

Gebrauchsanleitung

**Cannon-Fenske
Routineviskosimeter**

Operating Instructions

**Cannon-Fenske
Routine Viscometer**

Mode d'emploi

**Viscosimètre de routine
Cannon-Fenske**

Manual de instrucciones

**Viscosímetro de rutina
Cannon-Fenske**

SCHOTT

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Wichtige Hinweise: Die Gebrauchsanleitung vor der ersten Inbetriebnahme des Cannon-Fenske Routineviskosimeters bitte sorgfältig lesen und beachten. Aus Sicherheitsgründen darf das Cannon-Fenske Routineviskosimeter ausschließlich nur für die in dieser Gebrauchsanleitung beschriebenen Zwecke eingesetzt werden.

Bitte beachten Sie auch die Gebrauchsanleitungen für die anzuschließenden Geräte.

Alle in dieser Gebrauchsanleitung enthaltenen Angaben sind zum Zeitpunkt der Drucklegung gültige Daten. Es können jedoch von SCHOTT sowohl aus technischen und kaufmännischen Gründen, als auch aus der Notwendigkeit heraus, gesetzliche Bestimmungen der verschiedenen Länder zu berücksichtigen, Ergänzungen am Cannon-Fenske Routineviskosimeter vorgenommen werden, ohne dass die beschriebenen Eigenschaften beeinflusst werden.

Operating Instructions Page 6 10

Important notes: Before initial operation of the Cannon-Fenske Routine Viscometer please read and observe carefully the operating instructions. For safety reasons the Cannon-Fenske Routine Viscometer may only be used for the purposes described in these present operating instructions.

Please also observe the operating instructions for the units to be connected.

All specifications in this instruction manual are guidance values, which are valid at the time of printing. However, for technical or commercial reasons or in the necessity to comply with the statutory stipulations of various countries, SCHOTT may perform additions to the Cannon-Fenske Routine Viscometer without changing the described properties.

Mode d'emploi Page 11 15

Instructions importantes: Prière de lire et d'observer attentivement le mode d'emploi avant la première mise en marche du Viscosimètre de routine Cannon-Fenske. Pour des raisons de sécurité, le Viscosimètre de routine Cannon-Fenske pourra être utilisé exclusivement pour les usages décrits dans ce présent mode d'emploi.

Nous vous prions de respecter également les modes d'emploi pour les appareils à connecter.

Toutes les indications comprises dans ce mode d'emploi sont données à titre indicatif au moment de l'impression. Pour des raisons techniques et/ou commerciales ainsi qu'en raison des dispositions légales existantes dans les différents pays, SCHOTT se réserve le droit d'effectuer des suppléments concernant le Viscosimètre de routine Cannon-Fenske qui n'influencent pas les caractéristiques décrits.

Manual de instrucciones Página 16 20

Instrucciones importantes: Primeramente, lean y observen atentamente el manual de instrucciones antes de la primera puesta en marcha del Viscosímetro de rutina Cannon-Fenske. Por razones de seguridad, el Viscosímetro de rutina Cannon-Fenske debe ser empleado para los objetivos descritos en este manual de instrucciones.

Por favor, respeten las indicaciones descritas en los manuales de instrucciones de los equipos antes de conectarlos.

Todos los datos contenidos en este manual de instrucciones son datos orientativos que están en vigor en el momento de la impresión. Por motivos técnicos y/o comerciales, así como por la necesidad de respetar normas legales existentes en los diferentes países, SCHOTT puede efectuar modificaciones concernientes al Viscosímetro de rutina Cannon-Fenske sin cambiar las características descritas.



Operating Instructions

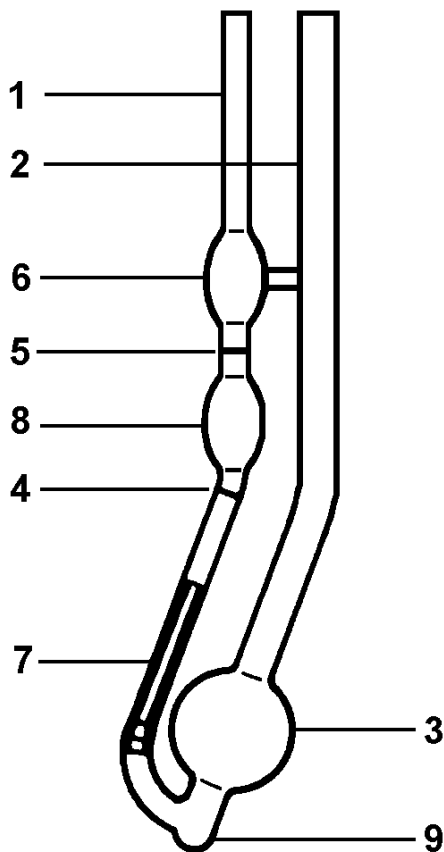
Cannon-Fenske Routine Viscometer

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Cannon-Fenske Routineviskosimeter
Cannon-Fenske Routine Viscometer
Viscosimètre de routine Cannon-Fenske
Viscosímetro de rutina Cannon-Fenske



