



**DDS CALORIMETERS**

Scientific Analytical Calorimeter Solutions



# CAL3K-F CALORIMETER

## Oxygen Bomb Calorimeter

MANUFACTURING SUPERB CALORIMETERS FOR TODAY'S ANALYTICAL NEEDS



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# CAL3K-F CALORIMETER

The CAL3K-F is the fourth in the range of innovative new oxygen bomb calorimeters from DDS Calorimeters. The new range, from the engineers who designed the CAL2K Oxygen Bomb Calorimeter range, features higher speeds, improved accuracy and a small footprint with the now legendary resource reduction (no water required, lower power consumption, low maintenance).

The CAL3K-F Oxygen Bomb Calorimeter is highly expandable to cater for increasing laboratory work. Start off with the most economical single vessel system and expand it as the need arises to a system of 6 samples per hour. The system uses the proven quick thread type vessel common to all CAL3K systems, and works in the dynamic (Isoperibol) calorimetry mode. It has three communication ports with a host of outstanding features that caters for every application. The CAL3K interfaces with different devices, including PC, Balance and Printer.

## COMPLETE SYSTEM

FOR USE WITH THE CAL3K-F.

The CAL3K-F is a flexible system for low to high throughput without compromising accuracy and repeatability. It is used in Food/Feed Analysis, Alternative Energy, Scientific Determination, Coal and Oil Production and Research and Quality Assurance. In short: wherever the calorific value of a solid/liquid sample must be determined.

The following accessories can be added to the calorimeter:

- RS232 Printer (sold separately)
- Pellet Die Set (sold separately)
- Analytical Sartorius Balance Scale (sold separately)
- High Pressure Oxygen Regulator (Requirement) (sold separately)

**CAL<sup>3</sup>K**  
NEXT GENERATION CALORIMETERS

## COMPLETE SYSTEM

The oxygen bomb calorimeter, filling station and air cooler are operated together for effective routine sample determination, using 1 or more bomb vessels. Use the air cooler for optimum results and faster throughput. The system can be supplied with 1, 2 or 4 bomb vessels depending on throughput. The CAL3K-F system is supplied in two different system options, but any combination is possible.

### Option 1 (up to 4 samples per hour):

- 1 x Calorimeter
- 1 x Air Cooler
- 1 x Filling Station
- 1 x Bomb Vessel

### Option 2 (up to 6 samples per hour):

- 1 x Calorimeter
- 1 x Air Cooler
- 1 x Filling Station
- 2 x Bomb Vessels



The complete CAL3K-F oxygen bomb calorimeter system contains all the parts and consumables necessary to set up the unit. The installation kits included with the setup of the calorimeter contains consumables for approximately 200 samples, depending on the type of sample being analyzed (coal analysis, animal feed analysis). Other samples like oil, might use more consumables as they are corrosive and could cause wear and tear. Additional consumables can be purchased separately from our authorized agents.

The complete calorimeter system is delivered with installation kits for the calorimeter, filling station, air cooler and vessels (for approx. 200 firings). The CAL3K-F uses Dynamic (Isoperibol) calorimetry method, while still using the dry method, i.e. it's waterless.

The vessel is manually filled with oxygen via the external oxygen bomb filling station.

An average of 4-6 tests per hour can be achieved depending on system option purchased.



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# CAL3K-F CALORIMETER

## ADVANCED CAL3K-F FEATURES



### TEMPERATURE CONTROL

No temperature control of room/lab required



### FAULT FINDING

Extensive fault finding and testing



### STEP-BY-STEP HELP

Screen prompts assist with step-by-step instructions to operate the calorimeter



### 15 CALIBRATION FIELDS

For different mode and different calorimeters



### TEMPERATURE ACCURACY

Temperature accuracy of 10ppm (parts per million)(0.00001°C)



### QUICK THREAD TYPE BOMB VESSEL

Self-Locking and Self-Sealing quick thread type bomb vessel



### EXTREMELY ACCURATE

Extremely accurate (%RSD - 0.1%) determination eliminates multiple sample repeats



### RESULTS

Results in KJ/Kg, KBTU/lb or KCal/g



### AIR COOLER

No water required to cool the bomb vessel



### MULTIPLE COMM CHANNELS

1 Wired (USB), 2 x RS232



### COMPENSATION

Compensation for firing energy, sulphur, fibre, moisture



### BALANCE INTERFACE

Balance interface with baud speed setting



### USER FRIENDLY

User Friendly Operation



### RESTRICT ACCESS

Operating parameter access is password restricted



### 15 CALIBRATION AVERAGE

For variable amount of calibration average to suit your application



### LARGE STORAGE

More than 400 results storage



### LOW POWER CONSUMPTION

Very low power consumption. No temperature controlling required.



