



Precipitation Measurement
OTT Pluvio² S –
Compact weighing precipitation gauge for
liquid, solid, and mixed precipitation

OTT Pluvio² S

Universal weighing precipitation gauge

The high-quality OTT Pluvio² S weighing precipitation gauge uses the weighing principle for dependably and precisely measuring the intensity and cumulative precipitation in each weather condition. Its compact designed collecting bucket featuring a 200 cm² collecting area accepts up to 400 mm of precipitation. The instrument is a further development of the OTT Pluvio series that has been successfully used in more than 10,000 stations worldwide and offers state-of-the-art technology in compact design. It is designed for professional use, and is suited for weather observer measuring networks as well as for urban precipitation stations or weather service measuring fields where only limited space is available.

Its advanced technologies for data logging and processing including signal analysis, filtering, and noise reduction provide highly accurate results in a broad measuring range of 0 to 3000 mm/h. The sophisticated mechanical and electronic design as well as lifetime calibration ensure long useful life with minimum maintenance requirements. Even units fitted with orifice rim heater may be used in reduced voltage operation for solar-powered stations.

Because of its compact design, the Pluvio² S unit needs only little space and may be installed to 2-inch pedestals. Thus, it can be used to easily replace tipping buckets or manual rain gauges in existing installations and can even be installed to their device carriers, eliminating the need for any concrete work.

Meteorology

OTT Pluvio² S – proven quality in compact design

Impressive measuring performance

- Meets the requirements as per WMO Guidelines No. 8 (WMO= World Meteorological Organisation).
- Precisely captures even extreme precipitation events of up to 3000 mm/h without delay – which exceeds the current WMO requirements (up to 2000 mm/h).
- Using a quantity threshold of only 0.03 mm/h, the unit correctly measures even the finest precipitation which meets the requirements specified by Deutscher Wetterdienst (German Weather Service).
- Provides exact data on solid precipitation – no evaporation losses caused by heated funnels or buckets.
- The specific temperature characteristic curve of the measuring system is continuously compensated for by the firmware which results in precise measured values.
- Considerable measuring accuracy of ± 0.1 mm, for the entire service life of the unit.
- Load cell and sensor electronics are calibrated for the life of the unit, no additional calibration required.

Compact, light-weight and durable

- Compact, weather-resistant collecting bucket for 400 mm of precipitation.
- Minimum space requirements – the unit is easily installed on existing 50 cm x 50 cm concrete bases, building device carriers, or any suitable vibration-free 2-inch pedestals.
- Little weight of as much as 8 kg.
- Robust moulded parts made of high-quality materials.
- Both load cell and evaluation electronics are effectively protected against environmental impact.
- A spring-loaded system protects the load cell against shocks during transport or when emptying the collecting bucket.
- Power supply and output interfaces are reliably protected against overvoltage.

Reliable operation even in cold temperatures and snow

Optionally, the Pluvio² S unit may be equipped with a rim heater. In cold temperatures, the heater prevents ice from building up or snow from depositing at the orifice rim. Thus, the bucket orifice is kept free and snow caps will not build up.

The heater is enabled as necessary and only heats the orifice rim. This prevents measuring errors from being introduced that are caused by evaporation effects. Various modes of operation allow the heater control system to be adapted to the requirements. To prevent the collecting bucket contents from freezing, an anti-freeze agent is available. Thus, the unit may also be used in regions in which long freezing seasons or snowy winter seasons occur.



Weighing measurement method

As is the case for all OTT Pluvio series units, the OTT Pluvio² S uses a weighing measurement method. Below the collecting bucket and well protected from damaging environmental impacts, there is a high-precision, hermetically sealed stainless steel load cell that is calibrated for its entire service life. This measures the total weight on it. The sensor

electronics attached use the measured value to continually calculate the increase in precipitation and to derive the temperature-compensated amount and intensity. An integrated temperature sensor provides the current environmental temperature at the time. The raw data obtained is subjected to a plausibility check by the OTT Pluvio² S. Factors affecting the result, such as wind or temperature, are eliminated by using a mathematical algorithm, thus providing adjusted precipitation data.



OTT Pluvio² S – also attractive considering economic aspects

An investment that will pay off

- Highest data availability of more than 99 % – reliable values for continuous and consistent precipitation time series.
- Durable design and minimum maintenance requirements – significantly lower TCO as compared with tipping buckets; noticeable savings will be obtained after two years already.
- No blocked funnels or filter screens – regular cleaning is no longer required.
- Nearly maintenance-free – emptying the collecting bucket, occasional visual inspection, and adding anti-freeze agent as necessary required.
- Easy-to-use spring-loaded terminals for quickly unlocking and securely fixing the collecting bucket – easily and quickly to be handled.
- Alarm and warning message output supports automatic error diagnosis, e.g. in case of collecting bucket overflow – prevents unnoticed data loss and allows immediate intervention.
- Automatic data output disable for maintenance operations and accuracy tests – prevents unusable data from being output.
- Replacement kit including base plate, electronics unit and pre-calibrated load cell – allows a unit to be replaced on site without considerable loss of data.



Little energy and space requirements

Irrespective of its considerable measuring performance, the OTT Pluvio² S unit requires only little energy and, therefore, may be powered by solar energy in most locations. Thus, it may be used in independently powered stations that are attended to in large intervals only. When combined with a suitable IP datalogger, e.g. the OTT netDL unit or an Adcon RTU, its measured data is automatically sent in preset intervals and – depending on the particular configuration – maybe retrieved off-line or through the web.

