Viscometers

CATALOG

SI Analytics

a xylem brand

Capillary viscometry from SI Analytics – know-how from the very beginning

Innovative capillary viscometry – from the outset

The viscosity of Newtonian fluids can be most precisely determined using capil-lary viscometers. This method of mea-surement, measures the time taken for a defined quantity of fluid to flow through a capillary with a known diameter and known length. With the industrial production of such precisely calibrated capillary viscometers, we have created the conditions to enable this measuring method to establish itself worldwide as a reliable proce-dure.

With the development of the first auto-matic measuring systems, we replaced the stopwatch with auto-matic registra-tion of the fluid at the start of the 1970's. Since then, subjec-tive measuring errors have been a thing of the past.

Further developments and improve-ments of viscometers, measuring instru-ments and accessories led to a range of products whose excellent performance is universally recog-nized. It is therefore no wonder that our viscosity measurement systems have become indispensable produc-tion control and quality insurance tools worldwide, whether in the min-eral oil industry, for polymer manufac-turers and processors, in the pharma-ceutical or food industry.

Our capillary viscometers are the worldwide basis for precise viscosity measurements of Newtonian fluids.

Contents

Viscometers and their range of use

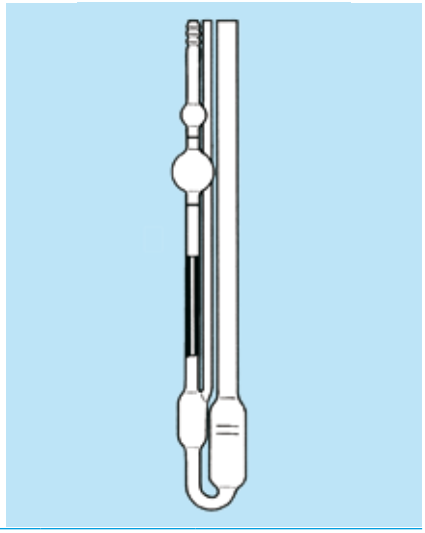
Measurement substance property	Viscometer type: Ubbelohde	Micro Ubbelohde	TC Ubbelohde	Ostwald	Micro Ostwald	Cannon-Fenske-Routine	Cannon-Fenske reverse flow	BS/IP-U tube reverse flow
Transparent liquids manual measurement	++	++	-	+	+	+	o	o
Transparent liquids automatic measurement	++	++	+	-	+	+	-	-
Opaque liquids manual measurement	-	-	-	-	-	-	+	+[2)]
Opaque liquids automatic measurement	-	-	++[1)]	-	-	-	-	-
Foaming liquids	o	o	o	+	+	+	o	o
Liquid mixture with highly volatile components	o	o	o	+	+	+	o	o
Minimum measurement substance and/or rinsing agent quantities	-	++	-	-	+	-	-	-
High-temperature or low-temperature measurements	+	+	+	o	o	o	o	o

Selection of glass capillary viscometers

++	use preferably	[1)] up to 30,000 mm²/s
+	highly suitable	[2)] above 30,000 mm²/s
o	less suitable	
-	unsuitable	

Ubbelohde viscometers, normal form

Viscometers with suspended ball level for determination of absolute and relative kinematic viscosity of liquids with Newtonian flow behavior. The calibrated viscometers are delivered with manufacturer's certificate in accordance with DIN 55 350, Part 18. All viscometers are provided with ring marks. This ensures that viscometers for automatic measurements can also be checked by means of manual measurements. The recommended minimum flowthrough time is 200 s.



Ubbelohde-Viskosimeter (DIN)

- in accordance with DIN 51 562 Part 1, ISO/DIS 3105 (BS-IP-SL)
- filling quantity: 15 ... 20 ml
- overall length: approx. 290 mm

calibrated,
with constant,
for manual measurements

calibrated
with constant,
for manual measurements;
automatic measurement
with stand AVS®/SK-HV

$\nu = K \cdot t$
$K = \frac{\nu}{t}$
$t = \frac{\nu}{K}$

ν = kinematic viscosity in mm²/s
K = constant [mm²/s]
t = flow-through time in s

Type No.	Order No.	Type No.	Order No.	Capillary No. acc. DIN	acc ISO	Capillary Ø i ± 0,01 [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)		
501 00	285400004	–	–	0	-	0.36	0.001	0.3	...	1
501 03	285400012	–	–	0c	-	0.47	0.003	0.5	...	3
501 01	285400029	–	–	0a	-	0.53	0.005	0.8	...	5
501 10	285400037	–	–	I	I	0.63	0.01	1.2	...	10
501 13	285400045	–	–	Ic	Ia	0.84	0.03	3	...	30
501 11	285400053	–	–	Ia	-	0.95	0.05	5	...	50
501 20	285400061	–	–	II	II	1.13	0.1	10	...	100
501 23	285400078	–	–	IIc	IIa	1.50	0.3	30	...	300
501 21	285400086	–	–	IIa	-	1.69	0.5	50	...	500
501 30	285400094	–	–	III	III	2.01	1	100	...	1000
501 33	285400107	–	–	IIIc	IIIa	2.65	3	300	...	3000
501 31	285400115	–	–	IIIa	-	3.00	5	500	...	5000
501 40	285400123	–	–	IV	IV	3.60	10	1000	...	10000
–	–	502 43	285400131	IVc	IVa	4.70	30	3000	...	30000
–	–	502 41	285400148	IVa	-	5.34	50	6000	...	30000
–	–	502 50	285400156	-	V	6.30	100		>	10000

not calibrated,
without constant;
for determination of
relative viscosity

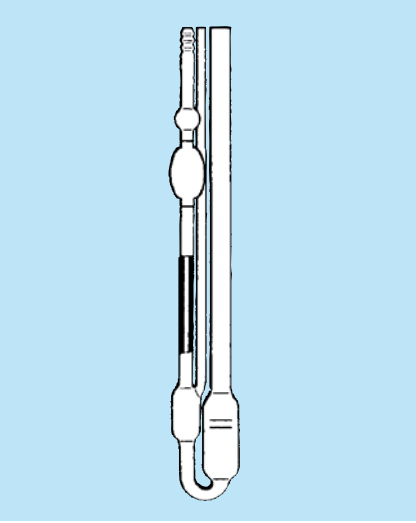
calibrated,
with constant for
automatic measurements

