

Technical Specifications of **U-Visc** Full Range of Automatic Viscometry Systems



OMNITEK

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Product description - Omnitek U-Visc series

Compact, high throughput automatic viscometer



The Omnitek U-Visc is the next generation of completely automatic viscometry systems. The system combines several unique features, making it the instrument of choice in many applications, ranging from QC to R&D to used oil analysis. While offering full compliance with ASTM D445/446, the specially designed viscometer tubes cover a 100-fold range, e.g. from 1 to 100 mm²/s. The tubes are based on the well-known and proven Ubbelohde design, but only require 8-16 ml of sample and approx. 12-15 ml of solvent for cleaning. Available with single or dual solvent cleaning, the instrument measures kinematic viscosity in Newtonian fluids like lubricants, fuels or dissolved plastics between 0.15 and 25,000 mm²/s.

Designed to be versatile and flexible, yet easy use. Different models are available range from 1 bath with 1 or 2 viscometer tubes, up to 2 baths with 1 or 2 viscometer tubes per bath, where each bath works independently. Sophisticated temperature control ensures that measurements are carried out well within limits specified by ASTM D445. Each bath features a 32-position sampling tray (16 samples per tube), allowing completely unattended operation. Depending on the viscosity of the sample, the instrument can process up to 40 measurements per hour, satisfying even the needs of high volume labs running several hundred samples per day.

Samples can be introduced using vacuum or pressure. The latter avoids evaporation of sample, which can be a point of concern in some dilute viscosity applications. Viscometers are easily exchanged in minutes instead of hours, minimizing downtime. All surfaces of the viscometer tubes, including the outside bottom, which is in contact with the sample, are thoroughly cleaned and dried using solvents and air.

Omnitek U-Visc requires a PC for operation (not included) but can also be controlled as a stand-alone unit through the responsive color touchscreen interface with a storage up to 10,000 measurement results. For fully data collection, storage, calculations and reporting, an advanced PC software application is provided with the instrument, which can gather data from multiple instruments simultaneously.





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Versions

Omnitek U-Visc is available in four different models

Version	Independent baths	Viscometer tubes / bath	Autosampler	Max. capacity per hour *	
	U-Visc 110	1	1	16 positions	10 meas.
	U-Visc 120	1	2	16 positions / tube	20 meas.
	Dimensions Weight	38 x 62 x 78 cm (width x depth x height) 54 kg (empty)			

Version	Independent baths	Viscometer tubes / bath	Autosampler	Max. capacity per hour *	
	U-Visc 210	2	1	16 positions / tube	20 meas.
	U-Visc 220	2	2	16 positions / tube	40 meas.
	Dimensions Weight	75 x 62 x 78 cm (width x depth x height) 92 kg (empty)			

* Measurements per / hour; depends on viscosity, tube, temperature and solvents chosen

U-Visc series features

- Applicable for fuels, base oils, formulated oils, and other petroleum products.
- Fully automatic
- Sample carousel
- Meets all ASTM, EN, ISO and DIN standards related to kinematic viscosity
- Extremely accurate temperature control
- Extremely accurate flow-time measurement independent of fluid type
- Viscometer filling by either vacuum or pressure method
- Little sample volume / little solvent consumption
- High throughput; up to 10 measurements per bath per tube per hour
- Innovative viscometer tube cleaning allowing cross contamination free operation
- Easy viscometer tube exchange
- Suitable for petrochemical fluids and diluted solution viscosity samples
- Chemically resistant to an extended range of fluids and solvents
- Multiple versions available covering a wide variety of requirements
- Compact design
- Optional duplo viscometer tubes for unstable samples



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Temperature control

Temperature control, which is crucial to enable reliable viscosity measurement, is extremely tight. Omnitek U-Visc surpasses ASTM and ISO standards with temperature stability of 15°C to 100°C ± 0.01°C and up to 150°C, ± 0.03°C. The temperature can be easily changed using the touchscreen on the front panel.

Safety

Safety was a primary concern throughout the design of the U-Visc series. Many precautions have been taken. Every movement of the sample carousel, cylinders and sample table are verified by accurate sensors. Additionally, bath over-temperature cut-offs, bath level detection and emergency stop safeties have been implemented.

