# Disdrometer

A disdrometer works by counting individual rain drops and measuring their size. The sensor consists of an electromechanical unit and a feed-back amplifier housed in a common case. A conical styrofoam body (green in this picture) is used to transmit the mechanical impulse of an impacting drop to a set of two moving coil systems in magnetic fields. At the impact of a drop both the styrofoam body and the two coils move downwards and a voltage is induced in the sensing coil. This voltage is amplified and applied to the driving coil, producing a force which counteracts the movement. As a consequence the excursion is very small, and it takes very little time for the system to return to its original resting position and therefore to get ready for the next impact of a drop. The amplitude of the pulse at the amplifier output is a measure of the size of the drop that caused it. The pulses are logged by a data acquisition unit and then recorded by a computer.

The system provides an instant response to the onset of rainfall and changes in rainfall rate and drop size distribution, without any delay such as occurs in raingauges which rely on collecting rain in a funnel. It allows a link between direct rainfall measurements and the deduction of drop size from radar reflectivity measurements using the 3 GHz CAMRa radar.

The specification of the disdrometer is as follows:

| Outdoor sensor | |
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| Instrument type | RD-69 Joss-Waldvogel disdrometer up to May 2011, RD-80 since. |
| Instrument manufacturer | Distromet Ltd |
| Sampling period | 10 seconds |
| Drop size uncertainty | $\pm$ 5% of measured diameter |
| Number of measured drop sizes | 127 |
| Minimum, maximum measured drop diameter | 0.3, 5.0 mm |
| Collector type | Styrofoam cone |
| Collector area (standard) | 50cm² |
| Operating temperature range | 0 - 50°C |
| Size (Width/Depth/Height) | 100/100/170 mm |
| Weight | 2.9 kg |

| Control Unit | |
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| | |
| Power requirement | 115/230Vac @ 50/60 Hz, 5.5 VA |
| Data display | 8 LEDs for 8 groups of 16 channels each |
| Operating temperature range | 0 - 40°C |
| Data output format | RS232, 7 data bits, 1 stop bit, even parity, 9600 baud |

| Data Archive | |
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| Sampling rate | 0.1Hz |
| Data storage | Continuous recording in daily files |
| Archive data format | netCDF |
| Archived to British Atmospheric Data Centre | http://badc.nerc.ac.uk/ |
| BADC datafile | disdrometer_chilbolton, disdrometer_sparsholt |

The combined use of radar measurements and disdrometer measurements of drop size is discussed in: Goddard, J. W. F., S. M. Cherry, and V. N. Bringi, 1982, "Comparison of dual-polarization radar measurements of rain with ground-based disdrometer measurements" *J. Appl. Meteor.,* 21, 252-256, 1982


For further information, please contact:

Judith Jeffery                          Tel.: +44 (0)1235 445774
Chilbolton Group                  E-mail: judith.jeffery@stfc.ac.uk
*RAL Space*
STFC Rutherford Appleton Laboratory    Web: www.chilbolton.stfc.ac.uk
Harwell Campus                  /chilbolton
Didcot
OX11 0QX
U.K.