

Certificato di Taratura
Certificate of Calibration

00171LAT XXXXXXXX

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- data di emissione -
date of issue
- cliente -
customer
- destinatario -
receiver

Si riferisce a

referring to

- oggetto -
item Catena manometrica (indicatore in linea con sonda)
Manometric Chain (Indicator + Probe)
- costruttore -
manufacturer
- modello -
model
- matricola -
serial number
- data di ricevimento -
date of receipt of item
- data delle misure -
date of measurements
- registro di laboratorio -
laboratory reference

Il presente certificato di taratura è emesso in base all'accreditamento n. 00171 Calibration che attesta le capacità di misura e di taratura, le competenze metrologiche del Centro e la riferibilità delle tarature eseguite ai campioni nazionali e internazionali delle unità di misura del Sistema Internazionale delle Unità (SI) in conformità ai requisiti della norma UNI CEI EN ISO/IEC 17025. L'accreditamento è rilasciato in accordo ai decreti attuativi della legge n. 273/1991 che ha istituito il Sistema Nazionale di Taratura (SNT).

This certificate of calibration is issued in compliance with the accreditation n. 00171 Calibration attesting the calibration and measurement capability, the metrological competence of the Centre and the traceability of calibration results to the national and international standards of the International System of Units (SI) in compliance with requirements of ISO/IEC 17025. The accreditation is granted according to decrees connected with Italian law No. 273/1991 which has established the National Calibration System.

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure di taratura citate alla pagina seguente, dove sono specificati anche i campioni o gli strumenti che garantiscono la catena di riferibilità del Centro e i rispettivi certificati di taratura in corso di validità. Essi si riferiscono esclusivamente all'oggetto in taratura e sono validi nel momento e nelle condizioni di taratura, salvo diversamente specificato.

The measurement results reported in this Certificate were obtained following the calibration procedures given in the following page, where the reference standards or instruments are indicated which guarantee the traceability chain of the laboratory, and the related calibration certificates in the course of validity are indicated as well. They relate only to the calibrated item and they are valid for the time and conditions of calibration, unless otherwise specified.

Le incertezze di misura dichiarate in questo documento sono state determinate conformemente alla ISO/IEC Guide 98-3 e al documento EA-4/02. Solitamente sono espresse come incertezza estesa ottenuta moltiplicando l'incertezza tipo per il fattore di copertura k corrispondente ad un livello di fiducia di circa il 95 %. Normalmente tale fattore k vale 2.

The measurement uncertainties stated in this document have been determined according to the ISO/IEC Guide 98-3 and to EA-4/02. Usually, they have been estimated as expanded uncertainty obtained multiplying the standard uncertainty by the coverage factor k corresponding to a confidence level of about 95%. Normally, this factor k is 2.

Direzione tecnica
Approving Officer

Certificato di Taratura

00171LAT XXXXXXXX

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Certificate of Calibration

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure N.
The measurement results reported in this Certificate were obtained following procedures No.

DHLP-E-21 Rev. 8

La catena di riferibilità ha inizio dai campioni di prima linea N° *Traceability is through first line standards No.*

Bilancia di pressione s/n 53050 - *Pressure balance s/n 53050:*

accoppiamento bassa pressione TL-1471, accoppiamento alta pressione V-1487, set di masse s/n 53057 muniti di certificati validi di taratura rispettivamente - - - - -

piston cylinder assembly TL-1471, piston cylinder assembly V-1487, masses s/n 53057 validated by certificates of calibration - - - - -

Misuratore numerico di pressione s/n 6422 - *Pressure digital meter s/n 6422:*

accoppiamento alta pressione 6424-7910-7911 (certificato di taratura - - - - -)

Set di masse s/n 3506 (certificato di taratura - - - - -)

piston cylinder assembly 6424-7910-7911 (calibration certificate - - - - -)

Masses s/n 3506 (calibration certificate - - - - -)

Multimetro 2823A21870 (certificato di taratura - - - - -)

