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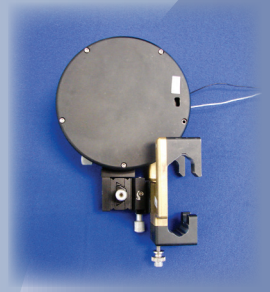
INCLUDED ITEMS

- Instrument
- Shipping case
- Operator manual
- One-year warranty
- One day of training at DMT facility
- Email and phone technical support

ACCESSORIES

- PADS software and laptop
- Spinning pinhole for alignment and calibration check (pictured at right)
- Canister adapter—allows the CDP-2 to be used with conventional cloud probe mounting canisters



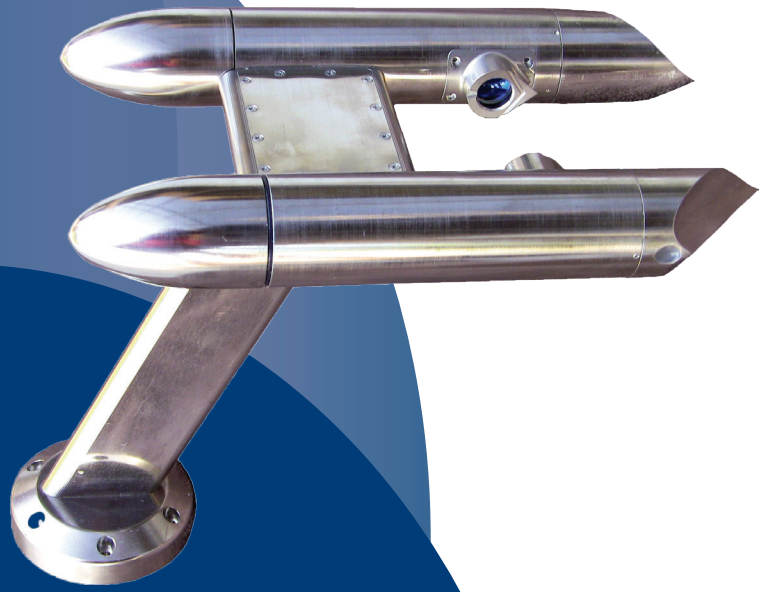
HOW TO ORDER

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

DROPLET MEASUREMENT TECHNOLOGIES

CDP-2

CLOUD DROPLET PROBE



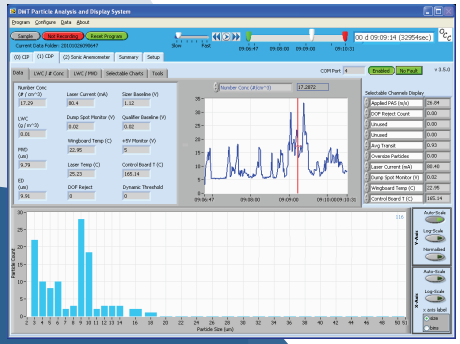
DROPLET MEASUREMENT TECHNOLOGIES

OVERVIEW

The CDP-2 is a miniature, lightweight, low-power cloud particle spectrometer. It measures droplets in the range of 2-50 µm in concentrations as high as 2,000 particles/cm^3. The CDP-2 mounts easily on aircraft, towers, unmanned airborne vehicles (UAV), and spray rigs.

APPLICATIONS

» Atmospheric and cloud research
» Weather modification
» Aircraft icing studies and certification
» Hurricane and storm research
» Agricultural and industrial spray characterization



ADVANTAGES

The CDP-2 uses state-of-the-art technology to size particles under a wide range of conditions. The latest design offers several new features:

» *Anti-shatter tips:* Recent studies have shown that particle fragmentation can lead to overestimating particles in certain size ranges by a factor of up to 1000. While the original CDP already improved dramatically upon older instruments like the FSSP in this regard, the new anti-shatter tips and wetless windows reduce particle artifacts further.

» *Dynamic baseline feature*: The instrument automatically adjusts both sizer and qualifier signals to adjust for temperature drifts and ensure accurate particle sizing.