U-Visc is built from highest standards of mechanical parts. It has ultimate chemical resistance towards most common used fluids and solvents like petroleum ether, kerosene, toluene, xylene, decalin, acetone, MEK, phenol, cresol, o-chlorophenol, chlorobenzene, trichloroacetic acid, 90% formic acid and glacial acetic acid.

U-Visc series specifications

Feature	U-Visc 110 / 120 / 210 / 220
Measuring range	0.15 - 25,000 mm ² /s @ 40°C *
Temperature range	15 - 150°C
Temperature stability	15°C to 100°C ± 0.01 °C* Up to 150°C, ± 0.03°C
Timer accuracy	0.001 s
Sample volume	8 ml - 16 ml
Sample introduction	Vacuum / Pressure
Solvent consumption	10 - 12 ml per cycle / 12 - 15 ml per cycle (single / double)
Sample throughput	U-Visc 110: up to 10 measurements per hour ** U-Visc 120: up to 20 measurements per hour ** U-Visc 210: up to 20 measurements per hour ** U-Visc 220: up to 40 measurements per hour **
Applicable standards	ASTM D445, D446, D2270, ISO3104, ISO3105, ISO 2909, DIN 51562.
Dimensions / Weight	U-Visc 110 / 120: 38 x 62 x 78 cm (w x d x h) / 54 kg (empty) U-Visc 210 / 220: 75 x 62 x 78 cm (w x d x h) / 92 kg (empty)
Viscometer type	Ubbelohde based
Sensor type	Thermal / Optical
Communication	RS-232C
PC control	Multiple instruments controlled with 1 PC
Data Export	USB
Power requirement	U-Visc 100: 10A @ 230 V U-Visc 200: 16A @ 230 V

* For temperatures around ambient, an external chiller is required.

** Measurements per / hour; depends on viscosity, tube, temperature and solvents chosen



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Viscometer tubes

The instrument utilizes up to 4 Ubbelohde based viscometer-tubes, 1 or 2 in each bath. Using thermal sensors, tubes are suitable for both opaque and transparent, non-conductive samples. Using optical sensors, tubes are suitable for transparent and/or conductive fluids. Prior to measurement, the sample is drawn up into the viscometer tube and then allowed to warm up to the test temperature. Then, the sample flows down under gravity and the time between the sensors is measured.

The viscometer tube is calibrated at 1 temperature of the customer's choice as standard. Special request must be made for an extra temperature on fee.

100-fold range tubes

These tubes have 3 sensors and 2 different measuring trajectories: the lower trajectory is used for high viscosity samples and the upper trajectory for lower viscosity samples. During sampling, the system measures the time it takes the sample to travel from the lower sensor to the middle sensor, thereby establishing the approximate viscosity. If the viscosity is high, the sample will be measured in the bottom trajectory, if it is low, it will be pulled up to the upper sensor and measured in the upper trajectory. The 3 sensor tubes thus have a very wide measuring range, approximately 100-fold, combined with fast flow times.

3 sensor tubes (100-fold range)			
Article nr.	Measuring range (cSt)		
92.2X0.0-003	0.15	-	15
92.2X0.0-01	0.5	-	50
92.2X0.0-02	1.0	-	100
92.2X0.0-03	1.5	-	150
92.2X0.0-05	2.5	-	250
92.2X0.0-10	5	-	500
92.2X0.0-20	10	-	1000
92.2X0.0-30	15	-	1,500
92.2X0.0-50	25	-	2,500
92.2X0.1-00	50	-	5,000
92.2X0.2-00	100	-	10,000
92.2X0.3-00	150	-	15,000
92.2X0.5-00	250	-	25,000
Thermal [X = 0]			
Optical [X = 5]			



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Duplo measurement tubes

Especially developed for unstable samples such as HFO, asphalts, etc., which typically show unstable viscosities when sampled repeatedly, these tubes have 2 measuring sections with an approximately identical tube constant. This allows for an actual duplo determination with only 1 sampling. The sample needs to exhibit Newtonian flow behaviour for this to work, but this applies to most petrochemical samples.

When used in Duplo mode, the tube produces 2 results within one sample efflux providing measuring range of 20-fold.

