

Deutsche Akkreditierungsstelle GmbH

Signatory to the Multilateral Agreements of
EA, ILAC and IAF for Mutual Recognition

Accreditation

The Deutsche Akkreditierungsstelle GmbH attests that the calibration laboratory

**Laboratorio Custodio de los Patrones Nacionales Magnitud Presión y Humedad
Gran Avenida Jose Miguel Carrera N° 11087, Comuna El Bosque,
Santiago de Chile, CHILE**

is competent under the terms of ISO/IEC 17025:2005 to carry out calibrations in the following fields:

Mechanical quantities

- Pressure

Thermodynamic quantities

Humidity quantities

- Devices for relative humidity
- Devices for absolute humidity

The accreditation certificate is valid until 24.04.2023. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 3 pages.

Registration number of the certificate: **D-K-15211-01-00**

Braunschweig, 25.04.2018

Dr. Heike Manke
Head of Division



Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-15211-01-00 according to DIN EN ISO/IEC 17025:2005

Period of validity: 25.04.2018 to 24.04.2023

Date of issue: 25.04.2018

Holder of certificate:

**Laboratorio Custodio de los Patrones Nacionales Magnitud Presión y Humedad
Gran Avenida Jose Miguel Carrera N° 11087, Comuna El Bosque,
Santiago de Chile, CHILE**

Head:

Marcial Hernán Espinoza Marchant

Deputy head:

Angel Eliseo Flores Torres

Antonio Eduardo Monsalve Venegas

Accredited as calibration laboratory since: 11.12.2003

Calibration in the fields:

Mechanical quantities

- Pressure

Thermodynamic quantities

Humidity quantities

- Devices for relative humidity
- Devices for absolute humidity

Abbreviations used: see last page

Within the scope of accreditation marked with ^{*)}, the calibration laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use calibration standards or equivalent calibration procedures listed here with different issue dates.

The calibration laboratory maintains a current list of all calibration standards / equivalent calibration procedures within the flexible scope of accreditation.

