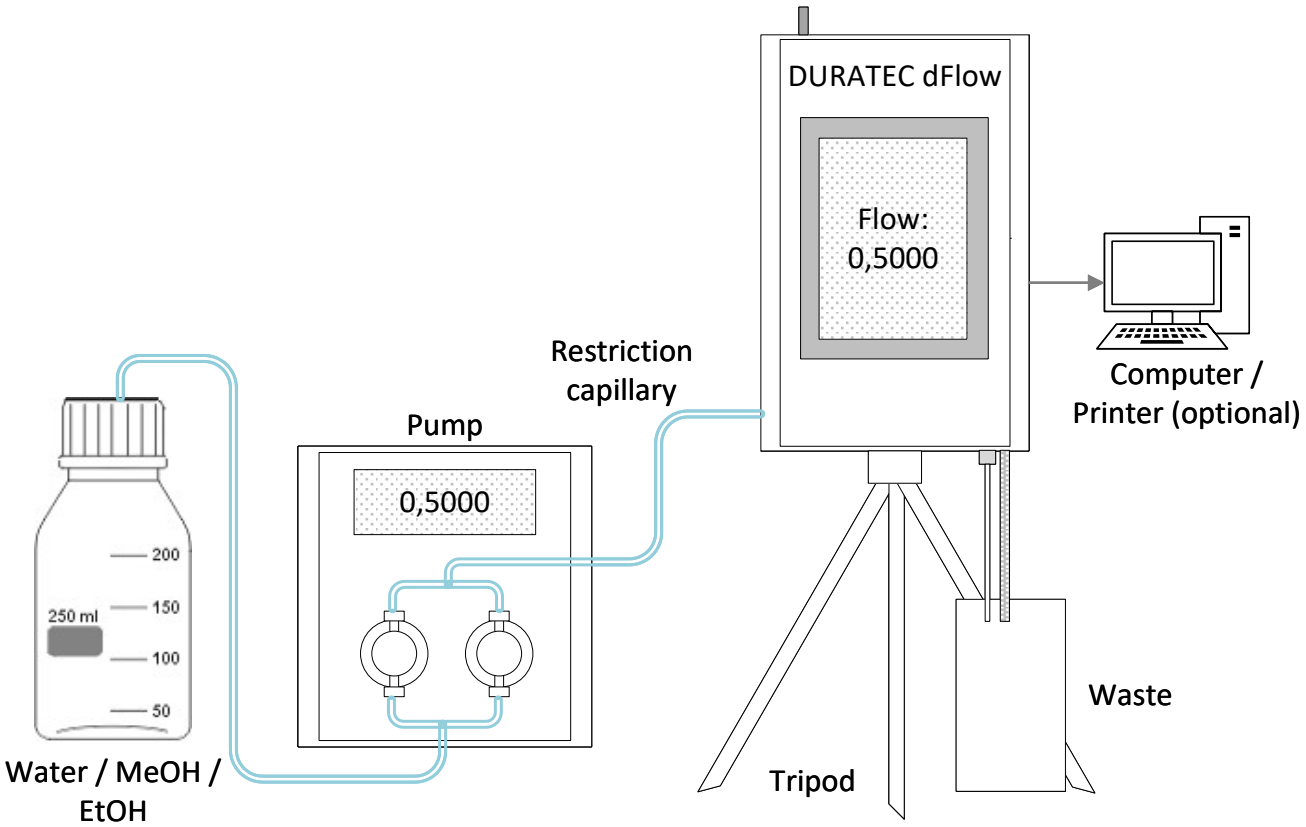
# d.Flow

Flowmeter

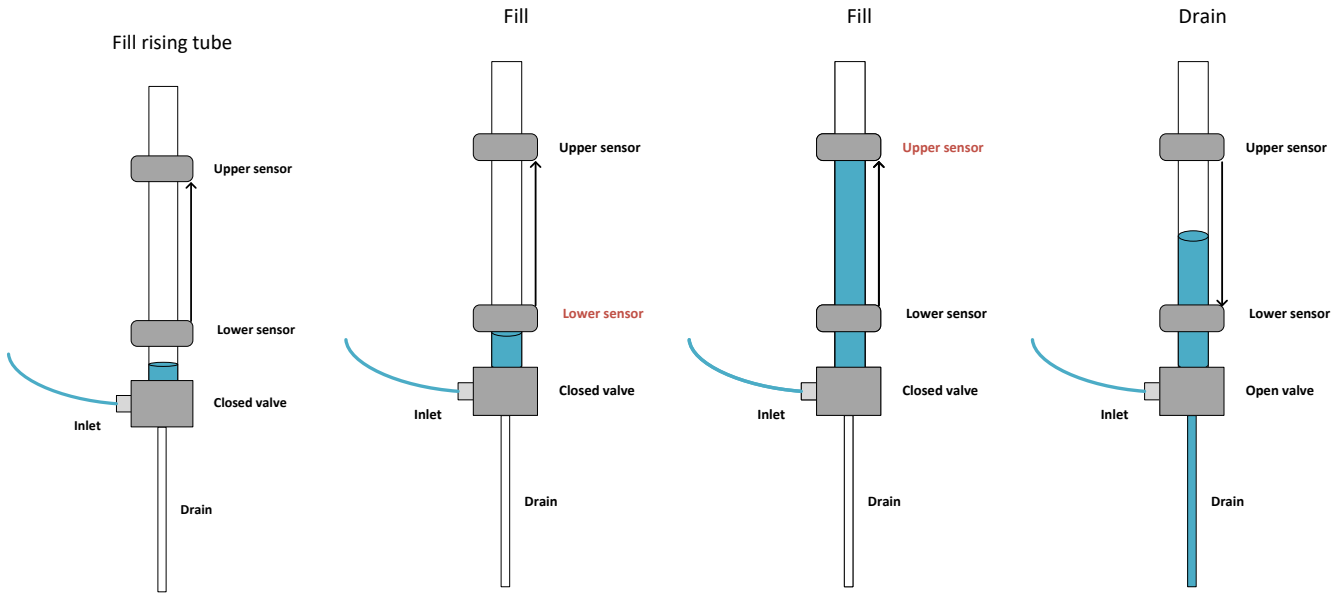
The flowmeter is especially designed for checking the accuracy and fluctuation of HPLC or dosing pumps. The device is calibrated and traceable according to DKD or NIST. The flowmeter is supplied with a power adapter, tripod, test certificate and transport case.

**Figure 1: Operating schematic**



# Operating principle

### Figure 2: Measuring cycle




The flowmeter d.Flow determines the actual flow rate of a liquid flow. For this purpose, the time to fill a measuring tube with constant volume is determined. The display shows the measured value and the filling level. The measured values could be logged or transmitted directly via RS232.

