



**DDS CALORIMETERS**

Scientific Analytical Calorimeter Solutions

**DDS CALORIMETERS**

[www.ddscalorimeters.com](http://www.ddscalorimeters.com)

Manufacturers of CAL2K/CAL3K Oxygen Bomb Calorimeters

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# CAL3K-AP INSTALLATION GUIDE



**VERSION 1.5**

MANUFACTURED BY DIGITAL DATA SYSTEMS (PTY) LTD.  
AND PART OF THE DDS CALORIMETERS BRAND



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## INTRODUCTION

Digital Data Systems (Pty) Ltd (**dds**) specializes in the design and manufacture of scientific bomb calorimeter systems for various types of industries and applications from the coal mining industry to educational institutes. **dds** bomb calorimeter systems are the most advanced combustion calorimeter systems available today. The system is used to measure the calorific value of both solids and liquids. **dds** has a wide range of systems to suit different applications and sample requirements. Please visit our website: [www.ddscalorimeters.com](http://www.ddscalorimeters.com) to find out more

You have chosen the **CAL3K-AP** Bomb Calorimeter System, which is best suited for fast or accurate calorimetry operations.

## PURPOSE OF THIS MANUAL

It serves as a short introduction to the CAL3K system and the various components. It explains the very basics of operation and guides you to perform hardware tests and do the first determination. It relies on the DEFAULT setting and the factory calibration.

But there is more: Information and capability! This is not explained here but in an ON-LINE version. It is safe to say that you need a PC or laptop to change from the basic operation to a more sophisticated or suitable one.

## HOW TO USE THIS MANUAL

This Manual makes use of some informative symbols or icons, in order to bring your attention to the text.

### WARNING SYMBOL



This yellow triangle with an exclamation mark inside it, indicates a WARNING message or a message that is instructing you NOT to do something. Please take note of this message, because if you ignore it you could damage the Calorimeter equipment.

### INFORMATION (NOTE) SYMBOL



This white hand with a finger pointing, indicates a NOTE or INFORMATIVE message. It indicates something that you need to pay attention to. Please take note of this message, as it provides special or detailed information about a particular item.

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## USER INFORMATION AND HELP AIDS

Included in your shipment is this printed Installation Guide.

The on-line Help Guide for basic system operations, trouble-shooting and solutions, application notes as well as how everything functions is available on-line and can be found at [www.ddscalorimeters.com](http://www.ddscalorimeters.com). Please note the CAL3K Windows Software can be downloaded from the following link: [www.ddscalorimeters.com/software/cal3k](http://www.ddscalorimeters.com/software/cal3k)

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## SYSTEM COMPONENTS

### THE CAL3K-AP SYSTEM CHECK LIST

The system consists of the following:

<b>3K-1</b>	<b>CAL3K-AP Calorimeter with Automatic Oxygen Filling</b>	<b>1</b>	<b>Received</b>
<b>3K-1-KT</b>	<b>CAL3K Calorimeter Installation Kit</b>	<b>1</b>	
Included in Kit:			
<b>3K-SM</b>	Power Supply	1	
<b>KETTLECORD</b>	Mains Cable 220V	1	
<b>3K-BC</b>	Balance Cable	1	
<b>USBCABAB</b>	PC Cable (USB)	1	
<b>CAL2K-KB</b>	PC Keyboard (PS2)	1	
<b>3K-4-PS</b>	Preparation Stand	1	
<b>TWEEZERS/S/S</b>	Stainless Steel Tweezers	1	
<b>CAL2K-4-BA</b>	Certified Benzoic Acid Tablets (50 x 0.5g Tablets per Bottle)	2	
<b>3K-1-OP</b>	High pressure oxygen pipe 4mm (4m)(CLEAR)	1	
<b>3K-1-EP</b>	Exhaust pipe 6mm (2m)(BLACK)	1	
<b>3K-1-RC</b>	Oxygen Regulator connection Standard - quick fit	1	
<b>3K-1-CF-05</b>	Calorimeter O-rings (1 packet of 5)	1	
<b>3K-1-LCR</b>	O-Ring Retainer for Centre Filling plastic	1	
<b>3K-1-LCR-TOOL</b>	Tool to O-ring remove retainer	1	
<b>3K-4-VN-KT</b>	Vessel Nozzle Kit complete with nozzle, O-ring, nut	1	
<b>GREASE_TUBE</b>	Silicone grease tube	1	
<b>3K-1-INST</b>	Installation Guide Printed	1	
<b>3K-2</b>	<b>CAL3K Air Cooler</b>	<b>1</b>	
<b>3K-2-KT</b>	<b>CAL3K Air Cooler Installation Kit</b>	<b>1</b>	
Included in Kit:			
<b>3K-SM</b>	Power Supply	1	
<b>KETTLECORD</b>	Mains Cable 220 V	1	
<b>3K-4</b>	<b>CAL3K-AP Bayonet Vessel</b>	<b>1</b>	
<b>3K-4-KT</b>	<b>CAL3K-AP Bayonet Vessel Installation Kit</b>	<b>1</b>	
Included in Kit:			
<b>3K-4-CE</b>	Centre Electrode	2	
<b>3K-4-VNR</b>	Vessel Nozzle O-Ring	2	
<b>3K-4-OE</b>	Outside Electrode	2	
<b>CAL2K-4-CB-SINGLE</b>	Crucibles	2	
<b>3K-4-DP</b>	Deflector Plate	2	
<b>3K-4-FW</b>	Firing Wire (1 packet of 5 wires)	5	
<b>3K-FC</b>	Firing Cotton Packet (1 Packet of 200 Threads)	1	
<b>3K-4-LR-5</b>	Lid O-Rings (1 packet of 5)	1	