### INTELLIGENT VESSEL

Intelligent vessel with built-in temperature sensing



### ECO FRIENDLY

Eco Friendly - small carbon footprint. No water, low power consumption.



### LINEAR SENSORS

Linear temperature sensing with platinum sensors



### TEMPERATURE RANGE

Extensive temperature range from 0°C to 70°C.



### SAFETY

Safety checks guarantee the safety of the operator.



### NO WATER REQUIRED

No Water Bucket. No Spillage. No Measuring.



### THREE OPERATING MODES

Isothermal, Adiabatic and ISOBATIC (and experimental)



### MANUAL OXYGEN FILLING

Makes use of an external oxygen filling station



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# CAL3K-F CALORIMETER

## The CAL3K Bomb Calorimeter Installation Kit includes :

- Power Supply 12V/1.25A (3K-1-055)
- Balance Cable (3K-1-117 )
- PC Cable USB (3K-1-084)
- PC Keyboard PS2 (3K-1-061)
- Preparation Stand (3K-4-049)
- Stainless Steel Tweezers (3K-1-081)
- Certified Benzoic Acid Tablets (150 x 0.5g tablets per bottle)(3K-4-084)
- Wire Brush (3K-4-106)
- Deflate cap (3K-3-18)
- RS232 Printer Cable (3K-1-098)
- Printed Installation Guide (3K-INSTALLATION)
- USB Memory Stick (including manuals, software, application notes etc) (3K-1-043)

## CAL3K-F KIT AND CONSUMABLES

### The CAL3K Air Cooler Installation Kit includes :

- Power Supply (3K-1-055)

### The CAL3K Bomb Vessel Installation Kit includes :

- 2 x Complete Top and Bottom Centre Electrode (3K-4-122)
- 2 x Outside Electrode (3K-4-124)
- 2 x Stainless Steel Crucibles (3K-4-047)
- 2 x Deflector Plate (3K-4-092)
- 1 x Packet Firing Cotton (100 threads) (3K-4-065)
- 1 x Packet Firing Wire (5 wires) (3K-4-093)
- 5 x Large Lid O-ring (3K-4-094)
- 10 x Top & Bottom O-rings (3K-4-022)

### The CAL3K Filling Station Installation Kit includes :

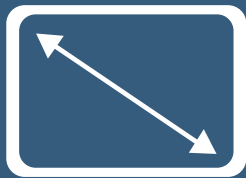
- 5 x Nozzle O-rings (3K-3-29)
- 1 x Oxygen Regulator Kit (3K-3-21)
- 1 x Defiller Cap (3K-3-22)
- 1 x Allen Key (3K-3-32)
- 1 x O-ring Lubrication Grease tube (3K-1-086)
- 2 x Nozzle O-ring used in 3K-3 Jet Assembly (3K-1-080)
- 1 x High Pressure Pipe 4mm (Clear/White) (3K-3-27)



CAL3K Quick Thread Bomb Vessel & Air Cooler



# TECHNICAL SPECIFICATIONS



## LCD Display

Large display for easy viewing.

# x3

## Easy to Use



## Compact Size

Approximately 350mm x  
280mm x 240mm



## Lightweight

Light weight for easy moving.  
Approximately 12kg.



## TUV CE Certification

Complies with ASTM, DIN and  
ISO International Standards.

Specification	Information
Working (Operating) Temperature	15-50°C
Storage Temperature	0-70°C
Temperature Resolution	0.000001°C
Reproducibility/Repeatability	0.1% RSD
Resolution	0.0001 MJ/Kg
Results per hour	Up to 4-6 samples per hour
Measuring range max.	99MJ, 99000J
Working temperature min.	5°C
Working temperature max.	50°C
Temperature Measurement Resolution	10ppm (parts per million)
Cooling Medium	Air



# TECHNICAL SPECIFICATIONS

Specification	Information
Type of Cooling	Airflow
Filling Oxygen Operating Pressure Max	40 bar
Balance/Scale Interface	RS232, 1200 to 38400 Baud (settable)
Printer Interface	RS232, 1.2Kb to 115.2Kb
PC Interface	USB
Power Input	2.4W
Interface External Keyboard	PS2
Oxygen Filling	Manual
De gasification	Manual
Halogen (Decomposition) Vessel	Yes, optional
Analysis according to DIN 51900	Yes
Analysis according to ASTM D240	Yes
Analysis according to ASTM D4809	Yes
Analysis according to ASTM D5865	Yes
Analysis according to ASTM E711	Yes
Analysis according to ISO 1928	Yes
Dimensions	350mm x 280mm x 240mm
Weight	~ 12.000kg
Permissible Ambient Temperature	1-35°C
Permissible Relative Humidity	80%
RS232 Interface	Yes
USB Interface	Yes
Voltage	220-240 / 100-120V, 12VDC, 1Amp
Frequency	50/60 Hz



