



MANUAL No.: 16613

Digital Rotational Viscometer

Small Sample DV1 Series



For DV1 LV DV1 RV DV1 HA DV1 HB

Keep this manual available to every operator. Read all safety, installation, spindle selection, and cleaning instructions before use. Confirm the ordered model and optional accessories before starting a test.

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1. Getting Started

Thank you for choosing the DV1 Series rotational viscometer. Before use, confirm that the model, spindle set, optional accessories, power connection, and intended viscosity range match the order.

Confirm the Ordered Configuration

Check	Confirm Before Use	Reason
Model	Check the nameplate for DV1 LV, RV, HA, or HB.	Each model has a different viscosity range and spindle system.
Standard spindles	DV1 LV uses spindles 1 to 4. DV1 RV, HA, and HB use R2 to R7.	A spindle from the wrong series can produce invalid results.
Small sample adapter	Confirm that the adapter and the ordered small sample spindles are listed on the sales order.	The adapter is optional and is not part of every standard package.
Temperature probe	Confirm whether a probe is supplied with the ordered configuration.	The display cannot show sample temperature without a compatible connected probe.
Data output	The instrument provides RS232 output. Confirm any cable, printer, or software separately.	RS232 is not a USB connection. External equipment may not be included.
Power connection	Use the supplied adapter with 100 to 240 V AC at 50 to 60 Hz.	Confirm that the plug supplied is suitable for the installation location.

Important Product Limits

- The stated model range is the combined capability of the instrument. The usable range for one test depends on the selected spindle and speed.
- Use a torque reading between 10% and 90% for reliable results. Dashes on the display usually indicate an overrange condition, not a failed instrument.
- The DV1 product sheet states a nominal small-sample capability of 2.1 to 20 mL. For the six listed small-sample spindles, the specified test volumes are 2.1 to 13.5 mL; use the exact value in the table.
- Results from non Newtonian samples can change with spindle, speed, temperature, and time. Compare results only when the complete method is the same.

2. Getting Started Safe Use

Important Safety Information

Use the instrument only by trained personnel who understand laboratory safety and the hazards of the sample under test.

The instrument is adjusted and inspected before shipment. It is ready for normal operation after correct assembly; do not alter internal calibration or mechanical settings.

WARNING Do not operate in an explosive atmosphere. Keep the instrument away from corrosive gases, strong electromagnetic fields, vibration, excessive humidity, and heavy dust.

CAUTION Never run an installed spindle in air. Dry rotation may damage the pivot and bearing.

CAUTION Support the coupling when installing or removing a spindle. Do not push the spindle sideways or use excessive force.

Electrical supply Use only 100 to 240 V AC at 50 to 60 Hz with the supplied power adapter. Disconnect power before cleaning or service.

Sample and Operator Safety

- Wear protective equipment appropriate for the sample and cleaning solvent.
- Use a fume hood and closed containers when handling toxic or volatile materials.
- Keep the power adapter and instrument controls dry.
- Inspect the housing, cable, ordered probe, spindle, and small-sample chamber before every use.
- Do not open the housing, add lubricant, or adjust internal parts.

3. DV1 Overview and Parameters

The DV1 Series measures the apparent viscosity of liquids with a rotating spindle. The optional small-sample adapter is advertised for 2.1 to 20 mL samples; the six spindle-specific volumes published for this series are 2.1 to 13.5 mL. The color screen can display measurement and method information, with sample temperature available when a compatible probe is connected.

Source scope DV1 model specifications, standard spindle families, small-sample ranges, and sample volumes are based on the DV1 small-sample product sheet. Structure, installation, color-screen operation, maintenance, troubleshooting, packing, and warranty content is translated and adapted from the supplied color-screen manual. If generic model data conflicts with DV1 data, the DV1 specifications in this manual control.

Model Specifications

Specification	DV1 LV	DV1 RV	DV1 HA	DV1 HB
Viscosity range	6 to 6.0M	40 to 40M	80 to 80M	320 to 320M
Standard spindle set	1 to 4	R2 to R7	R2 to R7	R2 to R7
Speed range	0.1 to 200 rpm	0.1 to 200 rpm	0.1 to 200 rpm	0.1 to 200 rpm
Viscosity accuracy	±1%	±1%	±1%	±1%
Repeatability	±0.5%	±0.5%	±0.5%	±0.5%
Suggested temperature range	0 to 60 °C	0 to 60 °C	0 to 60 °C	0 to 60 °C
Temperature accuracy	±0.1 °C	±0.1 °C	±0.1 °C	±0.1 °C
Net weight	6.5 kg	6.5 kg	6.5 kg	6.5 kg
Dimensions L x W x H	276 x 270 x 500 mm	370 x 325 x 500 mm	370 x 325 x 500 mm	370 x 325 x 500 mm

Viscosity values are in mPa·s. One mPa·s equals one cP. Accuracy and repeatability values apply to Newtonian liquids under controlled test conditions.