$\nu = K \cdot t$
$K = \frac{\nu}{t}$
$t = \frac{\nu}{K}$

ν = kinematic viscosity in mm²/s
K= constant [mm²/s]
t = flow-through time in s

Type No.	Order No.	Type No.	Order No.	Capillary No. acc. DIN	acc ISO	Capillary Ø i ± 0,01 [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)		
–	–	532 00	285400164	0	-	0.36	0.001	0.3	...	1
530 03	285400304	532 03	285400201	0c	-	0.47	0.003	0.5	...	3
530 01	285400312	532 01	285400218	0a	-	0.53	0.005	0.8	...	5
530 10	285400329	532 10	285400226	I	I	0.63	0.01	1.2	...	10
530 13	285400337	532 13	285400234	Ic	Ia	0.84	0.03	3	...	30
–	–	532 11	285400172	Ia	-	0.95	0.05	5	...	50
530 20	285400345	532 20	285400242	II	II	1.13	0.1	10	...	100
530 23	285400353	532 23	285400259	IIc	IIa	1.50	0.3	30	...	300
–	–	532 21	285400189	IIa	-	1.69	0.5	50	...	500
530 30	285400361	532 30	285400267	III	III	2.01	1	100	...	1000
530 33	285400378	532 33	285400275	IIIc	IIIa	2.65	3	300	...	3000
–	–	532 31	285400197	IIIa	-	3.00	5	500	...	5000
530 40	285400386	532 40	285400283	IV	IV	3.60	10	1000	...	10000

Ubbelohde viscometers, normal form (ASTM)



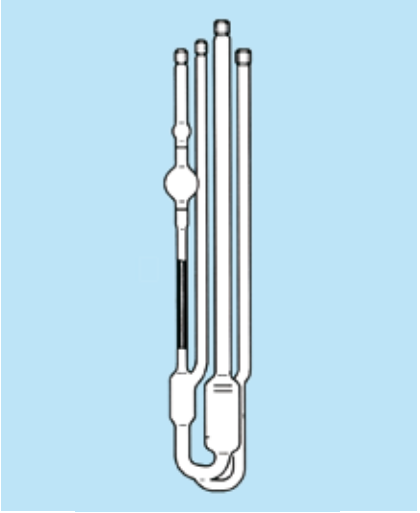
Ubbelohde Viscometer (ASTM)

- in accordance with ISO 3105, ASTM D 2515, ASTM D 446
- filling quantity: 15 ... 20 ml
- overall length: approx. 285 mm

calibrated, with constant for manual measurements		not calibrated, without constant for determination of relative Viscosity		calibrated, with constant for automatic measurements					
Type No.	Order No.	Type No.	Order No.	Type No.	Order No.	Capillary No.	Capillary Ø i ± 0,01 [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
525 00	285400501	526 00	285400707	527 00	285401255	0	0.24	0.001	0.35 ... 1
525 03	285400518	526 03	285400715	527 03	285401271	0c	0.36	0.003	0.6 ... 3
525 01	285400526	526 01	285400723	527 01	285401263	0b	0.46	0.005	1 ... 5
525 10	285400534	526 10	285400731	527 10	285401152	I	0.58	0.01	2 ... 10
525 13	285400542	526 13	285400748	527 13	285401169	Ic	0.78	0.03	6 ... 30
525 20	285400559	526 20	285400756	527 20	285401177	II	1.03	0.1	20 ... 100
525 23	285400567	526 23	285400764	527 23	285401185	IIc	1.36	0.3	60 ... 300
525 30	285400575	526 30	285400772	527 30	285401193	III	1.83	1	200 ... 1000
525 33	285400583	526 33	285400789	527 33	285401288	IIIc	2.43	3	600 ... 3000
525 40	285400591	526 40	285400797	527 40	285401296	IV	3.27	10	2000 ... 10000
525 43	285400604	526 43	285400801	527 43	285401309	IVc	4.32	30	6000 ... 30000

Ubbelohde viscometers, with additional tube and threads

Viscometers with suspended ball level for determination of absolute or relative kinematic viscosity. These viscometers are preferably used for automatic measurements when an AVS® 24 or AVS® 26 automatic viscometer cleaner is used simultaneously. The additional filling and cleaning tube and the glass thread ensure safe operational use. The calibrated viscometers are delivered with manufacturer's certificate in accordance with DIN 55 350, Part 18. The ring marks that are also present serve as auxiliary marks in case the viscometers must be checked by means of manual measurements.

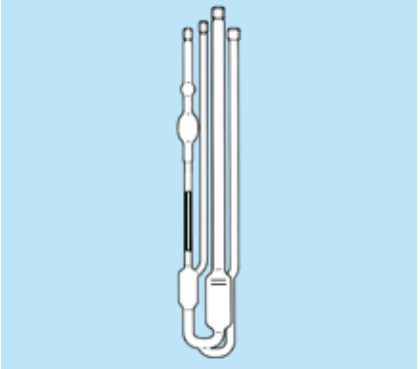


Ubbelohde viscometer (DIN)

- in accordance with ISO 3105, DIN 51 562, Part 1, BS 133, NFT 60-100
- filling quantity: 18 ... 22 ml
- overall length: approx. 290 mm

calibrated,
with constant for automatic measurements

Type No.	Order No.	Capillary No. acc. DIN	acc. ISO	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
541 03	285401925	0c	-	0.47	0.003	0.5 ... 3
541 01	285401917	0a	-	0.53	0.005	0.8 ... 5
541 10	285401933	I	I	0.63	0.01	1.2 ... 10
541 13	285401941	Ic	Ia	0.84	0.03	3 ... 30
541 20	285401958	II	II	1.13	0.1	10 ... 100
541 23	285401966	IIc	IIa	1.50	0.3	30 ... 300
541 30	285401974	III	III	2.01	1	100 ... 1000
541 33	285401982	IIIc	IIIa	2.65	3	300 ... 3000
541 40	285401999	IV	IV	3.60	10	1000 ... 6000



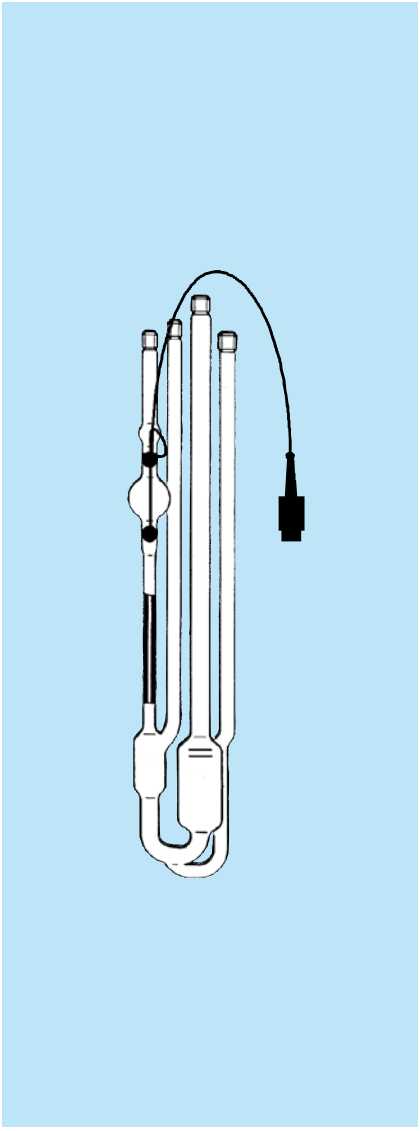
Ubbelohde viscometer (ASTM)

