

Accreditation



The Deutsche Akkreditierungsstelle attests with this **Accreditation Certificate** that the calibration laboratory

TetraTec Instruments GmbH
Gewerbestraße 8, 71144 Steinenbronn

meets the minimum requirements according to DIN EN ISO/IEC 17025:2018 for the conformity assessment activities specified in more detail in the partial accreditation certificates listed below. This includes additional existing legal and normative requirements, including those in relevant sectoral schemes.

D- K-17589-01 -01

D- K-17589-01 -02

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and confirm generally with the principles of DIN EN ISO 9001.

This accreditation was issued in accordance with Art. 5 Para. 1 Sentence 2 of Regulation (EC) 765/2008, after an accreditation procedure was carried out in compliance with the minimum requirements of DIN EN ISO/IEC 17011 and on the basis of a review and decision of the appointed accreditation committees.


This accreditation certificate consists of this cover sheet, the reverse side of the cover sheet and the following annex. It only applies in connection with the partial accreditation certificates listed above and the notices referred to there.

Registration number of the certificate: **D-K-17589-01-00**

Berlin, 10.10.2022

Dipl.-Ing. Gabriel Zrenner
Head of Department

Translation issued:
10.10.2022



Dipl.-Ing. Gabriel Zrenner
Head of Department

The certificate together with the annex reflects the status as indicated by the date of issue. The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH (www.dakks.de).

Deutsche Akkreditierungsstelle GmbH

Office Berlin
Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Europa-Allee 52
60327 Frankfurt am Main

Office Braunschweig
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38116 Braunschweig

The Deutsche Akkreditierungsstelle GmbH (DAkKS) is the entrusted national accreditation body of the Federal Republic of Germany according to § 8 section 1 AkkStelleG in conjunction with § 1 section 1 AkkStelleGBV. DAkKS is designated as the national accreditation authority by Germany according to Art. 4 Para. 4 of Regulation (EC) 765/2008 and clause 4.7 of DIN EN ISO/IEC 17000.

Pursuant to Art. 11 section 2 of Regulation (EC) 765/2008, the accreditation certificate shall be recognised as equivalent by the national authorities within the scope of this Regulation as well as by the WTO member states that have committed themselves in bilateral or multilateral mutual agreements to recognise the certificates of accreditation bodies that are members of ILAC or IAF as equivalent.

DAkKS is a signatory to the multilateral agreements for mutual recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Co-operation (ILAC).

The up-to-date state of membership can be retrieved from the following websites:

EA: www.european-accreditation.org

ILAC: www.ilac.org

IAF: www.iaf.nu

Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-17589-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 10.10.2022

Date of issue: 10.10.2022

Holder of accreditation certificate:

TetraTec Instruments GmbH
Gewerbestraße 8, 71144 Steinenbronn

The calibration laboratory meets the minimal requirements of DIN EN ISO/IEC 17025:2018 and, where applicable, additional legal and normative requirements, including those in relevant sectoral schemes, in order to carry out the conformity assessment activities specified in the partial accreditation certificates listed below:

D- K-17589-01 -01

D- K-17589-01 -02

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and confirm generally with the principles of DIN EN ISO 9001.

This certificate annex is only valid together with the written accreditation certificate and reflects the status as indicated by the date of issue. The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH at <https://www.dakks.de>.

Accreditation



The Deutsche Akkreditierungsstelle attests with this **Partial Accreditation Certificate** that the calibration laboratory

TetraTec Instruments GmbH
Gewerbestraße 8, 71144 Steinenbronn

meets the minimum requirements according to DIN EN ISO/IEC 17025:2018 for the conformity assessment listed in the annex to this certificate. This includes additional existing legal and normative requirements, including those in relevant sectoral schemes.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and confirm generally with the principles of DIN EN ISO 9001.

