



# Kalibrierschein

Calibration Certificate

**Gegenstand:** Coriolis-Durchflussmessgerät, DN25  
*Object:* Coriolis flowmeter

**Hersteller:** systec Controls, Germany  
*Manufacturer:*

**Typ:** SMF1200-025N  
*Type:*

**Kennnummer:** S/N: 22010012  
*Serial No.:*

**Auftraggeber:** systec Controls Mess- und Regeltechnik GmbH  
*Applicant:* Lindberghstraße 4  
82178 Puchheim  
Germany

**Anzahl der Seiten:** 4  
*Number of pages:*

**Geschäftszeichen:** PTB - 1.5 - 4111030  
*Reference No.:*

**Kalibrierzeichen:** PTB - 15001 - 23  
*Calibration mark:*

**Datum der Kalibrierung:** 2023-01-09 and 2023-01-10  
*Date of calibration:*

**Im Auftrag** Braunschweig, 2023-03-01  
*On behalf of PTB*

**Im Auftrag**  
*On behalf of PTB*

391 00B n

Dr. E. Frahm

**Siegel**  
*Seal*



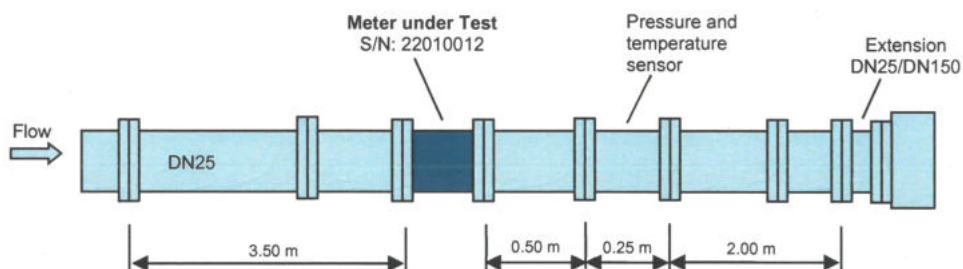
F. Bürsing

# Physikalisch-Technische Bundesanstalt

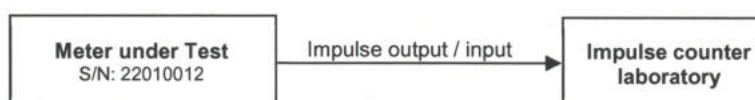
Seite 2 zum Kalibrierschein vom 2023-03-01, Kalibrierzeichen: PTB - 15001 - 23  
Page 2 of the Calibration Certificate dated 2023-03-01, calibration mark: PTB - 15001 - 23

**Operation mode:** Flying Start-Stop, Direct pumping, Gravimetric reference

## Installation:



## Electronical connection:



**Note:** Meter under Test was provided by the applicant



Installation of meter under test (MUT) in calibration line

**Test medium:** Water:

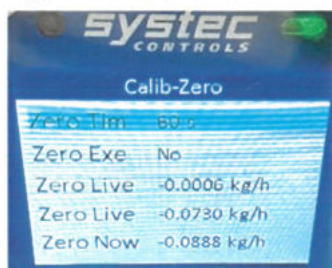
- Average density: 998.35 kg/m<sup>3</sup>
- Average pressure: 3.00 bar (downstream of MUT)
- all given pressure values of test fluid are related to gauge pressure
- Average temperature: 19.97 °C

**Conditions:**

Air pressure: 1001.33 mbar	Air temperature: 18.93 °C
Air humidity: 41.58 %	Air density: 1.19 kg/m <sup>3</sup>

**Test meter parameter:** Adjusted  $K_m$ -factor: 2000.0 pulses/kg (nominal  $K_m$ -factor)  
(Reference value for rel. measurement deviation)

## Preparations before calibration:



- Installation of the setup
- warm up of MUT at several flowrates (up to 4.00 t/h) for four hours
- stop flowrate
- 3 x autozero setting, final value: -0.0888 kg/h
- total counted pulses during 186.0162 s at zero flow: 54 pulses

# Physikalisch-Technische Bundesanstalt

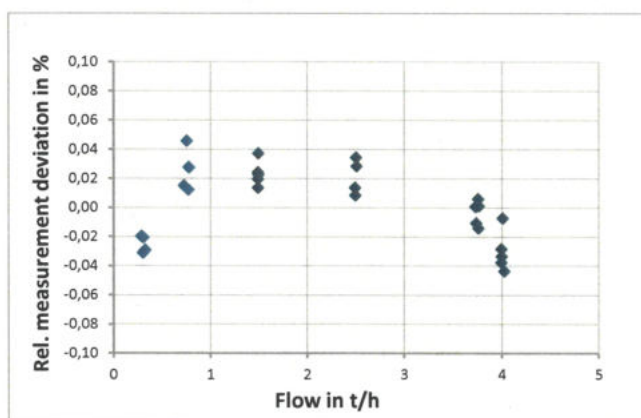
Seite 3 zum Kalibrierschein vom 2023-03-01, Kalibrierzeichen: PTB - 15001 - 23