Multimeter 2823A21870 (calibration certificate - - - - -)

CONDIZIONI AMBIENTALI DI TARATURA - ENVIRONMENTAL CONDITIONS :

Temperatura - *Temperature :* (23 ± 1) °C
Umidità relativa - *Relative Humidity :* (50 ± 20) %R.H.
Pressione atmosferica - *Atmospheric pressure :* (1013 ± 30) hPa

CONDIZIONI DI TARATURA - CALIBRATION CONDITIONS

Ampiezza del campo: 20 bar pressione relativa
Pressure Full Scale: 1100 hPa absolute pressure
Campo di taratura: Da 0 bar a 20 bar
Calibration range: From 0 bar to 20 bar
Risoluzione: 0,01 bar
Resolution:
Fluido di taratura: Aria secca
Pressure transfer medium: Dry air
Installazione: Verticale
Installation: Vertical
Riferimento: Base dell'attacco
Reference: Pressure input
Alimentazione: Batteria
Power supply: Battery

I risultati valgono per lo strumento nello stato in cui è pervenuto al laboratorio e consegnato al committente.
Calibration results refer to the instrument as received by the laboratory and delivered to the customer.

Questo certificato è redatto con riferimento alla linea guida Euramet CG-17 per quanto riguarda contenuti e terminologia.
Euramet CG-17 guideline is used as reference for this certificate.

Certificato di Taratura
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RISULTATI DELLA TARATURA TIPO BASE - BASE CALIBRATION RESULTS

Oggetto Catena manometrica (indicatore in linea con sonda)
Item *Manometric Chain (Indicator + Probe)*
Costruttore -
Manufacturer
Modello -
Model
Matricola -
Serial Number

Canale B
Channel

Riferimento Reference	Lettura Reading	Ripetibilità Repeatability	Errore Error	Incertezza - Uncertainty	
P_{ref} /bar	P_{read} /bar	/bar	$P_{read} - P_{ref}$ /bar	con correzioni ¹ with corrections ¹ U_m /bar	senza correzioni ² without corrections ² $U_{m'}$ /bar
Pressione crescente - Increasing pressure					
0,000	0,000	0,000	0,000	0,040	0,040
2,000	2,000		0,000	0,040	0,040
6,000	6,000		0,000	0,040	0,040
9,999	10,000		0,001	0,040	0,041
15,998	16,010		0,012	0,040	0,052
19,998	20,010		0,012	0,040	0,052
Pressione decrescente - Decreasing pressure					
19,998	20,010	0,000	0,012	0,040	0,052
15,998	16,010		0,012	0,040	0,052
9,999	10,000		0,001	0,040	0,041
6,000	6,000		0,000	0,040	0,040
2,000	2,000		0,000	0,040	0,040
0,000	0,000		0,000	0,040	0,040

¹ L'incertezza U_m è la somma in quadratura dei contributi delle incertezze tipo della pressione di riferimento, risoluzione, ripetibilità e deriva di zero dello strumento in taratura. L'incertezza estesa di misura dello strumento U_m si considera quando l'utente corregge le letture dello strumento sottraendone l'errore.

¹ Uncertainty U_m is the combination of the following contributions: reference pressure uncertainty, resolution, repeatability and zero drift of instrument. Measurement expanded uncertainty U_m has to be considered when user corrects the indications, subtracting the indication errors.

² L'incertezza estesa di misura $U_{m'}$ si considera quando l'utente non corregge le letture.

L'incertezza estesa di misura $U_{m'}$ è la somma di U_m con il modulo dell'errore.

² Measurement expanded uncertainty $U_{m'}$ has to be considered when user doesn't correct the instrument indications.

Measurement expanded uncertainty $U_{m'}$ is the sum of U_m with absolute value of error.

L'indicazione al punto di zero dello strumento tra l'inizio e la fine della taratura è derivata di: 0,000 bar.