Standard Features

- Aluminum instrument housing with a high-resolution 3.0 inch TFT color display
- 3.0 inch TFT color display with Chinese and English interface options
- Stepless or fixed step speed selection
- Storage for up to 10,240 measurement records
- Viscosity temperature time curve display
- Timer controlled measurement
- RS232 connection for computer or compatible printer output
- High precision stepper motor with internal vibration damping

4. Model and Accessory Compatibility



Figure 1 DV1 Series with small-sample measuring assembly

Choose the Correct Model

Model	Combined Model Range	Standard Spindle Family
DV1-LV	6 to 6.0M mPa·s	Spindles 1 to 4
DV1-RV	40 to 40M mPa·s	Spindles R2 to R7
DV1-HA	80 to 80M mPa·s	Spindles R2 to R7
DV1-HB	320 to 320M mPa·s	Spindles R2 to R7

Optional Equipment Must Be Ordered Separately

- The small-sample adapter and small-sample spindles 14, 18, 21, 27, 28, and 29 are optional configurations. Confirm the exact items on the sales order.
- A temperature-sensor interface is provided. Confirm whether a compatible probe is included in the ordered configuration.
- An RS232 interface is provided. Confirm the required cable, printer, computer connection, and software separately; RS232 is not USB.
- Photos and screen illustrations show the product family and functions. The delivered stand, plug, accessories, and firmware labels may vary by ordered configuration.

5. Setup and Pre-use Inspection

Choose the Work Area

- Use a clean, dry, stable, and level bench.
- Keep the instrument away from vibration, corrosive gas, and strong electromagnetic interference.
- Do not operate in an area with an explosive atmosphere.
- Allow enough space to raise the head and remove the sample vessel safely.

Set Up the Ordered Configuration

- Compare the model nameplate and all delivered items with the sales order before assembly. Photograph any shipping damage before use.
- Place and secure the instrument on the supplied stand according to the hardware actually delivered. Make sure the head is stable and can move vertically without dropping.
- Level the instrument using its bubble level and leveling feet. Recheck the level after moving the instrument.
- Confirm the spindle family: 1 to 4 for DV1 LV, or R2 to R7 for DV1 RV, HA, and HB. Use small-sample spindles only with the matching ordered adapter.
- Connect only the supplied power adapter to 100 to 240 V AC, 50 to 60 Hz. Connect an ordered temperature probe or RS232 accessory only to its matching interface.
- Keep all shipping protection and packaging for future transport. Remove any transport restraint identified on the delivered instrument before switching it on.

Before Every Test

- Confirm that the coupling, spindle, sample chamber, and threads are clean and undamaged.
- Check that the instrument is level and that all ordered measuring parts are securely installed.
- Bring the sample and measuring components to the required test temperature.
- Choose a spindle and speed that are likely to place the torque reading between 10% and 90%.

6. Equipment Operation

Control Panel and Main Menu

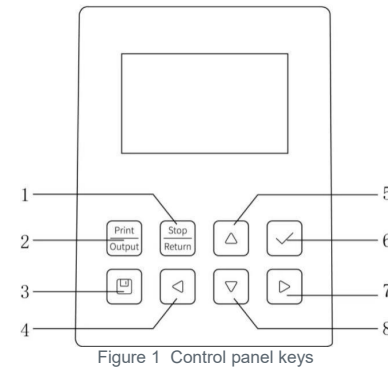


Figure 1 Control panel keys

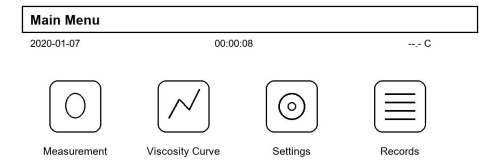


Figure 2 English main menu

Key	Function
2:Print / Output	Prints or outputs the displayed result
1:Stop / Return	Pauses a test or returns to the previous screen
3:Save	Stores a stable measurement result
4&7:Left / Right	Moves between menu items or editable fields
5&8:Up / Down	Selects an item or increases/decreases a value
6:Confirm	Opens a menu, accepts a setting, or starts a test

Start the Instrument

1. Switch on the rear power switch. The Main Menu appears.
2. Use Left or Right to select Measurement, then press Confirm.
3. At the Spindle field, use Up or Down to select the installed spindle number.