- the technical measurement characteristics are in accordance with ISO 3105, ASTM D 2515, ASTM D 446
- filling quantity: 15 ... 22 ml
- overall length: approx. 290 mm

calibrated,
with constant for automatic measurements

Type No.	Order No.	Capillary No. acc. DIN	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
545 00	285402005	0	0.24	0.001	0.35 ... 1
545 03	285402021	0c	0.36	0.003	0.6 ... 3
545 01	285402013	0b	0.46	0.005	1 ... 5
545 10	285402038	I	0.58	0.01	2 ... 10
545 13	285402046	Ic	0.78	0.03	6 ... 30
545 20	285402054	II	1.03	0.1	20 ... 100
545 23	285402062	IIc	1.36	0.3	60 ... 300
545 30	285402079	III	1.83	1	200 ... 1000
545 33	285402087	IIIc	2.43	3	600 ... 3000
545 40	285402095	IV	3.27	10	2000 ... 10000
545 43	285402108	IVc	4.32	30	6000 ... 30000

Ubbelohde viscometers with TC sensors



Viscometers with suspended ball level for determination of absolute and relative kinematic viscosity of liquids with Newtonian flow behaviour. The measuring levels are marked by TC sensors. The meniscus passage is detected due to the different conductivity of the liquid phase and the gas phase. A mea-surement stand of the type series AVS®/S is not required. TC viscometers can be used to determine the kinematic viscosity of all liquids with Newtonian flow behaviour.

They are especially suitable for liquids that cannot be detected with other systems: untransparent and/or black and/or electric conductive measuring samples.

TC viscometers are manufactured from technical glass types with an expansion coefficient of = ca. $9 \cdot 10^{-6}$. Due to the electric properties of TC sensors, it is important to make sure that a type is selected that is suitable for the required application temperature.

TC viscometers with additional filling and cleaning tube and with glass thread

- the technical measurement characteristics are in accordance with DIN 51 562, part 1, ISO 3105 (BS-IP-SL)
- for use in combination with an automatic viscosity measuring instrument and an AVS® 24 or AVS® 26 automatic viscometer cleaner
- filling quantity: 18 ... 22 ml
- overall length: approx. 355 mm
- suitable bracket Type No. 05393, Order No. 285405035

calibrated,
with constant for automatic measurements

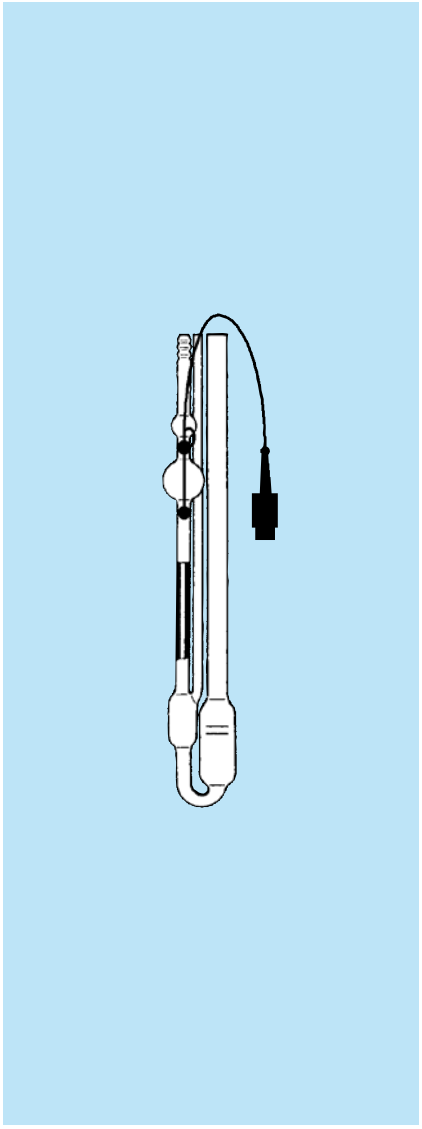
Type No.	Order No.	Type No.	Order No.	Type No.	Order No.	Capillary No.	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
+10 ... +80 °C		-40 ... +30 °C		+70 ... +150 °C					
562 03	285423120	–	–	–	–	0c	0.47	0.003	0.5 ... 3
562 10	285423130	563 10	285423240	564 10	285423330	I	0.54	0.01	1,2 ... 10
562 13	285423140	563 13	285423250	564 13	285423340	Ic	0.84	0.03	3 ... 30
562 20	285423150	563 20	285423260	564 20	285423350	II	1.15	0.1	10 ... 100
562 23	285423170	563 23	285423270	564 23	285423360	IIc	1.51	0.3	30 ... 300
562 21	285423160	–	–	–	–	IIa	1.69	0.5	50 ... 500
562 30	285423180	563 30	285423280	564 30	285423370	III	2.05	1	100 ... 1000
562 33	285423200	563 33	285423290	564 33	285423380	IIIc	2.7	3	300 ... 3000
562 31	285423190	–	–	–	–	IIIa	3.0	5	500 ... 5000
562 40	285423210	563 40	285423300	564 40	285423390	IV	3.7	10	1000 ... 10000
562 43	285423230	563 43	285423320	564 43	285423400	IVc	4.9	30	3000 ... 20000
562 41	285423220	563 41	285423310	–	–	IVa	5.3	50	5000 ... 30000

Ubbelohde viscometers with TC sensors

Viscometers with suspended ball level for determination of absolute and relative kinematic viscosity of liquids with Newtonian flow behaviour. The measuring levels are marked by TC sensors. The meniscus passage is detected due to the different conductivity of the liquid phase and the gas phase. A mea-surement stand of the type series AVS®/S is not required. TC viscometers can be used to determine the kinematic viscosity of all liquids with Newtonian flow behaviour.