### THE 3K-1 CALORIMETER INCLUDING AUTOMATIC OXYGEN FILLING



The CAL3K uses a mixture of isothermal and adiabatic methods while still using the DRY method. The vessel is automatically filled with oxygen and the pressure is monitored inside the calorimeter. The oxygen filling pressure can be changed (programmed). The 3K-1 is supplied with an installation kit (refer to list above).

<b>Width</b>	-	350mm
<b>Height</b>	-	280mm
<b>Depth</b>	-	240mm
<b>Weight</b>	-	12kg
<b>Power</b>	-	220-240V / 12W

### THE 3K-2 AIR COOLER



The air cooler requires no water, piping or other resources. The Air Cooler is supplied with an external 12V power supply and a suitable mains cable.

The air cooler will cool the vessel in approximately 6-8 minutes to the specified setting. The operation of the cooler can be set via the USB port and the CAL3K-A application software or from the CAL3K-A. The cooler is factory configured before shipment.

<b>Width</b>	-	155mm
<b>Height</b>	-	235mm
<b>Depth</b>	-	285mm
<b>Weight</b>	-	3 to 4kg
<b>Power</b>	-	12VDC



### THE 3K-4 BAYONET VESSEL



The ignition and burning process is contained within a chamber so that the energy released can be measured in the form of heat. The Vessel has temperature sensors built into it, so that the temperature rise can be measured.

Because of the high pressure of oxygen required for combustion, the Vessel is classified as a "Pressure Vessel" and is consequently tested by an inspection authority to 10 times its normal pressure.

**Diameter** - 63mm  
**Height** - 150mm  
**Weight** - 1.9kg

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## INSTALLATION

### UNPACKING AND INSPECTION

There are no special precautions to be taken when unpacking your system. The following check list is for your convenience:

1. Locate and tick-off the various system components as indicated on the CAL3K Check List as per above.
2. Unpack and inspect all the system components such as the 3K-1 Calorimeter, 3K-2 Air Cooler, and the 3K-4 Bayonet Vessels according to the instructions in the relevant sections in this document.
3. Inspect everything for any physical damage during transit. If damaged, consult your Agent immediately.
4. The Calorimeter has a GROUND (SAFETY EARTH) lug at the rear panel. This lug MUST be connected to the EARTH supply to insure operating personal safety in case the power supply fails.
5. Verify the earth connection of the mains outlet which you intend to use. Ask a qualified electrician to check it.
6. Connect the power supply to the mains power and to the Calorimeter. Any power supply with 12V output, 3000mA capacity, centre pin POS, can be used.
7. Do the same for the COOLER
8. Observe that the Display on the Calorimeter comes ON. If not, check the mains connections or consult your Agent immediately.
9. Observe that the Display on the COOLER comes ON. If not, check the mains connection or contact your agent.

### SETTING UP

#### PREREQUISITES

Prior to installation of the CAL3K System, the User must provide the following:



1. A mains outlet for the 3K-1 Calorimeter and a mains outlet for the 3K-2 Air Cooler power supplies.
2. A supply of oxygen at a pressure of 3.0-3.5Mpa (30-35 bars) (3000Kpa) within 4 meters of the 3K-1 Calorimeter. If bottled oxygen is used, a suitable high pressure oxygen regulator must be supplied. Digital Data Systems can supply a single stage high pressure oxygen regulator; contact your agent for more information. The exact regulator output pressure is not important as long as it is more than the programmable filling target. A PC is needed to adjust the filling pressure target.
3. If a balance is supplied, ensure that a sturdy, stable weighing surface is available. A mains outlet and Balance connecting cable will also be required (balance cable supplied as part of kit).

