

Kalibrierschein / Calibration Certificate

erstellt durch das Kalibrierlaboratorium
issued by the calibration laboratory



DMT Druckmesstechnik GmbH

Londoner Straße 25
D-48455 Bad Bentheim - Gildehaus



Deutsche
Akkreditierungsstelle
D-K-15191-01-00

Mitglied im Deutschen Kalibrierdienst
Member of the Deutscher Kalibrierdienst



Kalibrierzeichen
Calibration mark

T-13084

D-K-
15191-01-00

2025-02

Gegenstand
Object

Hersteller
Manufacturer

Typ
Type

Serien-Nr.
Serial number

Auftraggeber
Customer

Electrical pressure gauge

Mensor, USA

CPC 6000 pressure module

831877

IRSN - Institut de Radioprotection et de Sur
Batiment 346 BP17
F-13115 St Paul Lez Durance

Dieser Kalibrierschein dokumentiert die metrologische Rückführbarkeit 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 metrological 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.

Auftragsnummer
Order No.

Anzahl der Seiten des Kalibrierscheines
Number of pages of the certificate

Datum der Kalibrierung
Date of calibration

P00524274

8

17.02.2025

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.

This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature are not valid.

Datum der Ausstellung
Date of issue

Freigabe des Kalibrierscheins durch
Approval of the certificate of calibration by

17.02.2025

Dipl.-Ing. (FH) Heiko Bergfeld

1. Calibration object

Calibration object : Electrical pressure gauge
Type : CPC 6000 pressure module
Serial No. : 831877
Pressure range : -700,0 mbar to 700,0 mbar
Calibrated pressure range : -700,0 mbar to 700,0 mbar
Limit of deviation : 0,01% of span
Resolution : 0,001 mbar

2. Reference standard

Manufacturer : DH-Budenberg SA, Frankreich
Model : DPG 10A
Serial No. : 10065
Measuring system : Pressure head 610 14151
Expanded uncertainty $U (k=2)$: $4,5 \cdot 10^{-5} \cdot p_e + 1,2 \text{ Pa}$
Calibration mark : T-13058 D-K-15191-01-00 2025-02

2.1 Working standard

Manufacturer : DMT Druckmesstechnik GmbH
Model : DPG 2500
Measuring system : Absolute pressure
Measuring range : 900 hPa to 1050 hPa
Calibration mark : T-12965 D-K-15191-01-00 2025-01

Manufacturer : Fluke
Model : 1620
Measuring system : Temperature / rel. humidity
Measuring range : 18°C to 28°C / 0% to 100%
Calibration mark : 14-1186 D-K-15186-01-00 2024-10

3. Calibration method

The Calibration was conducted in accordance with the guideline DKD-R 6-1 / March 2014, calibration procedure A (calibration of pressure devices).

Generally, the values used, as provided by the reference standard, are compared with the values presented by the calibration object. Units, as determined by PTB, serve as references.

4. Location of calibration

Calibration location : Bad Bentheim, DMT Druckmesstechnik GmbH, Laboratory
Local gravity acceleration g_L : $(9,812783 \pm 0,000003)\text{m/s}^2$
Calibration date : 17.02.2025

5. Ambient conditions

Amb. temperature : $(20,2 \pm 1,0)^\circ\text{C}$ to $(20,8 \pm 1,0)^\circ\text{C}$
Rel. humidity : $(45 \pm 20)\%$
Amb. pressure : $(1021,8 \pm 0,1)\text{hPa}$ to $(1022,0 \pm 0,1)\text{hPa}$

6. Measuring conditions

Pressure transmission medium : air
Temperature reference standard : $(20,2 \pm 1,0)^\circ\text{C}$ to $(20,8 \pm 1,0)^\circ\text{C}$
Leveling measuring uncertainty : $\pm 0,01\text{m}$
Position of the calibration object : horizontal
(Pressure connection axis)
Pressure reference level : Pressure connection (median)
Settings on calibration object : -
Correction value : -