3 sensor duplo tubes measuring ranges (cSt) (thermal sensors)	
Article nr.	Duplo mode (20-fold)
92.220.0-015	0.75 - 15
92.220.0-025	1.25 - 25
92.220.0-05	2.5 - 50
92.220.0-1	5 - 100
92.220.0-15	7.5 - 150
92.220.0-25	12.5 - 250
92.220.0-5	25 - 500
92.220.1-00	50 - 1,000
92.220.1-50	75 - 1,500
92.220.2-50	125 - 2,500
92.220.5-00	250 - 5,000
92.220.10-00	500 - 10,000
92.220.15-00	750 - 15,000
92.220.25-00	1,250 - 25,000
92.220.50-00	2,500 - 50,000
92.220.100-00	5,000 - 100,000



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Dual solvent cleaning

A suitable solvent used for cleaning should have the following 2 main characteristics:

- It should be able to dissolve the sample that was tested, i.e. clean the tube
- It should evaporate quickly enough at the test temperature so that the tube is dry after cleaning

If the solvent used does have the ability to dissolve the sample, but does not evaporate quickly enough, a second solvent can be used to clean out the first solvent, as well as dry the tube. Usually, low boiling solvents are used for this purpose, such as Acetone or MEK. All fittings and valves on the system are fully chemically resistant and allow for the use of solvents like Petroleum ether, Heptane, Toluene, Acetone or MEK.

U-Visc series software

U-Visc utilizes advanced and easy to use *multi-lingual* software. One PC can control multiple systems (1 COM-port required for each instrument). Data can be exchanged with a LIMS via RS-232 or optionally via wireless. The instrument can be operated in its entirety through the PC interface. Sample ID's can be loaded and sample queues can be started, halted or temporarily suspended. Results are automatically stored in the internal database and optionally also on any external drive or network folder.

During a run several kinds of information is shown like measured flow times, average, spread and calibration / viscosity result. Also, actual status like filling, cleaning, etc is shown for every unit involved. Measured flow times are presented in left or right column, depending whether upper or lower measuring bulb is used for testing. Sample queue is permanently present and can be edited any time without interrupting running samples.

The screenshot displays the U-Visc software interface. At the top, there are tabs for 'System 1' and 'System 2'. Below this, a 'Status Overview' window is active, showing 'Bath 1' and 'Unit 1'. The interface includes a 'Sample ID' input field, a 'time (sec)' column with checkboxes, and an 'Average corrected Diff.%' section. A table with columns 'Unit', 'Sample ID', and 'Method' is visible, along with a 'Pending 0 / 0' indicator. A 'Menu' sidebar on the right contains options like 'Status Overview', 'System settings', 'Measurement results', 'Methods', 'Reference materials', and 'Viscosity Index'. The OMNITEK logo is at the bottom right of the interface.



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Methods

A unique feature of U-Visc software is its ability to define and store different operating methods, including different ways for cleaning and drying tubes. Methods can be set up for viscosity measurement or calibration and involve several configurable steps.

Method name	Defined name will show up in operating method
Operating mode	Viscosity & Calibration & QC Sample & Dilute Viscosity
Termination	Maximum determinations & Successive determinations & Any two determinations
Warm-up time	Fixed time for having sample thermally stabilized in viscometer tube
Pre-heating time	Time to allow sample being pre-heated (note: pre-heater is optional)
Reduced vacuum	Filling the viscometer with reduced vacuum may prevent premature evaporating of low volatile components and/or may reduce formation of gas bubbles
Cleaning method	Different pre-defined viscometer cleaning methods can be chosen
Sampling method	Different methods types are available for sampling

Omnitek U-Visc allows for defining several methods for cleaning of viscometer. This offers great advantages in operations as for any kind of fluid optimized cleaning parameters can be set.

Method name	Defined name will show up in operating method
Injections solvent 1	Number of injections of primary solvent, e.g. toluene
Injections solvent 2	Number of injections of secondary solvent, e.g. acetone
Injection quantity	Amount of solvent per injection
Drying time	Pre-set time
Thorough cleaning	When set it will allow for intensive solvent spraying

Viscosity method

Enter method parameters ✕

Please enter the method parameters and press OK to store the method or Cancel to discard.

