## ViscoSystem<sup>®</sup> AVS 370 makes maximum precision ...

## Well equipped for every viscosity determination

With the ViscoSystem<sup>®</sup> AVS 370 we have created a measuring device, which not only measures as precisely and con-sistently as you expect from SCHOTT Instruments, but also offers you maximum flexibility and possibilities for future extensions. Furthermore, it also saves valuable space on the laboratory bench.

### Now possible for the first time ever: "suction" and "pressure" measurement – with <u>one</u> device

The ViscoSystem<sup>®</sup> AVS 370 is the first viscosity measuring device, which can be used for both "suction" and "pressure" measurement. This enables simple adjustment of the method of measurement to each sample. This significantly reduces investment costs for measuring stations at which pressure and suction methods are to be used. In most cases, using the ViscoSystem<sup>®</sup> AVS 370 also achieves noticeable savings in setting up time.

## Easy with a modular concept for future expansion

The ViscoSystem<sup>®</sup> AVS 370 has a modular design. The basic version is available with one ViscoPump II module in optical or in TC version. Up to 3 other ViscoPump II modules can be inserted in the compact 19" housing. This means a measuring station can be adapted to increasing requirements at any time. The modular concept also significantly reduces the space required, and measuring instrument set-ups can be more easily and clearly arranged, for example for parallel and comparison measurements.



### ... easier and more flexible, with provision for future extension!

#### Can be extended from an affordable single measuring station up to an 8-sample station

The basic version of the ViscoSystem<sup>®</sup> AVS 370 is an affordable starter model, which can be used to measure high or low viscosity liquids. In the version for TC viscometers, for example, it is ideal for measuring opaque and black fluids. If necessary, each single measuring station can be extended to form a multiple measuring station with PC-controlledmultitasking. The WinVisco 370 software included in the standard equipment

0.00 nVisco 370 S-Center System/Maintance ApplicationProgram Quit AVS-Center X. Method/Results Sample Parameters ent Par Start/Stop Device / changed at 16.04.03 15:04:23 11 Sample-ID 11,47 Average Value[s Methodfile Load Method od1.mdb 0,09 Operator ٠ 0,00 ion(s) Save Method as 11,47 ted Average Value[s] Measurement Method ٠ 0,500000 Report 0,1902 0.3857 Add 0 HC-Correction 0,6143 Parame Printer-Protocol cosity[ml/g] 4 (Value Autom, Rinsing scosity Number[ml/g] Viscosity\_Bit nstruments 26,8231 ViscoPump II SCHOT 2,2305 11,46 . 11,47 02 03 10 11 02 Suction 02 03 09 10 01 Pressure X AVS 370

enables parallel operation of two fully equipped AVS 370, with a total of eight ViscoPump II modules. Each module can measure a different sample using a different method. All the results can be quickly and easily evaluated and documented independently of each other. It could hardly be more flexible!

#### Compatible with existing accessories

Existing accessories (thermostats, stands, flow through cooler, etc.) can continue to be used with the ViscoSystem<sup>®</sup> AVS 370. Also, virtually all customary capillary viscometers can be used.

The ViscoSystem<sup>®</sup> AVS 370 from SCHOTT Instruments. Up to 4 ViscoPump II modules can be integrated in the compact 19" housing. With a PC and the WinVisco 370 software, all kinds of different samples can be measured, evaluated and documented in parallel, independently of each other.

### ViscoSystem<sup>®</sup> AVS 370 – the right solution for all situations

Anyone working with the ViscoSystem<sup>®</sup> AVS 370 is perfectly equipped for all tasks involved in determining viscosity using capillary viscometers.

## How to automatically achieve the right results

PC-controlled, the ViscoSystem<sup>®</sup> AVS 370 determines the time which the liquid to be examined requires to flow through the measuring distance in the capillary viscometer with quartz precision. The time is displayed with a resolution of 0.01 s (1 digit).

Measurement of the flow time of the liquid's meniscus can be scanned optoelectronically or with TC sensors. (During optoelectronic scanning the meniscus is detected by glass light fibres, with TC sensors the sensor detects the different thermal conductivity of the sample and air.) Therefore the ViscoSystem<sup>®</sup> AVS 370 offers an extraordinary broad field of uses, which range from viscosity measurement of clear fluids through to black or fully opaque liquids.

# New: Two working principles with the same device.

For the first time ever, with the ViscoSystem<sup>®</sup> AVS 370 you can use the same device to work with "pressure" or "suction". This gives you more flexibility and better adjustment to the liquids to be examined.

In the "pressure" method of working an overpressure of up to 0.1 bar is applied to the liquid in the capillary, this is particularly advantageous for fluids with a low boiling point. In the "suction" principle the sample is sucked up into the capillary by a vacuum. A greater reproducibility of results is achieved using the "suction" method for higher viscosity samples. A further advantage of the "suction" principle is that it guarantees formation of the "hanging ball level" in Ubbelohde viscometers, even for the minimum required sample quantities.