The Pluvio² S is ideally suited also for situations, in which human weather observers are not available or shall be relieved from their workload by a dependable precipitation gauge. Thanks to the little space required, it may also be installed to existing concrete bases. Thus, it may replace conventional instruments such as tipping buckets or manual precipitation gauges and automate data acquisition providing high data availability of more than 99 %. Because of its compact design, the instrument is also attractive for all locations in which space constraints are to be taken into account, e.g. in urban areas or alongside roads.



USB interface for easy communication

Both for configuring the unit as well as for functional and accuracy tests and data monitoring on site, the menu-controlled OTT Pluvio² Operating Software is available. The USB interface of the precipitation gauge may be used to quickly establish a connection to a tablet or notebook. In such a case, the OTT Pluvio² S unit is powered by the portable PC, independently of the local power supply.

Reference weights of all kinds can be used for accuracy tests. You simply have to enter the exact weight into the software as reference value.



OTT Pluvio² S – proven state-of-the-art technology



Features and benefits

The compact OTT Pluvio² S is a precipitation gauge for professional use, that is drift- and ice-free, is calibrated for its entire service life, and requires hardly any maintenance. The intensity and cumulative data output meets the WMO Directive No. 308 and provides precise data even for finest or heaviest precipitation. This is ensured by the advanced data capture and processing including signal analysis, filtration, and noise reduction as well as algorithms that compensate for the influences of temperature and wind.

Applications

- Automated meteorological measuring networks
- Weather observer measuring networks
- Urban hydro-meteorological measuring networks
- Precipitation stations for flood warnings and modelling the precipitation discharge
- Precipitation stations as part of research projects
- Weather radar systems for calibration and Z/R correlation

Accessories

- USB flash memory with Pluvio² Operating Software
- USB cable (included)
- Rugged corrosion-resistant stainless steel wind shield (OTT PWS Alter model)
- Pedestals for different heights
- Anti-freeze agent

Technical data

Recordable precipitation

Liquid, solid, and mixed

Recordable precipitation amount

400 mm (approx. 8 l)

Collecting area

200 cm²

Measurement method

Weighing measurement method

Sensor element

Hermetically sealed load cell

Measuring ranges

- Precipitation: 0 ... 3000 mm/h
- Cumulative precipitation threshold at 60 min. collection time: 0.03 mm
- Precipitation intensity threshold: 0.1 mm/min or 6 mm/h

Accuracy

- Amount: ±0.1 mm or ±1% of measured value
- Intensity: ±0.1 mm/min, ±6 mm/h or ±1 % of measured value

Resolution

- SDI-12 and RS-485 interface:
Amount: 0.001 mm
Intensity: 0.001 mm/min or 0.01 mm/h
- Impulse output: 0.05/0.1/0.2 mm, adjustable
(remaining amounts in 1/100 mm will be factored in during the collecting time of 60 minutes)

Query interval

- Amount: 6 sec ... 60 min
- Intensity: 1 min

Output delay

- Real-time: < 1 min
- Non real-time (filtered values): 5 min

Measurement output

Intensity RT, amount RT/NRT, amount NRT, amount total NRT, bucket content RT and NRT, temperature of load cell

Status output

Pluvio² S status, heating status (if present)

Interfaces

- SDI-12 V1.3
- RS-485 (2- or 4-wire)
SDI-12 protocol and command line mode (ASCII)
- Digital outputs (2/5 Hz):
impulse 0.05/0.1/0.2 mm (adjustable)
status 0 ... 120 impulses/min
- USB (2.0) for service mode
(no overvoltage protection)

Power supply

6.6 ... 28 V DC,
secured against reverse polarity

Current consumption (without heating)

Typically 12 mA at 12 VDC

Power consumption (without heating)

< 145 mW

Ring heating, optional

- 12 ... 28 VDC, typ. 12/24 VDC,
secured against reverse polarity
- 24 VDC / max. 50 W
temperature control range 45 K
(wind speed 0 m/s)
- 12 VDC / max. 12.5 W
temperature control range 12 K
(wind speed 0 m/s)

Target temperature for orifice ring rim

+2 ... +9 °C, factory setting +4 °C

Operating range of orifice rim heater

-40 ... +60 °C (ambient temperature)

Modes of operation of orifice rim heater

Heater control system:

- Disabled
- Continuously enabled
- Continuously enabled within a specified temperature range
- US NWS standard, time-controlled
- Enabled in case of precipitation
(adjustable after-run time)

Dimensions

Pluvio² S: 288 mm x 651 mm (Ø x h)

Pedestal: Ø 2" / 50 ... 60 mm

Weight

Approx. 7.8 kg

Material

- Base plate: stainless steel/aluminium
- Collecting bucket: ASA, UV resistant
- Bucket support: ASA, UV resistant
- Pipe housing ASA, UV resistant

Environmental conditions

- Temperature, in operation: -40 ... +60 °C
- Temperature, storage: -40 ... +70 °C
- Relative humidity: 0 ... 100 % rF,
non-condensing

Protection

- Pipe housing closed: IP65
- Pipe housing open: IP63
- Load cell: IP67

Standards

- EMC: 2004/108/EG;
EN 61326-1:2013
- Salt resistance: EN 60068-2-11

*RT = real-time; NRT = non real-time; units can be configured in mm or in (inch), mm/min or mm/h, in/min or in/h and °C or °F



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