They are especially suitable for liquids that cannot be detected with other systems: untransparent and/or black and/or electric conductive measuring samples.

TC viscometers are manufactured from technical glass types with an expansion coefficient of α = ca. $9 \cdot 10^{-6}$. Due to the electric properties of TC sensors, it is important to make sure that a type is selected that is suitable for the required application temperature.



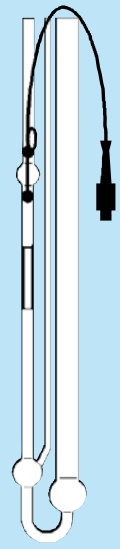
TC viscometers

- the technical measurement characteristics are in accordance with DIN 51 562, part 1, ISO 3105 (BS-IP-SL)
- for use in combination with an automatic viscosity measuring instrument and an AVS® 24 or AVS® 26 automatic viscometer cleaner
- filling quantity: 18 ... 22 ml
- overall length: ca. 355 mm
- suitable bracket Type No. 05393, Order No. 285405035

calibrated,
with constant for automatic measurements

Type No.	Order No.	Type No.	Order No.	Type No.	Order No.	Capillary No.	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
+10 ... +80 °C		-40 ... +30 °C		+70 ... +150 °C					
567 03	285423420	–	–	–	–	0c	0.47	0.003	0.5 ... 3
567 10	285423430	568 10	285423540	569 10	285423630	I	0.64	0.01	1.2 ... 10
567 13	285423440	568 13	285423550	569 13	285423640	Ic	0.84	0.03	3 ... 30
567 20	285423450	568 20	285423560	569 20	285423650	II	1.15	0.1	10 ... 100
567 23	285423470	568 23	285423570	569 23	285423660	IIc	1.51	0.3	30 ... 300
567 21	285423460	–	–	–	–	IIa	1.69	0.5	50 ... 500
567 30	285423480	568 30	285423580	569 30	285423670	III	2.05	1	100 ... 1000
567 33	285423500	568 33	285423590	569 33	285423680	IIIc	2.7	3	300 ... 3000
567 31	285423490	–	–	–	–	IIIa	3.0	5	500 ... 5000
567 40	285423510	568 40	285423600	569 40	285423690	IV	3.7	10	1000 ... 10000
567 43	285423530	568 43	285423620	569 43	285423700	IVc	4.9	30	3000 ... 20000
567 41	285423520	568 41	285423610	–	–	IVa	5.3	50	5000 ... 30000

Micro-Ubbelohde viscometers with TC sensors



Viscometers with suspended ball level for determination of absolute and relative kinematic viscosity of liquids with Newtonian flow behaviour. The measuring levels are marked by TC sensors. The meniscus passage is detected due to the different conductivity of the liquid phase and the gas phase. A mea-surement stand of the type series AVS®/S is not required. TC viscometers can be used to determine the kinematic viscosity of all liquids with Newtonian flow behaviour.

They are especially suitable for liquids that cannot be detected with other systems: opaque and/or black and/or electrically conductive measuring samples.

TC viscometers are manufactured from technical glass types with an expansion coefficient of α = ca. $9 \cdot 10^{-6}$. Due to the electric properties of TC sensors, it is important to ensure that a suitable type is selected for the required application temperature.

Micro TC viscometers

- the technical measurement characteristics are in accordance with DIN 51 562, Part 2
- for use in combination with an automatic viscosity measuring instrument
- filling quantity: 3 ... 4 ml
- overall length: approx. 350 mm
- suitable bracket Type No. 05393, Order No. 285405035

calibrated,
with constant for automatic measurements

Type No.	Order No.	Type No.	Order No.	Type No.	Order No.	Capillary No.	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)		
+10 ... +80 °C		-40 ... +30 °C		+70 ... +150 °C							
572 10	285423710	573 10	285423780	574 10	285423850	M I	0.40	0.01	0.4	...	6
572 13	285423720	573 13	285423790	574 13	285423860	M Ic	0.53	0.03	1.2	...	18
572 20	285423730	573 20	285423800	574 20	285423870	M II	0.70	0.1	4	...	60
572 23	285423740	573 23	285423810	574 23	285423880	M IIc	0.95	0.3	12	...	180
572 30	285423750	573 30	285423820	574 30	285423890	M III	1.26	1	40	...	800

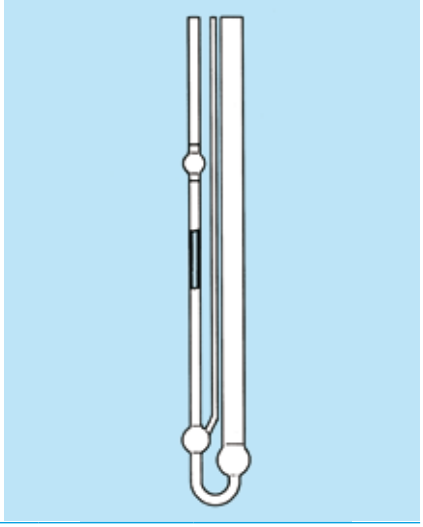
Micro-Ubbelohde viscometers
Viscometers for dilution viscometry

Viscometers with suspended ball level for determination of absolute and relative kinematic viscosity of liquids with Newtonian flow behavior. Due to their design, these viscometers are especially suitable for measurement of small liquid quantities and for particularly short running times. All viscometers are provided with ring marks. This ensures that viscometers for automatic measurements can also be checked by means of manual measurements.

Micro-Ubbelohde viscometers (DIN)

The calibrated viscometers are delivered with manufacturer's certificate in accordance with DIN 55 350, Part 18. For measurements with automatic viscosity measuring instruments, another constant is valid. This constant is determined by multiplication of the constant K with the correction factor F.