» *Isolated serial communication:* This change protects the instrument from power and ground fluctuations

» *Improved housekeeping processing*

SOFTWARE

The Particle Analysis and Display System (PADS, shown at left) is optional software that provides a user-friendly virtual instrument panel. PADS allows the user to control the CDP-2 and display real-time data and logs. For instance, the program enables the user to do the following tasks:

» Sample and record data
» View particle volume and number concentrations, as well as Median Volume Diameter (MVD) and Effective Diameter (ED)
» View LWC as measured by the CDP-2
» Monitor instrument parameters like CDP-2 laser current and various electronics voltages
» Play back data for post-flight viewing
» Reprocess data with new parameters for additional analysis

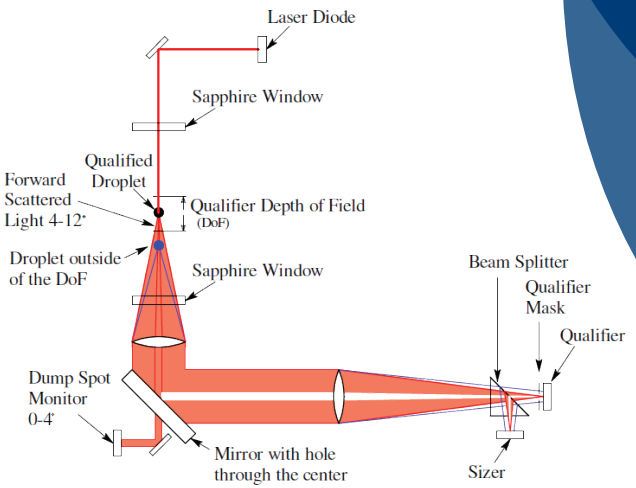


Diagram of CDP Optics, excerpted from S. Lance et al. (see selected bibliography). Red rays show the scattering signal for a qualified droplet, while blue rays are for a droplet outside the depth of field.

HOW IT WORKS

The CDP-2 is a forward-scattering optical spectrometer. For accurate sizing, the CDP accepts and sizes only particles that pass through a region of the laser beam with uniform power. This region of the laser is called the depth of field.

As particles pass through the laser beam, light scatters in all directions. The CDP-2 collects forward-scattered photons within an annular cone that is 4° to 12° from the laser beam. The collected light is then directed onto a 50/50 optical beam splitter and finally to a pair of photodetectors, referred to as the sizer and the qualifier (see figure). There is a mask in front of the qualifier detector to define the depth of field. The edge of the depth of field is defined by the points where half of the light scattered from a particle is blocked by the mask.

The photodetectors then convert the photon pulses into electrical pulses. The pulse from the qualifier is multiplied by two, and if the resulting signal exceeds the pulse from the sizer, the particle is deemed within the depth of field. The particle is then sized based on the amplitude of the sizer pulse.

PARTICLE-BY-PARTICLE (PBP) DATA FEATURE

PBP is an optional feature that provides precise information on particle scattering intensity and inter-arrival times. The standard CDP only lists particle times with one-second resolution. PBP provides particle times that are accurate to within a microsecond—an improvement by a factor of a million.

PBP data are useful when investigating small-scale cloud structure to identify mixing and entrainment, drop breakup and coalescence, and micro-scale turbulence.

CDP-2 SPECIFICATIONS

Measured Parameters	Single-particle light scattering
Derived Parameters	» Particle diameter » Particle number concentration » Liquid water content (LWC) » Effective diameter (ED) » Median volume diameter (MVD)
Particle Size Range	2 – 50 µm
Number Conc. Range	0 - 2,000 particles/cm^3
Typical Sample Area	0.24 mm^2
Number of Size Bins	30
Air Speed Range	10 - 250 m/sec
Sampling Frequency	Selectable, 0.04 to 20 seconds
Refractive Index	Non-absorbing, 1.33 (the industry standard for water)
Light Collection Angles	Optical design: 4° - 12° Optical performance: 1.7° - 14°
Laser	658 nm, up to 50 mW
Data System Interface	RS-232 or RS-422 serial interface
Calibration	Precision glass beads
Routine Maintenance	Window cleaning and glass bead calibration check
Recommended Service	Annual cleaning and calibration at DMT service facility
Software	Optional Particle Analysis and Display System (PADS) software
Power Requirements	» System Power: 28 VDC at 2A » Anti-ice Power: 28 VDC at 12A
Environmental Operating Conditions	» Temperature: -40 to 40 °C » Relative Humidity: 0 - 100%, non-condensing » Altitude: 0 - 50,000 feet (0 - 15,000 meters)
Weight	Probe: 1.37 kg / 3.0 pounds (standard version); a lightweight UAV version is also available Electronics box and header cable: 0.82 kg / 1.8 lb
Probe Dimensions	26.7 cm L x 17.5 cm W x 21.6 cm H (10.5” L x 6.9” W x 8.5” H)
Electronic Box Dimensions	17.8 cm L x 8.9 cm W x 5.1 cm H (7.0” L x 3.5” W x 2.0” H)

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

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DROPLET MEASUREMENT TECHNOLOGIES

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