# Environmental Simulation Laboratory

DAkkS accredited according DIN EN ISO/IEC 17025:2005

V 2.0

## Test Report No.: SSI 6-16

| Order No.: 238-16 | Pages: 19 | Herbrechtingen, 14 July 2016 |
|---|---|---|

| | |
|---|---|
| Customer: | LAMBRECHT meteo GmbH |
| Test no. given by customer:<br>(Only if applicable) | N/A |
| Device Under Test:<br>(DUT) | Ombrometer rain[e]H3 |
| Reason for testing: | Nachweis zur Nichtbeeinflussung des Messensors durch Sonneneinstrahlung |
| Test description: | Solar simulation |
| Test specification(s):<br>[covered by accreditation] | |
| Test specification(s):<br>[not covered by accreditation] | customer specification acc. to test order |
| Result: | No visible deviations were identified.<br>Further investigation of DUTs through customer.<br>Prüfdurchführung erfolgte in 8 Schritten. Während jedem Schritt erfolgte die Sonneneinstrahlung unter einem Winkelbereich von 45°. Eine Veränderung der kontinuierlich aufgezeichneten Messwerte durch Sonnenstrahlung aus den unterschiedlichen Richtungen 1-8 wurde nicht nachgewiesen. Über den gesamten Prüfzeitraum blieb die Anzeige der Niederschlagsgesamtmenge mit 0,137 mm/m² unverändert. |

The results relate only to the items tested as described in this test report.

Approved by:

S. Zelt | Deputy of ESL

This document was signed electronically.

Signature

Digitally signed by AUTH-Zelt, Dr. Sascha
Date: 2016.07.14 14:03:01 +02'00'

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## 1. Summary

No visible deviations were identified.

Further investigation of DUTs through customer.

Prüfdurchführung erfolgte in 8 Schritten. Während jedem Schritt erfolgte die Sonneneinstrahlung unter einem Winkelbereich von 45°. Eine Veränderung der kontinuierlich aufgezeichneten Messwerte durch Sonnenstrahlung aus den unterschiedlichen Richtungen 1-8 wurde nicht nachgewiesen. Über den gesamten Prüfzeitraum blieb die Anzeige der Niederschlagsgesamtmenge mit 0,137 mm/m² unverändert.

## 2. References

### 2.1. Specifications

Covered by accreditation:

Not covered by accreditation: customer specification acc. to test order

# 3. General information

## 3.1. Identification of customer

| | |
|---|---|
| Customer: | LAMBRECHT meteo GmbH |
| Street address: | Friedländer Weg 65-67 |
| ZIP Code, Town: | 37085 Göttingen |
| Contact person: | Frank Döllmann |

## 3.2. Test Laboratory

Environmental Simulation Laboratory

OSRAM GmbH

An der Bahnbrücke

D-89542 Herbrechtingen

## 3.3. Time schedule

| | |
|---|---|
| Test started: | 8 Jul 2016 |
| Test ended: | 13 Jul 2016 |

## 3.4. Editor

| | |
|---|---|
| Name: | Lukas Faber |
| Function: | Accreditated testing, editor |
| Phone: | +49 7324 12 513 |
| E-Mail: | L.Faber@osram.com |

## 4. Device Under Test (DUT)

Ombrometer rain[e]H3

## 5. Test equipment

### 5.1. Test Facility

The testing was carried out by the Environmental Simulation Laboratory

OSRAM GmbH

An der Bahnbrücke, 89542 Herbrechtingen, Germany

### 5.2. Measuring equipment

| PMÜ-No. | Equipment | Type | Manufacturer | Status | Last cal. | Next cal. |
|---|---|---|---|---|---|---|
| WWS18 AMD01 | Solar simulation chamber | SC³ 600 MHG | Vötsch | cal | Feb, 02 2016 | Feb 2017 |
| SPR1 AMD01 | Pyranometer CM3 | 140041 | Kipp/Zonen | cal | Jun, 02 2014 | Sep 2016 |

Cal = calibrated, cnn = calibration not necessary

## 6. Test specification and result

The test result in the report refers exclusively to the test object described in section 4 and the test period in section 3.3.

### 6.1. Test specification

#### 6.1.1. Solar simulation

| Test | Parameter | Test severity | Reference |
|---|---|---|---|
| Solar simulation | Climatic: | | customer specification acc. to test order |
| | Temp. range: | constant Temp. range | |
| | Irradiation temperature: | -20 °C | |
| | Darkness temperature | -20 °C | |
| | Humid. range: | unregulated | |
| | Exposure time/cycle: | 5 h | |
| | Transition time/cycle | N/A | |
| | Test duration / cycle: | 5 h | |
| | No. of cycles: | 5 (one per sector) | |
| | Irradiation: | | |
| | Total radiation: | 540 W/m² | |
| | Spectral distribution: | | |
| | 300 - 320 nm | 1.9 % | |
| | 320 - 400 nm | 12.9 % | |
| | 400 - 800 nm | 49.8 % | |
| | 800 - 2450 nm | 35.3 % | |
| | Test duration / cycle: | 5 h | |
| | No. of cycles: | 5 (one per sector) | |
| | Duration of darkness: | 1 h | |
| | Duration of radiation: | 4 h | |
| | Black-standard temperature: | N/A | |
| | Electric: | | |
| | Voltage (Test): | 24.0 V DC | |
| | Cycle of operation: | Continuous on | |
| | Voltage (Funct. test): | 24.0 V DC | |

