OTT HydroMet

KIPP & ZONEN
an OTT HydroMet brand

CSD3 Sunshine Duration Sensor

Operational Manual

0342322 | 01-1024

OTT HydroMet B.V.
Delftechpark 36
2628 XH Delft
The Netherlands

+31 15 2755 210
solar-info@otthydromet.com
www.otthydromet.com

Table of contents

1 Scope of supply

The following items are included with delivery:

- Sunshine Duration Sensor
- Instruction sheet
- Test reports
- 2 drying cartridges

2 Order numbers and variant code

2.1 Product variants

Variant	Order number
CSD3 Sunshine Duration Sensor, no plug, no cable	0342901-000
CSD3 Sunshine Duration Sensor, thermostat, no cable	0342901-030

2.2 Accessories and spare parts

Item	Order number
CMB1 Mounting Bracket	0369701
15 m cable, waterproof 8-pin plug	0362622
25 m cable, pre-wired with waterproof 8-pin plug	0362623

3 About this manual

3.1 Other applicable documents

The following documents contain further information on installation, maintenance and calibration:

– Instruction Sheet

3.2 General signs and symbols

The signs and symbols used in the operational manual have the following meaning:

Practical tip

i This symbol indicates important and useful information.

Action

✓ Prerequisite that must be met before performing an action.

▸ Step 1

⇨ Intermediate result of an action

▸ Step 2

⇨ Result of a completed action

List

– List item, 1st level

– List item, 2nd level

3.3 Explanation of warnings

To avoid personal injury and material damage, you must observe the safety information and warnings in the operating manual. The warnings use the following danger levels:

⚠ WARNING

WARNING

This indicates a potentially hazardous situation. If the hazardous situation is not avoided, it may result in death or serious injuries.

⚠ CAUTION

CAUTION

This indicates a potentially hazardous situation. If the hazardous situation is not avoided, it may result in moderately serious or minor injuries.

NOTICE

NOTE

This indicates a situation from which damage may arise. If the situation is not avoided, products may be damaged.

4 General safety instructions

4.1 Intended use
The CSD3 is a radiometer used to measure sunshine duration outdoors.

4.2 Potential misuse
Any use of the product that does not comply with the intended use, be this intentional or negligent, is forbidden by the manufacturer.

- Use the product only as described in the operational manual.

4.3 Personnel qualification
The equipment described in this manual must be installed, operated, maintained and repaired by qualified personnel only.

- Obtain training from OTT HydroMet if necessary.

4.4 Operator obligations
The installer is responsible for observing the safety regulations. Unqualified personnel working on the product can cause risks that could lead to serious injury.

- Have all activities carried out by qualified personnel.
- Ensure that everybody who works on or with the product has read and understood the operational manual.
- Ensure that safety information is observed.
- File the operational manual together with the documentation of the entire system and ensure that it is accessible at all times.
- The operational manual is part of the product, forward the operational manual together with the product.

4.5 Personnel obligations
To avoid equipment damage and injury when handling the product, personnel are obliged to the following:

- Read the operational manual carefully before using the product for the first time.
- Pay attention to all safety information and warnings.
- If you do not understand the information and procedure explanations in this manual, stop the action and contact the service provider for assistance.
- Wear the necessary personal protective equipment.

4.6 Correct handling
If the product is not installed, used and maintained correctly, there is a risk of injury. The manufacturer does not accept any liability for personal injury or material damage resulting from incorrect handling.

- Install and operate the product under the technical conditions described in the operational manual.
- Do not change or convert the product in any way.
- Do not perform any repairs yourself.
- Get OTT HydroMet to examine and repair any defects.
- Ensure that the product is correctly disposed of. Do not dispose of it in household waste.

4.7 Certification

CE (EU)
The equipment meets the essential requirements of EMC Directive 2014/30/EU.