7. Calibration results

Table 1: Results for the neg./pos. pressure range from -700,0 mbar to 700,0 mbar

Pressure at reference level calibration object p	Reading calibration object p_{ind}				Average $M_{\text{avg}} =$	Deviation $\Delta p =$	Repeatability $b'_{\text{mean}} =$	Hysteresis $h_{\text{mean}} =$	Expanded uncertainty U
	M1	M2	M3	M4	$(M1+M2+M3+M4)/4$	$M_{\text{avg}} - p$	$\max(b'_{\text{up}}, b'_{\text{down}})$	$((M2 - M1_0) - (M1 - M1_0)) + ((M4 - M3_0) - (M3 - M3_0)) / 2$	$(k=2)$
	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar
-699,621	-699,616	-699,616	-699,621	-699,621	-699,619	0,002	0,011	0,000	0,045
-559,710	-559,701	-559,701	-559,711	-559,704	-559,704	0,006	0,016	0,004	0,039
-419,881	-419,879	-419,873	-419,880	-419,878	-419,877	0,003	0,011	0,004	0,033
-279,915	-279,911	-279,913	-279,914	-279,914	-279,913	0,002	0,009	0,001	0,026
-139,940	-139,940	-139,940	-139,943	-139,941	-139,941	-0,001	0,009	0,001	0,019
0,000	-0,006	0,000	0,000	0,000	-0,002	-0,002	0,006	0,003	0,014
139,971	139,970	139,973	139,972	139,982	139,974	0,003	0,004	0,006	0,019
279,937	279,940	279,947	279,945	279,951	279,946	0,009	0,001	0,006	0,025
419,905	419,920	419,920	419,919	419,926	419,921	0,017	0,007	0,004	0,032
560,410	560,434	560,438	560,439	560,438	560,437	0,028	0,006	0,003	0,038
700,510	700,550	700,551	700,551	700,550	700,550	0,041	0,007	0,001	0,045

1 bar = 1000 mbar = 100000 Pa = 14,50377 psi = 750,0627 mmHg = 1,019716 kp/cm²

The expanded measuring uncertainty is valid for the corrected pressure value only after error correction of the indicated pressure value (see table 1 / figure 1) in the neg./pos. pressure range from -700,0 mbar to 700,0 mbar.