The measurement is volumetric by opto-electronic detection of the liquid level in a rising pipe. The time that passes between reaching a lower and an upper level is being measured and the flow is being calculated. After the upper level has been reached, the rising pipe will be drained via a magnetic valve and the measurement can start again.
Density and temperature of the medium do not matter due to the volumetric measuring principle. Due to the low surface tension, water, ethanol or methanol are recommended.

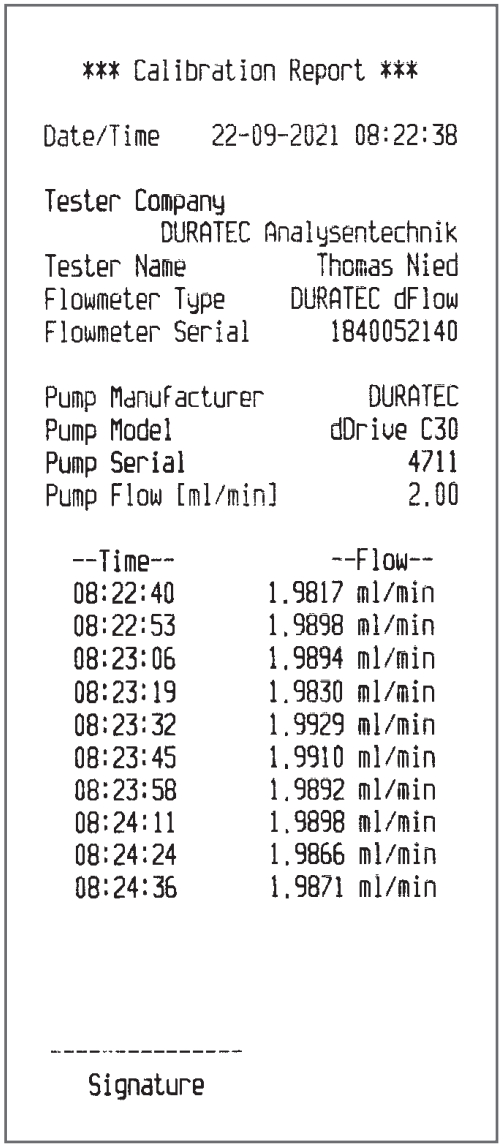
# Advanced features

**Detailed measurement protocol**

**Printing function**

**Data logger**

**Data transfer to PC**



*** Calibration Report ***

Date/Time 22-09-2021 08:22:38

Tester Company
DURATEC Analysentechnik
Tester Name Thomas Nied
Flowmeter Type DURATEC dFlow
Flowmeter Serial 1840052140