This accreditation was issued in accordance with Art. 5 Para. 1 Sentence 2 of Regulation (EC) 765/2008, after an accreditation procedure was carried out in compliance with the minimum requirements of DIN EN ISO/IEC 17011 and on the basis of a review and decision of the appointed accreditation committees.

This partial accreditation certificate only applies in connection with the notice of 10.10.2022 with accreditation number D-K-17589-01.

It consists of this cover sheet, the reverse side of the cover sheet and the following annex with a total of 4 pages.

Registration number of the partial accreditation certificate: **D-K-17589-01-01**

It is a part of the accreditation certificate: D-K-17589-01-00.

Berlin, 10.10.2022

Dipl.-Ing. Gabriel Zrenner
Head of Department

Translation issued:
10.10.2022



Dipl.-Ing. Gabriel Zrenner
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Deutsche Akkreditierungsstelle

Annex to the Partial Accreditation Certificate D-K-17589-01-01 according to DIN EN ISO/IEC 17025:2018

Valid from: 17.03.2023

Date of issue: 17.03.2023

This annex is a part of the accreditation certificate D-K-17589-01-00.

Holder of partial accreditation certificate:

TetraTec Instruments GmbH
Gewerbestraße 8, 71144 Steinenbronn

The calibration laboratory meets the requirements of DIN EN ISO/IEC 17025:2018 to carry out the conformity assessment activities listed in this annex. The calibration laboratory meets additional legal and normative requirements, if applicable, including those in relevant sectoral schemes, provided that these are explicitly confirmed below.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and confirm generally with the principles of DIN EN ISO 9001.

Fluid quantities

- Gas flow rate ^{a)}
- Mass of flowing gases ^{a)}
- Volume of flowing gases ^{a)}

Mechanical quantities

- Pressure ^{a)}

Thermodynamic quantities

Temperature quantities

- Resistance thermometers ^{a)}
- Direct reading thermometers ^{a)}
- Temperature transmitters, data loggers ^{a)}
- Temperature indicators and simulators

Humidity quantities

- Relative humidity

^{a)} also on site calibration

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Annex to the Partial Accreditation Certificate D-K-17589-01-01

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Fluid quantities Volume flow rate or volume of flowing gases	0.01 m³/h to 6 m³/h	Drum-type gas meter	0.33 %	Calibration medium: - atmospheric air - decompressed air - synthetic air to max. 30 m³/h
	39 mL/h to 27 L/h	Sonic nozzle gallery	0.31 %	
	27 L/h to 60 m³/h		0.24 %	
	60 m³/h to 1920 m³/h		0.24 %	
	3 m³/h to 1000 m³/h	Low pulsation rotary piston gas meter	0.26 %	Calibration medium: - atmospheric air - decompressed air
	13 m³/h to 10000 m³/h	Turbine gas meter	0.26 %	
	10 L/h to 9000 L/h	Drum-type resp. triple rotary-piston gas meter Calibration medium: - Nitrogen N ₂ - Hydrogen H ₂ - Methan CH ₄ - Helium He - Argon Ar under ambient conditions	0.46 %	
	10 L/h to 1500 L/h	Drum-type gas meter Calibration medium: - Carbon monoxide CO under ambient conditions	0.46 %	
	0.5 L/h to 540 L/h	Laminar flow elements: Calibration medium: - Propane C ₃ H ₈ under ambient conditions	0.40 %	
	> 540 L/h to 600 L/h		0,50 %	
	0,12 mL/h to 3 l/h	Calibration test leak medium air with pVTt method VQ610 at 0.5 to 6 bar rel. and ambient temperature	1,50 % + 7,2 · 10 ⁻⁶ l/h	On AE21 PVTT system
Mass flow rate or mass of flowing gases	12 g/h to 7.2 kg/h	Drum-type gas meter	0.32%	Calibration medium: - atmospheric air - decompressed air - synthetic air to max. 36 kg/h
	47 mg/h to 32 g/h	Sonic nozzle gallery	0.30 %	
	32 g/h to 72 kg/h		0.22 %	
	72 kg/h to 2300 kg/h		0.22 %	Calibration medium: - atmospheric air - decompressed air
	3.6 kg/h to 1200 kg/h	Low pulsation rotary piston gas meter	0.25 %	
	15 kg/h to 12000 kg/h	Turbine gas meter	0.25 %	