Method name

Operating mode ▼ 1 - Viscosity

Termination ▼ 3 - Use any two determinations

Max determinations ▼ 2

Max. % difference

Preheating time ▼

Preheating temp. ▼

Warmup time ▼ 150

Reduced vacuum

Blank viscosity

Concentration (g/ml)

Cleaning method ▼ CPS-S0

Sampling method ▼ 1 - Normal

Set as default

Cleaning method

Enter cleaning parameters ✕

Please enter the properties for the cleaning method and press OK to store the method or Cancel to discard

Method name

Injections solvent 1 ▼ 10

Injections solvent 2 ▼ 5

Solvent quantity ▼ 3 - large

Drying time ▼ 100

Thorough

Use solvent to soak (BitUVisc only)

Nr. of soaks ▼

Set as default



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Measurement data

All measurement and calibration data are stored and can be retrieved or exported to tab or csv format. Stored data may include:

- Timestamp
- System ID, tube ID, tube constant
- Temperature
- Flow times, Capillary constants
- Kinematic viscosity
- Viscosity index
- Solvent viscosity
- Relative, Specific, Intrinsic, Inherent viscosity
- Viscosity number / Staudinger function
- Hagenbach-Couette correction
- Statistical calculations
- Bath temperature during analysis
- Method parameters

Measurement data resulting from viscosity and calibration

All data are collected and stored. The touchscreen can store up to 10.000 measurement results and can be exported through a USB port. Retrieval can be done through several screens, data can be exported as TAB or CSV file for further storage or evaluation in LIMS or Excel.

The screenshot displays the 'Measurement results' interface. At the top, there are tabs for 'Viscosity', 'Dilute viscosity', and 'Calibrations'. Below these, there are search filters for 'Sample ID', 'Show from', 'to', and 'All temperatures'. A table lists measurement records with columns: Sample ID, Kinematic Viscosity, Ref. Viscosity, VI, Temp., Tube ID, Date, and Time. A 'Details' panel on the right shows a sample record for '601' with a Kinematic Viscosity of 0. A 'Menu' panel on the far right lists options: 'Measurement results', 'Status Overview', 'System settings', and 'Viscosity Index'.

Sample ID	Kinematic Viscosity	Ref. Viscosity	VI	Temp.	Tube ID	Date	Time		
<input type="checkbox"/> RVB	0	?	?	100	4554	03-06-2018	12:06:45	OK	X
<input type="checkbox"/> CVB	0	?	?	100	4554	03-06-2018	11:44:05	OK	X
<input type="checkbox"/> 608	0	?	?	100	4557	03-06-2018	11:12:12	OK	X
<input type="checkbox"/> BFO	0	?	?	100	4557	03-06-2018	10:48:42	OK	X
<input type="checkbox"/> HVGO	0	?	?	100	4554	03-06-2018	8:50:05	OK	X
<input type="checkbox"/> CF 602	0	?	?	100	4835	03-06-2018	0:09:32	OK	X
<input type="checkbox"/> CR	0	?	?	100	4557	03-06-2018	0:05:05	OK	X
<input type="checkbox"/> 608	0	?	?	100	4835	03-05-2018	23:25:44	OK	X
<input type="checkbox"/> BFO	0	?	?	100	4557	03-05-2018	20:38:12	OK	X
<input type="checkbox"/> CFB	0	?	?	100	4557	03-05-2018	19:57:47	OK	X
<input type="checkbox"/> RVB	0	?	?	100	4557	03-05-2018	18:16:39	OK	X
<input type="checkbox"/> 608	0	?	?	100	4557	03-05-2018	15:13:35	OK	X
<input type="checkbox"/> RVB	0	?	?	100	4557	03-05-2018	13:34:49	OK	X
<input type="checkbox"/> CVB	0	?	?	100	4554	03-05-2018	13:29:47	OK	X
<input type="checkbox"/> BFO	0	?	?	100	4557	03-05-2018	9:34:53	OK	X
<input type="checkbox"/> CV	0	?	?	100	4557	03-05-2018	9:10:42	OK	X
<input type="checkbox"/> CF	0	?	?	100	4557	03-05-2018	8:44:48	OK	X
<input type="checkbox"/> BFO	0	?	?	100	4554	03-04-2018	17:09:47	OK	X
<input type="checkbox"/> EXT	0	?	?	100	4835	03-04-2018	15:40:19	OK	X



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Viscosity index (VI)

VI is calculated either automatically or manually. Software gives VI automatically for same sample IDs. It is also possible to calculate VI by choosing two different sample IDs manually.