### Working with the ViscoSystem<sup>®</sup> AVS 370 is easy

The ViscoSystem<sup>®</sup> AVS 370 is very easy to use. The whole measuring procedure takes place automatically, subjective measuring errors are reliably precluded. The PC starts the measurement. After the set pretempering period has expired the entered number of measurements are carried out and the measured values saved.

The system can be protected against accidental overpumping or oversuction by means of a capacitive sensor. This prevents the sample to be measured from getting into the vessel containing the tempering liquid or inside the device.



		"pressure"	"suction"
Highly viscous samples e.g. oils, polymers			
Solvent (examples):	highly volatile		_
	Dichlormethane		-
	Chloroform		-
	Sulfuric acid	-	
	Dichloroethanoic acid	-	
	Toluene		
	Hexafluorisopropanol	-	
	m-cresol	-	
	Formic acid	-	
	Phenol-dichlorobenzene	_	
	Phenol-tetrachloroethane	_	



### Technical data

#### Unique flexibility

In the PC-controlled multiple measuring station, the ViscoSystem<sup>®</sup> AVS 370 offers you unique flexibility while working in a very small space: Up to eight modules, which equates to two fully equipped ViscoSystem® AVS 370, can be run parallel with the WinVisco 370 software. Each module can measure the same or different samples using "pressure" or "suction", fully independently of each other. In this way, series of measurements can be prepared extremely quickly and immediately evaluated and documented in the computer. This significantly reduces the time required to carry out viscosity measurements, especially for in process controls and quality assurance.



ViscoSystem <sup>®</sup> AVS 370					
Measuring range (time)	up to 9,999.99 s; resolution 0.01 s				
Measuring range (viscosity)	pressure: 0.35 1,800 mm <sup>2</sup> /s (cSt)				
	suction: 0.35 approx. 5,000 mm <sup>2</sup> /s (cSt)				
Measured parameter	flow through time [s]				
Accuracy of the time measurement	± 0.01 %				
Measured value display	via PC				
Display accuracy	± 1 digit (0.01 s)				
Pump pressure	automatically controlled				
Preselectable tempering period	0 20 min				
Preselectable number of measuremen	ts up to 10				
Connections					
Pneumatic connections	threaded connections for viscometers				
Electrical connections	circular connector with bayonet lock for measuring stands				
	and TC viscometers				
RS-232-C interface	9-pin				
Mains connections	plug in accordance with EN 60320				
Pump connection	socket outlet in accordance with EN 60320				
Data Input/Output	serial to EIA RS-232-C				
Ambient conditions					
Ambient temperature	+10 +40 °C				
Air humidity	max. 85 % rel.				
Housing					
Material	coated aluminum plate				
Dimensions (for 1 4 modules)	(W x H x D) approx. 255 x 205 x 320 mm				
Weight (incl. 1 module)	approx. 5.4 kg				
Power supply	90 240 V ~, 50 60 Hz				
Equipment safety	EMC-Compatibility according to the Directive 89/336/EEC of the				
	the Council;				
	low-voltage directive according to the Directive 73/23/EEC of				
	the Council, as amended by the Directive 93/68/EEC of the Council				
Ndulai angling					
Multi-tasking	for 1 8 ViscoPump II modules, with WinVisco 370 software				

The following viscometers can be used with the ViscoSystem<sup>®</sup> AVS 370: Ubbelohde viscometer to DIN, Ubbelohde viscometer to ASTM, micro Ubbelohde viscometer to DIN, micro Ostwald viscometer, Cannon-Fenske routine viscometer, TC-Ubbelohde viscometer, TC-micro Ubbelohde viscometer.

We reserve the right to make technical changes. ViscoSystem<sup>®</sup> is a registered trademark.

Compact, space-saving viscosity measuring station with the ViscoSystem<sup>®</sup> AVS 370. The measuring device is attached to a support table (recommended accessory). All the connections are within view and easily controlled. If necessary the sample can be automatically sucked away and the viscometer flushed e.g. with the TITRONIC<sup>®</sup> universal or the TITRONIC<sup>®</sup> 110 plus burette.

### Real multitasking for up to 8 measurements in parallel mode ...

#### Easy to understand, proven in practice: The WinVisco 370 software

WinVisco 370 is the ideal software for the ViscoSystem<sup>®</sup> AVS  $370^{*}$ ). It is supplied as part of the standard equipment. WinVisco 370 is easy to understand and can be quickly learned. Up to eight viscosity measurement modules can be controlled with only a few operating steps. The device parameters are easy to enter: Constants, t<sub>0</sub> flow time, number of measurements, pretempering period, type of viscometer, date and sample labeling for each measuring station.

WinVisco 370 works in real multitasking mode. This makes it possible for each measurement to be processed independently from the others. It also means that time-consuming measurements can be carried out from the same PC, without hindering the course of other, faster measurements. During the measurements you can change the monitor displays, start or stop other measurements, print out or save measured values. All data provided by the software can be passed on to an LIMS system.

WinVisco 370 supports three groups of users. For simple use, access is limited to: select viscometer, measure, load and save methods as well as enter parameters. In the highest level, users with administrator status can access all the software's facilities. Each user is given a user ID, an access level and a password.

