# AC600

## Semi-Automated Calorimeter

## Specification Sheet

| | | |
|---|---|---|
| **Method** | Isoperibol | |
| **Range** | | |
| Joules/Charge<br>Calories/Charge<br>Btu/Charge | 14000† to 35000†† (14000† kJ/kg to 35000†† kJ/kg for a 1 g sample)<br>3300† to 8300†† (3300† kcal/kg to 8300†† kcal/kg for a 1 g sample)<br>13† to 33†† (6000† to 15000†† Btu/lb for a 1 gram sample) | |
| **Precision** | 0.10 % RSD* | |
| **Analysis Time** | TruSpeed® Mode: 5 min | Delta T Mode: 9 min |
| **Corrections** | Nitrogen, sulfur, fuse wire, moisture, spike, and ash | |
| **User-Selectable Ignition** | String or wire-fuse | |
| **Temperature Measuring Resolution** | 0.0001 °C | |
| **Gas Requirements** | Analytical: Oxygen 450 psi (31.0 bar) max; 99.5 % purity<br>Pneumatic: Compressed Air; 12 psi (0.8 bar); source must be oil and water free | |
| **Electrical Requirements** | 100 to 120 V~/200 to 240 V~, 50/60 Hz, single phase, 5 A, 2000 Btu/h | |
| **Water Requirements** | | |
| Recirculating Water Chiller Nominal Temp: | 15 °C (59 °F) | |
| Cooling Capacity (at 15 °C): | Single AC600: 680 Btu/h | Dual AC600: 1400 Btu/h |
| Type: | Distilled Water NOTE: Do NOT use deionized water | |
| pH: | 6-8 | |
| Dissolved Solids: | 0.5 ppm to 100 ppm | |
| Resistivity: | 50 kΩ•cm to 2 MΩ•cm (0.5 µs/cm to 20 µs/cm) | |
| Pressure: | 4 psi to 15 psi (0.3 bar to 1.0 bar) | |
| Volume: | Single AC600: 3 gal (12 L) for initial setup | Dual AC600: 9 gal (35 L) for initial setup |
| **Required Work Space**** | 15 in W × 21 in D × 18 in H (38 cm × 53 cm × 46 cm) | |
| **Weight (approx.)** | 135 lb (61 kg) | Shipping Weight (approx.): 148 lb (67 kg) |
| **Environmental Conditions** | Operating Temp: 15 °C to 35 °C (59 °F to 95 °F) Humidity: 20 % to 80 %, non-condensing<br>General: Area should be free of drafts, and shielded from sunlight and other radiation sources | |
| **Sound Level Pressure** | 60 dBa (max reading at operator's level per IEC/EN 61010-1) | |

### Part Numbers

| | |
|---|---|
| AC600SC | AC600 Semi-Automatic Calorimeter with standard vessel; vessel preparation station; external PC |
| AC600SHC | AC600 Semi-Automatic Calorimeter with halogen-resistant vessel; vessel preparation station; external PC |
| AC600DC | AC600 Dual Semi-Automatic Calorimeter with two standard vessels; vessel preparation station; external PC |
| AC600DHC | AC600 Dual Semi-Automatic Calorimeter with two halogen-resistant vessels; vessel preparation station; external PC |


* *Based on analysis of benzoic acid at 1 g; n = 7.*
** *Allow a 6 in (15 cm) minimum access area around instrument.*
† *Lower values can be measured by spiking samples that are not completely combusting.*
†† *This is the combustion vessel safety limit. Do NOT exceed this limit. Exceeding this limit could result in vessel failure causing death, serious personal injury, and/or property damage.*
‡ *Chiller must be capable of operating continuously with flow stopped to the AC600.*

