



an OTT HydroMet brand



OTT Parsivel² Laser Present Weather Sensor



Multifunctional laser-optic disdrometer in the premier class

OTT Parsivel²

Introduction

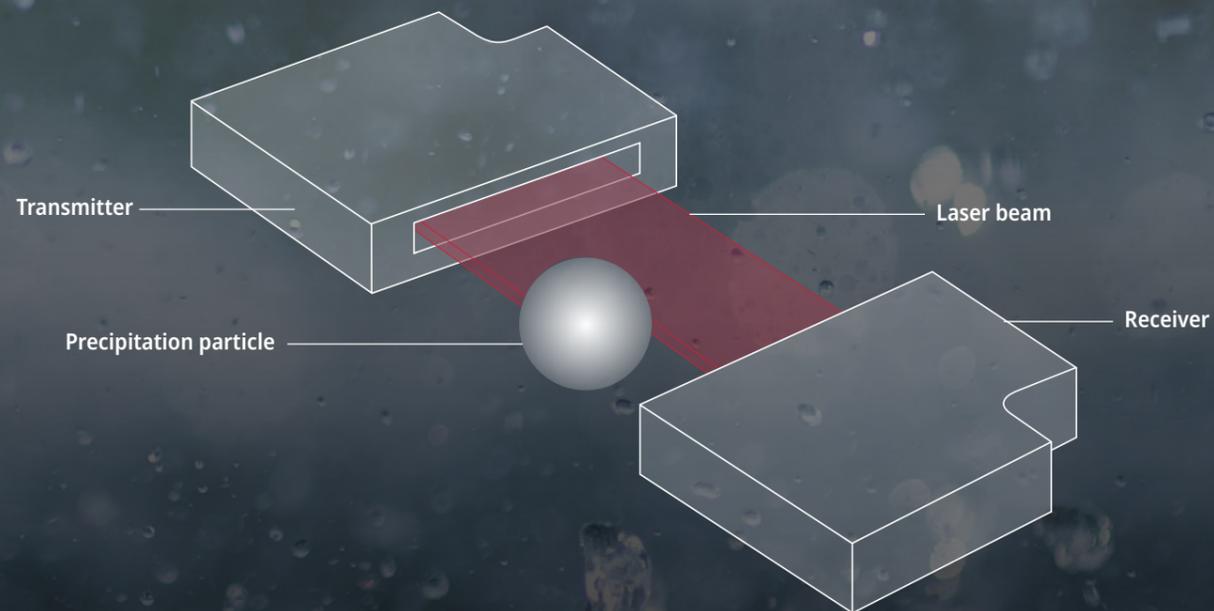
The OTT Parsivel² is a modern, laser-based disdrometer for comprehensive and reliable measurement of all types of precipitation. The device works on the extinction principle and measures precipitation particles using the shadowing effects they cause when they pass through a laser band.

The Parsivel² captures both the size and the rate of fall in detail of the individual hydrometeors and classifies them into a range of 32 classes. Depending on the measurement interval set, the resulting precipitation spectrum covers a time of between 10 seconds and one hour. A responsive signal processor uses the raw data to calculate precipitation type, amount, intensity, kinetic energy, visibility in the precipitation and the equivalent radar reflectivity. Using standard interfaces, both the calculated and the spectral data are output to a data-logger, an automatic weather station or a PC.

The principle

The OTT Parsivel² uses a laser-optical sensor to measure precipitation. The transmitter unit of the sensor generates a flat, homogenous beam profile that the receiver unit converts to an electrical signal. This signal changes whenever a hydrometeor falls through the beam anywhere within the measuring area (54 cm²). The degree of dimming is a measure of the size of the hydrometeor, and the fall velocity is derived from the duration of the extinction signal.

The measured values are characterized by high accuracy, which are retained over a long period. A ratiometric process also helps to ensure this, as it automatically compensates for the influence of the temperature characteristic curve and aging of the laser diodes.