\*) The language (English or German) can be chosen after installation over the programme menu.

A¥S-Center	×		
<u>O</u> verview		Method/Results	Rinsing Parameters
Measurement Parameters		Sample Parameters	discharge Rinse Start/Stop
Device / changed at:	1 16.04.03 15:04:23	Sample-ID	
Methodfile:	method1.mdb	Average Value[s]	11,47 Load
<u>.</u>	Inditionalitie	Rel.Standarddev.[%]	0,09 Method
Operator		HC-Correction[s]	0,00 Save
Measurement Method		Corrected Average Value[s] Concentration[g/ml]	11,47 Method as
Method	Probe	Density[g/ml]	0,500000 Report
		Dvn.Viscositu[mPas]	0,300000
Number of Meas. (110)	2	Rel.Viscosity	0,3857 Add
Pretempering time (020 min)	D HC-Correction		-0.6143 Parameter
Bath Temperatur [°C]	25 Printer-Proto	Inher.Viscosity[ml/g]	0 Remove
	125   Finiter-Floto	K-Value	0 Parameter
Max.Deviation [%]	3 🗌 🗌 Autom. Rins		0 Parameter
		Intrin.Viscosity_Billmeier	0 Selection
Viscosimeter		SUS	26,8231 Runtime
Viscosimeter Name		SFS	2,2305   11,46
VISCOSIMETER Mame	Viscometer 1		11,47
Viscosimeter Type	DIN-Ubbelohde		
to-Time [s]	29,74 07.02.03 10:11	.02	
Constant [mm²/s²]	0,0331565 07.02.03 09:10	01	
	10,000,000 101,02,00 00,10		
File-Protocol	CSV-Program	x	
win.csv			

All the important parameters required for the measurement are displayed on the "Methods/Results" page. If necessary, the parameter editor can be called up using "Add Parameter", in order to enter non-standard or customer specific formulae.



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AV5370.04	_				Stat
Runtme			1 1 1 2		
AV5380.05		14			Start
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All the measurements currently running can be monitored in parallel in the overview.

	**		-Date:		Verk	co interi
Distor	Tipe	Device No.	Constant (section)	-	Constant charged	-
Viscometer 1	Diffi Ubbelohde	123456	0.0331545	29.74	07 02 03 09 10 01	07.0
Visconeter 2	D011.bbeichde	123457	225.0000000	\$7.00	02:08:00 11:00 24	1031
Visconete 3	ASTR-Ubbeloke	123458	0.8142952	22.00	02/05/00 16:30 54	041
Vocceneter 4	Career Fersite Roden	123493	1.3636000	3.46	00:00:00	
Vocceneter 1	Minso-Ubbelishde	123450	0,1000000	1.00	00.00.00	
Vocumeter 6	AST442/bbminkde	125009	0.2000000	1.00	00:00:00	
Veconeter ?	Cannon-Fendes Roatine D1N+Ibbelchde	1,35547	1.000000	1.00	00.00.00	
Viccolveter B	The constants	4,0000	0.0100000	10.40	00.00.00	

The viscometer data required for the evaluation can be stored in a table. This guarantees perfect allocation of e.g. the  $t_0$  runtime, viscometer constants, the series number, etc. for each individual viscometer being used.

### ... with the practically proven WinVisco 370 software



The password protection prevents unwanted or confusing changes to the important measurement parameters.

# With the ViscoSystem<sup>®</sup> AVS 370 and WinVisco 370 you will even quickly find the right connection for rinsing

With the daisy chain link of the ViscoSystem<sup>®</sup> AVS 370, further devices can be integrated in the system and controlled using the WinVisco 370 software. For example, when working in suction mode the viscometers can be rinsed using the TITRONIC<sup>®</sup> *universal* and TITRONIC<sup>®</sup> 110 *plus* burettes. The TITRONIC<sup>®</sup> *universal* is preferably used for light solvents, the TITRONIC<sup>®</sup> 110 *plus* for solvents with a viscosity >3 mm<sup>2</sup>/s. A special interchangeable unit (TA 50V) is available for highly aggressive solvents.

A vacuum pump (accessory) integrated in the system is used to conveniently suck away samples and solvents.



The parameters can be individually adjusted to the measurement for each measuring position.

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10.00%	Filing speed(s)	30	tell at		Sanes	
Fiel Protocol			100 - 001			1

Each rinsing/dry step can be individually preselected. Even the application dependent quantity of solvent and the drying time can be separately determined.



Two basic concepts are available for the rinsing:

- A ViscoSystem<sup>®</sup> AVS 370 with four ViscoPump II modules (four measuring positions) and eight burettes, which enable each viscometer to be rinsed with two solvents. Time-consuming removal of the transparent thermostat for external rinsing of the viscometer is no longer necessary.
- Two ViscoSystem<sup>®</sup> AVS 370 complete with four ViscoPump II modules each (eight measuring positions), which enables semi-automatic rinsing of the viscometer with the next sample or solvent.