

G. LUFFT Mess- und Regeltechnik GmbH

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als Kalibrierlaboratorium im / as calibration laboratory in the

Deutschen Kalibrierdienst



Deutsche
Akkreditierungsstelle
D-K-15202-01-00

Kalibrierschein
Calibration certificate

Kalibrierzeichen
Calibration mark

| |
|---------------------|
| |
| D-K- 15202-01-00 |
| 2016-12 |

Gegenstand
Object **portable measuring instrument XP 201**

Hersteller
Manufacturer **LUFFT Mess- und Regeltechnik GmbH**

Typ
Type **5810.20 (xp 201)
8130.TFF (sensor)**

Fabrikat/Serien-Nr.
Serial number

Auftraggeber
Customer

Auftragsnummer
Order No.

Anzahl der Seiten des Kalibrierscheines
Number of pages of the certificate **3**

Datum der Kalibrierung
Date of calibration **07.12.2016 to
08.12.2016**

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).

Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.

Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).

The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.

The user is obliged to have the object recalibrated at appropriate intervals.

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| | | |
|----------------------|--|---------------------------------------|
| Datum <i>Date</i> | Leiter des Kalibrierlaboratoriums <i>Head of the calibration laboratory</i> | Bearbeiter <i>Person in charge</i> |
| 08.12.2016 | | |

Dieser Kalibrierschein ist elektronisch signiert und liegt als Original als PDF-Datei vor.
This calibration certificate is electronic signed and exists as original as PDF-file.

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Steuernummer 90490/28336

calibration item

The calibration object is a digital sensor for temperature and humidity with RS485-interface. The sensor was connected to a XP201.

Temperature

| | |
|-------------------|---|
| measuring range | -20°C...+80°C |
| accuracy | 0,15 K (within 0°C...+70°C); other 0,25 K |
| measuring element | NTC |

Relative Humidity

| | |
|-------------------|---|
| measuring range | 0...100 % |
| accuracy | 0,5% (+15°C to +30°C); 0,8% (0°C to +50°C); 2,5% (-20°C to +80°C) with reference to the nominal values of Novasina humidity standards, which refer to the Greenspan Report. Alternative refers the values to the measurement uncertainty of the calibration laboratory. |
| measuring element | resistive electrolytic |

reference standard

Temperature

| | |
|----------------------------|-------------------------------|
| reference standard | 2-pressure humidity generator |
| reference number | 062012 |
| calibration mark | 5937-D-K-15202-01-00 2016-08 |
| uncertainty of measurement | 0,1 K |

Relative Humidity

| | |
|----------------------------|-------------------------------|
| reference standard | 2-pressure humidity generator |
| reference number | 062012 |
| calibration mark | 5937-D-K-15202-01-00 2016-08 |
| uncertainty of measurement | 0,29 %...0,76 % |

calibration procedure

Temperature:

The temperature calibration was accomplished after the calibration instruction "Calibration of temperature measuring instruments" N9003.

A direct comparison between the used reference standard and the calibration item was accomplished.

The temperature values (t_{90}) refer to the International Temperature Scale of 1990 (ITS-90).

Humidity:

The humidity calibration was accomplished after the calibration instruction "Calibration of humidity measuring instruments" N9004. A direct comparison between the used reference standard and the calibration item was accomplished.

The temperature values refer to the International Temperature Scale of 1990 (ITS-90).

measurement conditions

temperature / relative humidity:
humidity generator, medium: air

description:

The sensor was placed in the metering chamber. Immersion depth was 5 cm. The measuring instrument was exposed to the room conditions during the calibration.

Adaptation time was at least 60 minutes for every calibration point.

The measuring values of the datalogger ("indicated value ") were read out with the Software SmartGraph3 V3.3.3. The measuring interval of the logger was 10 seconds, the storage interval was 10 min with arithmetic mean value calculation.

ambient conditions

temperature in °C: 22,0 ± 1 K
rel. humidity in %: 29 ± 10 %
air pressure in mbar: 1000 ± 10 mbar

calibration results

Temperature calibration

| Reference standard | Calibration unit | | |
|-------------------------------|-----------------------------------|---|--|
| temperature t_{90} in °C | indicated value t_{90} in °C | measurement deviation ΔT_{90} in K | uncertainty of measurement U in K |
| 21,52 | 21,49 | -0,03 | 0,10 |

Humidity calibration

| Reference standards | | Calibration unit | | |
|-----------------------------------|---------------------------------|-----------------------------|--|--|
| air-temperature t_{90} in °C | relative humidity U_w in % | indicated value U in % | measurement deviation ΔU in % | uncertainty of measurement U in % |
| 23 | 11,73 | 11,56 | -0,17 | 0,57 |
| 23 | 30,00 | 29,76 | -0,24 | 0,68 |
| 24 | 49,87 | 49,59 | -0,28 | 0,80 |
| 22 | 69,75 | 69,90 | +0,15 | 0,92 |
| 22 | 89,77 | 89,81 | +0,04 | 1,04 |

measurement uncertainty

The uncertainty stated is the expanded uncertainty U obtained by multiplying the standard uncertainty by the coverage factor $k = 2$. It has been determined in accordance with DAkkS-DKD-3. The value of the measurand lies within the assigned range of values with a probability of 95%.