- in accordance with DIN 51562, Part 2
- filling quantity: 3 ... 4 ml
- overall length: approx. 290 mm

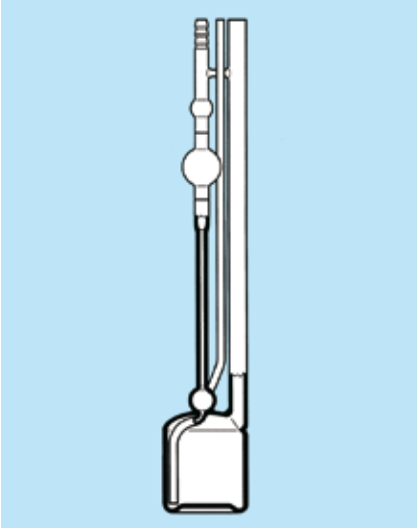


calibrated, with constant for manual measurement		calibrated, with constant for automatic measurement		not calibrated, without constant; for determination of relative viscosity					
Type No.	Order No.	Type No.	Order No.	Type No.	Order No.	Capillary No.	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
536 10	285401009	537 10	285401103	538 10	285401206	M I	0.40	0.01	0.4 ... 6
536 13	285401017	537 13	285401111	538 13	285401214	M Ic	0.53	0.03	1.2 ... 18
536 20	285401025	537 20	285401128	538 20	285401222	M II	0.70	0.1	4 ... 60
536 23	285401033	537 23	285401136	538 23	285401239	M IIc	0.95	0.3	12 ... 180
536 30	285401041	537 30	285401144	538 30	285401247	M III	1.26	1	40 ... 800

Viscometers for dilution viscometry

Viscometers with suspended ball level designed according to the principle of the Ubbelohde viscometers for determination of the limit viscosity number of polymers. The limit viscosity number is determined automatically in combination with one of our piston burettes TITRONIC® *universal*, TITRONIC® 110 *plus* or TITRONIC® 500.

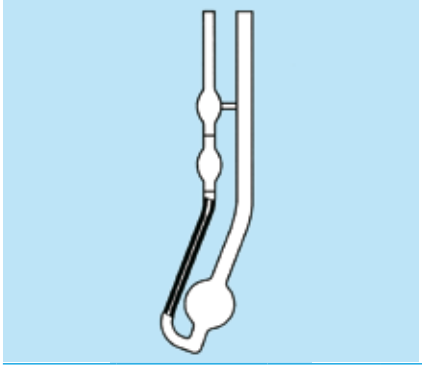
- filling quantity: 15 ... 75 ml
- overall length: approx. 290 mm



calibrated, for automatic measurements,
Model with glass filter on request

Type No.	Order No.	Capillary No.	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
531 00	285401403	0	0.36	0.001	0.35 ... 0.6
531 03	285401428	0c	0.47	0.003	0.5 ... 2
531 01	285401411	0a	0.53	0.005	0.8 ... 3
531 10	285401436	I	0.64	0.01	1.2 ... 6
531 13	285401444	Ic	0.84	0.03	3 ... 20
531 20	285401452	II	1.15	0.1	10 ... 60

Cannon-Fenske viscometers



Cannon-Fenske routine viscometers

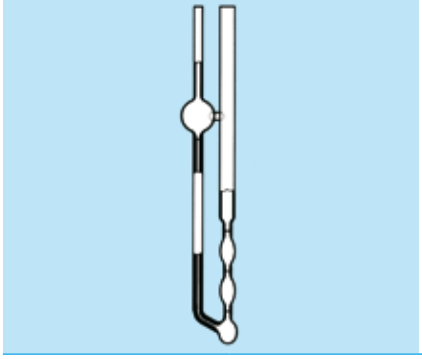
comply with standards ISO 3105, ASTM D 2515, BS 188 with respect to technical measuring specifications.

- are suitable for all Newtonian liquids with a viscosity of 0.35...20,000 mm²/s
- the present design has, as a supplement to the standard, a deepening in the lower bend. Accordingly, these viscometers can also be used for automatic measurements.
- filling quantity: approx. 7 ... 10 ml
- overall length: approx. 245 mm

calibrated,
with ring mark,
for manual measurements

with constant
for automatic measurements

Type No.	Order No.	Type No.	Order No.	Capillary No.	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
513 00	285403507	520 00	285403704	25	0.30	0.002	0.4 ... 1.6
513 03	285403515	520 03	285403712	50	0.44	0.004	0.8 ... 3.2
513 01	285403523	520 01	285403729	75	0.54	0.008	1.6 ... 6.4
513 10	285403531	520 10	285403737	100	0.63	0.015	3 ... 15
513 13	285403548	520 13	285403745	150	0.78	0.035	7 ... 35
513 20	285403556	520 20	285403753	200	1.01	0.1	20 ... 100
513 23	285403564	520 23	285403761	300	1.27	0.25	50 ... 200
513 21	285403572	520 21	285403778	350	1.52	0.5	100 ... 500
513 30	285403589	520 30	285403786	400	1.92	1.2	240 ... 1200
513 33	285403597	520 33	285403794	450	2.35	2.5	500 ... 2500
513 40	285403601	520 40	285403807	500	3.20	8	1600 ... 8000
513 43	285403618	520 43	285403815	600	4.20	20	4000 ... 20000



Cannon-Fenske reverse flow viscometers

- Comply with standards ISO 3105, ASTMD 2515, ASTM D 446, NF T 60 - 100 with respect to technical measuring specifications.
- filling quantity: approx. 12 ml
- overall length: approx. 295 mm

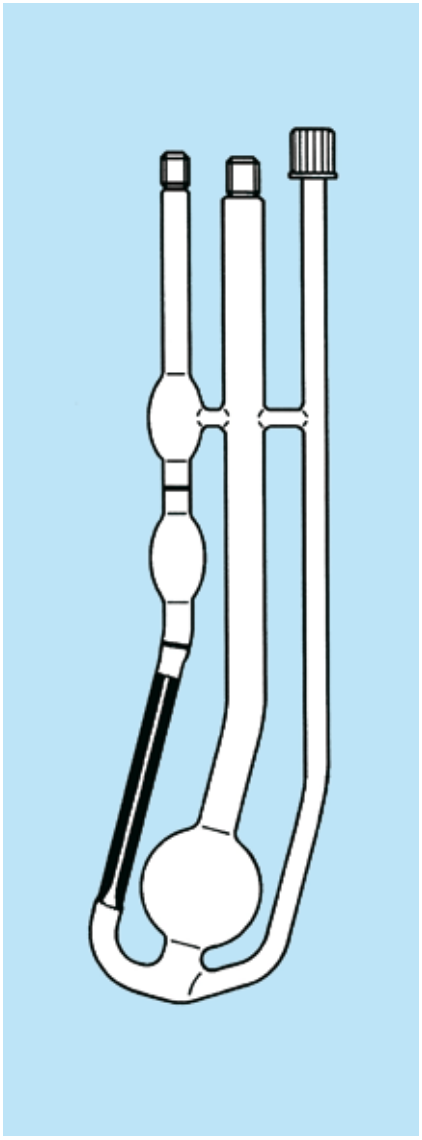
calibrated,
with 3 ring marks,
with 2 constants,
only for manual measurement