Pump Manufacturer DURATEC
Pump Model dDrive C30
Pump Serial 4711
Pump Flow [ml/min] 2.00

| --Time-- | --Flow-- |
|---|---|
| 08:22:40 | 1.9817 ml/min |
| 08:22:53 | 1.9898 ml/min |
| 08:23:06 | 1.9894 ml/min |
| 08:23:19 | 1.9830 ml/min |
| 08:23:32 | 1.9929 ml/min |
| 08:23:45 | 1.9910 ml/min |
| 08:23:58 | 1.9892 ml/min |
| 08:24:11 | 1.9898 ml/min |
| 08:24:24 | 1.9866 ml/min |
| 08:24:36 | 1.9871 ml/min |

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Signature

# Calibration certificate / recalibration

DURATEC Analysentechnik GmbH
Rheinauer Strasse 4
D-68766 Hockenheim

DURATEC Analysentechnik GmbH

*Zertifiziert nach DIN EN ISO 9001:2015*

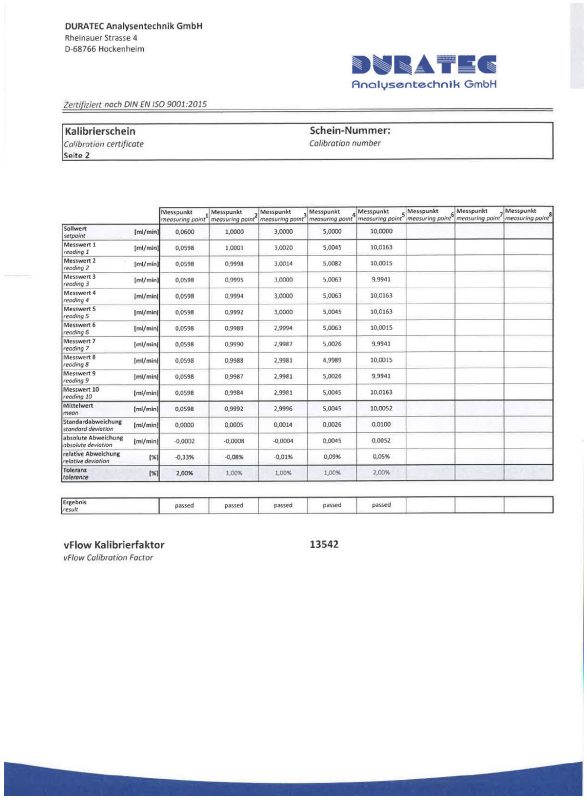
**Kalibrierschein** / *Calibration certificate* / Seite 1 — **Schein-Nummer:** / *Calibration number*

| | |
|---|---|
| **Gegenstand** *Object* | Flowmeter |
| **Hersteller** *Manufacturer* | DURATEC Analysentechnik |
| **Typ** *Type* | vFlow |
| **Seriennummer** *Serial number* | 2008-033 |
| **kundenspezifische Gerätenummer** *Custom device number* | 70120528 |
| **Auftraggeber** *Customer* | |
| **Auftragsnummer (Kunde)** *Work order customer* | |
| **Anzahl der Seiten Kalibrierschein** *Number of pages of the calibration certificate* | 3 |
| **Datum der Kalibrierung** *Date of calibration* | 08.07.2021 |
| **empfohlene nächste Kalibrierung** *Next calibration* | Jul. 2022 |

Das Kalibrierverfahren bezieht sich auf die derzeit gültige Kalibrieranweisung. Die Kalibrierung erfolgte durch Vergleich mit Bezugsnormalen bzw. Bezugsnormalmeßeinrichtungen, die der Prüfmittelüberwachung unterliegen. Die Rückführbarkeit auf die nationalen Normale, mit denen z.B. die Physikalisch-Technische Bundesanstalt (PTB), die die physikalischen Einheiten in Übereinstimmung mit den internationalen Einheitensystemen (SI) darstellt, ist sichergestellt und kann auf Wunsch empfohlen werden. Für die Kalibrierung und deren Dokumentation trägt der Aussteller die alleinige Verantwortung.