The screenshot shows the 'Viscosity Index' software interface. At the top, there are options to 'Select range from database' or 'Manually enter data'. The manual entry section shows: 40° C with a kinematic viscosity of 10.01 and 100° C with a kinematic viscosity of 2.656. A 'Viscosity Index' field shows the result '99'. Below this, two data tables are displayed for 40 °C and 100 °C. The 40 °C table has columns for Sample ID, Date, and Kinematic Viscosity. The 100 °C table has the same columns. A 'Viscosity Index' field at the bottom shows the result '7465'. A 'Menu' sidebar on the right contains: Viscosity Index, Status Overview, System settings, and Measurement results.

Multi-Lingual

New multi-lingual software allows for controlling all analysis procedure in different languages.

The screenshot shows the 'General Settings' software interface. At the top, there are tabs for 'System 1' and 'System 2'. The 'General Settings' tab is active, showing fields for System ID, COM Port (COM3), Unit (°C), Language (English), and Sign. Digits (4). A dropdown menu for Language is open, showing options: Deutsch, English, Español, Русский, and 中文. Below the language selection, there are checkboxes for various settings: Auto-save results to database, Start new queue with cleaning, Overwrite constant after calibration, Turn preheater off if sample doesn't require preheat, Turn backlight on, Enable multiple system control, Don't clean if other tube is measuring (BitUVisc only), Enable User Access Control, and Show last results in Status Overview. A 'Tube Settings' section at the bottom has tabs for 'Unit 1' and 'Unit 2', with fields for Tube ID, Constant 1/2, Trajectory limit, Last sampling time, and HC Correction. A 'Menu' sidebar on the right contains: System settings, Status Overview, Measurement results, Methods, Reference materials, and Viscosity Index. The OMNITEK logo is visible at the bottom right.



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Optional accessories & upgrades

Following items are optional accessories and upgrades to the instrument.

Sample pre-heater

All U-Visc versions can be equipped with a sample pre-heater unit suitable to heat up fluids and solids from ambient up to 120 °C (controllable). Sample pre-heating is applicable to every tube, so ultimately a U-Visc 220 may be equipped with 4 sample pre-heaters.



Integrated pre-heater in U-Visc

Cooling circulator

For measurements close to ambient ($\pm 8^\circ\text{C}$), an additional cooling circulator is required to create sufficient offset for the temperature control unit. Baths contain cooling spiral, to which an external cooling circulator can be easily connected. Complete with tubing and fittings. Cooling circulator will be supplied separately on request.

Compressor

Omnitek U-Visc systems operate on clean 5 bar compressed air. If not available on-site, you require a stand-alone version with minimum 5 bar @ 5 l/min for the U-Visc 100 series and @ 7.5 l/min for the U-Visc 200 series.

Pedestal base

Pedestal base can be supplied from Omnitek for floor-standing installation.

PC & Printer

Any kind of PC can be used. PC can be supplied locally or from Omnitek. Omnitek supplies a new generation laptop. Minimum operation software should be Windows 7. PC should have RS232 or USB port (RS-232 adapter comes with Omnitek software).

Any kind of printer can be used if instrument is connected to a PC by software. Printer can be supplied locally or from Omnitek. Omnitek supplies the latest model laser printer.

ASTM Thermometers

All U-Visc units can be equipped with ASTM thermometers. The recommended thermometers that can be supplied are the modern digital contact thermometers (DCT), used at multiple temperatures.

Part No.	Description
90.361.80	Digital thermometer, 3 decimals, -40 +150 °C, 1 channel, with factory calibration certificate
90.361.81	Digital thermometer, 3 decimals, -40 +150 °C, 2 channels, with factory calibration certificate



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U-Visc series site requirements

U-Visc 100/200 is a bench-top instrument. There are several things that need to be considered to facilitate its operation and maintenance. Instrument should be placed on a flat surface which is free from vibration and located close to the utilities required for operation such as power, compressed air, solvent supply, fluid waste disposal and venting. U-Visc 100/200 often fit on standard laboratory work benches, however 5 cm clearance is required to enable connection to utilities at the back of the instrument. If required, a specially designed pedestal base is available. An air-conditioned room is recommended for optimal temperature stability of the thermostatic bath. It is also good practice not to place the instrument in front of a window or door where the sun or drafts may cause temperature changes.