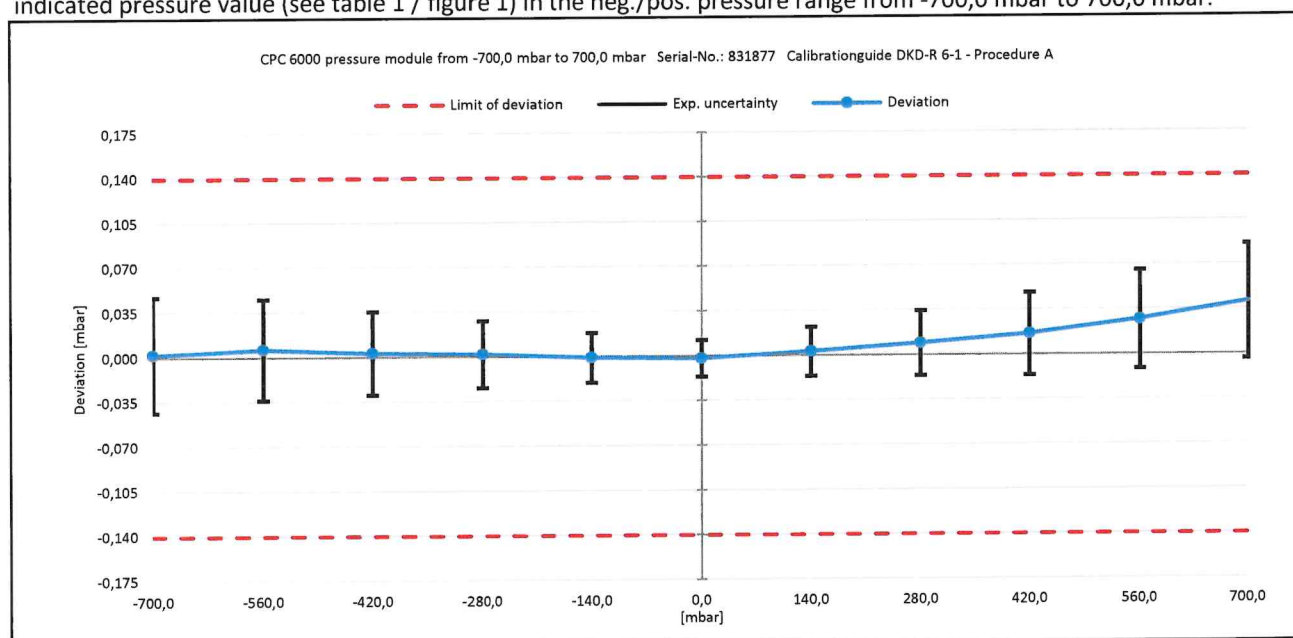


Figure 1

The effective range of measurement was not adjusted.

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8. Calibration object

Calibration object : Electrical pressure gauge
 Type : CPC 6000 pressure module
 Serial No. : 831877
 Pressure range : -350,0 mbar to 350,0 mbar
 Calibrated pressure range : -350,0 mbar to 350,0 mbar
 Limit of deviation : 0,01% of Span
 Resolution : 0,001 mbar

9. Reference standard

Manufacturer : DH-Budenberg SA, Frankreich
 Model : DPG 10A
 Serial No. : 10065
 Measuring system : Pressure head 610 14151
 Expanded uncertainty U (k=2) : $4,5 \cdot 10^{-5} \cdot p_e + 1,2 \text{ Pa}$
 Calibration mark : T-13058 D-K-15191-01-00 2025-02

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Local gravity acceleration g_L : $(9,812783 \pm 0,000003)\text{m/s}^2$
Calibration date : 17.02.2025

12. Ambient conditions

Amb. temperature : $(20,1 \pm 1,0)^\circ\text{C}$ to $(20,8 \pm 1,0)^\circ\text{C}$
Rel. humidity : $(45 \pm 20)\%$
Amb. pressure : $(1021,9 \pm 0,1)\text{hPa}$ to $(1022,1 \pm 0,1)\text{hPa}$

13. Measuring conditions

Pressure transmission medium : air
Temperature reference standard : $(20,1 \pm 1,0)^\circ\text{C}$ to $(20,8 \pm 1,0)^\circ\text{C}$
Leveling measuring uncertainty : $\pm 0,01\text{m}$
Position of the calibration object : horizontal
(Pressure connection axis)
Pressure reference level : Pressure connection (median)
Settings on calibration object : -
Correction value : -

14. Calibration results

Table 2: Results for the positive pressure range from -350,0 mbar to 350,0 mbar

Pressure at reference level calibration object	Reading calibration object				Average	Deviation	Repeatability	Hysteresis	Expanded uncertainty
p	p_{ind}				$M_{avg} =$	$\Delta p =$	$b'_{mean} =$	$h_{mean} =$	U
	M1	M2	M3	M4	$(M1+M2+M3+M4)/4$	$M_{avg} - p$	$\max(b'_{up}, b'_{down})$	$\{((M2_1 - M1_0) - (M1_1 - M1_0)) + ((M4_1 - M3_0) - (M3_1 - M3_0))\} / 2$	$(k=2)$
mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar
-349,908	-349,905	-349,895	-349,895	-349,896	-349,898	0,010	0,008	0,006	0,029
-279,918	-279,907	-279,901	-279,890	-279,907	-279,901	0,017	0,015	0,012	0,028
-209,922	-209,915	-209,912	-209,912	-209,912	-209,913	0,009	0,001	0,001	0,022
-139,947	-139,941	-139,936	-139,937	-139,938	-139,938	0,009	0,004	0,003	0,019
-69,963	-69,959	-69,955	-69,957	-69,956	-69,956	0,006	0,003	0,003	0,016
0,000	0,001	0,006	0,003	0,004	0,004	0,004	0,004	0,003	0,013
69,988	69,995	69,994	69,989	69,999	69,994	0,006	0,008	0,005	0,017
139,968	139,968	139,970	139,977	139,983	139,974	0,006	0,010	0,004	0,021
209,950	209,964	209,960	209,958	209,965	209,962	0,012	0,008	0,005	0,024
279,947	279,967	279,968	279,960	279,968	279,966	0,019	0,009	0,005	0,028
349,929	349,946	349,946	349,954	349,942	349,947	0,018	0,006	0,006	0,031

1 bar = 1000 mbar = 100000 Pa = 14,50377 psi = 750,0627 mmHg = 1,019716 kp/cm²

The expanded measuring uncertainty is valid for the corrected pressure value only after error correction of the indicated pressure value (see table 2 / figure 2) in the positive pressure range from -350,0 mbar to 350,0 mbar.