## 6.2. Test performance

### 6.2.1. Solar simulation

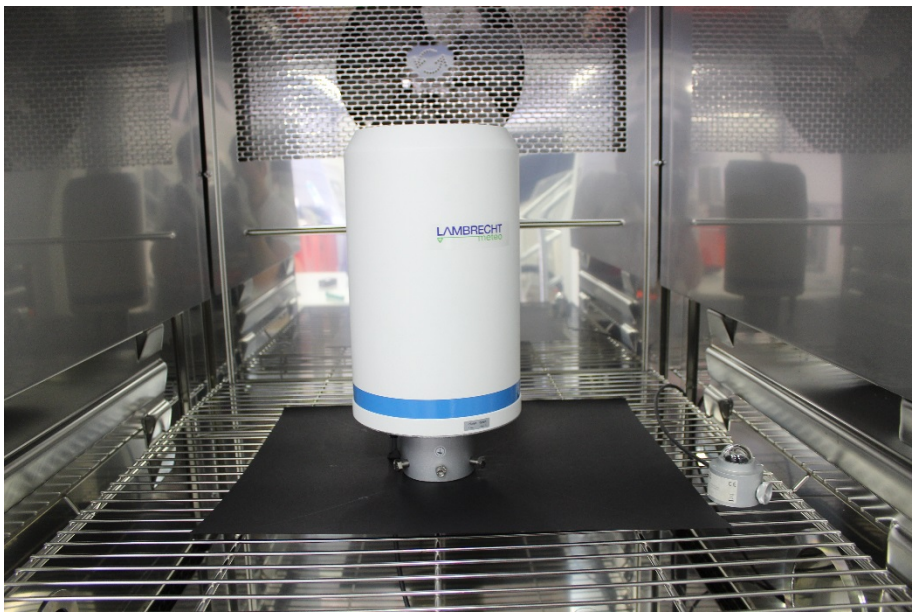


**Figure 1: Test setup without covering**

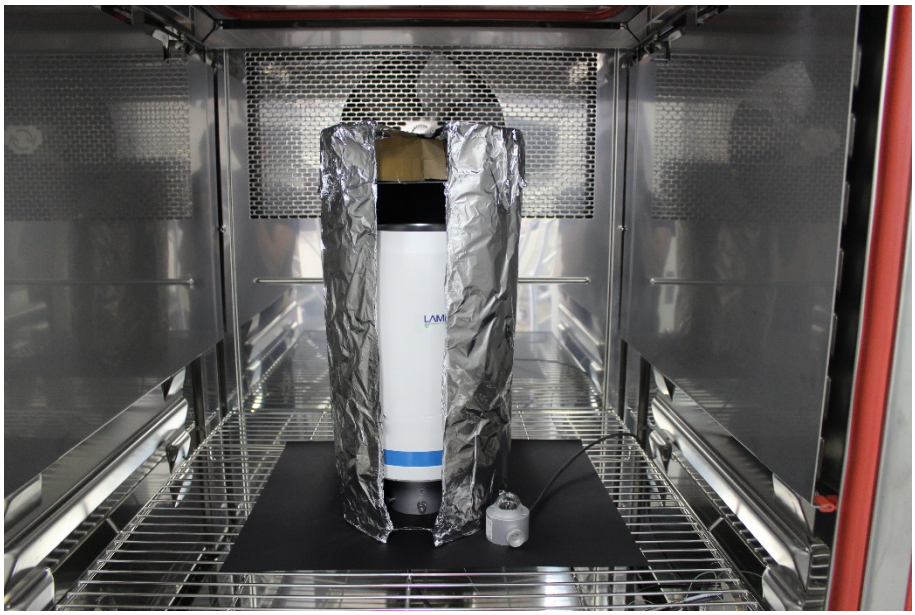

**Figure 2: Test setup with covering (exemplary)**


**Figure 3: Syringe with 2.5 ml of water**

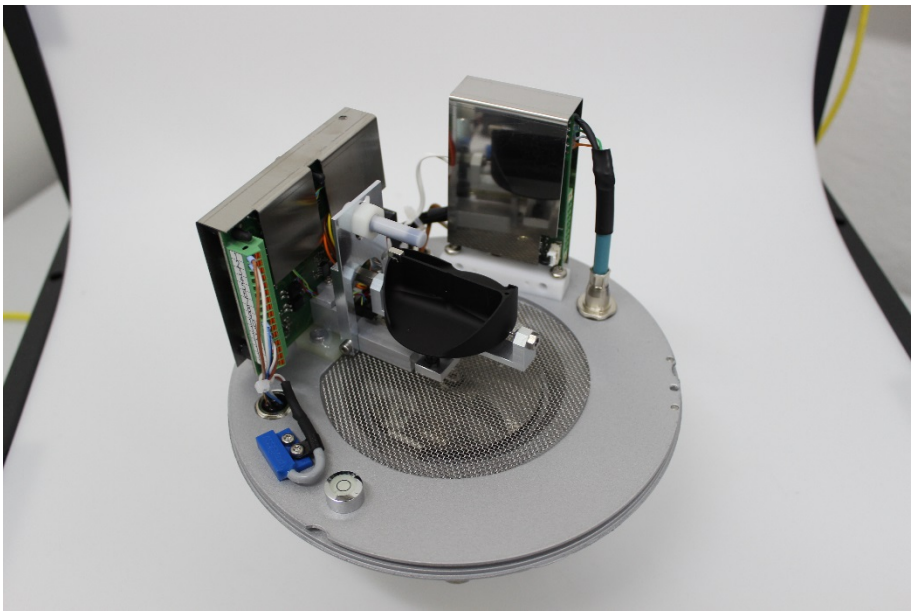

**Figure 4: Installation of collecting jar**

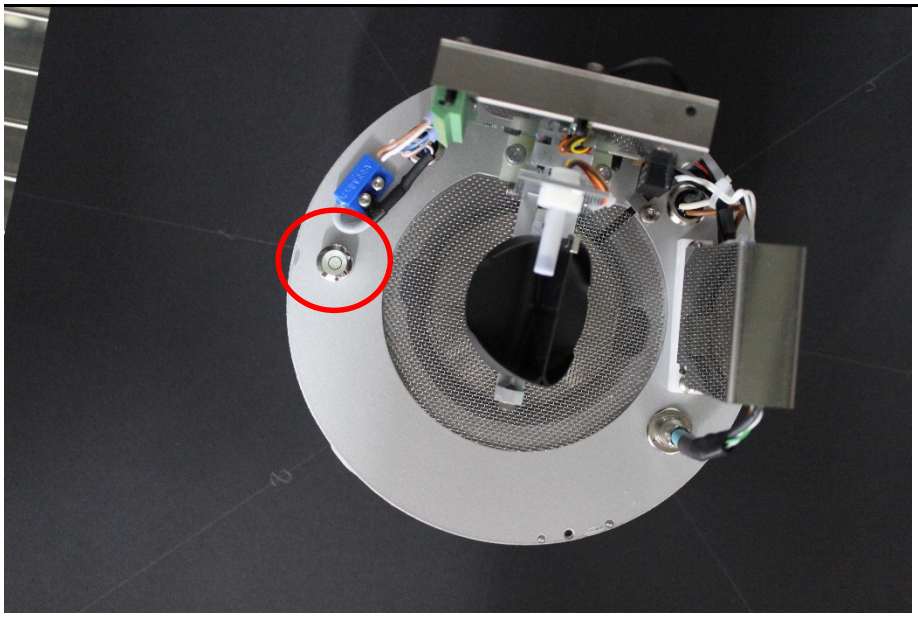

**Figure 5: Leveling of set up during installation**

**Figure 6: Leveling of set up during installation (close-up view)**

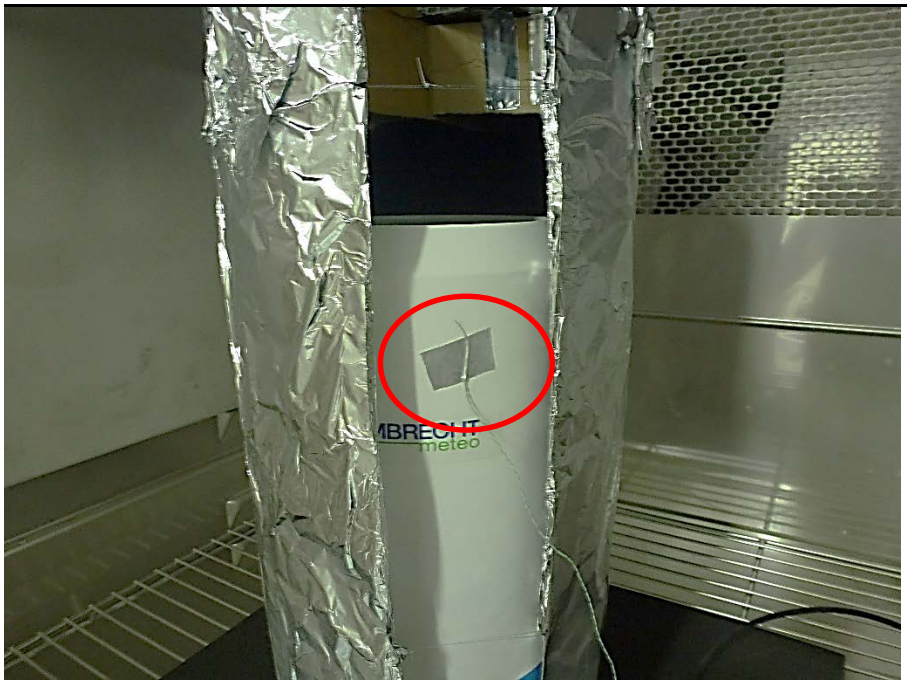


**Figure 7: Point of temperature measurement (casing, exemplary)**

**Figure 8: Point of temperature measurement (base)**

## 6.3. Test result

### 6.3.1. Solar simulation

No visible deviations were identified.

Further investigation of DUTs through customer.

Prüfdurchführung erfolgte in 8 Schritten. Während jedem Schritt erfolgte die Sonneneinstrahlung unter einem Winkelbereich von 45°. Eine Veränderung der kontinuierlich aufgezeichneten Messwerte durch Sonnenstrahlung aus den unterschiedlichen Richtungen 1-8 wurde nicht nachgewiesen. Über den gesamten Prüfzeitraum blieb die Anzeige der Niederschlagsgesamtmenge mit 0,137 mm/m² unverändert.