### SITE SELECTION

The 3K-1 Calorimeter is a desktop unit, which can be installed wherever the laboratory space permits, with two restrictions:

1. The CAL3K system, consisting of 3K-1 Calorimeter, 3K-2 Air Cooler, should be connected to a mains circuit without heavy inductive or SCR switched equipment. It is safe to have balances or other small electronic apparatuses on the same circuit. Good installation practice would be to have a separate fused mains circuit with separate earth leakage supply (or an earth current monitor, if applicable) for every system component. Future computers and peripherals installed can be connected to the same circuit.



**Please see above for the dimensions, weights and power requirements per unit. The BALANCE data would be dependent on the make and model that you will be using.**

### SAFETY PRECAUTIONS

#### CALORIMETER (3K-1)

- Electrical Shock: There are no user serviceable parts inside.
- Do not open the bottom panel unless the supply cable has been disconnected.
- Dangerous voltages will be present inside the unit after the supply cable has been disconnected.



**DO NOT TAMPER WITH THE EARTHING - CONSULT A QUALIFIED ELECTRICIAN SO THAT THE EARTHING CAN BE CHECKED.**

**DO NOT USE ANY OTHER PIPE OTHER THAN THE HIGH PRESSURE PIPE SUPPLIED FOR OXYGEN FILLING.**

**THE OXYGEN FILLING IS CONTROLLED BY THE CAL3K CALORIMETER. THE FACTORY SETTING IS 30 BAR. CONSULT YOUR AGENT IF ANY OTHER PRESSURE IS NEEDED. HE CAN CHANGE IT.**

- NOTE: With some applications you may need to fill the Vessel to less than 2400KPA e.g.1500KPA (15 bar), however this is only applicable when you have a sample which is highly combustibile, for example with wood related samples. THE FILLING PRESSURE IS ADJUSTABLE via the PC interface.





**REMEMBER: You may fill the Vessel LESS than 3000KPA but NEVER more than 3000KPA.**

### HIGH PRESSURE OXYGEN

- The type of Oxygen to be used is the standard Industrial Oxygen used for welding. A purity of 99.5% will be suitable.
- Conform to the industry standard of handling procedures for oxygen bottles.
- Secure the bottle against a wall.
- The unit has an exhaust outlet (6mm pipe). Route this pipe to the outside or any suitable scrubber to prevent the burned gas to enter the room.

### COOLER (3K-2)

- Electrical shock: There are no user serviceable parts inside.

### VESSEL

- The Vessel has been pressure tested (certificate will be provided if required), at 40 MPA according to international standards.

**NEVER OPERATE ANY UNSAFE VESSEL.**



**NEVER IMMERSE THE VESSEL INTO COLD WATER WHEN COOLING. USE THE 3K-2 AIR COOLER OR ALLOW THE VESSEL TO COOL DOWN NATURALLY.**

- A SUITABLE INSPECTION WARNING PERIOD OF 2000 FIRINGS, AND A STOP OPERATING LIMIT OF 2500 FIRINGS ARE PRE-PROGRAMMED FROM THE FACTORY