FCC (US)
FCC Part 15, Class "B" Limits

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

IC (CA)
Canadian Radio Interference-Causing Equipment Regulation, ICES-003, "Class B"

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

5 Product description

5.1 Design and function

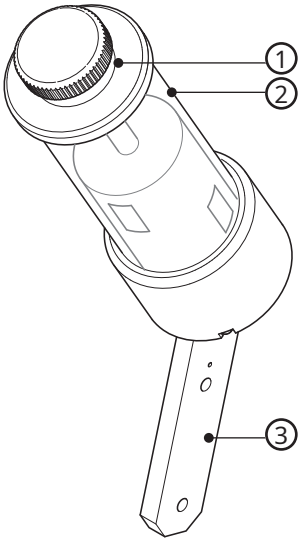
The CSD3 radiometer measures the sunshine duration. The sunshine duration is defined as the time during which the direct solar radiation exceeds the level of 120 W/m^2.

The instrument measures solar radiation through a glass tube. It has no moving parts and uses 3 photo-diodes with specially designed diffusers to make an analog calculation of when it is sunny. The output is switched high or low to indicate sunny or not sunny conditions. The calculated direct irradiance value is also available.

The instrument has a drying cartridge and a humidity indicator shows when the cartridge has to be changed.

The instrument operates from 12 V DC power and has two levels of built-in heating to dissipate rain, snow and frost. These are normally switched externally, but an optional internal thermostat control is available. A mounting arm is fitted to the base of the instrument.

5.2 Product overview



1 Drying cartridge
2 Glass tube
3 Mounting arm

6 Transport, storage, and unpacking

6.1 Transport

- Transport the product always in its original packaging.
- Ensure that the product is not mechanically stressed during transport.

6.2 Storage

- Store within specified temperature ranges.
- Store in dry area.
- Store in original box where possible.

6.3 Unpacking

- Carefully remove the product from the packaging.
- Check that the delivery is complete and undamaged.
- If you find any damage or if the delivery is incomplete, then immediately contact your supplier or manufacturer.
- Keep the original packaging for any further transportation.

7 Installation

7.1 Mechanical installation

7.1.1 Required tools and aids

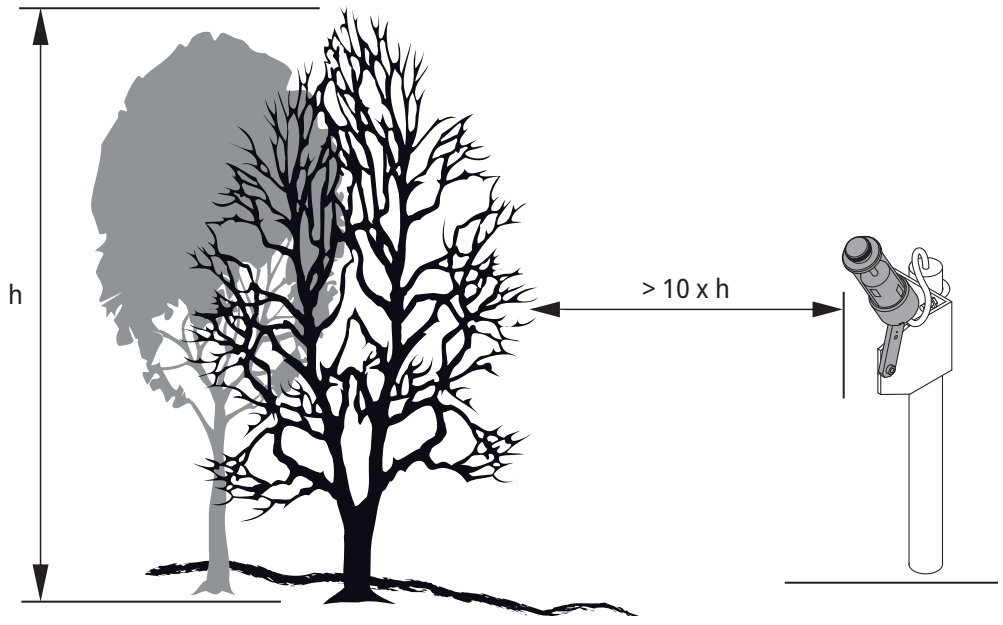
The following tools and aids are required:

- Allen key, 4 mm
- Allen key, 5 mm
- wrench, 8 mm
- wrench, 10 mm
- compass
- bubble level
- protractor

7.1.2 Choosing a site

There should be no obstructions to the field of vision above the instrument's sensor element. If this is not possible, the location of the instrument must be chosen to ensure that obstacles do not rise by more than 5 degrees above the azimuth range between sunrise after the shortest night and sunset on the longest day.