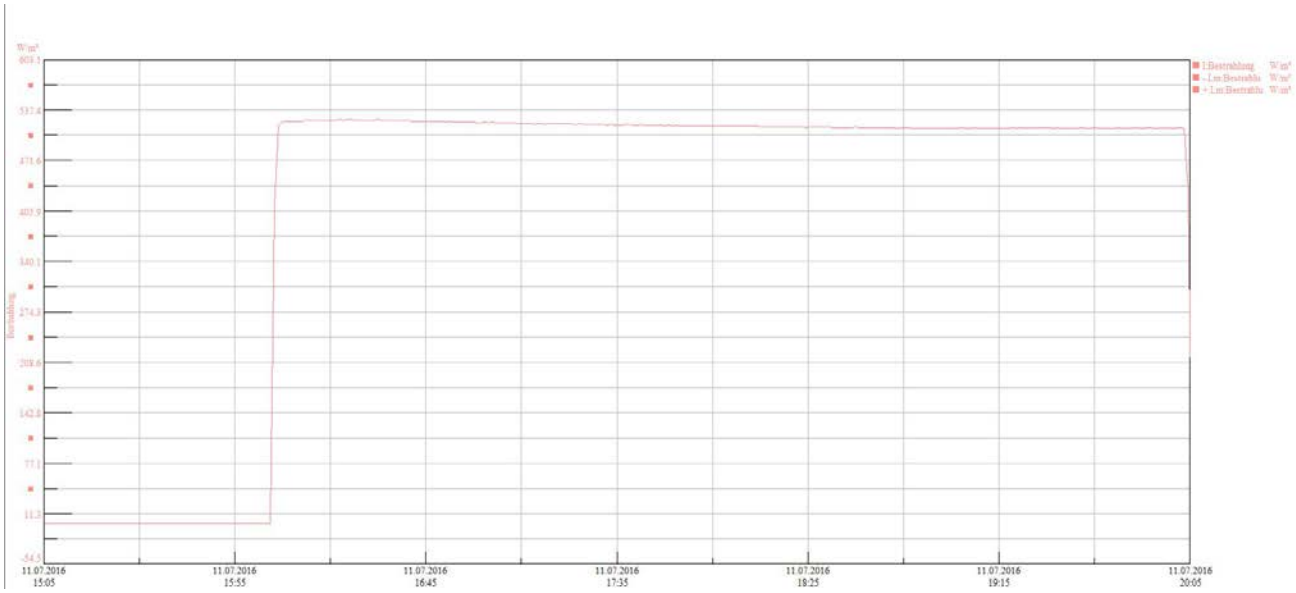

**Figure 9: Graph of solar radiation (exemplary)**

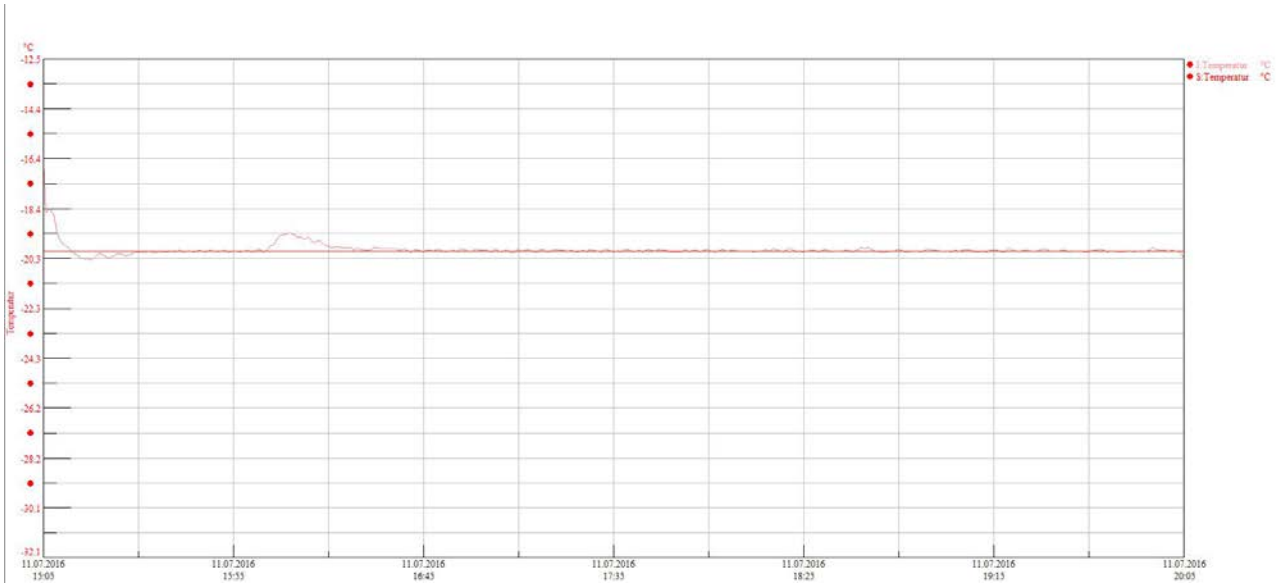

**Figure 10: Graph of temperature of climatic chamber (exemplary)**

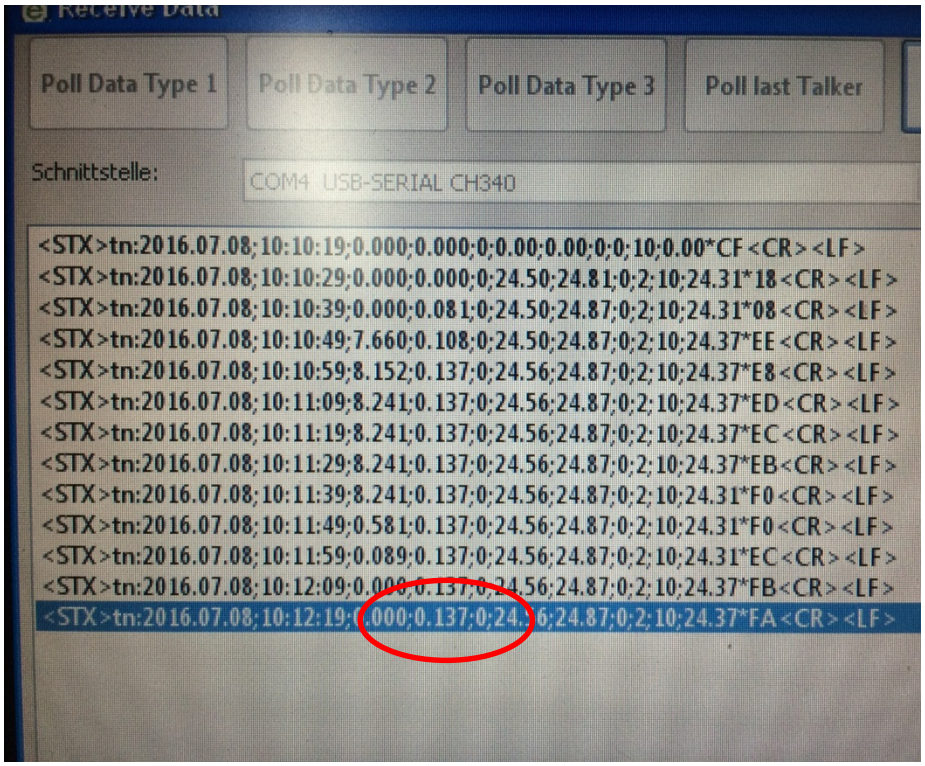


**Figure 11: Sensor measurement during filling with ca. 2.5ml of water and stabilized value of sensor before testing (marked in red color)**