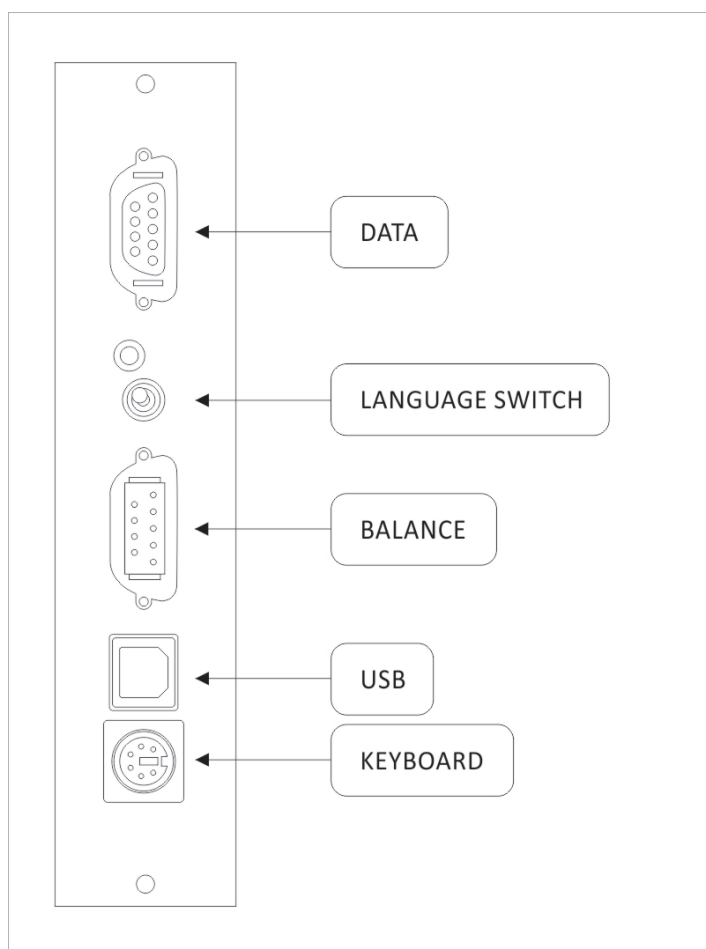
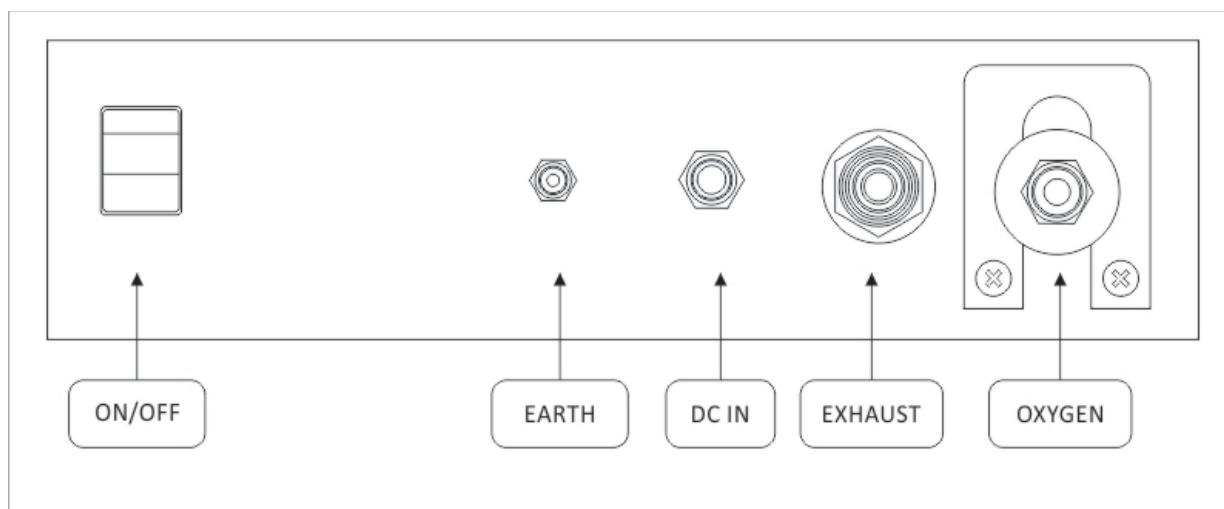
**THE VESSEL MUST BE INSPECTED AT REGULAR INTERVALS DEPENDING ON THE USE. A SUITABLE INSPECTION PERIOD CAN BE SET (By your agent!) AND THE UNIT WILL ISSUE AN INSPECTION WARNING AND SOON AFTER THIS IT WILL SHUT-DOWN THE OPERATION.**



**NOTE: THE MANUFACTURER (DDS) AND ITS AGENTS CANNOT BE HELD RESPONSIBLE FOR ANY LOSS OR DAMAGE RESULTING FROM NEGLIGENCE OR INCORRECT USE OF THEIR EQUIPMENT. IT IS YOUR DUTY AND RESPONSIBILITY TO CHECK ALL SAFETY ASPECTS OF THE CAL3K SYSTEM REGULARLY.**



## CAL3K-A REAR PANEL CONNECTIONS





## SYSTEM TESTING

### HOW TO TEST CAL3K HARDWARE

The CAL3K has a hardware test built in, which is referred to as the USER or FIELD TEST. It is activated by entering the following on the calorimeter keyboard:



Once you have entered the Field/User Test Mode the CAL3K will cycle through all the installed tests. When all CAL3K hardware tests are done it will proceed with the vessel test and ask you to insert a vessel, close the lid and provide oxygen pressure. It then tests the firing wire, filling, firing and deflating operation

All the above tests are displayed with the appropriate comments. If a test fails then the test sequence will stop at the failed test. The failed test is logged into Event Logging. Once the hardware test is completed the test is logged into the Event Logging and the User Test Log.