Valid from: 17.03.2023

Date of issue: 17.03.2023

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Annex to the Partial Accreditation Certificate D-K-17589-01-01

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Fluid quantities Mass flow rate or mass of flowing gases	12 g/h N ₂ to 10,5 kg/h N ₂ 0.9 g/h H ₂ to 0,75 kg/h H ₂ 6,6 g/h CH ₄ to 5,9 kg/h CH ₄ 1.7g/h He to 1,5 kg/h He 17 g/h Ar to 15 kg/h Ar 12 g/h CO to 1,7 kg/h CO	Drum-type resp. triple rotary-piston gas meter Calibration medium - Nitrogen N ₂ - Hydrogen H ₂ - Methan CH ₄ - Helium He - Argon Ar - Carbon monoxide CO under ambient conditions	0.46 %	
	1 g/h to 1000 g/h	Laminar flow elements Calibration medium - Propane C ₃ H ₈ under ambient conditions	0.40 %	
	>1000 g/h to 1100 g/h		0,50 %	
	0,144 mg/h to 3,6 g/h	Calibration test leak medium air with pVTt method VQ610 at 0.5 to 6 bar rel. and ambient temperature	1,50 % + $7,2 \cdot 10^{-6}$ l/h	On AE21 PVT system
Pressure Negative and positive gauge pressure p_e	-1000 mbar to -50mbar	DKD-R 6-1:2014	$5 \cdot 10^{-3} \text{ mbar} + 4.9 \cdot 10^{-5} \cdot p_e $	Pressure medium: dried compressed air or nitrogen
	> -50 mbar to 30 mbar		$4 \cdot 10^{-4} \cdot p_e $, but not smaller than 0.003 mbar	
	> 30 mbar to 1700 mbar		$3.4 \cdot 10^{-3} \text{ mbar} + 2.9 \cdot 10^{-5} \cdot p_e$	
	> 1.7 bar to 7 bar		$14 \cdot 10^{-3} \text{ mbar} + 3.2 \cdot 10^{-5} \cdot p_e$	
	> 7 bar to 70 bar		$0.14 \text{ mbar} + 3.3 \cdot 10^{-5} \cdot p_e$	
Absolut pressure p_{abs}	14 mbar to 1700 mbar	DKD-R 6-1:2014	$3.4 \cdot 10^{-3} \text{ mbar} + 3.1 \cdot 10^{-5} \cdot p_{abs}$	Pressure medium: dried compressed air or nitrogen
	> 1.7 bar to 7 bar		$14 \cdot 10^{-3} \text{ mbar} + 3.4 \cdot 10^{-5} \cdot p_{abs}$	The uncertainty of the measured residual gas pressure U_{rest} has to be taken into account.
	> 7 bar to 70 bar		$0.14 \text{ mbar} + 3.5 \cdot 10^{-5} \cdot p_{abs}$	

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Annex to the Partial Accreditation Certificate D-K-17589-01-01

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Temperature quantities Resistance thermometers, direct reading thermometers and temperature transmitters with resistance sensors	0 °C to 90 °C	DKD-R 5-1:2018 in liquid bathes	17 mK	Comparison with standard resistance thermometers
	21 °C to 25 °C	DKD-R 5-1:2018 in air channel	0.15 K	Comparison with standard resistance thermometers
	0.01 °C	DKD-R 5-1:2018 triple point of water	5 mK	Calibration at fixed point temperatures.
Simulators for resistance thermometers	0 °C to 90 °C	DKD-R 5-5:2018	5 mK	Comparison with DC resistance standard .
Indicators for resistance thermometers	0 °C to 90 °C	DKD-R 5-5:2018	5 mK	Comparison with reference resistances (fixed resistances of 100 Ω, 110 Ω, 120 Ω, 130 Ω and 140 Ω).
Relative humidity Hygrometers, hygrometric sensors and transmitters	10 % to 95 %	DKD-R 5-8:2019 in humidity generator room temperature Measuring medium: air	$0.1 \% + 7.5 \cdot 10^{-3} \cdot rF$	rF = measured value Comparison with dew point mirror Uncertainty as absolute value of relative humidity.