| | Datum / *Date* | Name / *Name* |
|---|---|---|
| Geprüft / *control* | 08. JULI 2021 | Dr. Gerald Degenhardt |
| Bearbeiter / *person in charge* | 08. JULI 2021 | Thorsten Nied |

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverarbeitet werden. Auszüge bedürfen der Genehmigung der ausstellenden Kalibrierstelle. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit. Die Festlegung des Rekalibrierzyklus liegt in der Verantwortung des Betreibers. Die hier angegebene nächste Kalibrierung ist als Empfehlung anzusehen.



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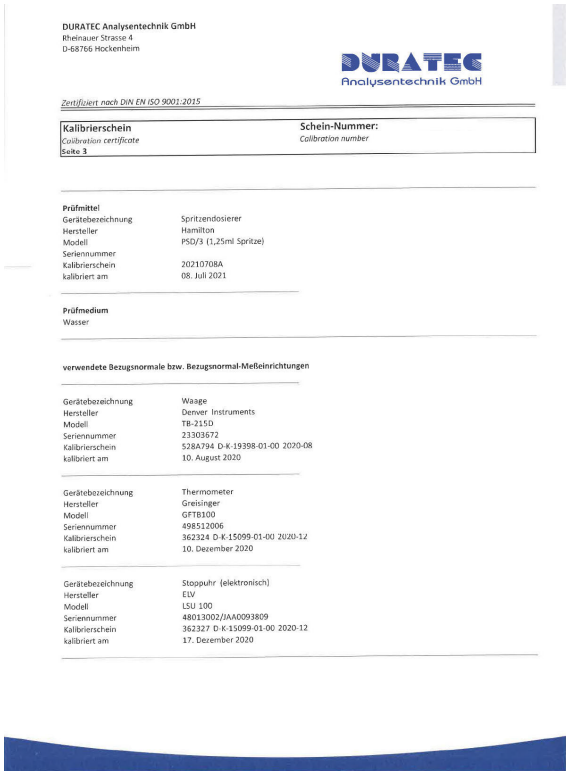
**Kalibrierschein** / *Calibration certificate* / Seite 2 — **Schein-Nummer:** / *Calibration number*

| | | Messpunkt 1 *measuring point* | Messpunkt 2 *measuring point* | Messpunkt 3 *measuring point* | Messpunkt 4 *measuring point* | Messpunkt 5 *measuring point* | Messpunkt 6 *measuring point* | Messpunkt 7 *measuring point* | Messpunkt 8 *measuring point* |
|---|---|---|---|---|---|---|---|---|---|
| Sollwert *setpoint* | [ml/min] | 0,0600 | 1,0000 | 3,0000 | 5,0000 | 10,0000 | | | |
| Messwert 1 *reading 1* | [ml/min] | 0,0598 | 1,0001 | 3,0020 | 5,0045 | 10,0163 | | | |
| Messwert 2 *reading 2* | [ml/min] | 0,0598 | 0,9998 | 3,0014 | 5,0082 | 10,0015 | | | |
| Messwert 3 *reading 3* | [ml/min] | 0,0598 | 0,9995 | 3,0000 | 5,0063 | 9,9941 | | | |
| Messwert 4 *reading 4* | [ml/min] | 0,0598 | 0,9994 | 3,0000 | 5,0063 | 10,0163 | | | |
| Messwert 5 *reading 5* | [ml/min] | 0,0598 | 0,9992 | 3,0000 | 5,0045 | 10,0163 | | | |
| Messwert 6 *reading 6* | [ml/min] | 0,0598 | 0,9989 | 2,9994 | 5,0063 | 10,0015 | | | |
| Messwert 7 *reading 7* | [ml/min] | 0,0598 | 0,9990 | 2,9987 | 5,0026 | 9,9941 | | | |
| Messwert 8 *reading 8* | [ml/min] | 0,0598 | 0,9988 | 2,9981 | 4,9989 | 10,0015 | | | |
| Messwert 9 *reading 9* | [ml/min] | 0,0598 | 0,9987 | 2,9981 | 5,0026 | 9,9941 | | | |
| Messwert 10 *reading 10* | [ml/min] | 0,0598 | 0,9984 | 2,9983 | 5,0045 | 10,0163 | | | |
| Mittelwert *mean* | [ml/min] | 0,0598 | 0,9992 | 2,9996 | 5,0045 | 10,0052 | | | |
| Standardabweichung *standard deviation* | [ml/min] | 0,0000 | 0,0005 | 0,0014 | 0,0026 | 0,0100 | | | |
| absolute Abweichung *absolute deviation* | [ml/min] | -0,0002 | -0,0008 | -0,0004 | 0,0045 | 0,0052 | | | |
| relative Abweichung *relative deviation* | [%] | -0,33% | -0,08% | -0,01% | 0,09% | 0,05% | | | |
| Toleranz *tolerance* | [%] | 2,00% | 1,00% | 1,00% | 1,00% | 2,00% | | | |
| Ergebnis *result* | | passed | passed | passed | passed | passed | | | |

