DDS CALORIMETERS

Scientific Analytical Calorimeter Solutions

CAL2K CALORIMETER

Isothermal Bomb Calorimeter

MANUFACTURING SUPERB CALORIMETERS FOR TODAY'S ANALYTICAL NEEDS

www.ddscalorimeters.com

CAL2K CALORIMETER

CAL2K SYSTEM FEATURES

The CAL2K system is the most advanced, fully automatic calorimeter system available today. The result of years of research with dedicated engineers employing the latest state-of-the-art technology and the highest quality materials.

The CAL2K is easy to use and has special features which places it in a league of its own. Accuracy is guaranteed with microprocessors that use self-correcting processes, exceeding the standard requirements of DIN, ASTM and ISO. Its ability to interface with a personal computer, ensures preferred results with displays, data printouts and connectivity across a network.

The CAL2K has been designed for the high volume market and is most suitable for customers running 10 or more CV samples per day.





- Easy to maintain, self-system test for technicians.
- Compact Size- able to fit more systems into a standard laboratory.
- Fully automatic operation- temperature readings and calculations are done for you.
- Possible to network up to 7 calorimeters.
- Rapid and accurate determinations.
- 10 samples per hour using the CAL2K-2 Water Cooler and 2 Vessels.
- Isothermal design using a waterless patented vessel (no water bucket, spillage or measuring)
- Large memory for storing more than 2000 determinations, including operating conditions and user statistics.
- Manual and automatic mass entry through the front panel, balance interface or PC.
- Automatic corrections for firing wire, cotton, spikes, etc.
- Fully automatic calibration, with 10 stored calibration curves per vessel for standard deviation.
- Calibrated sensors built into vessel wall.
- Vessel is intelligent “SMART” with fault diagnostics and microprocessor.
- Adjustable firing limits set per vessel.
- High and low mass limits.
- Determination cycle adjustment.
- Other features include User, Group and Sample ID.
- CE Certified, TÜV Certified.
- Precise and reproducible determination of gross calorific values according to ISO 1928, DIN 51900 and BS 1016:105.

CAL2K SOFTWARE FEATURES

- User controlled access for vital or routine operations
- Automatic result retrieval for selected and formatted data
- Weight station operation
- Calorimeter and vessel setup
- Calibration management
- Service and maintenance routines
- Filing, printing and other operator functions, including data export and common faults
- Real time graphical temperature display
- Network status display
- Grouped sample determinations and analysis

CAL2K CALORIMETER

TECHNICAL SPECIFICATIONS

Power
50/60 Hz 90 - 260 VAC

Operating Temperature
0 - 60°C

Repeatability
0.1° (%RSD)

Resolution
0.001 (MJ/Kg)

Temperature Resolution
0.000001°C

Calibration
Calibration Details per Calibration Curve. 10 Stored Calibration and Deviation Curves. Automatic Standard Deviation Calculations.

Results per hour
10 samples (with two vessels)

ENHANCED FEATURES

- Computer, balance and calorimeter interface.
- Adjustable firing voltages for different firing wire.
- Real-time clock with one-week backup.
- 1-Watt consumption.
- Manufacturer and history information stored on each vessel

COMPLETE CAL2K OXYGEN BOMB CALORIMETER SYSTEM

THE CALORIMETER

The CAL2K-1 Calorimeter can operate as either a stand-alone unit or via PC. When operating as a stand-alone unit it is operated via the keyboard and all relevant information is displayed on the LCD Display. Up to 7 Calorimeters can be connected as a network with or without a PC.

CAL2K BOMB VESSEL

The CAL2K-4 vessel is the first of its kind and is the heart of the CAL2K System. Its sophisticated design allows the temperature to be measured to five decimal places in degrees Celsius. The vessel is an intelligent (SMART) vessel with a microprocessor built into its base. The vessel is capable of : firing counts, identification, memory and reconditioning data. The vessel is the combustion chamber. It is made of stainless steel and tested up to a pressure of 300 atmospheres (4200psi).

CAL2K CALORIMETER

COMPLETE CAL2K OXYGEN BOMB CALORIMETER SYSTEM

CAL2K WATER COOLER

The unit is designed to reduce the temperature of a recently fired vessel, obtained from the calorimeter, to ambient temperature in 2-3 minutes. Solid state cooling is used and the hot junction of the peltier elements is cooled by a continuous trickle of water from the mains water supply.

CAL3K FILLING STATION

The Filling Station is designed to fill the vessel with oxygen to 3Mpa. The filling rate is controlled so as not to disrupt the sample in the crucible. The Filling Station is extremely easy to operate and requires minimal adjustments and maintenance.