Zero instrument indication drift, between the beginning and the end of the calibration, has been: 0,000 bar.

Le letture dello strumento in salita e in discesa sono state corrette rispettivamente per la lettura alla pressione atmosferica iniziale di 0,000 bar e finale di 0,000 bar.

Up and Down indications have been corrected respectively for the beginning indication at atmospheric pressure of 0,000 bar and the final indication at atmospheric pressure of 0,000 bar.

Werkskalibrierschein

Proprietary Calibration Certificate



senseca

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Kalibrierzeichen / Calibration mark



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Kalibriergegenstand / Calibration item

ECO 240-1

Seriennummer / Serial number

Hersteller / Manufacturer

Senseca Germany GmbH
Hans-Sachs-Straße 26
93128 Regenstein

Auftraggeber / Customer

Auftragsnummer / Order number

Datum der Kalibrierung / Date of Calibration

Anzahl der Seiten / Number of pages

3

Dieser Werkskalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Am Kalibriergegenstand (KG) ist eine Klebmarke angebracht, die mit der Kalibriernummer dieses Werkskalibrierscheines sowie dem Kalibriermonat und Jahr versehen wurde.

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 measurements according to the International Systems of units (SI). The calibration label fixed to the calibration item contains number, month and year of the calibration. The client is responsible for an appropriate calibration interval.

Dieser Werkskalibrierschein darf nur vollständig und unverändert weiterverbreitet werden.

Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums.

Werkskalibrierscheine 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

Date

Leiter des Kalibrierlaboratoriums

Head of calibration laboratory

Sachbearbeiter

Person responsible

Alexandra König-Gerbersdorf

Werkskalibrierschein

Proprietary Calibration Certificate

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Kalibrierzeichen / Calibration mark



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Kalibriergegenstand / Calibration item

Messgerät <i>Instrument</i>	Seriennummer <i>Serial number</i>	Messstellennummer <i>Tag number</i>	Messbereich <i>Measuring range</i>
ECO 240-1	---	---	(0 ... 1700) hPa a

Anzeige und Drucksensor können nur in der angegebenen Kombination die Kalibrierergebnisse wiedergeben.*The calibration results can only be reproduced, in the specified combination of the indicator and pressure sensor.*

Werksnorm / Reference standard / WN

Gerätebezeichnung <i>Device name</i>	Hersteller <i>Manufacturer</i>	Seriennummer <i>Serial number</i>	Messbereich <i>Measuring range</i>	Kalibrierzeichen <i>Calibration mark</i>
CPC 8000 (10abs)	Mensor	410000DQ	(0 ... 11000) mbar a	C01109127382, 01-2026 (*)

Die Rückführung auf nationale Normale ist somit gegeben.*Traceability to recognized national standards is given.*

Kalibrierverfahren / Calibration methods

Vergleichsmessung des Kalibriergegenstandes mit dem Werksnorm in einer Druckleitung. Die Lage des Sensors während der Kalibrierung war waagrecht. Dieser Kalibrierschein wurde mit WIKA-Cal Version 3.4.0.230 erstellt.

Comparison of the calibration item with the reference standard in a pressure tube. The position of the sensor during the calibration was horizontal. This calibration certificate has been created with WIKA-Cal version 3.4.0.230.

Die Kalibrierung erfolgte in Anlehnung an die DKD-Richtlinie DKD-R 6-1, 03/2014*The calibration has been done according to the DKD-directive DKD-R 6-1, 03/2014*

Umgebungsbedingungen / Environmental conditions

Temperatur <i>Temperature</i>	Luftdruck <i>Atmospheric pressure</i>	Luftfeuchte <i>Air humidity</i>
24°C ± 2°C	977mbar ± 2mbar	55%RH ± 5%RH

Werkskalibrierschein

Proprietary Calibration Certificate

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Kalibrierzeichen / Calibration mark



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Prüfergebnisse vor Justage / Results before adjustment

ECO 240-1

Werksnorm / WN Reference standard	Kalibriergegenstand / KG Calibration item
hPa	hPa
---	---
---	---

Der Kalibriergegenstand wurde nicht justiert.

