# Drop Counting Raingauge

This type of raingauge works on the principal of counting drops of a known constant volume as they pass an optical sensor. The drops of constant volume are formed from a precision tube under zero-head conditions. Rain from the main collector is funnelled into a small reservoir chamber. This reservoir is kept constantly primed, maintaining the critical water level within the system, allowing a quick response to the onset of rain. A pipe links from the top of this reservoir to the precision dropper tube, as the water level in the system increases during rain, the excess water in the reservoir flows out causing drops to form from the precision tube.

The benefit of this technique is the rapid response to rainfall. A single drop is equivalent to 0.004mm accumulation of precipitation (based on the standard collector), compared to the standard tipping bucket gauge, which triggers with 0.2mm accumulation of precipitation. Rainfall rate can be estimated by equating the volume of water recorded with the collecting area.

Three sizes of collector can be used with this raingauge, the standard size is 150cm², a larger, 324cm² (8”), collector enabling better resolution at lower rainfall rates. A small 75cm² collector has been successfully used in tropical areas.

The specification of the drop counting raingauge is as follows:

| **Raingauge** | |
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| | |
| Rainfall rate range (maximum) | 200mmhr$^{-1}$ |
| Sampling period | 10 seconds |
| Rainfall rate accuracy at 10s sampling period | < ± 10% @ > 20 mmhr$^{-1}$ |
| Standard drop volume | 0.06 ± 0.002 cc @ 20°C |
| Sampling quantisation (1minute integration, standard collector) | 0.2mm/hr |
| | |
| Collector type | MKIV UK Meteorological Office |
| Collector area (standard) | 150cm² |
| Operating temperature range | 0 - 40°C |
| Size (Width/Depth/Height) | 250/250/450mm |
| Weight | 7.5kg |
| | |
| Rainfall drop pulse | Current loop 10mA |
| Rainfall drop pulse period | 35ms |
| Power requirements | 50VAC @ 50Hz |
| Connectors | Lemo 6-way waterproof |
| | |
| Other features | Peristaltic pump (12hour cycle / manual operation) |
| | Pump inhibit; temperature <2°C |
| | Mechanical frost protection |
| | 20W heater; zero voltage switched with |

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|---|---|
| | proportional control 20°C |

| **Control Unit** | |
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| Power requirement | 220-240Vac @ 50Hz, 30VA |
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| Front panel: | |
| Analogue rain rate meter | 0 - 200 $mmhr^{-1}$ |
| Rainfall accumulation | 7-segment display, 0.1mm |
| Indicators | Mains on |
| | Drop pulse |
| | Data inhibit (pump on) |
| | Heater on |
| | Time base (10 seconds) |
| | Service (cleaning warning) |
| Switches | Mains toggle |
| | Pump command toggle |
| Rear panel: | |
| Mains input | IEC switched fused input |
| Outputs | TTL output |
| | +5VDC pulse |
| | RS232 |

| **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 | raingauge_chilbolton, raingauge_sparsholt |
| | multiple-raingauges_chilbolton, multiple_raingauges_sparsholt |

A detailed description of the drop counting raingauge, together with examples of typical measured data, is given in ‘A rapid-response rain gauge’ by J R Norbury and W J White, Journal of Physics E: Scientific Instruments, 1971, Vol. 4 pp 601-602.

The drop counting raingauge system was designed and developed by Chilbolton Group. If you are interested in acquiring a system please contact us.

For further information, please contact:

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