HIGH PRESSURE OXYGEN REGULATOR

A supply of oxygen at a pressure of 3Mpa (30 bar)(3000Kpa) within 10 meters of the calorimeter system is required. A suitable high pressure regulator MUST be supplied to allow for this pressure. DDS can supply a suitable regulator at an additional cost or this item should be sourced locally by the agent or customer. However it is important to note that this item is VITAL and MUST be supplied before installation of the system.

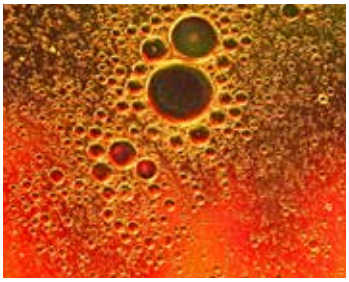
TRADITIONAL APPLICATIONS

PROPELLANTS

Here the instrument is used as a quality assurance tool. The vessel is not charged at all, or charged with an inert gas. A small sample is burned and the energy is displayed.

FOSSIL FUELS

Producers and users of solid combustible fuels like COAL and OIL use the instruments for quality assurance and exploration. The unit has excellent repeatability and accuracy in accordance with ISO, DIN and ASTM.




SAFETY APPLICATIONS

These applications are mainly concerned with the energy of a substance when burned in a domestic or industrial fire. Seat material in cars, paint on furnishings, plastic used in airliners, floor covers, etc. Obviously the flash point and gas emissions are important, but the energy of the substance is as well.

SCIENTIFIC RESEARCH

These applications are endless. Most refer to methods related to combustible energy. However, the rising cost of traditional energy has resulted in more research. A shroud of mystery surrounds the unconventional energy research, but we have heard of measuring the energy absorption of leaves during sunshine, measuring the energy contained in production by-products, and measuring the energy in vegetable oils. The unit measures disposable waste in accordance with ASTM D5468-02.

HEAT IGNITABLE EXPLOSIVES

The development and secrecy in the industry prevents us from publishing details. But if the substance can be ignited by heat, then the DDS range of bomb calorimeters can measure it. Typical applications are igniter caps and charges. The vessel is at present used for quality control. The speed of combustion is not measured.

VOLATILE FUEL & OILS

With the price of crude oil escalating as it is as present, the energy or calorific value of fuels is becoming more and more critical. The calorific value of fuel determines the amount of energy contained in it- this means that a fuel of high calorific value will give more energy and thus more propulsion to the vehicle than the fuel of lower calorific value. All liquid fuels can be analyzed in a bomb calorimeter unit. The determination is performed in accordance with ASTM D240-02 and D4809-00 standards.

NON-TRADITIONAL APPLICATIONS

ANIMAL FEED PRODUCTION

It is obvious that digestible energy is not equivalent to combustible energy. However, the bomb calorimeter can be used in a comparative fashion in quality control in animal feed production and optimization of feed consumption. The instrument is used in animal feed and dairy research, Departments of Agriculture, Universities and the private industry.

The aims are to improve the nutritional value of the feed, or optimize the nutritional absorption by animals. The unit has proved to be a fast and reliable tool in comparison to wet digestive methods.

PRODUCTION AND USE OF EDIBLE OILS

The digestive calories of vegetable oils are nearly the same as combustible energy. Therefore the instrument is ideally suited for incoming control of raw products during oil production.

Consequently, any food production, which uses oil in the process, can use the calorimeter to measure the oil content of the final product. Since we are all concerned with the daily intake of calories, the instrument is used to control the use of oil during production of potato chips, canned beef and fish.