Valid from: 17.03.2023

Date of issue: 17.03.2023

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Annex to the Partial Accreditation Certificate D-K-17589-01-01

On-site Calibration

Calibration and Measurement Capabilities (CMC)				
Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Fluid quantities Volume flow rate or volume of flowing gases	160 m³/h to 1600 m³/h	Turbine gas meter	0.34 %	Calibration medium: - atmospheric air - decompressed air Medium supply must be provided by customer.
	1.6 m³/h to 250 m³/h	Rotary piston gas meter	0.34 %	
	> 530 m³/h to 4700 m³/h	Laminar flow elements	0.39 %	
	10 L/h to 530 m³/h		0.38 %	
	60 mL/h to < 10 L/h		0.43 %	
Mass flow rate or mass of flowing gases	192 kg/h to 1920 kg/h	Turbine gas meter	0.33 %	
	1.9 kg/h to 300 kg/h	Rotary piston gas meter	0.33 %	
	> 635 kg/h to 5640 kg/h	Laminar flow elements	0.39 %	
	12 g/h to 635 kg/h		0.37 %	
	72 mg/h to < 12 g/h		0.42 %	
Temperature quantities Resistance thermometers, direct reading thermometers and transmitters with resistance sensors	5 °C to 50 °C	DKD-R 5-1:2018 in liquid bath	0,075 K	Comparison with standard resistance thermometers
	10 °C to 50 °C	DKD-R 5-1:2018 in dry block calibrator	0,25 K	
Pressure Negative and positive gauge pressure p_e	-680 mbar to -68 mbar	DKD-R 6-1:2014	0,5 mbar	Pressure medium: dried compressed air or nitrogen
	> -68 mbar to 68 mbar		$1,5 \cdot 10^{-3} \cdot p_e $, but not smaller than 0,01 mbar	
	> 68 mbar to 680 mbar		0,5 mbar	
	> 0,68 bar to 6,8 bar		1,5 mbar	
Absolut pressure p_{abs}	400 mbar to 1200 mbar	DKD-R 6-1:2014	0,5 mbar	$p_{abs} = p_e + p_{amb}$ p_{amb} : atmospheric air pressure
	> 1,2 bar to 7 bar		1,75 mbar	

Abbreviations used:

CMC Calibration and measurement capabilities

DKD-R Guideline of Deutscher Kalibrierdienst (DKD), issued by Physikalisch-Technische Bundesanstalt PTB

Valid from: 17.03.2023

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Page 5 of 5

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Accreditation



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TetraTec Instruments GmbH
Gewerbestraße 8, 71144 Steinenbronn

meets the minimum requirements according to DIN EN ISO/IEC 17025:2018 for the conformity assessment listed in the annex to this certificate. This includes additional existing legal and normative requirements, including those in relevant sectoral schemes.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and confirm generally with the principles of DIN EN ISO 9001.

This accreditation was issued in accordance with Art. 5 Para. 1 Sentence 2 of Regulation (EC) 765/2008, after an accreditation procedure was carried out in compliance with the minimum requirements of DIN EN ISO/IEC 17011 and on the basis of a review and decision of the appointed accreditation committees.

This partial accreditation certificate only applies in connection with the notice of 10.10.2022 with accreditation number D-K-17589-01.