The 5 degrees correspond to a minimum distance from the instrument to the obstacle of 10 times the height of the obstacle:



Minimum distance from instrument to obstacle

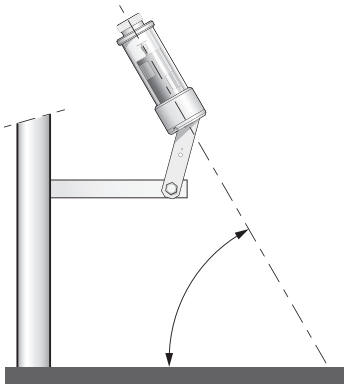
The minimum distance is important for measuring the direct radiation. The diffuse solar radiation is not so affected by obstacles near the horizon. An obstacle to the field of vision that rises 5 degrees over the entire azimuth range of 360 degrees reduces the diffuse radiation directed downwards by only 0.8 %.

- Position the instrument in such a way that no shadows fall on it, for instance from masts.
- Avoid hot exhaust gases with a temperature of over 100 °C in the proximity of the instrument. It can cause measurement deviations.

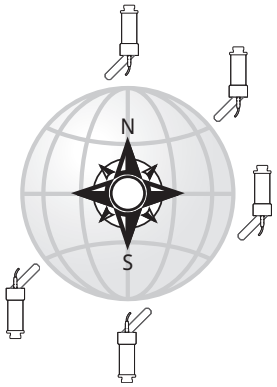
- Do not position the instrument in front of light-colored walls or any other objects that reflect the sunlight or emit short-wave radiation.

7.1.3 Mounting instrument

- Attach the instrument with the mounting arm at the chosen installation site or use the CMB1 mounting bracket to fix the mounting arm to a mast or wall.
- Mount the instrument in a vertical plane and incline at an angle equal to the latitude within ±1°. Delft Netherlands is located at a lattitude 52 degrees. The angle of the instrument with the horizontal plane is therefore adjusted to be 52 degrees.



- The top of the instrument should point to the North Pole on the northern hemisphere, and it should point to the South Pole on the southern hemisphere.



7.2 Electrical connections

The instrument has an 8-pin plug. For the pin assignment, refer to the instruction sheet.

- Connect the instrument to a data logger or voltmeter.
- If the instrument has not been grounded, connect the black shield cable to the ground.

8 Maintenance

8.1 Maintenance schedule

The frequency of cleaning is dependent upon the local weather and environmental conditions.

The following maintenance intervals are recommended:

Interval	Activity	Performed by
Twice a week	▸ Clean the glass tube using a lint-free cloth and distilled water or pure alcohol. ▸ Ensure that no streaks or deposits are left on the dome.	Operator
Monthly	▸ Check if the instrument is parallel to the earth axis. Adjust the instrument if required. ▸ Check the desiccant in the drying cartridge. ▸ Replace the drying cartridge if the internal 40 % humiditiy indicator is pink, refer to the instruction sheet.	Operator
2 years	▸ Have a recalibration performed.	OTT HydroMet

9 Troubleshooting

9.1 Error elimination

Error	Possible cause	Corrective action
Output signal not available or incorrect	Instrument does not work properly	▸ Check that the cables are correctly connected to the readout equipment. ▸ Check the glass tube for contamination. Carry out maintenance work as required. ▸ Check the drying cartridge humidity indicator. ▸ Check that the instrument is correctly aligned. ▸ Check the last calibration date to see if re-calibration is required. ▸ Report any malfunctions or damage to the representative of OTT HydroMet.