Multifunctional, flexible and easy to use

Benefits

- **Accurate** – measures the size and speed of each individual hydrometeor and derives other important meteorological parameters
- **Maintenance free** – lowest obstruction to wind and freely accessible optical measuring area without moving parts or collection bucket
- **Durable** – continuous and precise precipitation data in all environmental and weather conditions. Integrated overvoltage protection
- **Economical in use** – Economical electronics and separately controllable head heating enable a flexibly designed power supply with low energy consumption
- **Convenient** – integrated USB interface configuration and online monitoring using a laptop
- **Flexible** – standard interfaces RS 485, SDI-12 and impulse for connecting to a datalogger, automatic weather station (AWS) or PC
- **Sensor health** – control LEDs to show function, measurement, communication and status
- **Seamless integration** – integrated push-in connection for connecting the electrical supply and data interfaces
- **Cleverly designed** – robust aluminium housing and symmetrically arranged measuring heads whose design prevents dripping in the direction of the laser band

Interfaces

The OTT Parsivel² communicates using several output interfaces: precipitation intensities are provided via the pulse output, present weather data via SDI-12 and complex spectral information via RS-485. With the help of the operating and monitoring software ASDO, the user can configure and optimize the data output in accordance with the respective application case. Thanks to the USB interface integrated into the device base, a laptop can be connected in no time.

Power supply and output interfaces can be connected conveniently and service-friendly via a device connector.



OTT ASDO user software

The convenient operating and monitoring software OTT ASDO is available in two versions:

- Basic version for setting all system parameters for startup, online recording and visualization of the data.
- Full version with integrated database for automated, convenient online operation. The measured values are saved on a PC with the help of the software at set intervals.

One device – five application solutions

1. Precipitation

The Parsivel² determines the precipitation intensity from as little as 0.001 mm/h. With the integral volume equivalent of all particle sizes classified per time unit, it calculates the amount and intensity of the precipitation that has fallen and takes account of physical aspects in the process, such as droplet model and differentiated precipitation densities. This leads to particularly precise results, even with mixed precipitation. With the values measured for size and velocity of the individual particles, the Parsivel² also determines the composition of the precipitation and records it statistically.

The drop size classification range covers the range from 0.2 mm (drizzle) up to 8 mm large droplets in thunderstorms, or even up to 25 mm in solid precipitation (hail).

2. Present Weather Sensor (PWS)

The Parsivel² classifies the current weather and the precipitation types (rain, drizzle/rain, snow, hail and sleet) according to an international weather code, which was originally introduced by the WMO. For unmanned weather stations, the automatic, reliable and unique identification of the current precipitation event is necessary. The Parsivel² determines the type, amount and composition of the precipitation.

3. Flood early warning

To be able to warn of impending flooding in a timely way, it is necessary to measure the amount and spatial distribution of precipitation quickly and exactly. This goal is achieved with a combination of weather radar measurements (spatial information with reduced accuracy) and ground-based disdrometer measurements.

The Parsivel² not only provides the droplet size distribution on the ground (S), but also calculates all relevant ground data for deriving the local Z/R and Z/S ratios, such as precipitation rate (R) and the radar reflectivity (Z). These values can be used immediately to adjust the weather radar data and thus to optimize the intensity forecast in the spatial development of the precipitation event. Combined with water level sensors and drainage modeling, the Parsivel² is thus the central component for a modern, high performance, regional, flooding early warning system.

4. Monitoring of road conditions

Heavily localized precipitation can lead to aquaplaning or packed snow. To prevent accidents, fast traffic warning and control systems are necessary. Precipitation amount, hydrometeor composition and visibility are of significant importance in these systems. The Parsivel² is an intelligent sensor contributing to your Road Weather Information System.

5. Monitoring erosion

The Parsivel² calculates the distribution of kinetic precipitation energy and outputs it. Together with precipitation data and other parameters such as ground state or relief, the precipitation energy is decisive for the effect of the rain on the ground and an important input for erosion models.