**vFlow Kalibrierfaktor** / *vFlow Calibration Factor* **13542**



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**Kalibrierschein** / *Calibration certificate* / Seite 3 — **Schein-Nummer:** / *Calibration number*

**Prüfmittel**

| | |
|---|---|
| Gerätebezeichnung | Spritzendosierer |
| Hersteller | Hamilton |
| Modell | PSD/3 (1,25ml Spritze) |
| Seriennummer | |
| Kalibrierschein | 20210708A |
| kalibriert am | 08. Juli 2021 |

**Prüfmedium**
Wasser

**verwendete Bezugsnormale bzw. Bezugsnormal-Meßeinrichtungen**

| | |
|---|---|
| Gerätebezeichnung | Waage |
| Hersteller | Denver Instruments |
| Modell | TB-215D |
| Seriennummer | 23303672 |
| Kalibrierschein | 528A794 D-K-19398-01-00 2020-08 |
| kalibriert am | 10. August 2020 |

| | |
|---|---|
| Gerätebezeichnung | Thermometer |
| Hersteller | Greisinger |
| Modell | GFTB100 |
| Seriennummer | 498512006 |
| Kalibrierschein | 362324 D-K-15099-01-00 2020-12 |
| kalibriert am | 10. Dezember 2020 |

| | |
|---|---|
| Gerätebezeichnung | Stoppuhr (elektronisch) |
| Hersteller | ELV |
| Modell | LSU 100 |
| Seriennummer | 48013002/JAA0093809 |
| Kalibrierschein | 362327 D-K-15099-01-00 2020-12 |
| kalibriert am | 17. Dezember 2020 |

The flowmeter includes a calibration certificate. The flowmeter is checked at 3 specified flow rates. Each setpoint is measured 10 times. The test equipment used for calibration is traceable to DKD. Optionally, it is possible to use up to 6 preset points.

In order to be able to use the flowmeter as a test equipment without any time restrictions, an annual recalibration is recommended.

## Specification

| | |
|---|---|
| **Packing list** | 1x Flowmeter d.Flow with tripod, power supply, waste cup, manual, certificate (with 3-point calibration), transport case |
| **Fluid path** | PEEK, PTFE, FEP, EPDM |
| **Flow range** | 0.05 ml/min - 20 ml/min |
| **Measuring principle** | volumetric |
| **Measuring volume** | approx. 240 µl |
| **Accuracy** | better 1% (measuring range 0.1 - 10.0 ml/min)* |
| **Reproducibility** | better 1% (measuring range 0.1 - 10.0 ml/min)* |
| **Resolution** | 0.0001 ml/min |
| **Display** | 3.5“ touch display (LCD-TFT) |
| **Output** | RS232 interface |
| **Power supply** | 24 V/DC |
| **Dimensions** | Flowmeter: W: 105 mm / H: 170 mm / D: 40 mm (without tripod)<br>Case: W: 420 mm / H: 360 mm / D: 135 mm |
| **Weight** | approx. 3.1 kg (incl. case and accessories) |

*based on water as reference medium

## Ordering Information

| Part no. | Description |
|---|---|
| 792625 | Flowmeter d.Flow with tripod, power supply, waste cup, manual, certificate (with 3-point calibration), transport case |
| 792615-28 | Thermoprinter for flowmeter with power supply and RS232 connection cable |
| 792615-CAL | 3-point recalibration incl. certificate |
| 792615-CAL-4 | 4-point recalibration incl. certificate |
| 792615-CAL-5 | 5-point recalibration incl. certificate |
| 792615-CAL-6 | 6-point recalibration incl. certificate |