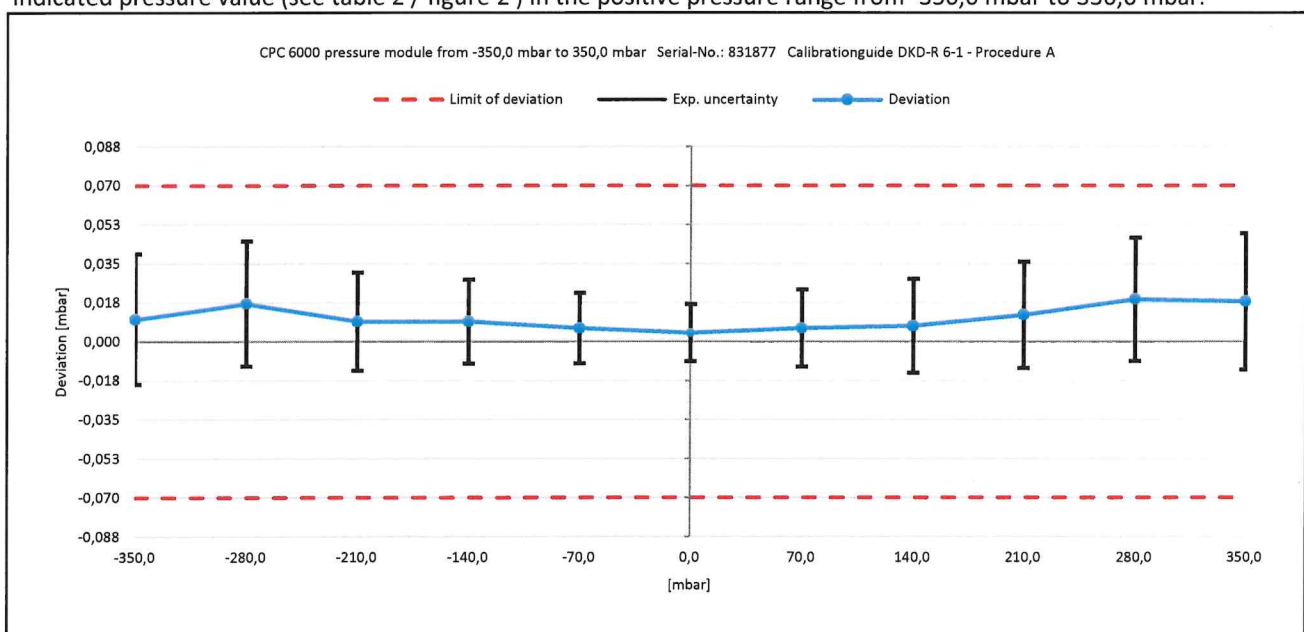


Figure 2

The effective range of measurement was not adjusted.

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15. Measurement uncertainty

The expanded measurement uncertainty resulting from the standard measurement uncertainty multiplied with the extension factor $k=2$, determined in accordance with EA-4/02 M: 2022, is indicated. With a probability of 95%, the value of the measured variable is within the assigned value range.

16. Marking

The calibration object was marked with a calibration label having the number T-13084.

17. Remarks

The calibration becomes invalid if settings in the calibration object are changed, manipulations are carried out which can lead the loss of the preset parameters or security seals or labels are removed.

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 other signatories in and outside Europe can be seen on the Websites of EA (www.european-accreditation.org) and ILAC (www.ilac.org)

The values apply to the condition of the calibration item at the time of calibration.

End of the registration