IKA

analytical equipment
designed for scientists

EN |

New Generation Calorimeters

Calorimeter upgrade from C 2000 to C 3000
Improved precision and accuracy

IKA oxygen bomb calorimeters are the market leaders when it comes to determining the calorific values of liquid and solid samples. The selection of IKA oxygen bomb calorimeters is optimally geared towards various different demands. Functionality, safety and longevity are the main goals in the development of IKA oxygen bomb calorimeters.

C 2000

The C 2000 basic calorimeter is our former generation combustion calorimeter for determining gross calorific values of liquid and solid samples. It already provided a high level of automation and was easy to operate.

After more than 20 years of successful operation in the market, the IKA R&D team decided to give the old fashioned C 2000 a facelift and update the technology to today's demands.

C 3000

With the IKA C 3000 isoperibol calorimeter we present the technologically advanced successor of our C 2000 model, with great new features such as faster sample runs, a spherically shaped decomposition vessel for faster heat transfer and a convenient touch screen for easy operation. Both oxygen filling as well as the complete water handling are fully automated.

Its measurements and calculations of gross calorific value are according to ISO 1928, ASTM D4809, ASTM D5865, ASTM D240 and GB T213. Areas of application include the power and cement industry where accurate analyses are vital.

C 2000 Basic Version 1
Ident. No. 8801801

C 2000 Basic Version 2
Ident. No. 8801901

C 3000 Isoperibol Package 1/10
Ident. No. 10005542

C 3000 Isoperibol Package 1/12
Ident. No. 10005544

"Customer satisfaction is of overriding importance to us. Considering and fullfilling the standard conformity of our calorimeters is one of our top priorities".

Armin Wiesler, Corporate Director Research & Development, IKA-Werke GmbH & Co. KG, Germany

C 5000

The IKA calorimeter C 5000 is a well-established product in the global calorimeter market that has proven over many years. However since its technology is no longer state of the art, IKA has launched a modern successor with the latest technology but including well-established advantages.

C 5000 control Package 1/10
Ident. No. 8803001

C 5000 control Package 1/12
Ident. No. 8803301

C 6000

The C 6000 global standards oxygen bomb calorimeter combines modern technology, variability and automation. It provides the IKA-unique adiabatic as well as the isoperibol and dynamic measuring modes in one instrument. As its name already indicates the C 6000 operates according to all bomb calorimeter standards, such as the DIN, ISO, ASTM, GOST and GB.

The operator can choose between three different starting temperatures (22 °C, 25 °C, 30 °C) in each measuring mode and therefore is able to adapt the unit to given conditions. Technical improvements allow shorter measurement times compared to C 5000.

C 6000 Isoperibol Package 1/10
Ident. No. 10004535

C 6000 Isoperibol Package 1/12
Ident. No. 10004536

C 6000 Global Standards Package 1/10
Ident. No. 10004531

C 6000 Global Standards Package 1/12
Ident. No. 10004532

Technical Data	C 2000	C 3000
Maximum energy input	40,000 J / 9,560 cal	40,000 J / 9,560 cal
Resolution of temperature sensor PT 1000	0.0001 K	0.0001 K
Operating oxygen pressure	30 bar	40 bar
Display	TFT	TFT with touch screen
Measuring modes	Isoperibol (Regnault Pfaundler) Dynamic	Isoperibol (Regnault Pfaundler) Dynamic
Reproducibility isoperibolic (1g benzoic acid NBS39i) Reproducibility dynamic (1g benzoic acid NBS39i)	0.05 % RSD 0.1 % RSD	0.05 % RSD 0.15 % RSD
Measurements per hour	Isoperibol (Regnault Pfaundler) 4 Dynamic 6	Isoperibol (Regnault Pfaundler) 4 Dynamic 6
Working temperature min. Working temperature max.	25 °C 30 °C	22 °C 30 °C
Jacket control	Controlled, water	Controlled, water
Operator time	< 1 min	< 1 min
Operation time	7 to 22 min	8 to 16 min
Number of possible decomposition vessels per device	4	4
Decomposition vessels	C 5010 and C 5012	C 6010 and C 6012
Interfaces		
PC	9 pin (M) RS 232 serial	9 pin (M) RS 232 serial
Printer	Centronics	USB - B, Ethernet
Balance	9 pin (M) RS 232 serial	9 pin (M) RS 232 serial
Ethernet	No	Yes
SD-Card	No	Yes
Sample rack	Yes	No
Ext. keyboard	No	Yes
Automatic Functions		
Automatic water filling/draining	Yes	Yes
Automatic oxygen filling	Yes	Yes
Automatic oxygen venting	No	No
Cooling with RC 2 Chiller		
Cooling medium temperature min.	12 °C	12 °C
Cooling medium temperature max.	27 °C	27 °C
Cooling medium permissible operating pressure	1.5 bar	1.5 bar
General Data		
Weight	35 kg	29 kg
Dimension (W x H x D)	440 x 500 x 450 mm	500 x 450 x 450 mm
Permissible ambient temperature	20 – 25 °C	20 – 30 °C
Permissible relative humidity	80 %	80 %
Voltage	100 – 120 V	100 – 120 V
Frequency	50/60 Hz	50/60 Hz
Power Input	1,800 W	1,700 W