The calibration item has not been adjusted.

Prüfergebnisse nach Justage / Results after adjustment

ECO 240-1

Werksnorm / WN Reference standard	Kalibriergegenstand / KG Calibration item		Mess- unsicherheit Uncertainty of measurement
Solldruck Desired value	Istdruck / auf / up	Actual value ab / down	Abweichung Deviation
hPa	hPa	hPa	hPa
10,00	9,6	9,7	-0,3
340,00	339,7	339,7	-0,3
680,00	679,7	679,8	-0,2
1020,00	1019,8	1019,8	-0,2
1360,00	1359,8	1359,8	-0,2
1700,00	1699,6	1699,6	-0,4

Konformitätsaussage / Statement of compliance

Der Kalibriergegenstand hält die geforderte Spezifikation ein!
 The calibration item keeps the required specification!

Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardmessunsicherheit durch Multiplikation mit dem Erweiterungsfaktor $k=2$ (Normalverteilung) ergibt. Sie wurde in Anlehnung an die Richtlinie EA-4/02 M:2022 ermittelt. Der Wert der Messgröße liegt mit einer Wahrscheinlichkeit von 95% im zugeordneten Werteintervall.

The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor $k=2$ (normal distribution). It has been determined in accordance with EA-4/02 M:2022. The value of the measurand lies within the assigned range of values with a probability of 95%.

(*): Traceability to recognized national standards with accredited calibration are accepted in the following countries:

Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.
 Argentina, Australia, Brazil, Canada, Chile, People's Republic of China, Costa Rica, Cuba, Ecuador, Egypt, Guatemala, Hong Kong China, India, Indonesia, Israel, Japan, Kazakhstan, Republic of Korea, Malaysia, Mexico, New Zealand, Pakistan, Papua New Guinea, Philippines, Russian Federation, Singapore, South Africa, Sri Lanka, Chinese Taipei, Thailand, Tunisia, United Arab Emirates, United States of America, Uruguay and Vietnam.



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Kalibrierzeichen / Calibration mark



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Kalibriergegenstand / Calibration item

GMH 3151
MSD 400 MRE
MSD-K31

Seriennummer / Serial number

Hersteller / Manufacturer

GHM Messtechnik GmbH
Hans-Sachs-Straße 26
93128 Regenstauf

Auftraggeber / Customer

Auftragsnummer / Order number

Datum der Kalibrierung / Date of Calibration

Anzahl der Seiten / Number of pages

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Dieser Werkskalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Am Kalibriergegenstand (KG) ist eine Klebmarke angebracht, die mit der Kalibriernummer dieses Werkskalibrierscheines sowie dem Kalibriermonat und Jahr versehen wurde.

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 measurements according to the International Systems of units (SI). The calibration label fixed to the calibration item contains number, month and year of the calibration. The client is responsible for an appropriate calibration interval.

Dieser Werkskalibrierschein darf nur vollständig und unverändert weiterverbreitet werden.

Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums.

Werkskalibrierscheine 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

Date

Leiter des Kalibrierlaboratoriums

head of calibration laboratory

Sachbearbeiter

Person responsible



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Kalibrierzeichen / Calibration mark



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Kalibriergegenstand / Calibration item

Messgerät <i>Instrument</i>	Seriennummer <i>Serial number</i>	Messstellennummer <i>Tag number</i>	Messbereich <i>Measuring range</i>
GMH 3151 MSD 400 MRE	---		(0 ... 400) mbar g

Anzeige und Drucksensor können nur in der angegebenen Kombination die Kalibrierergebnisse wiedergeben.

The calibration results can only be reproduced, in the specified combination of the indicator and pressure sensor.