Advantages & applications

Meteorology

Advantages

- Detailed recording and analysis of precipitation type, amount and distribution
- Classifies the precipitation round the clock and automates the tasks of a synoptic observer
- Maintenance free alternative to tipping bucket rain gauges – continuous precipitation measurement in all conditions without delays with pulse output of the precipitation amount (0.1/0.01 mm)
- Homogenous laser band guarantees exact raw data of the captured precipitation over the complete area of the laser band
- Measurement accuracy for liquid precipitation meets the WMO recommendation of $\pm 5\%$ in the intensity range of 0.001 to 1,200 mm/h
- Can be used as a maintenance free, autonomous system or as part of an unmanned weather station



Flood warning



Monitoring of road conditions



Precipitation

Technical Specifications

Optical sensor, laser diode	<ul style="list-style-type: none"> • Wavelength: 650 nm, Output power (peak): 0.2 mW • Laser class: 1, IEC/EN 60825-1: 2014
Measuring surface (W x D)	180 x 30 mm (54 cm ²)
Measuring ranges	<ul style="list-style-type: none"> • Particle size: <ul style="list-style-type: none"> liquid precipitation: 0.2 ... 8 mm solid precipitation: 0.2 ... 25 mm • Particle velocity: 0.2 ... 20 m/s
Classification	<ul style="list-style-type: none"> • 32 size and 32 velocity classes • Measurement accuracy¹⁾: <ul style="list-style-type: none"> ± 1 size class (0.2 ... 2 mm) ± 0.5 size class (> 2 mm)
Types of precipitation	8 precipitation types (drizzle, drizzle/rain, rain, mixed rain/snow, snow, snow grains, sleet, hail)
Outputs	<ul style="list-style-type: none"> • Reports: WMO 4680/4677 (SYNOP), 4678 (METAR/SPECI) and NWS tables • Differentiation of precipitation types: drizzle, rain, hail, snow > 97 % (compared to a weather observer) • Snow depth intensity (volume equivalent)
Precipitation intensity	<ul style="list-style-type: none"> • 0.001 ... 1,200 mm/h • Accuracy¹⁾: $\pm 5\%$ (liquid) / $\pm 20\%$ (solid)
Radar reflectivity Z	- 9.999 ... 99.999 dBz
Kinetic energy	0 ... 999.999 J/(m ² h)
Visibility in precipitation (MOR)	0 ... 20,000 m
De-icing protection	Microprocessor controlled heating
Power supply	<ul style="list-style-type: none"> • Electronics: 10 ... 28 V DC, reverse polarity protection • Optimum heating output of the sensor head heating system can be guaranteed with a power supply voltage of at least 20 V DC.
Power consumption (without heating)	65 mA@24 V DC
Heating capacity sensor heads	<ul style="list-style-type: none"> • 50 W (default) • 100 W (adjustable)
Lightning protection	integrated
Interfaces (configurable²⁾)	<ul style="list-style-type: none"> • RS-485 for all values incl. spectral data (EIA-485; 1,200 ... 57,600 Baud) • SDI-12 for calculated values • USB for PC connection (configuration and service) • Output relay for pulse output of the precipitation amount in 0.1 m
Material	Powder-coated aluminium housing
Weight	max. 6.4 kg
Dimensions (H x W x D)	670 x 600 x 114 mm
Environmental conditions	<ul style="list-style-type: none"> • Temperature range: - 40 ... +70 °C • Relative humidity: 0 ... 100 %
Protection	IP65
Installation	2 inch pipe, \varnothing 50 ... 62 mm
Standards	<ul style="list-style-type: none"> • EN 61326-1: 2013, CE compliant • 2014/30/EU, CE compliant

¹⁾ Proof under laboratory conditions using an OTT test system with reference particle simulation of 0.5 mm, 1.0 mm, 2.0 mm and 4.0 mm

²⁾ ASDO software supplied (basic version)

Insights for Experts

For more information, please contact

OTT Hydromet GmbH

Ludwigstrasse 16

87437 Kempten | Germany

T +49 831 5617-0 | Fax -209

info@ott.com

www.ott.com