Technical Data	C 5000	C 6000 Isoperibol / Global Standards
Maximum energy input	40,000 J / 9,560 cal	40,000 J / 9,560 cal
Resolution of temperature sensor PT 1000	0.0001 K	0.0001 K
Operating oxygen pressure	30 bar	30 bar
Display	TFT	TFT with touch screen
Measuring modes	Isoperibol (Regnault Pfaundler) Dynamic Adiabatic	Isoperibol (Regnault Pfaundler) Dynamic Adiabatic (Only Global Standards)
Reproducibility isoperibol (1g benzoic acid NBS39i) Reproducibility dynamic (1g benzoic acid NBS39i) Reproducibility adiabatic (1g benzoic acid NBS39i)	0.05 % RSD 0.1 % RSD 0.05 % RSD	0.05 % RSD 0.15 % RSD 0.05 % RSD
Measurements per hour	Isoperibol (Regnault Pfaundler) 3 Dynamic 6 Adiabatic 4	Isoperibol (Regnault Pfaundler) 4 Dynamic 6 Adiabatic (Only Global Standards) 5
Working temperature min. Working temperature max.	25 °C 30 °C	22 °C 30 °C
Jacket control	Controlled , water	Controlled , water
Operator time	< 1 min	< 1 min
Operation time	10 to 22 min	8 to 16 min
Number of possible decomposition vessels per device	4	4
Decomposition vessels	C 5010 and C 5012	C 6010 and C 6012

Interfaces		
PC	9 pin (M) RS 232 serial	9 pin (M) RS 232 serial
Printer	Centronics	USB - B, Ethernet
Balance	9 pin (M) RS 232 serial	9 pin (M) RS 232 serial
Ethernet	No	Yes
SD-Card	No	Yes
Sample rack	Yes	Yes
Ext. keyboard	No	Yes

Automatic Functions		
Automatic water filling/draining	Yes	Yes
Automatic oxygen filling	Yes	Yes
Automatic oxygen venting	Yes	Yes

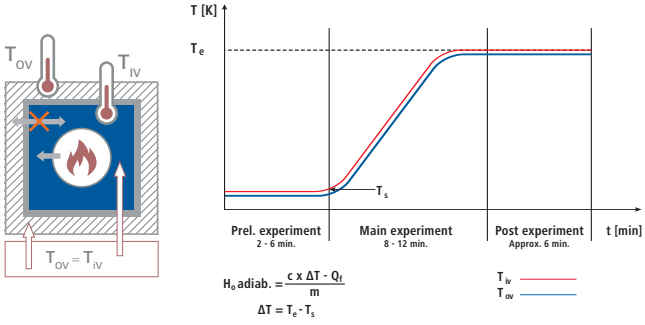
Cooling with RC 2 Chiller		
Cooling medium temperature min.	12 °C	12 °C
Cooling medium temperature max.	27 °C	27 °C
Cooling medium permissible operating pressure	1.5 bar	1.5 bar

General Data		
Weight	58 kg	29 kg
Dimension (W x H x D)	740 x 400 x 380 mm	500 x 425 x 450 mm
Permissible ambient temperature	20 – 25 °C	20 – 25 °C
Permissible relative humidity	80 %	80 %
Voltage	100 – 120 V	100 – 120 V
Frequency	50/60 Hz	50/60 Hz
Power Input	1,300 W	1,700 W

Calorimeter Fundamentals

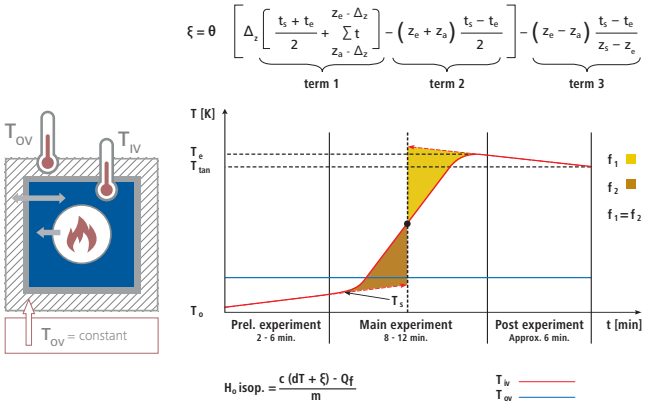
Adiabatic calorimeter

In an adiabatic calorimeter, the temperature in the outer vessel (T_{ov}) is equal to the temperature of the inner vessel (T_{iv}) throughout the experiment. This is as close to a "perfect isolation" as possible. The influence of the environment has to be minimized using air-conditioning to keep the room temperature as constant as possible. No correction calculations need to be done when compared with the isoperibolic calorimeter.