Type No.	Order No.	Capillary No.	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
511 00	285403001	25	0,31	0.002	0.4 ... 1.6
511 03	285403018	50	0,42	0.004	0.8 ... 3.2
511 01	285403026	75	0,54	0.008	1.6 ... 6.4
511 10	285403034	100	0,63	0.015	3 ... 15
511 13	285403042	150	0,78	0.035	7 ... 35
511 20	285403059	200	1,02	0.1	20 ... 100
511 23	285403067	300	1,26	0.25	50 ... 200
511 21	285403075	350	1,48	0.5	100 ... 500
511 30	285403083	400	1,88	1.2	240 ... 1200
511 33	285403091	450	2,20	2.5	500 ... 2500
511 40	285403104	500	3,10	8	1600 ... 8000
511 43	285403112	600	4,00	20	4000 ... 20000

Cannon-Fenske routine viscometers

comply with standards ISO 3105, ASTM D 2515, BS 188 with respect to technical measuring specifications. These viscometers are preferably used for automatic measurements when an AVS® 24 or AVS® 26 automatic viscometer cleaner is used simultaneously. The additional filling and cleaning tube and the glass thread ensure safe operational use. The calibrated viscometers are delivered with manufacturer's certificate in accordance with DIN 55 350, Part 18.

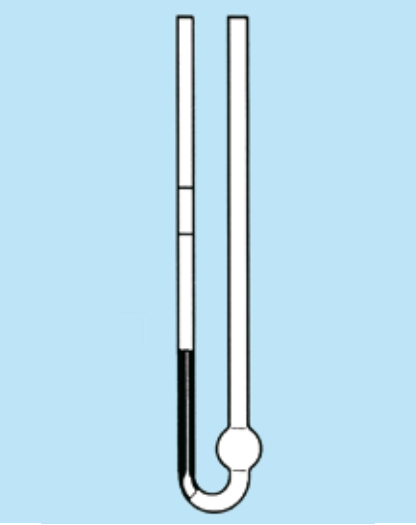
- are suitable for all Newtonian liquids with a viscosity of 0.35 ... 20,000 mm²/s.
- filling quantity: approx. 7 ... 12 ml
- overall length: approx. 245 mm



calibrated,
with ring marks,
with constant for automatic measurements

Type No.	Order No.	Capillary No.	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
546 00	285402116	25	0.30	0.002	0.4 ... 1.6
546 03	285402132	50	0.44	0.004	0.8 ... 3.2
546 01	285402124	75	0.54	0.008	1.6 ... 6.4
546 10	285402149	100	0.63	0.015	3 ... 15
546 13	285402157	150	0.78	0.035	7 ... 35
546 20	285402165	200	1.01	0.1	20 ... 100
546 23	285402181	300	1.27	0.25	50 ... 200
546 21	285402173	350	1.52	0.5	100 ... 500
546 30	285402198	400	1.92	1.2	240 ... 1200
546 33	285402202	450	2.35	2.5	500 ... 2500
546 40	285402219	500	3.20	8	1600 ... 8000
546 43	285402227	600	4.20	20	4000 ... 20000

Ostwald viscometers

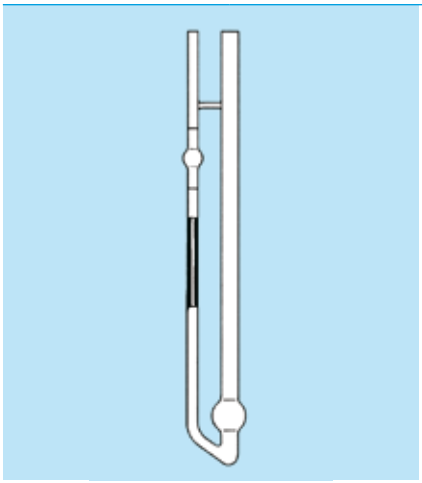


Ostwald viscometers

- filling quantity: 3 ml
- overall length: approx. 220 mm

with ring marks,
without constant,
for manual measurements

Type No.	Order No.	Capillary Ø i [mm]	Transit time for water approx. [s]	Constant K (approx.)	for use from [mm²/s] (approx.)
509 03	285404006	0.3	250	0.004	0.3
509 04	285404014	0.4	75	0.01	1
509 05	285404022	0.5	30	0.03	2.5
509 06	285404039	0.6	15	0.07	5.5
509 07	285404047	0.7	10	0.1	10



Micro-Ostwald viscometers

- are suitable for measurements of small liquid quantities even with excessive foam formation
- filling quantity: 2 ml
- overall length: approx. 290 mm

calibrated,
with ring marks,
with constant,
for manual measurements

calibrated,
with ring marks,
with constant,
for automatic measurements

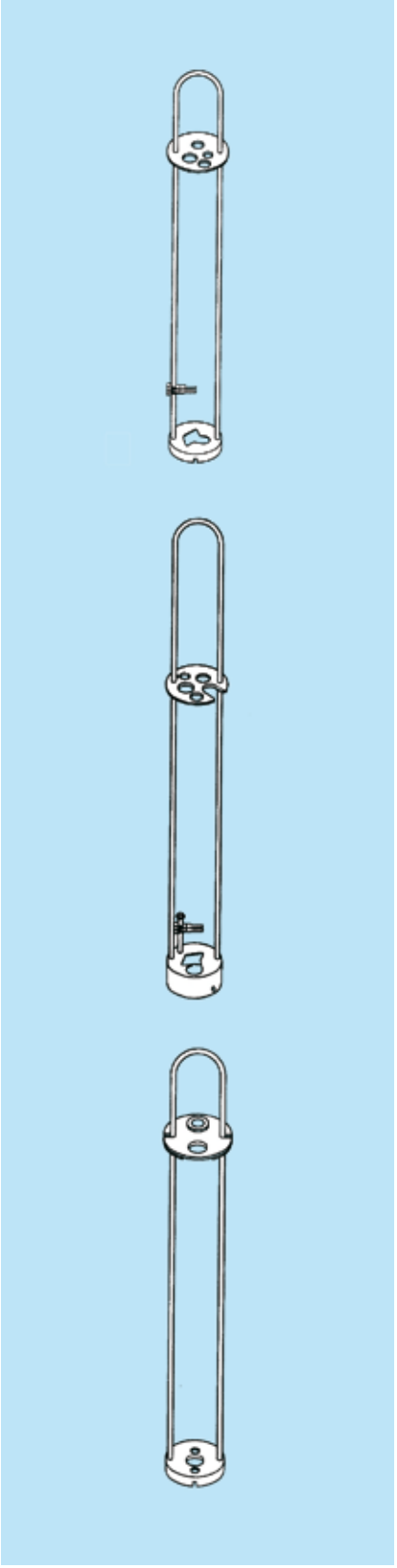
Type No.	Order No.	Type No.	Order No.	Capillary No.	Capillary Ø i [mm]	Constant K (approx.)	Measuring range [mm²/s] (approx.)
516 10	285404203	517 10	285404306	I	0.43	0.01	0.4 ... 6
516 13	285404211	517 13	285404314	Ic	0.60	0.03	1.2 ... 18
516 20	285404228	517 20	285404322	II	0.77	0.1	4 ... 60
516 23	285404236	517 23	285404339	IIc	1.00	0.3	12 ... 180
516 30	285404244	517 30	285404347	III	1.36	1	40 ... 800

Accessories

Brackets and stands

All brackets and stands are designed to ensure that the viscometers are held vertically. They also protect the viscometers from breakage. The maximum deviation is < 1°. In conjunction with SI Analytics and other commercially available seethrough thermostats the viscometers can only be used with the appropriate stand or bracket.