It consists of this cover sheet, the reverse side of the cover sheet and the following annex with a total of 2 pages.

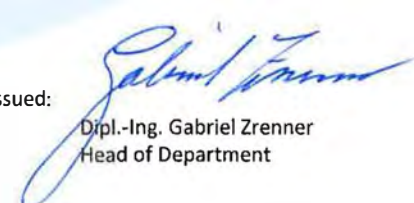
Registration number of the partial accreditation certificate: **D-K-17589-01-02**

It is a part of the accreditation certificate: D-K-17589-01-00.

Berlin, 10.10.2022

Dipl.-Ing. Gabriel Zrenner
Head of Department

Translation issued:
10.10.2022



Dipl.-Ing. Gabriel Zrenner
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Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-17589-01-02 according to DIN EN ISO/IEC 17025:2018

Valid from: 10.10.2022

Date of issue: 10.10.2022

Holder of accreditation certificate:

TetraTec Instruments GmbH
Gewerbestraße 8, 71144 Steinenbronn

The calibration laboratory meets the minimal requirements of DIN EN ISO/IEC 17025:2018 and, if applicable, additional legal and normative requirements, including those in relevant sectoral schemes, in order to carry out the conformity assessment activities listed below.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and confirm generally with the principles of DIN EN ISO 9001.

Calibration in the fields:

Electrical quantities

DC and low frequency quantities

- DC voltage
- DC current

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Annex to the Accreditation Certificate D-K-17589-01-02

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Electrical quantities				
DC voltage	0 mV to 120 mV	with system multimeter	$50 \cdot 10^{-6} \cdot U + 3.5 \mu\text{V}$	U = measured value
Measuring devices and sources	> 120 mV to 1.2 V		$40 \cdot 10^{-6} \cdot U + 7 \mu\text{V}$	
	> 1.2 V to 12 V		$45 \cdot 10^{-6} \cdot U + 50 \mu\text{V}$	
	> 12 V to 60 V		$45 \cdot 10^{-6} \cdot U + 0.6 \text{ mV}$	
DC current	0 mA to 12 mA	with system multimeter	$50 \cdot 10^{-6} \cdot I + 1 \mu\text{A}$	I = measured value
Measuring devices and sources	> 12 mA to 20 mA		$30 \cdot 10^{-6} \cdot I + 1.4 \mu\text{A}$	
	> 20 mA to 120 mA		$0.5 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	> 120 mA to 1 A		$1 \cdot 10^{-3} \cdot I + 0.1 \text{ mA}$	
	> 1 A to 3 A		$1.2 \cdot 10^{-3} \cdot I + 0.6 \text{ mA}$	
DC resistance	0 Ω to 120 Ω	with system multimeter or resistance meter	$2 \cdot 10^{-6} \cdot R + 0.75 \text{ m}\Omega$	R = measured value
Resistances	> 120 Ω to 150 Ω		$5 \cdot 10^{-6} \cdot R + 0.75 \text{ m}\Omega$	
	> 150 Ω to 1.2 k Ω		$0.1 \cdot 10^{-3} \cdot R + 100 \text{ m}\Omega$	
	> 1.2 k Ω to 12 k Ω		$0.1 \cdot 10^{-3} \cdot R + 100 \text{ m}\Omega$	
	> 12 k Ω to 120 k Ω		$0.1 \cdot 10^{-3} \cdot R + 1 \Omega$	
	> 120 k Ω to 1.2 M Ω		$0.1 \cdot 10^{-3} \cdot R + 10 \Omega$	
	> 1.2 M Ω to 12 M Ω		$0.4 \cdot 10^{-3} \cdot R + 100 \Omega$	
DC resistance	50 Ω	with fixed resistances	0.25 m Ω	
Measuring devices	100 Ω ; 110 Ω ; 120 Ω ; 130 Ω ; 140 Ω		0.50 m Ω	

Abbreviations used:

CMC Calibration and measurement capabilities