6. Equipment Operation Continued

Select the Spindle and Speed

Measurement Setup			
2020-01-07		23:59:36	
		--- C	
Spindle	R1#	Speed	50 rpm
		Timer	02:00
		cP	
Shear Stress --- Pa		Shear Rate 0.00 1/s	
Torque ---%			Range 200.0

Figure 3 Measurement setup

Speed Selection			
2020-01-07	23:59:36	--- C	
Spindle	R3#	Speed	0.5 rpm
		Timer	02:00
		cP	
Shear Stress --- Pa		Shear Rate 0.00 1/s	
Torque ---%			Range 200K

Figure 4 Speed selection

1. Use Left or Right to move to Speed, then use Up or Down to select the required rpm.
2. Check the maximum measurable range shown at the lower right. Change the spindle or speed if the expected viscosity is outside that range.
3. Press Confirm. The spindle begins rotating and the measurement screen becomes active.

Run, Pause, and Resume

Measurement Running			
2020-01-07		23:59:36	
--- C			
Spindle	R3#	Speed	1 rpm
		Timer	02:33
- - - - -		cP	
Shear Stress --- Pa		Shear Rate 0.00 1/s	
Torque ---%		Range 100K	

Figure 5 Measurement running

Use a result only after the viscosity, temperature, and torque indication are stable. Press Stop / Return to pause. Press Confirm to resume with the previous spindle, speed, and timer settings, or return to setup before changing them.

Range warning If torque exceeds 100%, the viscosity field displays dashes. For reliable accuracy, keep torque between 10% and 90%.

6. Equipment Operation Continued

Timed Measurement and Viscosity Curve

Viscosity Curve																																																						
Spindle R2#	Speed 1 rpm			Timer 03:00																																																		
Viscosity (cP)	<table border="1" style="width: 100%; height: 150px; border-collapse: collapse;"> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																																																					Temp. (C)
Torque --% Range 40.0K																																																						

Figure 6 Viscosity and temperature curve

To enable timed testing, open Settings, select Timer, choose On, and confirm. If the selected time is shorter than the instrument minimum, the instrument automatically uses the minimum time. Select Viscosity Curve from the Main Menu to display viscosity, temperature, and elapsed time during a test.

Save, Review, and Configure

Records		1/1
R3# 50.0 rpm	0.000 cP	2020-01-06 23:53:21

Parameters	Value	Time
R3# 50.0 rpm	0.000 cP	2020-01-06 23:53:21

Settings	
1. Language	
2. Theme Color	
3. Date and Time	
4. Time Format	
5. Speed Mode	
6. Communication / Print	
7. Timer	

Figure 7 Saved records

Figure 8 Settings menu

1. After the reading stabilizes, press Save. A saving message confirms that the result has been stored.
2. Open Records to review spindle, speed, viscosity, and measurement time.
3. Open Settings to choose language, theme color, date and time, 12/24-hour format, fixed-step or stepless speed mode, communication/printing mode, and timer status.
4. Set Communication or Printing before using Print / Output. RS232 is not USB; confirm the required cable and external equipment separately.

7. Measurement Workflow

1. Prepare a clean, homogeneous sample and control its temperature. For standard spindles, use a cylindrical vessel at least 80 mm in diameter and 100 mm high. Use the dedicated chamber for the small-sample adapter.
2. Level the instrument and verify that the measuring assembly is secure. Install the spindle guard for standard-spindle testing when it is supplied with the ordered configuration.
3. Support the coupling. Turn the spindle to the left to install it. Avoid sideways force.
4. Lower the head slowly to the immersion position specified by the spindle or adapter. Keep the spindle centered and remove any trapped air bubbles.
5. Switch on the instrument and open Measurement. Select the installed spindle number.
6. Move to the speed field and select the required speed. The lower right of the display shows the maximum range for the selected spindle and speed.
7. Press Confirm to start. Wait until the reading and sample temperature are stable.
8. Check the torque percentage. Use results between 10% and 90% for best accuracy. Change spindle or speed if required, then repeat the measurement under the same conditions.
9. Press Save to store the stable result, or Print Output to send it through the configured output mode.
10. Press Stop Return to stop the test. Raise the head, remove the vessel, then support the coupling and turn the spindle to the right to remove it.