For DIN Ubbelohde viscometers that are used as reference measuring standard, specifically modified bracket (VZ 5840) must be used.



Brackets made of stainless steel
suitable for use with all Ubbelohde viscometers
for manual and automatic measurements

Type No.	Order No.
053 92	285405043
VZ 5840 (accessory for reference measuring standard)	285417201

suitable for use with Ubbelohde viscometers with TC sensors

Type No.	Order No.
053 93	285405035

suitable for use with all reverse flow viscometers
(Cannon-Fenske and BS/IP U-tube viscometers) for manual and automatic measurements (not illustrated)

Type No.	Order No.
053 96	285405019

suitable for use with Micro-Ostwald viscometers
for manual and automatic measurements

Type No.	Order No.
053 97	285405027

Accessories

Brackets for reference measuring standard

DIN Ubbelohde viscometers which are used as testing standard should be stored in a specially modified viscometer bracket (053 92) according to official inspection / calibration authorities. The extension set for the test standard (VZ 5840) guarantees vertical slope with a maximum deviation of < 1° and the centered positioning of the capillaries.

Type No.	Order No.
VZ 5840	285417201

Control thermometers

Type No.	Order No.	Measuring range °C	Graduation °C
VZ 2801	285415763	- 5 ... + 38	1/10
VZ 2802	285415771	+ 33 ... + 67	1/10
VZ 2803	285415788	+ 66 ... + 102	1/10
VZ 2804	285415796	+ 95 ... + 152	1/10
VZ 2901	285415809	+ 20 ... + 25	1/100
VZ 2907	285417078	+ 22 ... + 27	1/100
VZ 2908	285415825	+ 37 ... + 42	1/100
VZ 2905	285415841	+ 45 ... + 50	1/100
VZ 2906	285415858	+ 97 ... + 101	1/100
VZ 2909	285417094	+ 132 ... + 137	1/100

Control thermometers for CT 72 thermostat series

Type No.	Order No.	Measuring range °C	Graduation °C
VZ 7100	285421051	+ 19 ... + 21	1/100
VZ 7101	285421068	+ 24 ... + 26	1/100
VZ 7102	285421076	+ 29 ... + 31	1/100
VZ 7103	285421084	+ 39 ... + 41	1/100
VZ 7104	285421092	+ 99 ... + 101	1/100
VZ 7105	285421105	+ 134 ... + 136	1/100

Accessories

LabPump

The LabPump VZ 5655 (not illustrated) used with manual and semi-automatic measurements to extract and pump solutions:

- filling of viscometers
- rinsing with the next sample
- extracting between manual measurements
- emptying of viscometers without removing them from the thermostatic bath

Since the LabPump VZ 5655 and the connections are made of PTFE or stainless steel, the pump is suitable for use with aggressive mediums.

The range of use for semi-automatic processing of samples, e.g. with a viscosity measuring instrument AVS® 360, AVS® 370 or AVS® 470, is possible up to a viscosity of 30,000 mm²/s. For semi-automatic processing work, the PTFE tube combination with stand (see illus-tration) and the waste bottle, type no. VZ 5624, are used.

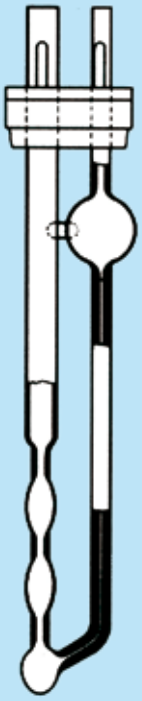
Type No.	Order No.
VZ 5655	1040755

Polyamide bracket
for use with Cannon-Fenske routine viscometers,
Cannon-Fenske reverse flow viscometers and all Ostwald viscometers
for manual measurements only

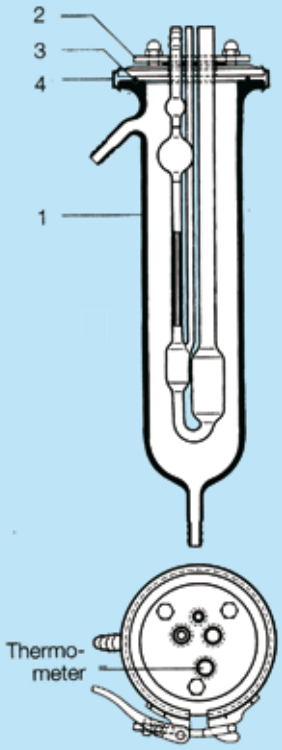
Type No.	Order No.
064 99	285405105

PTFE bracket
for use with Cannon-Fenske routine viscometers,
for automatic measurements only (not illustrated)

Type No.	Order No.
065 99	285405113



Accessories



Temperature stabilization jackets

In the absence of a see-through thermostat the temperature of capillary viscometers can be stabilized in this type of jacket using circulation thermostats in the temperature range 0 to 180 °C. The shape of the jacket and the number of holes in the support plate depend upon the type of viscometer being used. The support plate has been designed to facilitate changing the viscometer when required. An additional hole is provided in the support plate so that a control thermometer can be fitted. A quick-action seal simplifies changing viscometers.