Bench space

- Dimensions of U-Visc 110 / 120: 38 x 62 x 78 cm (w x d x h)
- Dimensions of U-Visc 210 / 220: 75 x 62 x 78 cm (w x d x h)

Power requirement

- U-Visc 100: 10A @ 230 V
- U-Visc 200: 16A @ 230 V

Compressed air (free of particles, water, oil and dust)

- Compressed air is needed at 5 Bar @ 5 l/min for U-Visc 100 series and @ 7.5 l/min for U-Visc 200 series, preferably fitted with a moisture/oil mist filter. Compressed air supply should be fitted with a connector that accepts 6 mm OD pressure tubing.

Cleaning/drying solvent

- A solvent suitable for cleaning the samples to be tested should be available. If dual solvent is used, a suitable drying solvent should also be available.

Ventilation

- The exhaust of the U-Visc system should be connected to a ventilation duct, to ensure that solvent vapours are safely emitted. The system is provided with a hose barb having 12 mm OD, accepting flexible tubing of 13 mm ID. Alternatively, the ventilation can be directly connected to the system's exhaust, which has a ¼" female thread.

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U-Visc series applications

Industries	Petroleum Based Samples	Other Sample Types
Refineries Terminals (Fuel Distribution) Lubricant Manufacturers Additive Manufacturers Condition Monitoring Labs Third Party Testing Labs Research & Development Labs Quality Control Labs Military Labs Power Plants Mines Customs Universities Automotive Chemical Plants Iron & Steel Pulp & Paper Textile Aviation Railways Highways	Lubricating Oils Additives Base Stocks Industrial Oils Transmission Oils Hydraulic Fluids Used Oils Waste Oils Crude Oils Fuel Oils Gasoline Diesel Bio Fuels Marine Fuels Waxy Samples	Printer ink

For other fluids / solutions please inquire



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U-Visc 100 series scope of supply list

Item	Qty		Part No.	Description
	110	120		
1	1	1	91.1X0.0Y.04 *	U-Visc 110 / 120 single bath kinematic viscosity system, single solvent cleaning
2	1	2	92.200.00	Ubelohde based viscometer tube, 100-fold range
3	1	1	92.330.30	Sample tray
4	3	3	92.330.48	Bath oil, 5 liters
5	2	4	90.500.00	Viscosity calibration standard **
6	1	1	92.330.01	Disposable sample cups, 750 pcs.
7	1	1	92.330.79	USB-stick with user manual, PC software and calibration certificates
8	1	1	92.330.50	U-Visc 100 Series User Operation manual
9	1	1	90.350.09	Serial communication cable
10	1	1	92.330.03	USB-Serial converter
11	1	1	92.330.15/13	Power cable (230V/115V)
12	1	1	92.330.25	Programming cable for U-Visc 110/120
13	2	2	92.330.101	Solvent supply flask, 5 lt, complete with tubing and connectors
14	1	1	92.330.106	Waste bottle, 5 lt, complete with tubing and connectors
15	1	1	92.330.06	Bath drain accessory
16	1	2	92.330.26	Teflon stopper for U-Visc tube removal
17	1	2	92.330.24	Rubber stopper for U-Visc viscometer tube, set of 2
18	1	1	90.105.00	Exhaust muffler for vacuum pump
19	1	1	90.364.00	Hose barb, blue, ¼"x12mm
20	1	1	92.330.27	Levelling supports, set of 4
21	1	1	92.330.84	Stainless steel hose barbs to connect ext. circulator, set of 2
22	1	1	92.330.28	Allen key 3mm
23	1	1	90.330.28	3m air pressure tubing Ø 6mm

* X = 1 for 1 tube, X = 2 for 2 tubes; Y = 0 for 230V / 50 Hz, 1 for 115V / 60 Hz.