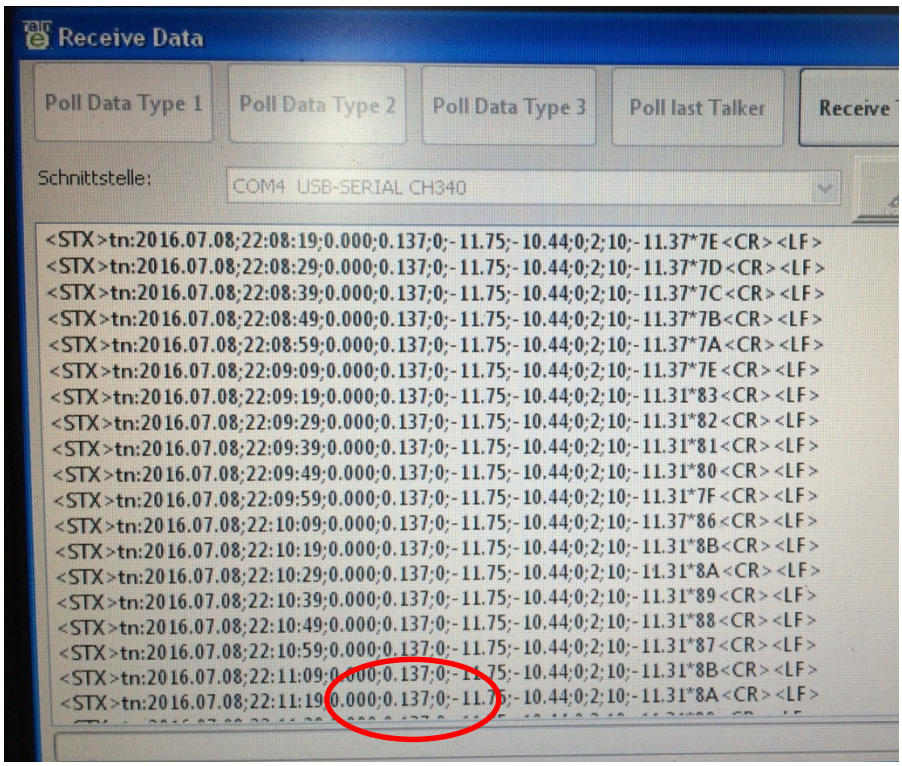


**Figure 12: Sensor measurement after test run 1**

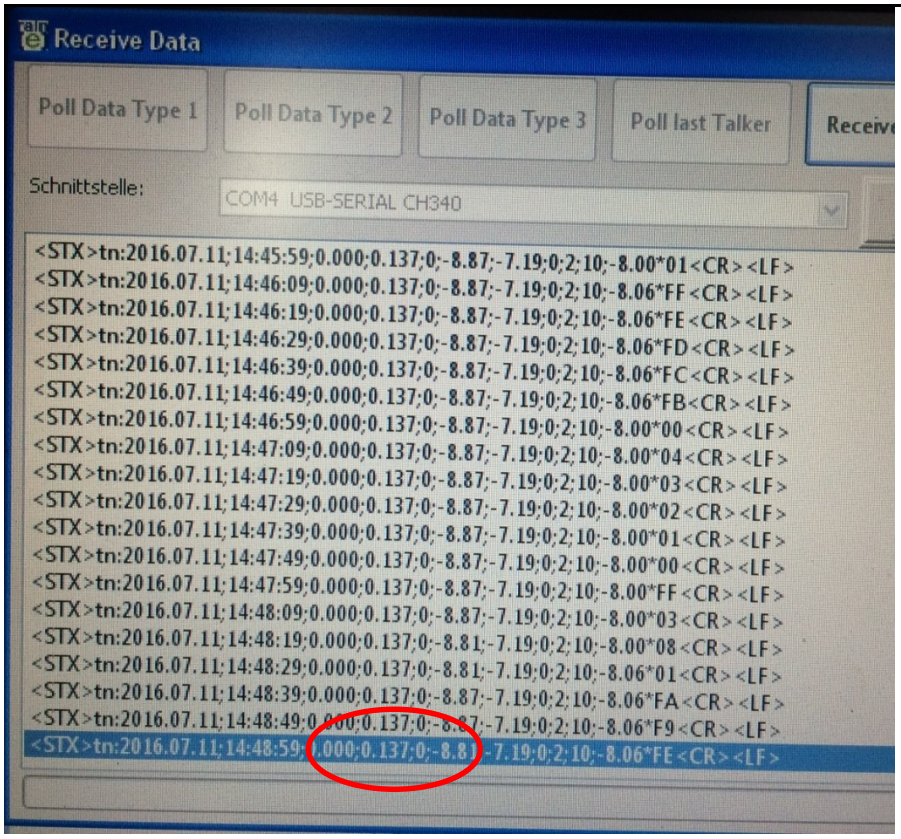


**Figure 13: Sensor measurement after test run 2**

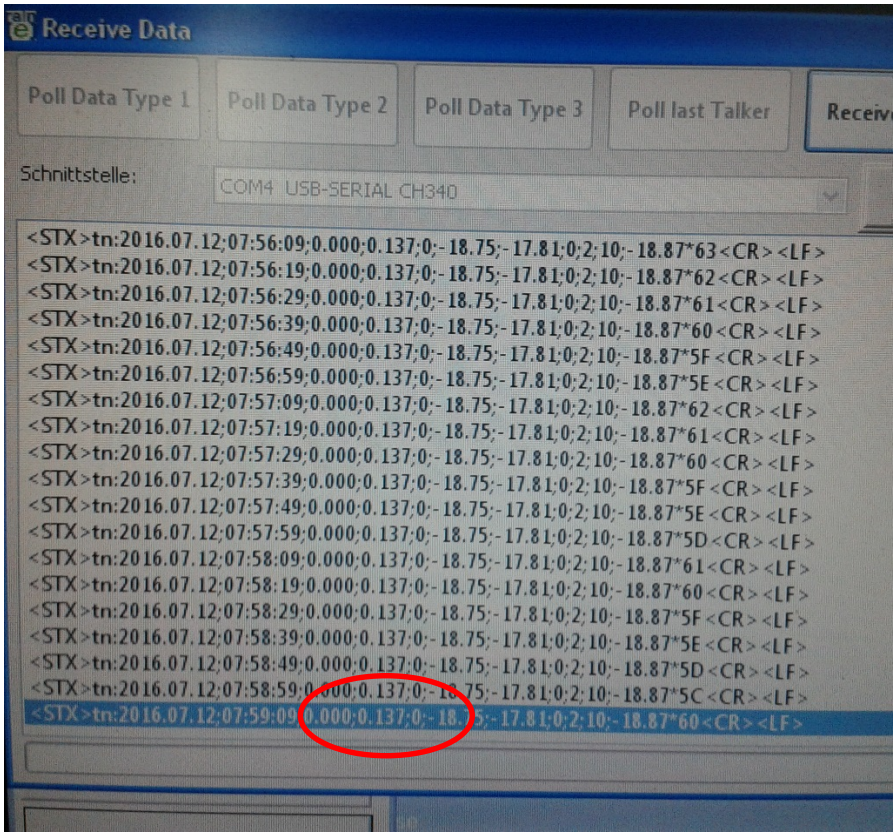


**Figure 14: Sensor measurement after test run 3**

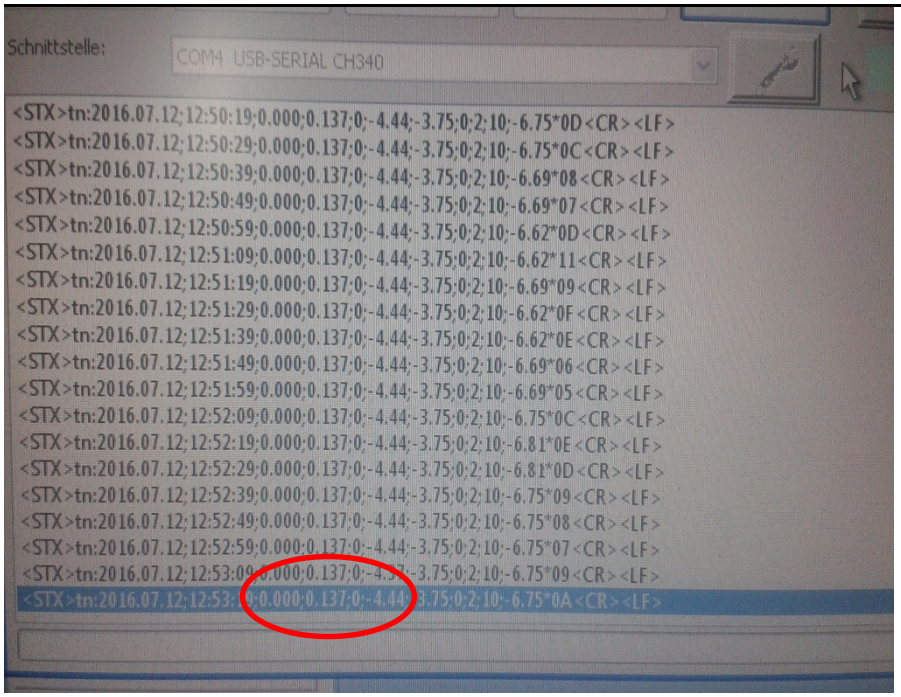


**Figure 15: Sensor measurement after test run 4**

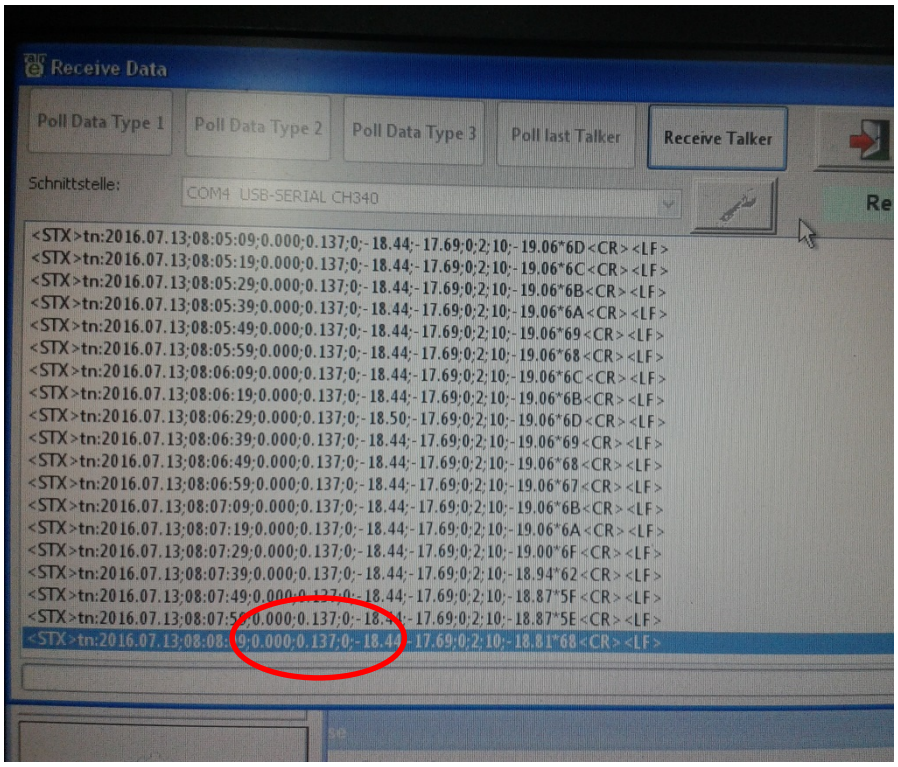


**Figure 16: Sensor measurement after test run 5**

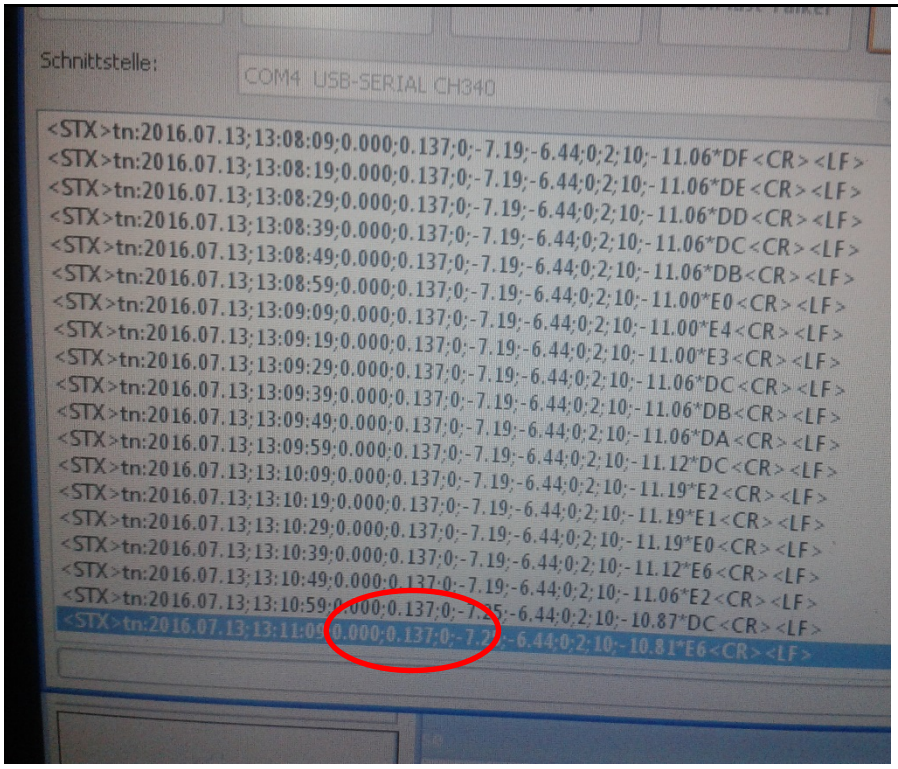


**Figure 17: Sensor measurement after test run 6**

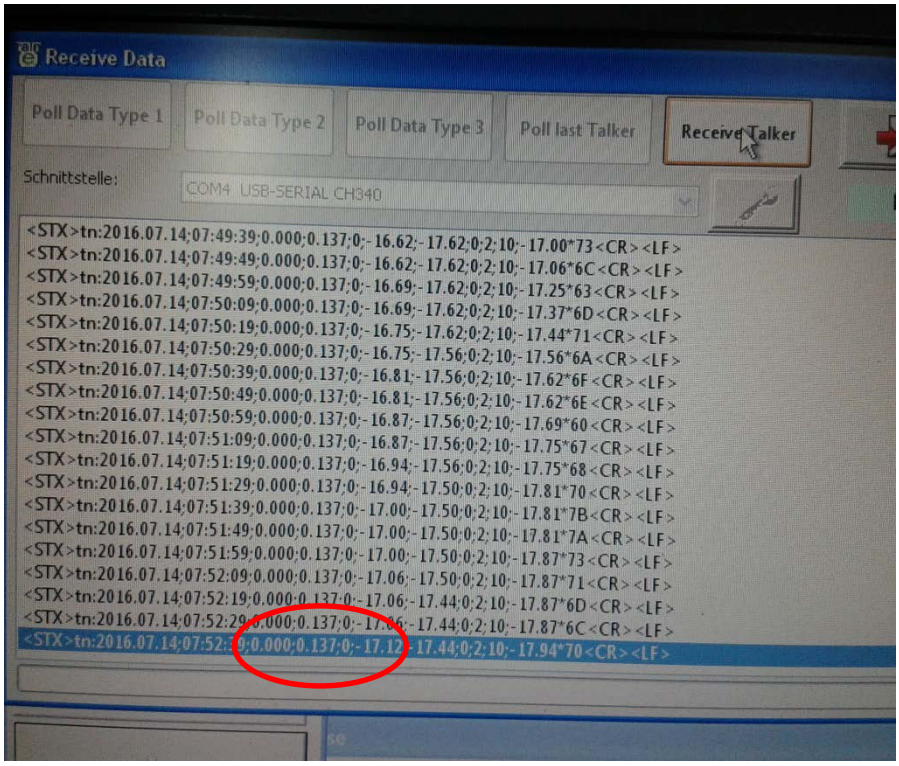