**It is recommended to repeat the hardware once a day or once per shift. The hardware test takes approximately 1 minute to complete.**

The test can be terminated at any given time with ESC.

### HOW TO TEST THE VESSEL

The vessel test is done in two stages:

1. Automatic, Internal self-diagnostics every time the vessel is inserted into the calorimeter well
2. Operator initiated test in the calorimeter environment

### 3K-4 SELF DIAGNOSTIC TEST

The vessel has a built in diagnostic program which is activated every time the vessel is inserted in the calorimeter well. The outcome of the internal check is transmitted to the calorimeter and is available (visible) on the PC Software as BOMB\_STATUS. This status includes the following items:

- Fire Warning limit exceeded
- Fire Inspection Fault
- Wire warning limit exceeded
- O-ring warning limit exceeded
- Supply Fault
- Reference Fault
- Memory Fault
- Temperature Sensor #1, 2 fault
- Temperature Sensor #3, 4 Fault



Temperature #0 Fault

Temperature #1 Fault



If a fault is detected, then the vessel is prevented from further use and the operator is informed accordingly. Note that with the self-diagnostic test only the vessels electronics. To test how the vessel operates within the calorimeter the following test must be used.

### 3K-4 VESSEL TEST

This test checks the vessel performance inside the calorimeter environment. For this test the high pressure oxygen connection is required, and the vessel must have a firing wire. This test is the last portion of the CAL3K hardware test.



The unit cycles through the following steps and stops for operator action or when a fault is encountered.



Will stop the test.

The results of the test are logged together with the 'Vessel Name' and time into Event Logging, if a fault is found it will be logged.



**NOTE: This test MUST be repeated for each vessel.**

---

## OPERATING

This is a brief operating explanation. A more detailed version is available on-line from [www.ddscalorimeters.com](http://www.ddscalorimeters.com). The unit has various communication options which are not explained here, and the unit requires a PC to change the setup. At present the unit operates on the DEFAULT parameter setting.

### KEYBOARD COMMANDS

The Unit is delivered with a password activated. In this mode NOT all commands are accessible. The default password is: 3KDDS. We recommend that the default password is changed via the PC application software. Check the installed (password active=restricted) commands by:



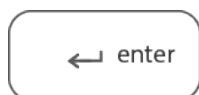
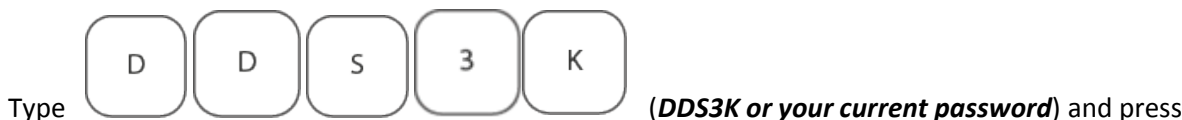
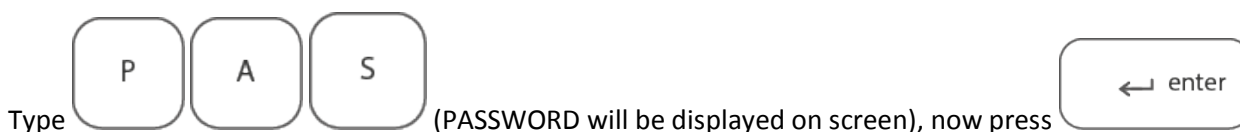
(Press repeatedly)

You will see the command (Line#3) and a short explanation (Line#4). If you wish to operate the indicated command,



press

To see the FULL list of commands:



and repeat above procedure. If you hear a loud beep after pressing enter, you've entered the wrong password.

Function keys: They serve as a shortcut to the keyboard commands. The following function keys are used:

F1	Mass entry	(F1,Enter,0.xxxx,Enter)
F2	Sample Identification	(F2,Enter,mysampleId,Enter)
F3	Group Identification	(F3,Enter,MyGroupId, Enter)
F4	Spike Mass	(F4,Enter,0.xxxx,Enter)
F5	Balance Mass	(F5,Enter)
F6	Open Lid	(F6,Enter,Y,Enter)
F7	Vessel User Test	(F7,Enter)
F8	Terminate User Test	(F8)
F9	CAL3K_AP User Test	(F9,Enter)
F10	Subject Help	(F10) Read display!