SYSTEM COMPARISON

FEATURE	ECO	E2K	CAL2K	CAL3K-AP	CAL3K-A	CAL3K-U	CAL3K-F
LIMS	No	No	No	2 x via RS232, or Bluetooth	Yes	Yes	Yes
MASS HEAP	No	No	Yes	No	No	No	No
BALANCE INTERFACE	Yes	Yes	Yes, at 2.4KB	Yes, from 1.2 to 38.4KB	Yes, from 1.2 to 38.4KB	Yes, from 1.2 to 38.4KB	Yes, from 1.2 to 38.4KB
RESULT MEMORY	1000 records	+1000 records	2048 records, 131KB	1024 records, 262KB	1024 records	300 records	300 records
TEMPERATURE RESOLUTION	0.000'01°C	0.000'01°C	0.000'01°C	0.000'001°C	0.000'001°C	0.000'001°C	0.000'001°C
DISPLAY	2 x 16 LCD	2 x 16 LCD	4 x 40 character LCD	4 x 40 character LCD	4 x 40 character LCD	4 x 40 character LCD	4 x 40 character LCD
KEYBOARD	PC Type PS2	PC Type PS2	Limited, front panel, no ASKII, on-board	QWERTY, External, PS2	QWERTY, External, PS2	QWERTY, External, PS2	QWERTY, External, PS2
SAMPLE ID	5 characters	5 characters	6 characters	16 characters, auto-increment	16 characters, auto-increment	16 characters, auto-increment	16 characters, auto-increment
GROUP ID	No	8 characters	8 characters	16 characters	16 characters	16 characters	16 characters
VESSEL RECORD	No	No	No	Yes, unlimited	Yes, unlimited	Yes, unlimited	
REAL TIME	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CHASSIS IDENTIFICATION	No	No	No	Yes, number	Yes, number	Yes	Yes
CALIBRATION	Single	Single	Normal replace, single or multiple	Normal average & PC	Normal average & PC	Normal average & PC	Normal average & PC
HISTORY CALIBRATION	No	No	No	Yes, up to 10 runs	Yes, up to 10 runs	Yes, up to 10 runs	Yes, up to 10 runs
UNITS	KJ, BTU, CAL	KJ, BTU, CAL	KJ, BTU, CAL	KJ, BTU, CAL	KJ, BTU, CAL	KJ, BTU, CAL	KJ, BTU, CAL
RESULT COMPENSATION	No	No	No	Via PC (IntelCal), Default	Via PC (IntelCal), Default	Via PC (IntelCal), Default	Yes
RESULT VALIDATION	No	No	No	Yes	Yes	Yes	Yes
VESSEL PRESS. MONITOR	No	No	No	Up to 100 bar	No	No	No
OXYGEN FILLING	External manual filling station	External manual filling station	External manual filling station	Internal, automatic filling	External manual filling station	External manual filling station	External manual filling station
DE-FILLING	Manual	Manual	Manual	Automatic	Manual	Manual	Manual
MAX CHASSIS RECORDING	-	-	-	Yes	Yes	Yes	Yes
CHASSIS NAME	No	No	No	20 characters, Bluetooth name	20 characters, Bluetooth name	20 characters	20 characters, Bluetooth name
PASSWORD	No	No	User Security Manager Password, PC Password	CAL3K & PC Password	CAL3K & PC Password	CAL3K & PC Password	CAL3K & PC Password
NETWORK MULTIPLE CALORIMETERS	No	No	Yes, up to 7 x CAL2K	No	No	No	No
VESSEL LEAK MONITOR	No	No	No	Yes, flags result and warning	No	No	No
EVENT STORAGE	No	No	No	~6000 events	~6000 events	~3000 events	~3000 events
EVENT TYPES	-	-	-	~70 different events	~70 different events	~70 different events	~80 different events
EVENT CLASSIFICATION	-	-	-	Operational & Technical	Operational & Technical	Operational & Technical	Yes

SYSTEM COMPARISON

FEATURE	ECO	E2K	CAL2K	CAL3K-AP	CAL3K-A	CAL3K-U	CAL3K-F
VESSEL INTERCHANGE	No	No	No	Yes	Yes	Yes	Yes
VESSEL LOCKOUT, LOCK-IN	No	No	No	Yes, Manual/Auto Linking	Yes, Manual/Auto Linking	Yes, Manual/Auto Linking	Yes, Manual/Auto Linking
SAMPLE REPEAT SPEED	40 min	10 min (water cooler) 25min (air cooler)	7-8 min	4-6 min	4-5 min	8-10 min	5-7 min
OPERATOR TIME PER TEST	5 min	2 min	2 min	2 min	2 min	1 min	1 min
COOLING	Air	Air/Water	Water	Air	Air	Air	Air
COOLING MODES	-	-	-	Ambient/Fixed	Ambient/Fixed	Ambient/Fixed	Ambient/Fixed
RSD	0.1	0.1	0.1	<0.1	0.1	0.1	0.1
POWER CONSUMPTION	0-264 VAC 50/60 Hz 1W	0-264 VAC 50/60 Hz 1W	0-264 VAC 50/60 Hz 5W	0-264 VAC 12W	0-264 VAC 12W	12 VAC 6W	12 VAC 6W
POWER SUPPLY	External 9V	External 9V	External 9V	External 12V	External 12V	External 12V	External 12V
WATER CONSUMPTION	Waterless	Yes, re-circulating	Yes, re-circulating	None	None	None	None
REPEATABILITY	0.1%	0.1%	0.1%	<0.1%	0.1%	0.1%	0.1%
CALORIMETER TYPE	Static Jacket	Static Jacket	Static Jacket (Isothermal)	Dynamic, Isothermal, Adiabatic	Dynamic, Isothermal, Adiabatic	Dynamic	Dynamic
NUMBER OF VESSELS	Limited (Up to 4)	Limited (Up to 8)	Unlimited (10+)	Unlimited	Unlimited	Unlimited	Unlimited
CLOSURE TYPE	Screw Cap	Screw Cap	Screw Cap	Bayonet Lid	Bayonet Lid	Bayonet Lid	Bayonet Lid
TESTS P/H WITH 2 VESSELS	1	6	10	10+	10+	8+	8+
BOMB VESSEL TYPE	Removable	Removable	Removable	Removable	Removable	Removable	Removable
OXYGEN FILLING	Semi-Automatic	Semi-Automatic	Semi-Automatic	Fully Automatic	Semi-Automatic	Semi-Automatic	Semi-Automatic
BOMB VESSEL WASHING	Manual	Manual	Manual	Manual	Manual	Manual	Manual
PRINTER CONNECTION	RS232	RS232	RS232	RS232	RS232	RS232	RS232
BALANCE CONNECTION	RS232	RS232	RS232	RS232	RS232	RS232	RS232
ENVIRONMEN-TAL	10-40°C	10-40°C	10-40°C	5-40°C	5-40°C	5-40°C	5-40°C
PRINTING OF RESULTS	Via PC Software	Print without PC (direct)	Via PC Software	Via PC Software	Via PC Software	Via PC or RS2232	Via PC or RS2232
PC SOFTWARE	Limited	Limited	Advanced	Advanced	Advanced	Advanced	Advanced
CORRECTION FACTORS	1	2	2	8	8	8	8
MASS ENTRY	Auto & Manual	Auto & Manual	Auto & Manual	Auto & Manual	Auto & Manual	Auto & Manual	Auto & Manual
CE/TUV CERTIFICATE	Yes	Yes	Yes	Yes (Pending)	Yes (Pending)	Yes (Pending)	Yes (Pending)
VESSEL DETERMINA-TIONS	5000	5000	5000	Unlimited	Unlimited	Unlimited	Unlimited
SPIKING	Yes	Yes	Yes	Yes	Yes	Yes	Yes