**Figure 18: Sensor measurement after test run 7**

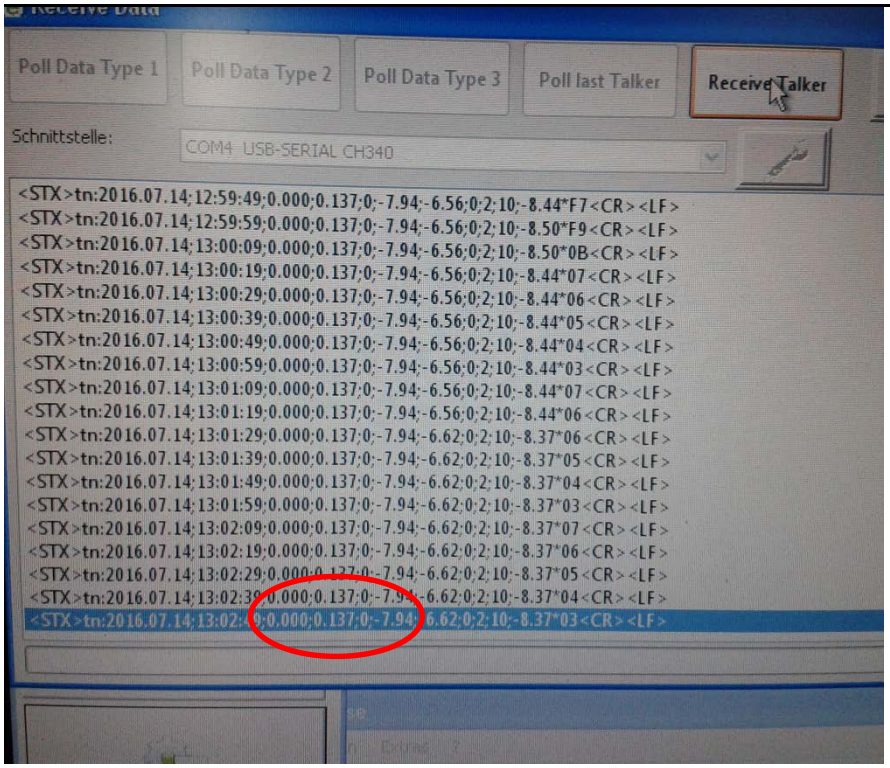


**Figure 19: Sensor measurement after test run 8**

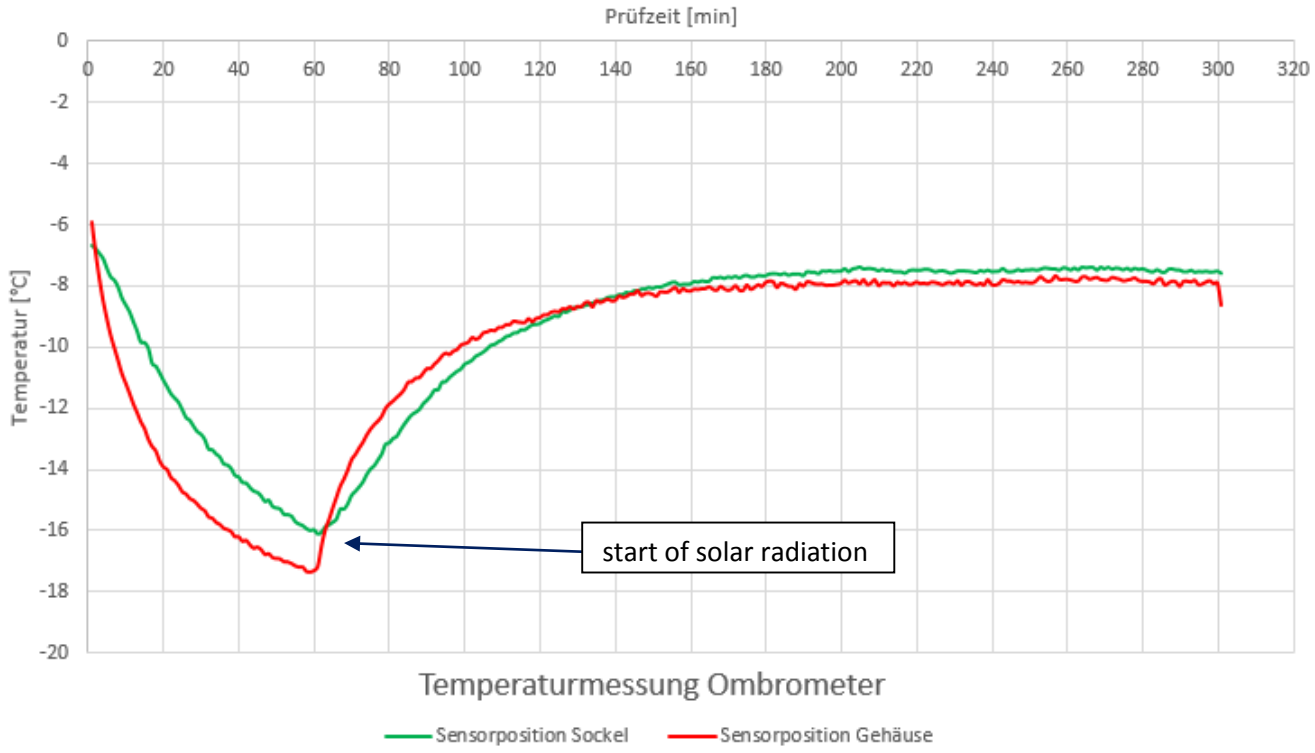


**Figure 20: Temperature measurement (casing and base) during testing (exemplary)**

## Zusatzinformationen:

**Ausgangssituation:**
Der Niederschlagssensor wurde unmittelbar vor dem Beginn der Prüfung mit einer Wassermenge von ca. 2,5 ml gefüllt. Die Messdaten werden alle 10 Sekunden vom Sensor ausgegeben und im Prüfsystem gespeichert. Die in Folge angezeigte Niederschlagsgesamtmenge beträgt konstant 0.137 mm/m².

Ziel der Prüfung ist der Nachweis, dass durch Sonnenstrahlung hervorgerufene Temperaturgradienten im Sensor die Erfüllung der messtechnischen Anforderungen nicht beeinflussen.

**Prüfergebnis:**
Eine Veränderung der kontinuierlich aufgezeichneten Messwerte durch Sonnenstrahlung aus unterschiedlichen Richtungen wurde nicht nachgewiesen. Über den gesamten Prüfzeitraum bliebe die Anzeige der Niederschlagsgesamtmenge mit 0.137 mm/m² unverändert.

**Bezeichnungen:**

| | |
|---|---|
| Prüfgegenstand: | Ombrometer |
| Produktname: | rain[e]H3 |
| Ident-Nr.: | 00.15184.940006 |
| Seriennummer: | 830801.0001 |

| No. of testing direction | Remark |
|---|---|
| 1 | DUT with constant measurement signal |
| 2 | DUT with constant measurement signal |
| 3 | DUT with constant measurement signal |
| 4 | DUT with constant measurement signal |
| 5 | DUT with constant measurement signal |
| 6 | DUT with constant measurement signal |
| 7 | DUT with constant measurement signal |
| 8 | DUT with constant measurement signal |

**Figure 21: Overview of result**