Isoperibol calorimeter

In an isoperibol calorimeter the temperature in the outer vessel (T_{ov}), is kept constant throughout the experiment. This does not allow a "perfect isolation". There are still small temperature fluctuations. The influence of the environment has to be minimized by using air-conditioning to keep the room temperature as constant as possible. A correction factor (Regnault-Pfaundler = ξ) will be calculated after the experiment that takes these temperature fluctuations into account.

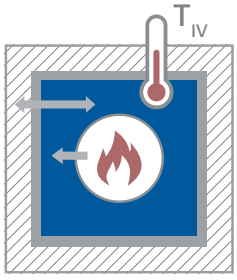


Dynamic calorimeter

The dynamic IKA designed modes are basically short versions of the original adiabatic and/or isoperibolic measuring modes. The measurement results still conform to the required Relative Standard Deviation (RSD) of the official standards.

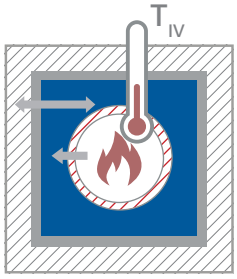
Static jacket calorimeter

In the C 1 static jacket calorimeter the outer vessel is a combination of the pressure chamber, insulating air and the housing of the unit itself. The jacket is not controlled nor filled with water. It acts static. Looking at the temperature profile of (T_{iv}), the C 1 behaves similar to an isoperibol calorimeter. The same correction calculations as in an isoperibol calorimeter according to "Regnault Pfaundler" can be applied.



Double dry calorimeter

In the double dry calorimeter, the temperature increase is measured directly in the decomposition vessel. It is surrounded by a large aluminium block. The heat of combustion is thus measured directly, and not transferred as in the classical calorimeters into water in the inner vessel, which primarily takes time. This results, depending on the chosen preliminary-test-time, in a measurement time of down to 3 minutes per experiment. The methodology is complying to ISO 1928. The actual measurement process is similar to an isoperibol measurement, but with a relatively large drift. The applied correction calculations here are IKA specific.



Calorimeter Standards

GB/T 213 – 2008	Calorie testing method of coal
ASTM D240	Standard test method for heat of combustion of liquid hydrocarbon fuels by bomb calorimeter
ASTM D4809	Standard test method for heat of combustion of liquid hydrocarbon fuels by bomb calorimeter(precision method)
ASTM D5865	Standard test method for gross calorific value of coal and coke
ASTM D5468	Standard test method for gross calorific and ash value of waste materials
ASTM E711	Standard test method for gross calorific value of refuse-derived fuel by bomb calorimeter
JIS M 8814	Coal and coke: determination of gross calorific value by the bomb calorimetric method and calculation of net calorific value
ISO 1928	Solid mineral fuels Determination of gross calorific value by the bomb calorimetric method and calculation of net calorific value
ISO 1716	Reaction to fire tests for building products
DIN EN ISO 9831	Animal feeding stuffs; animal products - feces or urine determination of gross calorific value
DIN EN 14582:2007	Characterization of waste - halogen and sulfur content oxygen combustion in closed systems and determination methods
DIN 51900 – 1	Testing of solid and liquid fuels - determination of gross calorific value by the bomb calorimeter and calculation of net calorific value Part 1: Principles, apparatus, methods
DIN 51900 – 2	Method using isoperibolic or static jacket calorimeter
DIN 51900 – 3	Method using adiabatic jacket

Calorimeter Certificates

C 6010/C 6012
CE-EU Declaration of Conformity

ISO 9001 : 2008
DQS / UL Certificate

C 6010/C 6012
TÜV Süd Certificate

Contact sales@ika.net for your free demo

IKA

C 3000 isoperibol package 1/10

C 3000 isoperibol package 1/12

C 3000 ISOPERIBOL PACKAGES

C 3000 ISOPERIBOL PACKAGE 1/10 | Ident. No. 0010005542

C 3000 Measurement cell
C 6010 Standard decomposition vessel
RC 2 basic Recirculation chiller

C 3000 ISOPERIBOL PACKAGE 1/12 | Ident. No. 0010005544

C 3000 Measurement cell
C 6012 Halogen resistant decomposition vessel
RC 2 basic Recirculation chiller

Subject to technical changes

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KEY FEATURES CALORIMETER C 3000

> Easy and convenient touch screen operation
> Software provides control chart view and correction calculation of globally used standards
> SD card slot for additional data management
> Ethernet interface for data management via FTP server
> Decomposition vessel with spherical top, better heat transfer, faster sample runs
> Easy decomposition vessel preparation due to upside down crucible holder technology

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