- 1 Kapillarrohr
Tube with capillary
Tube avec capillaire
Tubo con capilar
- 2 Belüftungsrohr
Venting tube
Tube de ventilation
Tubo de ventilación
- 3 Vorratsgefäß
Reservoir
Réservoir
Reservorio
- 4 Untere Ringmessmarke M2
Lower timing mark M2
Marque annulaire M2 en bas
Marca anular inferior de medida M2
- 5 Obere Ringmessmarke M1
Upper timing mark M1
Marque annulaire M1 en haut
Marca anular superior de medida M1
- 6 Vorlaufkugel
Pre-run sphere
Boule d'entrée
Bola de entrada
- 7 Kapillare
Capillary
Tube capillaire
Capilar
- 8 Messgefäß
Measuring sphere
Boule de mesure
Bola de medición
- 9 Rohrerweiterung
Tube expanding
Elargissement du tube
Extensión del tubo

1 Description

The Cannon-Fenske Routine Viscometer consists essentially of 2 tubes, the tube with capillary (1) and the venting tube (2), the reservoir (3), the upper timing mark M1 (4), the lower timing mark M2 (5), the pre-run sphere (6), the capillary (7) and the measuring sphere (8).

The Cannon-Fenske Routine Viscometer is in accordance of technical measurements to standard like ISO 3105, ASTM 446 and D 2515. With the tube expanding (9), the viscometer is also convenient for automatic measuring system.

2 Preparation of the sample

Low viscosity samples must be filtered through a SCHOTT glass filter porosity 2 to 4 (10 ... 100 µm) before the measurement; high viscosity samples, through a sieve with 0.3 mm mesh width (test sieve cloth 0.2, DIN 4 188). Samples, whose stock value in accordance with DIN 51 583 or pour point in accordance with DIN 51 597 is not at least 30 °C lower than the test temperature must be heated up to 50 °C before the measurement.

3 Selection of the capillary

The size of the capillary is to be selected in such a way that the uncertainty inherent in the kinetic energy correction (HC) does not exceed the allowable error for the time measurement (see table). For precision measurements, the correction seconds in brackets should not be used. If necessary, a viscometer with a narrower capillary is to be used.

4 Cleaning the viscometer

Before the first use, a cleaning with 15 % H₂O₂ and 15 % HCl is recommended. The viscometer should then be rinsed with a suitable solvent. It must be completely dry and dust-free and can thereby be used for automatic measurements.

5 Filling the viscometer

For filling, the Cannon-Fenske Routine Viscometer is placed on its „head“. The tube with capillary (1) is submerged in the liquid to be measured while suction using a hose is applied to the venting tube (2) until the liquid reaches the lower timing mark M2. During automatic measurement after being turned back into the normal measuring position, the viscometer connected with its particular hose accessories (📖 Operating Instructions for the corresponding AVS device) and fixed in the measurement stand with the fitting type no. 065 99 is placed in a **Transparent Thermostat from SCHOTT-GERÄTE GmbH**. During manual measurement the viscometer will be fitted after inverting to normal measuring position with its stand type no. 064 99 vertically into a **Transparent Thermostat from SCHOTT-GERÄTE GmbH**.

6 Adaptation of the sample to the bath temperature

If the accuracy of the viscometer measurement is to be fully utilised, the thermostat should keep the measuring temperature constant within ± 0.01 °C (**Transparent Thermostat from SCHOTT-GERÄTE GmbH**). The measurement should only be carried out after a waiting time of approx. 10 minutes.

7 Manual measuring

(Viscometer type no. 513 ..)

For manual viscosity measuring operation use constant marked „K“.

For measuring, draw the liquid drained into the reservoir (3) back into the pre-run sphere (6) passing the upper timing mark M1 (4) and the lower timing mark M2. Then measure the flow time between the upper timing mark (M1) and the lower timing mark (M2). The measurement can be repeated any time.

8 Automatic measuring

(Viscometer type no. 520 ..)

Automatic viscosity measurement systems (AVS) from SCHOTT-GERÄTE GmbH replace the manual measurement of viscosity. Subjective measurement errors are eliminated, the measured times are available in the data memory and are printed out depending upon the device. To carry out the measurement, please see the operating instructions for the particular measurement device.

The viscometer is inserted into the fitting out of PTFE of the measuring stand type no. AVS/S-CF. The time measurement is made in the measurement levels from M1 to M2. Light barriers replace the ring markers hereby. For automatic viscosity measurement, the constant identified with "AK = ..." is to be used.

