FAN**

The internal fan runs continuously when the unit is operating. This provides cooling for the internal electronic components. Allow at least 150 mm of space in front and behind the unit and DO NOT obstruct any of the ventilation holes.

## STAND

The stand can be folded flat against the under side of the unit when not in use or if the unit is to be operated in a horizontal position. It can be swung down and forward until it hits the stops so that the unit can be used in an inclined position. The stand was not designed to be a carrying handle and should NOT be forced past the stops for this purpose.

## DRY-WELL

The aluminium dry-well is located on the right hand side of the front panel. Dry-well models have blocks with holes in to accept temperature probes.

The 3001 dry-well is designed to accept four different probe sizes: two Ø3.3, 4.0, 4.76 and 6.35 mm.

The 3002 dry-well is designed to accept four different probe sizes: Ø3.3, 4.76, 6.35 and 9.5 mm.

The 3003 dry-well is designed to accept two different probe sizes: 4.76 and 12.7 mm.

In addition to the Ø3.3 mm reference hole, the 3004 dry-well is designed to accept a 13 mm removable brass insert for probe sizes Ø3.3, 4.1, 4.76, 6.4 and 9.5 mm and is supplied with an insert of the customer's choice.

Use the nearest, larger size insert to the probe diameter being checked. The inserts are a close fit in the dry-well to give good thermal conduction. Keep the inserts clean and avoid damage by storing carefully. The inserts MUST be regularly removed and cleaned to ensure they do not seize in the dry-well. Do not introduce any liquids or substance into the dry-well or inserts as this may result in the inserts sticking in the dry-well.

## TEMPERATURE CONTROLLER

In normal operating mode the numeric LED display shows the actual well temperature. A Control Output Indicator light (O1) is located in the top left corner of the display. This indicates the on/off state of the heater element in the block.

To show the set point temperature in the display press and release **either** the up or down arrow button (ΛV). Press and hold **either** the up or down arrow button (ΛV) to change the set-point value.

A shift can be entered into the controller by pressing the scroll (left-hand) button. Press and hold either the up or down arrow button ( $\uparrow$ / $\downarrow$ ) to change the shift value. A factory set value will be entered at the time of certification. The shift value should only be adjusted if the unit is being monitored by an ETI Reference Thermometer or similar.

All other functions of the controller have been factory set and locked to maintain accuracy and repeatability.

## **OPERATION**

### **DRY-WELL SET-UP**

Place the dry-well unit on a flat level surface with at least 150 mm of space in front and behind. The stand may be swung out to lift the front of the unit. Plug the power lead into a suitable grounded AC power outlet socket. Check for and remove any foreign objects prior to switching on. Turn the instrument on using the switch located on the rear panel, below the power lead. The fan will start immediately and the controller display will illuminate after approximately three seconds.

### **TEMPERATURE SETTING**

The dry-well may be set to any temperature between 33 and 300 °C in 0.1 °C increments (see 3.1.6 Temperature Controller for details). The control will cause the unit to heat to the set point temperature. A control indicator light will show in the top left corner of the display when the heater is active. The dry-well temperature is displayed in operation. A small overshoot and undershoot will occur when the well reaches the set point temperature. Ten minutes are normally required to reach a higher set point temperature. It will take longer to reach a lower set point temperature. Once the set point temperature is reached a further ten minutes should be allowed to achieve stability. For optimum accuracy and stability allow the unit to warm up for 30 minutes after power up. The displayed well temperature should stay within  $\pm 0.5$  °C of the set point temperature.

### **PROBE TESTING**

Insert the probe to be tested into one of the holes in the dry-well. The probe should be a snug fit for good heat transfer but should not be so tight that it cannot be removed easily. Best results will be obtained when the probe is inserted to the full depth of the dry-well hole of closest size

to the probe diameter. Allow the reading from the probe to stabilise and then compare the reading with either the temperature controller display or an external reference thermometer. For optimum comparison accuracy use a high precision ETI Reference Thermometer or similar. If probes with a large mass are inserted into the dry-well holes the unit will require up to 10 to 15 minutes to re-stabilise.

## **MAINTENANCE**

### **CARE OF THE 3000 SERIES UNITS**

The 3000 Series of dry-wells require very little maintenance. Avoid operation in dusty, dirty, oily or wet environments. If the case becomes dirty it may be cleaned using a damp cloth and mild detergent. Do not allow moisture to enter the case. It is important to check for and remove any foreign objects in the dry-well holes.

**WARNING:** Never introduce any fluids or other foreign material into the dry-well. This will damage the dry-well and could cause probes to become lodged. It could also cause a potential electric shock hazard. In the event that the heat source should require service or repair, please contact ETI for assistance. There are no user serviceable parts inside and any attempted repair will void any guarantee.

### **GUARANTEE**

This instrument carries a two-year guarantee against defects in either components or workmanship. During this period, products that prove to be defective will, at the discretion of ETI, be either repaired or replaced without charge. The product guarantee does not cover damage caused by fair wear and tear, abnormal storage conditions, incorrect use, accidental misuse, abuse, neglect, misapplication or modification. Full details of liability are available within ETI's Terms & Conditions of Sale at [www.etiltd.com/terms](http://www.etiltd.com/terms). In line with our policy of continuous development, we reserve the right to amend our product specification without prior notice.



## SPECIFICATION

|                       |  |
|-----------------------|--|
| temperature range     | 33 to 300 °C (at 20 °C ambient)                                    |
| resolution            | 0.1 °C   |
| accuracy              | 33 to 199.9 °C $\pm 0.5$ °C<br>200 to 300 °C $\pm 1$ °C            |
| stability             | holes greater than 6.35 mm $\pm 2.0$ °C<br>$\pm 0.5$ °C            |
| heating times         | Ambient to 300 °C after 10 minutes                                 |
| stabilisation         | 5 minutes  |
| cooling times         | 300 to 100 °C after 15 minutes                                     |
| 3001 hole dimensions* | 2 x $\text{Ø}3.4$ , 1 x 4.1, 4.9 & 6.4 mm                          |
| 3002 hole dimensions* | 1 x $\text{Ø}3.4$ , 4.9, 6.4 & 9.6 mm                              |
| 3003 hole dimensions* | 1 x $\text{Ø}4.9$ & 12.8 mm  |
| 3004 hole dimensions* | 1 x $\text{Ø}3.4$ & 13.0 mm that will accept various inserts       |
| well depth            | 100 mm   |
| power                 | 230 volt AC 50-60 Hz (110-115 volt<br>50-60 Hz available) 200 watt |
| display               | 10 mm LED  |
| case dimensions       | 57 x 125 x 158 mm  |
| weight                | 900 grams  |

\*hole dimensions given are nominal

## INSTRUMENT RECORD CARD

- 3001 Dry-Well order code 271-301
- 3002 Dry-Well order code 271-302
- 3003 Dry-Well order code 271-303
- 3004 Dry-Well order code 271-304

Serial No. \_\_\_\_\_

Calibrated by \_\_\_\_\_ Date \_\_\_\_\_

This instrument has been checked or calibrated against reference instrument(s) calibrated by a UKAS Accredited Calibration Laboratory at 50 °C, 100 °C and 150 °C.

**To BS EN 60584**



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