SYSTEM COMPARISON

FEATURE	ECO	E2K	CAL2K	CAL3K-AP	CAL3K-A	CAL3K-U	CAL3K-F
SELF TESTING	No	No	No	Yes	Yes	Yes	Yes
CONNECTIVITY	RS232	RS232	Multi-drop RS232 port at 9.6KB	USB 2.0, 2 x RS232 at 115.2KB for Bluetooth	USB 2.0, 2 x RS232 at 115.2KB for Bluetooth	USB 2.0, 2 x RS232 at 115.2KB	USB 2.0, 2 x RS232 at 115.2KB
STATS	No	No	No	Yes	Yes	Yes	Yes
PRINTING	No	No	No	Yes, D1 port, 1.2 to 115.2KB	Yes, D1 port, 1.2 to 115.2KB	Yes, D1 port, 1.2 to 115.2KB	
MOISTURE COMPENSATION	No	No	No	Yes	Yes	Yes	Yes
FOOD FIBRE COMPENSATION	No	No	No	Yes	Yes	Yes	Yes
LIMS	No	No	No	Yes	Yes	Yes	Yes
RESULT APPROVAL	No	No	No	Yes, keyboard or PC	Yes, keyboard or PC	Yes, keyboard or PC	Yes, keyboard or PC
REAL TIME PRINTOUT	No	No	No	Yes, optional customer and parameter header	Yes, optional customer and parameter header	Yes, optional customer and parameter header	Yes, optional customer and parameter header
GELATINE CAPSULE				Yes	Yes	Yes	
COMPENSATION							
SPIKING	Yes	Yes	Yes	Yes	Yes	Yes	Yes

INTERNATIONAL STANDARDS

ASTM	Description	Year	Complies
	Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter	2002	Yes
D4809-00	Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)	2000	Yes
E144-94	Standard Practice for Safe Use of Oxygen Combustion Bombs	1994	Yes
British	**Description**	**Year**	**Complies**
BS 4791:1985	Specification for Calorimeter Bombs	1985	Yes
BS 1016:105:1992	Methods for analysis and testing of coal and coke. Determination of gross calorific value using adiabatic, isothermal or static bomb calorimeter.	1992	Yes
DIN	**Description**	**Year**	**Complies**
DIN 51900-2	Determining the Gross calorific value of solid and liquid fuels using isoperibol or static jacket calorimeter and calculation of net CV	2003	Yes
ISO	**Description**	**Year**	**Complies**
ISO 1928	Solid mineral fuels- Determining Gross calorific value by bomb calorimetric methods and calculation of net CV	1995	Yes

CAL2K CALORIMETER

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.

digital data systems (pty) ltd dds

DDS Calorimeters are proudly manufactured by :
Digital Data Systems (Pty) Ltd.

For more information about any of our products visit our website at www.ddscalorimeters.com.

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