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## Theory of Operation

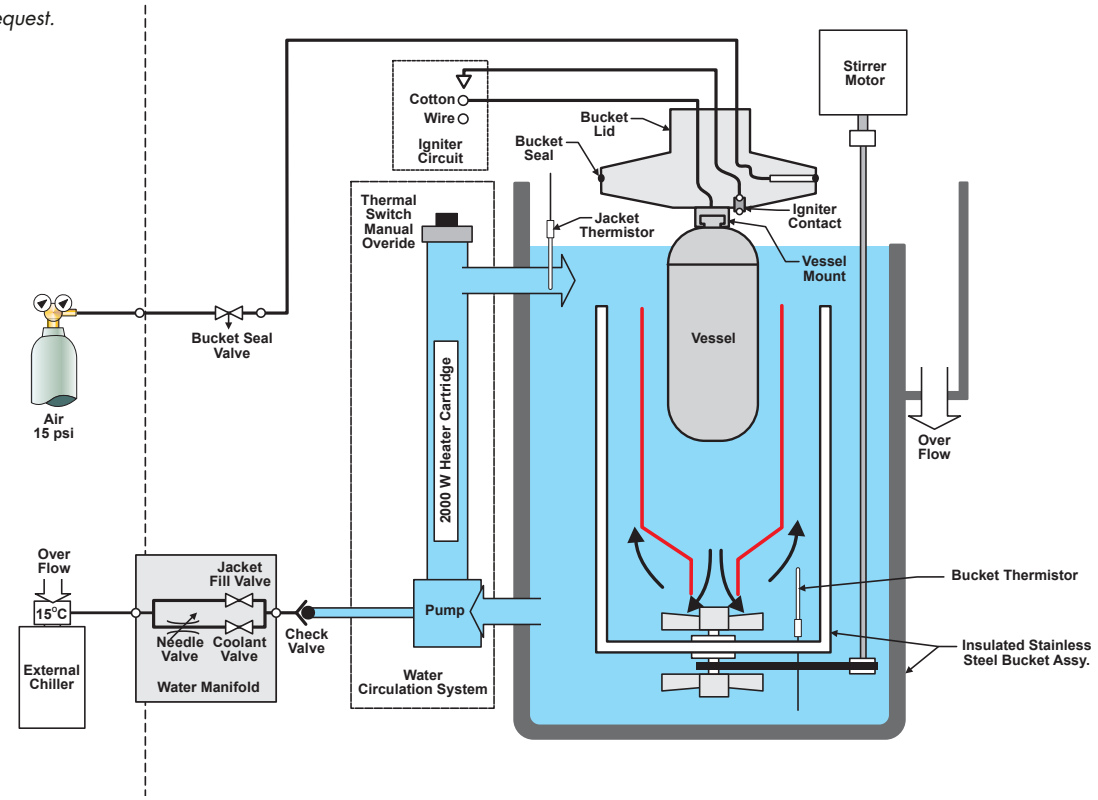
The LECO AC600 semi-automatic calorimeter was developed to measure the calorific content of various organic materials such as coal, coke, and fuel oil.

The calorific value of a sample is determined by precisely measuring the heat released after combustion of the sample in a controlled environment. The heat released is proportional to the calorific value of the substance.

The sample is placed into a combustion vessel, which is pressurized with oxygen. The combustion vessel is automatically lowered into a water bath within the instrument (known as a bucket), and sealed. The cavity surrounding the bucket is known as the jacket and is also filled with water. The water temperature in the jacket is closely controlled at a precise set temperature (isoperibol calorimeter system). The sample is ignited and the temperature of the bucket and jacket water is measured by an electrical thermometer with a resolution of 0.0001 of a degree. A measurement of the water temperature inside the bucket and jacket is collected every second. The results can be corrected within the software for any spiking, nitrogen, sulfur, moisture, and ash content if necessary. Two options for analyzing data are available. A simple temperature difference may be chosen by the user Delta T mode), in which calorific values are determined by a simple maximum temperature rise of the bucket. The user may also choose to use a thermodynamic model (TruSpeed mode) that has been developed by LECO to model heat exchange within the AC600 system. The TruSpeed mode takes into account heat capacities of the system's components along with corrections for energy transfer within the system. The TruSpeed mode enables the AC600 to attain rapid 5 minute analysis times without compromising the accuracy or precision of the calorific result.

## Flow Diagram Shown for CS744 Configuration

*Configuration-specific flow diagrams available on request.*



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