Werksnorm / Reference standard / WN

Gerätebezeichnung <i>Device name</i>	Hersteller <i>Manufacturer</i>	Seriennummer <i>Serial number</i>	Messbereich <i>Measuring range</i>	Kalibrierzeichen <i>Calibration mark</i>
CPG 2500	Mensor	720311	(0 ... 500) mbar g	01108794325, 09-2025 (*)

Die Rückführung auf nationale Normale ist somit gegeben.

Traceability to recognized national standards is given.

Kalibrierverfahren / Calibration methods

Vergleichsmessung des Kalibriergegenstandes mit dem Werksnorm in einer Druckleitung. Die Lage des Sensors während der Kalibrierung war senkrecht. Dieser Kalibrierschein wurde mit WIKA-Cal Version 3.4.0.230 erstellt.

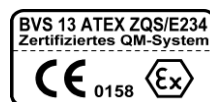
Comparison of the calibration item with the reference standard in a pressure tube. The position of the sensor during the calibration was vertical. This calibration certificate has been created with WIKA-Cal version 3.4.0.230.

Die Kalibrierung erfolgte in Anlehnung an die DKD-Richtlinie DKD-R 6-1, 03/2014

The calibration has been done according to the DKD-directive DKD-R 6-1, 03/2014

Umgebungsbedingungen / Environmental conditions

Temperatur <i>Temperature</i>	Luftdruck <i>Atmospheric pressure</i>	Luftfeuchte <i>Air humidity</i>
22°C ± 2°C	974mbar ± 2mbar	59%RH ± 5%RH



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Kalibrierzeichen / Calibration mark

Prüfergebnisse vor Justage / Results before adjustment

GMH 3151 + MSD 400 MRE

Werksnorm / WN Reference standard	Kalibriergegenstand / KG Calibration item
mbar	mbar
---	---
---	---

Der Kalibriergegenstand wurde nicht justiert.

The calibration item has not been adjusted.

Prüfergebnisse nach Justage / Results after adjustment

GMH 3151 + MSD 400 MRE

Werksnorm / WN Reference standard	Kalibriergegenstand / KG Calibration item		Mess- unsicherheit Uncertainty of measurement
	Istdruck / Actual value auf / up	Abweichung Deviation	
Solldruck Desired value			
mbar	mbar	mbar	mbar
0,00	0,3	0,2	0,3
40,00	40,3	40,3	0,3
80,00	80,3	80,2	0,3
120,00	120,4	120,3	0,4
160,00	160,3	160,3	0,3
200,00	200,3	200,3	0,3
240,00	240,3	240,3	0,3
280,00	280,3	280,3	0,3
320,00	320,3	320,3	0,3
360,00	360,3	360,3	0,3
400,00	400,3	400,3	0,3

Konformitätsaussage / Statement of compliance

Der Kalibriergegenstand hält die geforderte Spezifikation ein!

The calibration item keeps the required specification!

Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardmessunsicherheit durch Multiplikation mit dem Erweiterungsfaktor $k=2$ (Normalverteilung) ergibt. Sie wurde in Anlehnung an die Richtlinie EA-4/02 M:2022 ermittelt. Der Wert der Messgröße liegt mit einer Wahrscheinlichkeit von 95% im zugeordneten Werteintervall.

The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor $k=2$ (normal distribution). It has been determined in accordance with EA-4/02 M:2022. The value of the measurand lies within the assigned range of values with a probability of 95%.

(*): Traceability to recognized national standards with accredited calibration are accepted in the following countries:

Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Argentina, Australia, Brazil, Canada, Chile, People's Republic of China, Costa Rica, Cuba, Ecuador, Egypt, Guatemala, Hong Kong China, India, Indonesia, Israel, Japan, Kazakhstan, Republic of Korea, Malaysia, Mexico, New Zealand, Pakistan, Papua New Guinea, Philippines, Russian Federation, Singapore, South Africa, Sri Lanka, Chinese Taipei, Thailand, Tunisia, United Arab Emirates, United States of America, Uruguay and Vietnam.