# SYSTEM COMPARISON

FEATURE	CAL3K-A	CAL3K-AP	CAL3K-F	CAL3K-S	CAL3K-ST
<b>BALANCE INTERFACE</b>	Yes, from 2.4 to 38.4KB	Yes, from 2.4 to 38.4KB	Yes, from 2.4 to 38.4KB	Yes, from 2.4 to 38.4KB	Yes, from 2.4 to 38.4KB
<b>RESULT MEMORY</b>	700 records	700 records, 262KB	900 records	480 records	430 records
<b>TEMPERATURE RESOLUTION</b>	0.000'001°C	0.000'001°C	0.000'001°C	0.000'001°C	0.000'001°C
<b>DISPLAY</b>	4 x 40 character LCD	4 x 40 character LCD	4 x 40 character LCD	2 x 20 character LCD	4 x 40 character LCD
<b>KEYBOARD</b>	QWERTY, External, PS2	QWERTY, External, PS2	QWERTY, External, PS2	QWERTY, External, PS2	QWERTY, External, PS2
<b>SAMPLE ID</b>	16 characters, auto-increment	16 characters, auto-increment	16 characters, auto-increment	16 characters, auto-increment	16 characters, auto-increment
<b>GROUP ID</b>	16 characters	16 characters	16 characters	16 characters	16 characters
<b>REAL TIME</b>	Yes	Yes	Yes	Yes	Yes
<b>CALIBRATION</b>	15	15	15	15	15
<b>UNITS</b>	KJ, KBTU, KCAL	KJ, KBTU, KCAL	KJ, KBTU, KCAL	KJ, KBTU, KCAL	KJ, KBTU, KCAL
<b>RESULT COMPENSATION</b>	Automatically applied	Automatically applied	Automatically applied	Automatically applied	Automatically applied
<b>VESSEL PRESS. MONITOR</b>	No	Up to 100 bar	No	No	No
<b>OXYGEN FILLING</b>	External manual filling station	Internal, automatic filling	External manual filling station	External manual filling station	External manual filling station
<b>DE-FILLING</b>	Manual	Automatic	Manual	Manual	Manual
<b>MAX CHASSIS RECORDING</b>	Yes	Yes	Yes	Yes	Yes
<b>CHASSIS NAME</b>	16 characters, Bluetooth name	16 characters, Bluetooth name	16 characters, Bluetooth name	16 characters, Bluetooth name	16 characters, Bluetooth name
<b>KEYBOARD PASSWORD</b>	CAL3K	CAL3K	CAL3K	CAL3K	CAL3K
<b>VESSEL LEAK MONITOR</b>	No	Yes, flags result and warning	No	No	No
<b>EXTERNAL COOLER</b>	Yes	Yes	Yes	No, Built-tin	Yes
<b>ACCEPT CAL2K VESSEL</b>	No	No	No	No	Yes
<b>VESSEL LOCKOUT, LOCK-IN</b>	Yes, 2500 firings	Yes, 2500 firings	Yes, 2500 firings	Yes, 5000 firings	Yes, 5000 firings
<b>SAMPLE REPEAT SPEED</b>	4-5 min	6 min	7-8 min	20 min	20 min
<b>OPERATOR TIME PER TEST</b>	+/- 3 min	+/- 3 min	+/- 3 min	+/- 3 min	+/- 3 min
<b>COOLING</b>	Air	Air	Air	Built-in	Built-in
<b>COOLING MODES</b>	Ambient/Fixed	Ambient/Fixed	Ambient/Fixed	Ambient/Fixed	Ambient/Fixed
<b>RSD</b>	0.1	0.1	0.1	<0.1	0.1
<b>POWER CONSUMPTION</b>	12W	12W	6W	6W	6W
<b>POWER SUPPLY</b>	External 12V	External 12V	External 12V	External 12V	External 12V
<b>WATER CONSUMPTION</b>	None	None	None	None	None
<b>REPEATABILITY</b>	0.10%	0.10%	0.10%	0.10%	0.10%