**MASS ENTRY**

The mass is a weight in the range 0.2 to 1.5 Gramm. The limits can be set via a PC to suit your operation. Once it is entered it is 'LOCKED' in to the present operation until it is ignited. The only way to 'ERASE' the mass or 'UNLOCK' it is as follows:





### SAMPLE IDENTIFICATION

The sample ID is a 16 character (or shorter) string of characters. The last character will be automatically incremented at each firing. That is to say that a 5 is incremented to 6, and 'C' increments to 'D'. If a short SID is used, followed by spaces, then the last non-space character is incremented.

F2

### GROUP IDENTIFICATION

The Group ID is a 16 character (or shorter) string.

F3

### SPIKE MASS

Enter the weight of the spike mass here. A spike mass of zero disables spiking. For details of spiking see [www.ddscalorimeters.com](http://www.ddscalorimeters.com)

F4

### BALANCE MASS

The supplied balance cable (Part No: CAL2K-BC, D9 to D25) can be connected to a suitable balance and then the weight is transferred automatically to the CAL3K display. Then 'ENTER' must be pressed to LOCK the mass in to the calorimeter.

F5



### OPEN LID

The lid can be open at any given time. The present operation is terminated and the lid is opened. If one does this during the main period then the sample is aborted and the premature termination is logged.

F6



### VESSEL USER TEST

This requires that the vessel is in the well and that the vessel has a firing wire.

F7



### TERMINATE USER TEST

If a user test 'hangs' on a problem, then pressing this key terminates it. It is a little more powerful than Esc.



### CAL3K USER TEST

This tests the CAL3K hardware.




The test cycles through all tests and checks the hardware connections and functionality. A Vessel is not required. Some interaction is required.

### SUBJECT HELP

Every time that the unit waits for an action, a more detailed subject help is available to explain what is needed.



Press  whenever something does not progress and read the comments.

### OTHER KEYBOARD COMMANDS

Here are some handy commands, which have to be typed. The Unit checks the typing, and if no ambiguity exists it will complete the command for you.

#### ABORT

This is a reset. The unit terminates ALL operations and starts fresh.

#### FIRE MANUAL

This can be used to shorten the initial period. The firing conditions are circumvented and the Vessel charge is ignited. Useful to test the firing/ignition procedure

#### USE CALIBRATION

With this command you can direct the CAL3K\_AP to use any of the 10 calibration sets (0-9). Zero is the standard calibration set by the factory.



### CALIBRATION

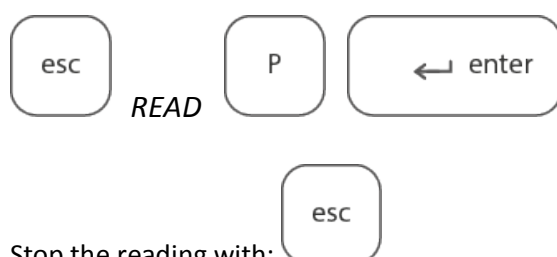
This directs the unit to perform a calibration procedure with the next sample. During this procedure the Sulphur correction (if set) is disabled.

### ZERO PRESSURE

The oxygen pressure is measured during the filling process. This commands ZEROS the pressure to atmospheric condition.

### READ PRESSURE

This command displays the present Vessel pressure. With no vessel it should read 0+-0.3 bar.



Stop the reading with:

### READ RESULT

This command is required to read the previous stored results. The holds the last 1024 results which can be retrieved by:



The unit displays the Last result number and the result details in line #4.

Press (Enter)

Press (Enter)

The unit displays the previous result

repeat until you have all results!



**Note: The results can only be cleared from a PC or mobile device if allowed to do so!**

### CONNECTING TO A BALANCE

This step is not absolutely necessary. The weight (mass) of the sample can be transferred manually from the balance to the CAL3K and entered on the keyboard. The balance connection cable is included in the kit. If the unit is installed near the balance then connect up. The default balance speed is 2400baud. Set your balance to this speed! The balance speed can be changed from the PC only. Test the connection by pressing (F5). Then the stable balance weight should show on the display. If you press (Enter) then the mass is locked. See MASS ENTRY to unlock it.

---





## PERFORM THE FIRST SAMPLE

The object of this exercise is to check that everything functions. We assume that the CAL3K and the Vessel hardware has been tested and found to be OK. This means you have the oxygen connected.