10 Repair

10.1 Customer support

- Have repairs carried out by OTT HydroMet service personnel.
- Only carry out repairs yourself, if you have first consulted OTT HydroMet.
- Contact your local representative: www.otthydromet.com/en/contact-us
- Include the following information:

– instrument model
– instrument serial number
– details of the fault or problem
– examples of data files
– readout device or data acquisition system
– interfaces and power supplies
– history of any previous repairs or modifications
– pictures of the installation
– overview of the local environment conditions

11 Notes on disposing of old devices

Member States of the European Union

In accordance with the German Electrical and Electronic Equipment Act (ElektroG; national implementation of EU Directive 2012/19/EU), OTT HydroMet takes back old devices in the Member States of the European Union and disposes of them in the proper manner. The devices that this concerns are labeled with the following symbol:

- For further information on the take-back procedure contact OTT HydroMet:

OTT HydroMet B.V.
Service & Technical Support
Delftechpark 36
2628 XH Delft
The Netherlands
phone: +31 15 2755 210
email: solar-info@otthydromet.com

All other countries

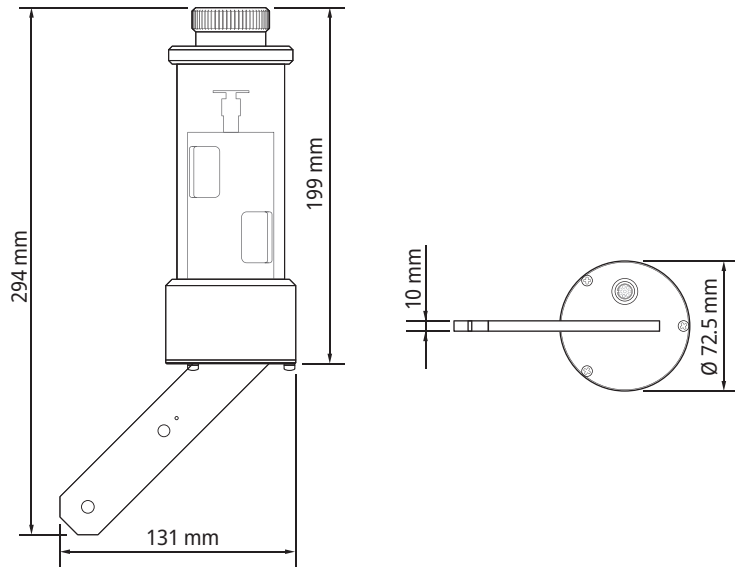
- Dispose of the product in the proper manner following decommissioning.
- Observe the country-specific regulations on disposing of electronic equipment.
- Do NOT dispose of the product in household waste.

12 Technical data

12.1 Optical and electrical data

Specification	Value
Spectral range	400 to 1100 nm
Sunshine signal (direct radiation > 120 W/m^2)	1 ±0.1 V
Accuracy (monthly sunshine hours)	> 90 %
Analogue output signal (direct solar radiation)	1 mV/Wm^2
Accuracy (direct signal for clear sky)	> 90 %
Non-stability (change/year)	< 2 %
Temperature response	< 0.1 %/°C
Response time	< 1 ms
Power supply	< 0.1 W at 12 V DC (9 to 15 V DC)
Heating level 1 (dew removal)	1 ±0.1 W at 12 V DC
Heating level 2 (frost and snow removal)	10 ±1 W at 12 V DC
Thermal switch (optional)	Level 2 ON < 6 °C ±3 °C Level 2 OFF > 14 °C ±3 °C
Operating temperature range	-40 °C to +70 °C
Storage temperature range	-40 °C to +70 °C
Humidity range (non-condensing)	0 to 100 %
Protection rating	IP67

12.2 Dimensions and weight



CSD3 Sunshine Duration Sensor, 900 g

OTT HydroMet

Contact Information