# SYSTEM COMPARISON

FEATURE	CAL3K-A	CAL3K-AP	CAL3K-F	CAL3K-S	CAL3K-ST
<b>OPERATING MODES</b>	Dynamic, Isothermal, Adiabatic	Dynamic, Isothermal, Adiabatic	Dynamic	Dynamic	Dynamic
<b>NUMBER OF VESSELS</b>	4	4	4	1	2
<b>CLOSURE TYPE</b>	Quick Thread Cap	Quick Thread Cap	Quick Thread Cap	Quick Thread Cap	Quick Thread Cap
<b>TESTS P/H WITH 2 VESSELS</b>	10+	8+	4-6+	2	3+
<b>BOMB VESSEL TYPE</b>	Removable	Removable	Removable	Removable	Removable
<b>OXYGEN FILLING</b>	Semi-Automatic	Fully Automatic	Semi-Automatic	Semi-Automatic	Semi-Automatic
<b>BOMB VESSEL WASHING</b>	Manual	Manual	Manual	Manual	Manual
<b>PRINTER CONNECTION</b>	RS232	RS232	RS232	RS232	RS232
<b>BALANCE CONNECTION</b>	RS232	RS232	RS232	RS232	RS232
<b>ENVIRONMENTAL</b>	5-40°C	5-40°C	5-40°C	5-40°C	5-40°C
<b>PRINTING OF RESULTS</b>	Via PC or RS232 Printer	Via PC or RS232 Printer	Via PC or RS232 Printer	Via PC or RS232 Printer	Via PC or RS232 Printer
<b>PC SOFTWARE</b>	Advanced	Advanced	Advanced	Advanced	Advanced
<b>CORRECTION FACTORS</b>	4	4	4	4	4
<b>MASS ENTRY</b>	Auto & Manual	Auto & Manual	Auto & Manual	Auto & Manual	Auto & Manual
<b>CE/TUV CERTIFICATE</b>	Yes (Pending)	Yes (Pending)	Yes	Yes	Yes (Pending)
<b>SPIKING</b>	Yes	Yes	Yes	Yes	Yes
<b>SELF TESTING</b>	Yes	Yes	Yes	Yes	Yes
<b>AI COMPENSATION</b>	Yes	Yes	Yes	Yes	Yes
<b>CONNECTIVITY</b>	USB 2.0, 2 x RS232 at 115.2KB for bluetooth	USB 2.0, 2 x RS232 at 115.2KB for bluetooth	2 x RS232 at 115.2KB	2 x RS232 at 115.2KB	2 x RS232 at 115.2KB
<b>PRINTING</b>	Yes	Yes	Yes	Yes	Yes
<b>MOISTURE COMPENSATION</b>	Yes	Yes	Yes	Yes	Yes
<b>FOOD FIBRE COMPENSATION</b>	Yes	Yes	Yes	Yes	Yes
<b>REAL TIME PRINTOUT</b>	Yes	Yes	Yes	No	No
<b>GELATIN CAPSULE COMP.</b>	Yes	Yes	Yes	Yes	Yes

The CAL3K-F Oxygen Bomb Calorimeter System can be used with most applications including, but not limited to: Animal Feed Research, University Research, Food/Nutrition Analysis, Explosives Analysis, Coal Analysis, Oil Analysis, and other traditional and non-traditional applications.



# CONTACT US

## COMPANY HISTORY

Digital Data Systems (DDS has more than 40 years of experience in calorimetry.

In 1972, DDS produced their first calorimeter, the AMPC (Automatic Micro Processor Calorimeter). The AMPC was a dual water isothermal unit controlled by a microprocessor.

In 1980 work began on a new revolutionary design of vessel, namely the DRY vessel or CP510, which meant that there was no surrounding water jacket. A copper sleeve pressed over the vessel replaced the water jacket and the temperature sensors were placed inside the vessel resulting in the heat transfer being extremely fast. Determination time was significantly reduced, increasing the unit efficiency by 4 times. With the processing power of the microprocessors available at the time, the CP500 Calorimeter was born. The striking "buttercup yellow" colour gave a splash of brightness to the then drab laboratories.

In 2002 work began on the CAL2K. The tried and tested DRY system was retained and only the very latest electronic technology was used, including the surface mount devices.

In 2005, DDS came to realize the need for smaller, low volume, inexpensive calorimeter systems, with the same accuracy and reliability of the CAL2K. The ECO was then created as an alternative system to the CAL2K. The ECO is suitable for the following markets: Universities, Research Facilities, Brick Manufacturers, Animal Feed Industries, Food Quality, and Food Production.

In 2007, the new E2K system was developed. Should you require more information on our superb range of bomb calorimeters please contact your nearest dealer or visit our website.



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