Permanent Laboratory

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
Pressure Absolute pressure p_{abs} *)	0,015 mbar to 0,08 bar	DKD-R 6-1:2014 EURAMET Calibration Guide No. 17, Version 3.0 BS EN 837:1998	$2,5 \cdot 10^{-5} \cdot p_{abs} + 3,5 \mu\text{bar}$	Pressure medium: gas p_{abs} measured pressure in bar The uncertainty of the measured residual pressure has to be added.
	> 0,08 bar to 7,0 bar		$2,0 \cdot 10^{-5} \cdot p_{abs} + 4,0 \mu\text{bar}$	
	> 7,0 bar to 35 bar		$2,5 \cdot 10^{-5} \cdot p_{abs} + 12 \mu\text{bar}$	
	> 35 bar to 70 bar		$2,5 \cdot 10^{-5} \cdot p_{abs} + 25 \mu\text{bar}$	
	> 70 bar to 251 bar	Principle of measurement: $p_{abs} = p_e + p_{amb}$ and with gas/oil-volume	$3,0 \cdot 10^{-5} \cdot p_{abs} + 0,25 \text{ mbar}$	The uncertainty of the measured atmospheric pressure has to be added.
Absolute pressure p_{abs} *)	1 bar; 5 bar to 51 bar	DKD-R 6-1:2014 EURAMET Calibration Guide No. 17, Version 3.0 BS EN 837:1998	$3,0 \cdot 10^{-5} \cdot p_{abs} + 62 \mu\text{bar}$	Pressure medium: oil The uncertainty of the measured atmospheric pressure has to be added.
	> 51 bar to 501 bar		$3,0 \cdot 10^{-5} \cdot p_{abs} + 0,23 \text{ mbar}$	
	> 501 bar to 1001 bar		$4,5 \cdot 10^{-5} \cdot p_{abs} + 0,47 \text{ mbar}$	
	> 1001 bar to 1401 bar		$5,0 \cdot 10^{-5} \cdot p_{abs} + 0,33 \text{ mbar}$	
	> 1401 bar to 2501 bar	Principle of measurement: $p_{abs} = p_e + p_{amb}$	$2,0 \cdot 10^{-4} \cdot p_{abs} + 10 \text{ mbar}$	
Gauge pressure p_e *)	-1,0 bar to -0,03 bar	DKD-R 6-1:2014 EURAMET cg-3, Version 1.0 EURAMET Calibration Guide No. 17, Version 3.0 BS EN 837:1998	$6,0 \cdot 10^{-5} \cdot p_e + 17 \mu\text{bar}$	Pressure medium: gas p_e : measured pressure in bar
	-0,01 bar to 0,015 bar		$1,2 \cdot 10^{-2} \cdot p_e + 8,0 \mu\text{bar}$	
	> 0,015 bar to 0,08 bar		$2,0 \cdot 10^{-5} \cdot p_e + 3,5 \mu\text{bar}$	
	> 0,08 bar to 7,0 bar		$1,5 \cdot 10^{-5} \cdot p_e + 4,0 \mu\text{bar}$	
	> 7,0 bar to 35 bar		$2,2 \cdot 10^{-5} \cdot p_e + 12 \mu\text{bar}$	
	> 35 bar to 70 bar		$2,2 \cdot 10^{-5} \cdot p_e + 25 \mu\text{bar}$	
	> 70 bar to 250 bar	with gas/oil-volume	$3,0 \cdot 10^{-5} \cdot p_e + 0,25 \text{ mbar}$	
Gauge pressure p_e *)	0 bar; 5 bar to 50 bar	DKD-R 6-1:2014 EURAMET cg-3, Version 1.0 EURAMET Calibration Guide No. 17, Version 3.0 BS EN 837:1998	$3,0 \cdot 10^{-5} \cdot p_e + 62 \mu\text{bar}$	Pressure medium: oil p_e : measured pressure in bar
	> 50 bar to 500 bar		$3,0 \cdot 10^{-5} \cdot p_e + 0,23 \text{ mbar}$	
	> 500 bar to 1000 bar		$4,5 \cdot 10^{-5} \cdot p_e + 0,47 \text{ mbar}$	
	> 1000 bar to 1400 bar		$5,0 \cdot 10^{-5} \cdot p_e + 0,33 \text{ mbar}$	
	> 1400 bar to 2500 bar		$2,0 \cdot 10^{-4} \cdot p_e + 10 \text{ mbar}$	

¹⁾ The best measurement capabilities are stated according to EA-4/02. These are expanded uncertainties of measurement with a coverage probability of 95% and have a coverage factor of $k = 2$ unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.

Annex to the Accreditation Certificate D-K-15211-01-00

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
Humidity Relative humidity	10% to 90%	Climate Cabinet Air Temperature 10 °C to 70 °C LCPN-HR-101, Rev. C	1,0 %	Uncertainty is an absolute value of relative humidity
	10% to 40%	Humidity Generator Air Temperature 5 °C to 70 °C LCPN-HR-201, Rev. C	0,5 %	Uncertainty is an absolute value of relative humidity
	> 40% to 60%		0,6 %	
	> 60% to 95%		0,8 %	
Dew Point Temperature Dew Point Hygrometers	-24 °C to 68 °C	Humidity Generator LCPN-HR-301, Rev. C	0,25 K	Reference is two pressure humidity generator or dew point meter (chilled mirror)
Air temperature	5 °C to 70 °C	Humidity Generator LCPN-HR-201, Rev. C	0,3 K	Comparison to temperature sensor of humidity generator or dew point meter
	10 °C to 70 °C	Climate Cabinet LCPN-HR-101, Rev. C	0,5 K	Comparison to relative humidity and air temperature sensors

Abbreviations used:

DKD-R	Calibration Guideline of Deutscher Kalibrierdienst (DKD)
EURAMET	European Association of National Metrology Institutes
BS EN	British Standard, European Standard
LCPN-HR-xxx	Calibration Procedure for Relative Humidity of Laboratorio Custodio de los Patrones Nacionales Magnitud Presión y Humedad

¹⁾ The best measurement capabilities are stated according to EA-4/02. These are expanded uncertainties of measurement with a coverage probability of 95% and have a coverage factor of $k = 2$ unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.