BCP

BACKSCATTER CLOUD PROBE

INCLUDED ITEMS

- Instrument
- Shipping case
- Operator manual
- Email and telephone technical support

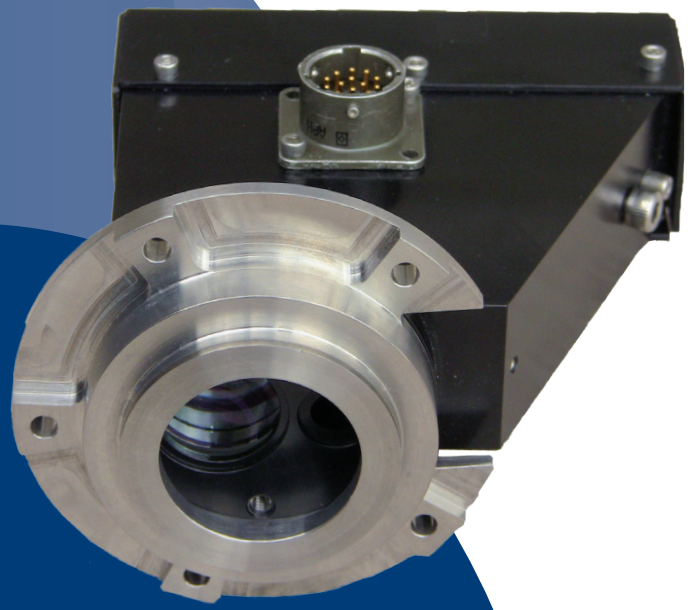
ACCESSORIES

- Electronics box and cable
- Shipping case (left)
- Particle Analysis and Display System

(PADS) software, purchased separately

HOW TO ORDER

Contact DMT for pricing or more information:
+1.303.440.5576,
customer-contact@dropletmeasurement.com.



DROPLET MEASUREMENT TECHNOLOGIES

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OVERVIEW

The Back-Scatter Cloud Probe (BCP) measures cloud droplet size distributions from 5 µm to 75 µm, which are then used to derive the total number concentrations, liquid water content (LWC), median volume diameter (MVD), and effective diameter (ED). The BCP's non-intrusive optical housing allows use in a range of ground-based or airborne applications with no contamination from ice crystal shattering and no airflow distortion.

DESIGN

The BCP's aerodynamic design minimizes airflow disturbance and allows for undisturbed particle measurement.

In addition, the BCP's minimal size (right) allows it to be mounted easily on aircraft, even when space is at a premium.

ADVANTAGES

» Classification of particles by size in histogram form

» User-programmable sample rates and bin thresholds

» Size distributions accumulated in the probe, with serial transmission to computer via any standard RS-232 or RS-422 communications port

» Monitoring of multiple variables, e.g. total particles, average transit time, over-range particles, and various probe health indicators

APPLICATIONS

» Cloud particle research

» Climate studies

» Aircraft icing

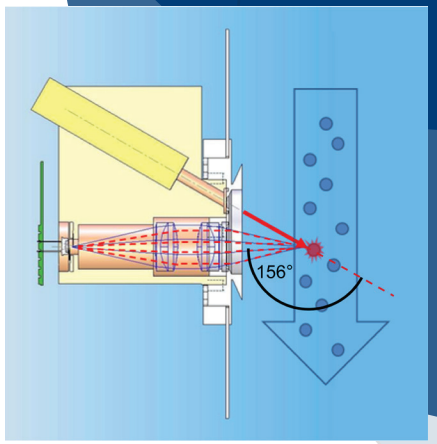
» Fluid contamination detection (e.g., gas in a pipe)

The BCP is suitable for both airborne and ground-based applications.

The BCP is currently being flown on Lufthansa and China Airlines commercial flights as part of the IAGOS program. IAGOS is an E.U.-funded mission to further climate research. Below, the BCP window (circled in white) on a Lufthansa *Viersen* aircraft. Photo courtesy of IAGOS.

HOW IT WORKS

Particles passing through the laser beam scatter light in all directions. Some of this light transmits within a cone with subtending angles between 143° and 169° (156° ± 13°). These photons are directed onto a photodetector that converts their pulses into electrical pulses, which are then transmitted to a signal processor that amplifies and digitizes them. Mie theory is used to determine the particle's size from the peak amplitude of the scattering signal. At programmable intervals, the BCP accumulates a size distribution that relates a number concentration to each particle's optical diameter.



FEATURES

DYNAMIC THRESHOLDING

The BCP's dynamic thresholding feature allows the instrument to correct drifts in the baseline sizer and qualifier signals. This ensures data accuracy during temperature fluctuations.

COMING SOON: DEPOLARIZATION

The next-generation BCP will have a depolarization feature that allows the instrument to discriminate between ice and water particles. This capability allows the BCP to detect when an aircraft encounters abnormally high concentrations of ice crystals, for example.

SOFTWARE

The Particle Analysis and Display System (PADS) is optional software that displays a user-friendly virtual instrument panel. PADS allows the user to control the BCP and display and log data. For instance, the program enables the user to do the following tasks:

» Start data recording and sampling

» View a size histogram of particles measured by the BCP

» View particle volume and number concentrations, as well as Liquid Water Content (LWC), Median Volume Diameter (MVD) and Effective Diameter (ED)

» Monitor instrument operational parameters like optic block temperature, electronic box temperature, and the baseline monitor voltage

BCP SPECIFICATIONS

Measured Parameters	Single-particle light scattering
Auxiliary Parameters	» Temperature » Pressure
Derived Parameters	» Particle diameter » Particle number concentration » Liquid water content (LWC) » Effective diameter (ED) » Median volume diameter (MVD)
Particle Size Range	5 - 75 µm
Number of Size Bins	» 10, 20, 30, or 40 (configured at time of purchase) » User-selectable boundaries
Number Concentration Range	0 - 1,000 particles/cm^3
Air Speed Range	10 - 250 m/sec
Sampling Frequency	Selectable, 0.04 sec to 20 sec
Light Collection Angles	Center-line: 156°, +/- 13° (see “How it Works” diagram)
Laser	658 nm (see reverse side of sheet for more information)
Laser Power	50 mW or less
Data System Interface	RS-232 or RS-422 serial interface
Additional components	» Electronics box » 1 m connecting cable
Calibration	Performed with glass beads at DMT facility
Routine Maintenance	Optics cleaning before every field campaign
Recommended Service	Annual cleaning and calibration at DMT service facility
Software	Optional Particle Analysis and Display System (PADS) software
Environmental Operating Conditions	» Temperature: -40 to 40 °C » Relative Humidity: 0 - 100%, non-condensing » Altitude: 0 - 50,000 feet (0 - 15,000 meters)
Weight	1.5 kg
Probe Dimensions	11.7 cm x 10.7 cm x 4.5 cm, with 5.9 cm diameter mounting flange
Electronic Box Dimensions	21.6 cm x 12 cm x 5.7 cm
Power Requirements	28 VDC, 5 A for system and heaters

DROPLET MEASUREMENT TECHNOLOGIES

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BCP SPECIFICATIONS, CONT.

LASER WARNING: The requirement for the BCP to be non-intrusive to aircraft operations (i.e., no external components) dictates that there be no laser beam-stop mechanism. The laser beam will project unimpeded from the optical window. The laser is not eye-safe, so precautions must be enforced for operation on the bench or ground.

Specifications are subject to change without notice. The BCP is a Class 3B Laser Product.

Rev B

July 27, 2012