Page 3 of the Calibration Certificate dated 2023-03-01, calibration mark: PTB - 15001 - 23

## Calibration results:

Table - Mean values

Gravimetric standard					Test fluid conditions		Meter under test				Measurement uncertainty
Date	No.	Flow	Measurement time	Mass	Pressure	Temperature	Pulses	$K_m$ -factor Measurement	Measurement deviation		$U_{rel}$ ( $k = 2$ )
		mean	mean	mean	mean	mean	mean	mean	mean	standard deviation	combined uncertainty
		[t/h]	[s]	[kg]	[bar]	[°C]	[pulses]	[pulses/kg]	[%]	[%]	[%]
09.01.23	1	0.309	1200.109	103.02566	3.01	19.96	205997	1999.48	-0.03	0.006	0.02
09.01.23	2	0.762	480.112	101.61942	2.98	20.03	203291	2000.51	0.03	0.013	0.02
10.01.23	3	1.494	648.107	268.99134	2.99	19.90	538108	2000.47	0.02	0.009	0.02
10.01.23	4	2.506	388.896	270.66859	2.99	19.98	541569	2000.42	0.02	0.012	0.02
10.01.23	5	3.752	259.302	270.23855	3.00	19.97	540458	1999.93	0.00	0.009	0.02
10.01.23	6	4.006	243.105	270.49810	3.01	19.96	540833	1999.40	-0.03	0.014	0.02



The calibration results (Table) represent average values. Each of these values was calculated from five individual measurements (diagram), only set point No. 4 was averaged based on four measurements.

The combined uncertainty of the measurements represents the expanded measurement uncertainty which is based on a standard uncertainty multiplied by a coverage factor  $k = 2$ . This provides a level of confidence of 95 %. The estimate of the standard uncertainty has been carried out with the methods recommended in the „Guide to the Expression of Uncertainty in Measurement“ of ISO.

The represented value of  $U_{rel}$  was estimated in accordance to ILAC-P14 12/2010:  $U_{rel}$  additionally includes short-term contributions during calibration.

# Physikalisch-Technische Bundesanstalt

Seite 4 zum Kalibrierschein vom 2023-03-01, Kalibrierzeichen: PTB - 15001 - 23  
Page 4 of the Calibration Certificate dated 2023-03-01, calibration mark: PTB - 15001 - 23

**Die Physikalisch-Technische Bundesanstalt (PTB)** in Braunschweig und Berlin ist das nationale Metrologieinstitut und die technische Oberbehörde der Bundesrepublik Deutschland für das Messwesen. Die PTB gehört zum Geschäftsbereich des Bundesministeriums für Wirtschaft und Klimaschutz. Sie erfüllt die Anforderungen an Kalibrier- und Prüflaboratorien auf der Grundlage der DIN EN ISO/IEC 17025.

Zentrale Aufgabe der PTB ist es, die gesetzlichen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI) darzustellen, zu bewahren und weiterzugeben. Die PTB steht damit an oberster Stelle der metrologischen Hierarchie in Deutschland. Die Kalibrierscheine der PTB dokumentieren eine auf nationale Normale rückgeführte Kalibrierung.

Dieser Ergebnisbericht ist in Übereinstimmung mit den Kalibrier- und Messmöglichkeiten (CMCs), wie sie im Anhang C des gegenseitigen Abkommens (MRA) des Internationalen Komitees für Maße und Gewichte enthalten sind. Im Rahmen des MRA wird die Gültigkeit der Ergebnisberichte von allen teilnehmenden Instituten für die im Anhang C spezifizierten Messgrößen, Messbereiche und Messunsicherheiten gegenseitig anerkannt (nähere Informationen unter <http://www.bipm.org>).



**The Physikalisch-Technische Bundesanstalt (PTB)** in Braunschweig and Berlin is the National Metrology Institute and the supreme technical authority of the Federal Republic of Germany for metrology. The PTB comes under the auspices of the Federal Ministry of Economic Affairs and Climate Action. It meets the requirements for calibration and testing laboratories as defined in DIN EN ISO/IEC 17025.

The central task of PTB is to realize, to maintain and to disseminate the legal units in compliance with the International System of Units (SI). PTB thus is at the top of the metrological hierarchy in Germany. The calibration certificates issued by PTB document a calibration traceable to national measurement standards.

This certificate is consistent with the Calibration and Measurement Capabilities (CMCs) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures (CIPM). Under the MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (for details, see <http://www.bipm.org>).

- End of Calibration Certificate -