9 Viscosity calculation

The seconds contribution given in the table for the kinetic energy correction (HC) is to be subtracted from the measured flow time for the various capillaries. Intermediate values can be interpolated.

With absolute measurements, the corrected flow time multiplied by the viscometer constant K produces the kinematic viscosity [mm^2/s *) directly.

$$v = K (t - \vartheta)$$

The viscometer constant K is mentioned in the enclosed production certificate.

10 Example of evaluation

CANNON FENSKE VISCOMETER

Type no. 513 10

Capillary no. 100

Constant = 0.01500

Flow time (averaged) = 100.00 s

Kinetic energy correction (HC) for 100.00 s = 0.27 s

Kinematic viscosity $v = K (t - \vartheta)$

$$= 0.015 (100.00 - 0.27)$$

$$= 1.495 \text{ mm}^2/\text{s}^*$$

*) previously centistokes [cSt]; 1 cSt = 1 mm^2/s

11 Table of the kinetic energy correction (HC) for:

(Hagenbach Couette Correction)

Cannon-Fenske Routine Viscometer

Routine Viscometer type no. 513 ..., 520 ..

Correction seconds¹:

Flow time [s]	Capillary no.				
	25	50	75	100	150
50	--	--	--	1.09	0.28
60	--	--	(2.10) ²	0.76	0.19
70	--	--	(1.55) ²	0.56	0.14
80	(4.71) ²	(3.70) ²	1.18	0.43	0.11
90	(3.72) ²	(2.93) ²	0.93	0.34	0.09
100	(3.01) ²	(2.37) ²	0.76	0.27	0.07
110	2.49	1.96	0.63	0.23	0.06
120	2.09	1.65	0.53	0.19	0.05
130	1.78	1.40	0.45	0.16	0.04
140	1.54	1.21	0.39	0.14	0.03
150	1.34	1.05	0.34	0.12	0.03
160	1.18	0.93	0.30	0.11	0.03
170	1.04	0.82	0.26	0.09	0.02
180	0.93	0.73	0.23	0.08	0.02
190	0.83	0.66	0.21	0.08	0.02
200	0.75	0.59	0.19	0.07	0.02
220	0.62	0.49	0.16	0.06	0.01
240	0.52	0.41	0.13	0.05	0.01
260	0.45	0.35	0.11	0.04	0.01
280	0.38	0.30	0.10	0.03	0.01
300	0.33	0.26	0.08	0.03	0.01
350	0.25	0.19	0.06	0.02	0.01
400	0.19	0.15	0.05	0.02	< 0.01
450	0.15	0.12	0.04	0.01	< 0.01
500	0.12	0.10	0.03	0.01	< 0.01

¹ The correction seconds given are based on the particular theoretical constant.

² For precision measurements, the correction seconds in the brackets should not be used. If necessary, a viscometer with a narrower capillary is to be used.

Type no.	Capillary no.	Capillary Ø _i (mm)	Constant K (Approx. value)	Measurement range mm ² /s (cSt) (Approx. value)	
... 00	25	0.30	0.002	0.4	to 1.6
... 03	50	0.44	0.004	0.8	to 3.2
... 01	75	0.54	0.008	1.6	to 6.4
... 10	100	0.63	0.015	3	to 15
... 13	150	0.77	0.035	7	to 35
... 20	200	1.01	0.1	20	to 100
... 23	300	1.26	0.25	50	to 200
... 21	350	1.52	0.5	100	to 500
... 30	400	1.92	1.1	240	to 1200
... 33	450	2.30	2.5	500	to 2500
... 40	500	3.20	8	1600	to 8000
... 43	600	4.10	20	4000	to 20000

Typ / Type / Type / Tipo:

Serien Nr. / Serial no. / No. de série / N° de serie:

Bescheinigung des Herstellers

Wir bestätigen, dass das oben genannte Gerät gemäß DIN EN ISO 9001, Absatz 4.10.4 "Endprüfung" geprüft wurde und dass die festgelegte Qualitätsanforderung an das Produkt erfüllt wird.

Supplier's Certificate

We certify that the equipment EN ISO 9001, part 4.10.4 "Final inspection and testing" and that the specified requirements for the product are met.

Certificat du fournisseur

Nous certifions que le produit a été vérifié selon EN ISO 9001, partie 4.10.4 "Contrôles et essais finals" et que les exigences spécifiées pour le produit sont respectées.

Certificado del fabricante

Nosotros certificamos que el equipo verifica la producción conforme a EN ISO 9001, parte 4.10.4 "Inspección y control final" y que las especificaciones requeridas para el equipo son respetadas y cumplidas.

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