** Calibration standards will be matched to the viscometer tubes selected.



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U-Visc 200 series scope of supply list

Item	Qty		Part No.	Description
	210	220		
1	1	1	91.2X0.0Y.04 *	U-Visc 210/220 dual bath kinematic viscosity system, single solvent cleaning
2	2	4	92.200.00	Ubbelohde based viscometer tube, 100-fold range
3	1	1	92.330.30	Sample tray for left bath
4	1	1	92.330.31	Sample tray for right bath
5	5	5	92.330.48	Bath oil, 5 liters
6	4	8	90.500.00	Viscosity calibration standard **
7	1	1	92.330.01	Disposable sample cups, 750 pcs.
8	1	1	92.330.79	USB-stick with user manual, PC software and calibration certificates
9	1	1	92.330.80	U-Visc 200 Series User Operation manual
10	1	1	90.350.09	Serial communication cable
11	1	1	92.330.03	USB-Serial converter
12	1	1	92.330.15/13	Power cable (230V/115V)
13	1	1	92.330.32	Programming cable for U-Visc 210/220
14	2	2	92.330.100	Solvent supply flask, 5 lt, complete with tubing and connectors
15	1	1	92.330.105	Waste bottle, 5 lt, complete with tubing and connectors
16	1	1	92.330.06	Bath drain accessory
17	2	4	92.330.26	Teflon stopper for U-Visc tube removal
18	2	2	92.330.24	Rubber stopper for U-Visc viscometer tube, set of 2
19	1	1	90.105.00	Exhaust muffler for vacuum pump
20	1	1	90.364.00	Hose barb, blue, ¼"x12mm
21	1	1	92.330.27	Levelling supports, set of 4
22	2	2	92.330.84	Stainless steel hose barbs to connect ext. circulator, set of 2
23	1	1	92.330.28	Allen key 3mm
24	1	1	90.330.28	3m air pressure tubing Ø 6mm

* X = 1 for 1 tube, X = 2 for 2 tubes; Y = 0 for 230V / 50 Hz, 1 for 115V / 60 Hz.

** Calibration standards will be matched to the viscometer tubes selected.

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U-Visc spare part kits scope of supply list

To enable best U-Visc performance in time it is recommended to have a set of spare-parts available. For U-Visc 100 and U-Visc 200 series spare-part kits consist of same parts but differ in numbers.

Composition of spare-part sets

Item	Qty per U-Visc series		Part No.	Description
	100	200		
	92.330.00	92.331.00		
1	1	1	90.330.28	3m air pressure tubing Ø 6 mm
2	1	1	90.330.38	Chemically resistant tubing 6 mm, 3 m
3	1	1	90.330.04	Chemically resistant tubing 3 mm, 3 m
4	1	1	90.330.14	Chemically resistant tubing 4 mm, 3 m
5	1	1	92.330.18	Pressure tubing 4 mm, yellow 3 m
6	1	1	92.330.19	Pressure tubing 4 mm, red 3 m
7	1	1	92.330.20	Pressure tubing 6 mm, red 3 m
8	1	2	92.330.16	O-ring kit for upper injector block, set of 5 each, includes below items
9	5	10	92.330.37	O-ring, 3x1 for tubing seal injector block U-Visc
10	5	10	92.330.38	Silicon seal for injector block U-Visc
11	5	10	92.330.39	O-ring, 11.91 x 2.62 for injector block U-Visc
12	1	2	92.330.17	O-ring kit for bottom injector block, set of 5 each, includes below items
13	5	10	92.330.40	O-ring 5.28 x 1.78 for bottom feedthrough block U-Visc
14	5	10	92.330.41	O-ring 20 x 1.5 for bottom feedthrough block U-Visc
15	5	10	92.330.42	O-ring 7.6 x 2.62 for bottom feedthrough block U-Visc
16	5	10	92.330.43	O-ring 32 x 3 for bottom feedthrough block U-Visc
17	2	4	92.330.47	Viton O-ring for pressurized sampling, set of 4
18	1	2	92.330.09	Solvent resistant valve U-Visc (A,B,E,F,G,H,I,K)
19	1	2	92.330.10	Air valve U-Visc (C,D,L)
20	1	2	92.330.11	Ferrule for 3 mm tubing, set of 5
21	1	2	92.330.12	Nut for 3 mm tubing, set of 5
22	1	--	92.330.34	Slow-blow fuse 8A, for U-Visc 110/220, pack of 2
23	--	1	92.330.35	Slow-blow fuse 15A, for U-Visc 110/220, pack of 2

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