### The sample test requires the following:

- The default setup (set by the factory)
- Calibration #0 (set by the factory)
- One Benzoic Acid (CAL2K-4-BA) tablet, supplied in 3K-1 Installation kit
- Firing cotton (3K-FC), supplied in 3K-4 Installation Kit
- Firing wire (3K-4-FW), (already fitted to vessel lid assembly, also supplied in 3K-4 Installation kit), check that this is present
- Minimum fuss, Minimum explanations, Minimum keyboard entry

Herewith the operating sequence:

1. Weigh a Benzoic Acid (supplied) on a scale to 4 decimal places with the tarred crucible. Do not touch the tablet but use the supplied tweezers.
2. Prepare a vessel: Attach Firing cotton thread to the Firing wire. Insert the crucible with the BA tablet in to the holder, and position the tablet on top of the cotton thread. Handle the lid gently because if the tablet moves and does not touch the cotton thread it is unlikely that the tablet fires. Then gently close the vessel. Do not over tighten. Place vessel into the calorimeter well.
3. Enter the sample MASS (weight of sample) by selecting F1, ENTER, Type mass (e.g.: 0.5432) and ENTER.
4. Close the lid until you hear a click. You may have to press the lid down.
5. The CAL3k will automatically check everything and then inflate the vessel with oxygen. You will hear some clicking sounds of the filling valve.
6. The CAL3K will then go into an INITIAL waiting period. The time is indicated in the top line on the LCD screen.
7. After 2 to 3 minutes the sample is fired. This is displayed and announced with a short beep. You will notice on the top line of the display the FIN period
8. After 2-3 minutes the result is displayed in the bottom line of the display, the vessel is then deflated (all oxygen released) and the lid opens.
9. Put the (warm) vessel in to the cooler. You will hear the fan coming on, and after a while (time is indicated) the cooler fan will stop and the message "VESSEL READY" is displayed. The cooling time depends on the Room temperature and vessel temperature and is indicated.

The above is just a short step-by-step procedure to run your first CV sample to make sure your calorimeter is in working order.

There are many additional steps and procedures that you can do whilst running an actual CV sample. You will find these How to Steps via the On-line Help Guide available on the website: [www.ddscalorimeters.com](http://www.ddscalorimeters.com)

Please note the CAL3K Windows Software can be downloaded from the following link:  
[www.ddscalorimeters.com/software/cal3k](http://www.ddscalorimeters.com/software/cal3k)

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## CALIBRATION

All vessels are calibrated in the factory with the calorimeter before shipment. Note that the calibration is saved for a particular CAL3K chassis and for a particular vessel number. If this pre-calibration is not possible then the full calibration procedure must be performed in the field. Here follows a SHORT description of the various calibration procedures:

### CHECK SAMPLE

It confirms that the calibration is valid and saves the result to the calibration history. Perform this once a day/week.

### CALIBRATION

As above, but it affects the bomb factor with the average of old and new bomb factors. This is also entered in the calibration history. Perform this once a day/week.

### INTELCAL CALIBRATION

This requires a PC. The PC reads all the saved history calibrations and performs a SYSTEM calibration with the data. It requires 7 to 10 history entries and when done it will download the IntelCal calibration data to the vessel. Perform this once every 1 to 6 month. The unit is shipped with a universal default IntelCal calibration set.

### VESSEL CALIBRATION WITH MORE THAN ONE CALORIMETER

If you have more than one calorimeter and you like to operate every vessel in every calorimeter then you must calibrate each vessel in every calorimeter. A maximum of seven calorimeters are allowed per vessel.

### ROUTINE CALIBRATION

Each vessel must be calibrated. The calibration is best performed at the normal operating conditions. Prepare the vessel as outlined previously and set the unit to the calibration mode by:



**Note: that the state is displayed during the initial period as: ICA**

Then close the LID and wait. You will notice that the calibration operation is indicated in the top left corner. Once done, remove the vessel and repeat the procedure with the second vessel.

The calibration data set is stored in the vessel calibration history for the chassis number.

---



## ROUTINE SAMPLE DETERMINATION

The procedure is the same. If you perform multiple determinations in a row then the operating cycles with two vessels overlap:

Place prepared vessel in well	Place warm vessel in cooler
Tare a crucible and weigh a sample, but leave crucible in balance	
Vessel fires (short beep)	Warm vessel is still cooling
Enter mass from balance F5 Enter	
Wait until cooler is ready	Cooler fan switches off
Remove cooled vessel and prepare it	
Wait until lid opens	

## CHECK SAMPLE

A check sample is the same as a unknown sample, but it uses Benzoic acid without any sulphur correction. the result is displayed and it should not differ by more than 0.12Kj/g from the standard value. Perform a checksample once or twice a day. A check sample is saved for calibration averaging, but the calibration is not affected

## WARRANTY – FOR NEW PRODUCTS

### PURPOSE OF PRODUCT WARRANTY

Any part of a product is subject to ageing and eventual failure. These failures occur during normal use. The purpose of a warranty is to protect the Owner against a part failure caused by manufacturing defects in workmanship, material or design for a specific time.