Temperature stabilization jacket with support plate for Ubbelohde viscometers

Type No.	Order No.	Item No.	Comment
577 00	285405508		complete, without viscometer
Component parts			
577 01	285405516	1	temperature stabilization jacket, straight
238 00	285405524	2	support plate with 4 silicone rings (d = 4, 6, 8 and 10 mm)
225 34	285405532	3	silicone O-ring, ND 60
072 34	285405549	4	quick-action seal, NW 60

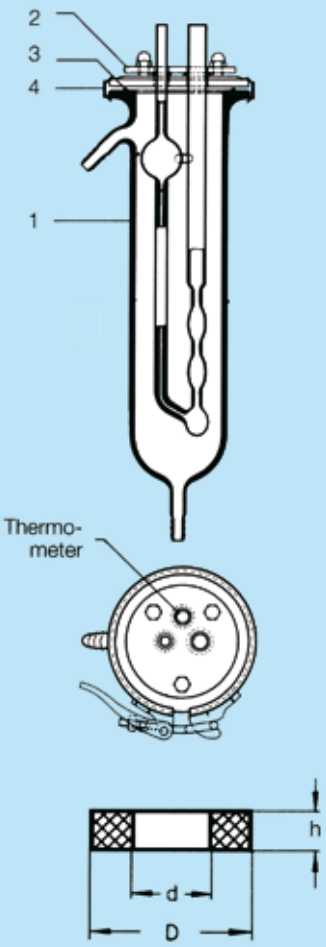
Accessories

Temperature stabilization jacket with support plate for Cannon-Fenske reverse flow viscometers and Ostwald viscometers

Type No.	Order No.	Item No.	Comment
Component parts			
577 01	285405516	1	temperature stabilization jacket, straight
225 34	285405532	3	silicone O-ring, ND 60
072 34	285405549	4	quick-action seal, NW 60

Silicone rings

Type No.	Order No.	d mm	D mm	h mm
228 11	285405808	4	10	5
228 14	285405816	6	16	5
228 16	285405824	8	16	5
228 17	285405832	10	16	5



AVS® measuring stands and tube sets

AVS® measuring stands

Measuring stands of the AVS®/S series can be used to measure the flow-through time in viscometers automatically.

The measuring stands can be connected to all measuring instruments made by SI Analytics for automatic measurement of viscosity and operate with all standard viscometers for repetitive measurements.

Automatic measurements have the following advantages:

- the repetitive standard deviation is less than for manual measurements
- the measurement is free from subjec-tive factors of influence
- the results can be printed out and/or be automatically documented on data memory system
- automatic processing of sample series is available.

The use of different materials ensures adaptation to existing measurement temperatures and applications.

The measuring stands or brackets can be exchanged at random.

The distance between the levels of the automatic optoelectronic unloading system is 40.00 mm ± 0.03 mm. This results in a standard deviation of VK = 0.05 % for Ubbelohde viscometers if the measuring stand is replaced or changed within the process.

For repetitive measurements with viscosity measuring instruments and Ubbelohde viscometers with measuring stands, the standard deviation VK = 0.03 %.

Manually calibrated Ubbelohde viscometers can also be used in AVS® measuring stands. If the automatic sensing levels do not correspond to the ring marks, the superimposed meniscus detection system will provide a higher constant. The difference amounts to 0.1 % per millimeter of height offset.

Required tube/cable combinations

	Viscometer type				
	517 ...	540 ...	542 ...	547 ...	531 ...
	520 ...	541 ...	543 ...	548 ...	
	530 ...	545 ...	544 ...	549 ...	
	532 ...	546 ...		552 ...	
	537 ...			553 ...	
				554 ...	
Instrument	**Tube/cable combinations**				
AVS® 310	VZ 5501(2)	VZ 5505(1)			
AVS® 350	VZ 5505(1) or VZ 5501(2)	VZ 5623(2)	VZ 5606(1)	VZ 5505(1) and VZ 6226	VZ 5857(1)
AVS® 360 and AVS® 361	VZ 5104(1) or VZ 5622(2)	VZ 5623(2)	VZ 5623(2)	VZ 5104(1) or VZ 5622(2)	VZ 5104(1) or VZ 5622(2)
AVS® 400 and AVS® 410	VZ 5505(1) or VZ 5501(2)	VZ 5621(1) and VZ 5505(1)	–	–	VZ 5857(1)
AVS® 440 and AVS® 450	VZ 5505(1) or VZ 5501(2)	VZ 5621(1) and VZ 5505(1)	VZ 5606(1)	VZ 5505(1) and VZ 6226	VZ 5857(1)

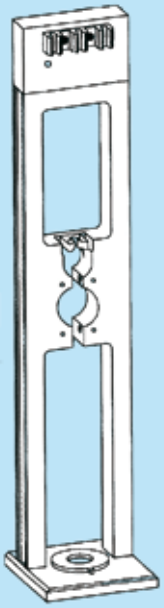
(1) Silicon tube
(2) PTFE tube (aggressive mediums)

AVS® measuring stands

Measuring stands

	AVS®/S	AVS®/S-HT	AVS®/SK	AVS®/S-CF	AVS®/SK-V
Available viscometers	Ubbelohde viscometers in accordance with DIN, ASTM, ISO 3105, Micro-Ubbelohde viscometers, Micro-Ostwald viscometers			Cannon-Fenske-routine viscometer	Ubbelohde-dilution viscometer
Temperature range	-80 ... +100 °C	-80 ... +200 °C	0 ... +60 °C	-80 ... +100 °C	0 ... +60 °C other temperature ranges available on request
Suitable brackets (type no.)	05392 05397			no bracket required	
Material	Aluminium, TiO_2-anodized		PVDF, stainless steel	Aluminium, TiO_2-anodized	PVDF, stainless steel
Dimensions (W x H x D) mm	90 x 447 x 90	90 x 496 x 90	90 x 447 x 90	90 x 447 x 90	90 x 447 x 90
Weight (kg) appr.	1.0	1.25	0.8	1.0	0.8
Accessories included in scope of delivery	Bracket Type No. 05392 for Ubbelohde viscometers, tube/cable combination VZ 5505			tube/cable combination VZ 5505	tube/cable combination VZ 5857, magnetic stirring rods, fastening springs for viscometer

Note:
When TC viscometers are being used, a bracket type no. 05393, with the necessary tube set is required only. A measuring stand is not required.



Suitable for use with the measuring units: AVS® 350, AVS® 360, AVS® 370, AVS® 450, AVS® 470, AVS® Pro

Suitable for use with the thermostatic baths: CT 72/P, CT 72/2-TT, CT 72/2, CT 72/4

Electrical connection: Cable VZ 6225 for all measuring stands to all instruments (is included in hose sets VZ 5505, VZ 5622 and VZ 5857), control lamp as function display

Distance between measuring levels: 40.00 mm ± 0.03 mm at 25 °C

Signal transmission: Optically using optical fibres from the measuring level in the stand head, converted into analogue signal from stand to measuring instrument

SI Analytics

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