### OWNER'S WARRANTY

In the event of the Owner contracting directly with Digital Data Systems (Pty) Ltd “dds”, or in the event of the installation of a unit arising out of a contract between the Owner’s Dealer or any other party on his/her behalf and the said “dds”, the Owner records that notwithstanding same, this warranty is the only warranty applicable to “dds” units and is expressly in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular purpose. No amendments or additions to this warranty shall be binding on “dds”, unless recorded in writing and signed by a duly authorised officer of the company. **“dds” agrees to repair and replace with a new or remanufactured part, any part, other than those excluded below, which after inspection, upon its return to the factory in Randburg, Johannesburg by the Owner or the authorised Dealer to which he/she returns the unit, is proven to be defective.**

Replacement of a defective part will be made only within the applicable warranty period of **12 (twelve) months from date of shipment**. Notwithstanding anything to the contrary herein, any labour involved in repairing or replacing a defective part will be charged at “dds” rates applicable at the time.



**If upon inspection it is found that the pressure vessel was submerged in water the warranty will automatically be null and void and the owner will be responsible for the labour and parts charges.**

### **EXCLUDED (NON-WARRANTY) PARTS**

“dds” shall be entitled to treat this warranty as void unless the relevant warranty form (attached) is sent by registered post to “dds” by the Owner within 10 (ten) days from date of original installation.

Regardless of warranty-status, the Owner shall be responsible for labour charges connected with periodic maintenance requirements involving visual and functional inspection of the systems.

This warranty expressly covers the unit(s) “dds” supplied only and does not cover any other part, which may, as a consequence of the installation and operation of the unit, become damaged in any way whatsoever.

**Special attention should be given to the safe operation of the high-pressure Vessels. The published rules are guidelines only and enclosed in this leaflet for the convenience of the User. The manufacturer is not responsible for any damages, consequential, indirect or direct, or loss whatsoever, resulting out of electrical shock, Vessel explosion, or any other cause.**

### **WARRANTY – REPAIRED PRODUCTS**

Any “dds” scientific product that has been repaired has a warranty period of **30 Days from date of shipment** for the Repair request only. If something else goes wrong that is not part of the original Repair, the warranty does not apply. Each product that is sent to “dds” for Repair is tested and checked and leaves “dds’s” Factory in 100% working order. It is the Owner’s responsibility to inspect any repaired product on receipt thereof and confirm in writing, any faults, errors or problems with the said product. If a fault, error or problem is reported after the 30 Day warranty period, and “dds” finds that the product has been damaged and requires another repair, the full cost of repair will be applicable and paid for by the Owner.

### **GENERAL – WARRANTY VOID**

All serial numbers on any relevant “dds” Scientific product need to remain on the product at all times, or warranty will be void. Warranty will also be void if any of the branding stickers or decals have been removed and/or the colour of the Scientific product has been changed in any way.



## WARRANTY REGISTRATION FORM

<b>SERIAL NUMBERS (S/N):</b>	<b>Calorimeter:</b>
	<b>Air Cooler:</b>
	<b>Vessel(s):</b>
	<b>Other:</b>

<b>DEALER NAME:</b>	
<b>OWNER'S/CUSTOMER'S COMPANY NAME:</b>	
<b>AUTHORISED BY:</b>	
<b>INSTALLED AT:</b>	
<b>TEL NO:</b>	
<b>FAX NO:</b>	
<b>CONTACT PERSON:</b>	
<b>INSTALLED BY:</b>	
<b>DATE INSTALLED: (REPRESENTATIVE OF DEALER/AGENT)</b>	
<b>CUSTOMER ORDER NUMBER AND DATE:</b>	

<b>INSTALLATION DETAILS (LOCATION, WATER SUPPLY, AIR-CONDITIONING ETC.):</b>

<b>ACCEPTED IN GOOD CONDITION:</b>	
<b>DATE:</b>	
<b>SIGNATURE:</b>	
<b>NAME (printed):</b>	
<b>WITNESS:</b>	

I have read, understood and accepted the conditions of this warranty, the details of which are printed in this Manual.

<b>CUSTOMER'S SIGNATURE:</b>	
<b>NAME (printed):</b>	
<b>DATE:</b>	