Overrange indication: If torque exceeds 100%, the viscosity field displays dashes. Stop the test and select a lower speed or a spindle suited to a higher viscosity.

Timed tests: Enable the timer in Settings before starting the measurement. If the selected time is shorter than the instrument minimum, the instrument automatically uses the minimum measurement time.

Pause and resume: Press Stop Return during a test to stop rotation. Press Confirm to repeat the previous spindle, speed, and timer settings, or return to the setup screen before changing them.

8. Small Sample Adapter

Use the small sample adapter when sample volume is limited or when a controlled measuring chamber is preferred. Select the spindle from the range table on page 16 and dispense the matching sample volume. Small sample spindle numbers 14, 18, 21, 27, 28, and 29 require 2.1 to 13.5 mL.

The product sheet also states a nominal adapter capability of 2.1 to 20 mL. This broader statement is not a universal fill volume; use the spindle-specific volume below for the listed DV1 small-sample spindles.

Small Sample Procedure

1. Select a small sample spindle whose viscosity range includes the expected result. If the viscosity is unknown, begin with a spindle and speed suitable for the higher expected viscosity.
2. Clean and dry the spindle and sample chamber. Dispense the specified sample volume without introducing foam or air bubbles.
3. Support the coupling and install the spindle. Fit the small sample chamber and adapter securely, keeping the spindle centered and free from contact with the chamber wall.
4. Allow the sample, spindle, and chamber to reach the target temperature. Insert the temperature probe when the test method requires temperature monitoring.
5. Select the matching spindle number and an initial speed. Start the test and confirm that torque settles between 10% and 90%.
6. Record the viscosity, temperature, speed, spindle, torque percentage, and elapsed time. Use the same conditions for every comparative result.
7. Stop the instrument before removing the chamber or spindle. Clean both parts immediately after use.

Sample Volume Reference

Small Sample Spindle	Required Sample Volume
14	2.1 mL
18	6.7 mL
21	7.1 mL
27	10.4 mL
28	11.0 mL
29	13.5 mL

9. Measurement Quality

Control the Test Conditions

Variable	Control
Temperature	Control the sample temperature accurately and allow the spindle and sample to equilibrate before testing.
Torque	Use readings between 10% and 90%. Values outside this band may reduce measurement reliability.
Position	Keep the spindle centered and immersed to the correct mark or adapter position.
Sample	Use a homogeneous sample and prevent bubbles from adhering beneath the spindle.
Cleanliness	Keep the spindle, chamber, coupling face, and threads clean.
Method	For comparison work, keep spindle, speed, temperature, container, sample preparation, and test time the same.

Newtonian and Non Newtonian Samples

For a Newtonian liquid, viscosity is independent of shear rate at a fixed temperature. The stated instrument accuracy and repeatability are specified for Newtonian liquids.

Many suspensions, emulsions, polymer solutions, paints, and adhesives are non Newtonian. Their apparent viscosity may change with spindle, speed, temperature, and time. Different results under different conditions do not by themselves indicate an instrument fault.

Report the complete method with every non Newtonian result. At minimum, record the spindle, speed, sample temperature, torque percentage, and measurement time.

Choosing Spindle and Speed

If the approximate viscosity is known, select a combination whose displayed maximum range is above the expected value. If the viscosity is unknown, begin conservatively at a lower speed and with a spindle suited to higher viscosity. Adjust one setting at a time until the torque reading falls within the recommended band.

Very low viscosity

The supplied color-screen manual recommends an optional No. 0 spindle for liquids below 10 mPa·s. This spindle is not part of the standard DV1 spindle sets; confirm compatibility, range, and supply before purchase.

10. Records Curves and Settings

Save and Review Results

1. Wait for a stable measurement, then press Save. The instrument confirms that the result is being stored.
2. Return to the main menu and open Records.
3. Review the saved spindle, speed, viscosity, and measurement time. The instrument stores up to 10,240 records.

Bluetooth note

The generic color-screen manual mentions Bluetooth printing for some variants.

Bluetooth is not stated as a standard DV1 feature in the DV1 product sheet. Confirm the ordered communication hardware before purchase.

Viscosity Curve

Open Viscosity Curve from the main menu to view viscosity, temperature, and time during a run. Select spindle, speed, and timer settings in the same way as a routine measurement. Use the curve to observe stabilization or time dependent behavior; report the final method settings with exported data.

Communication and Printing

1. Connect the compatible computer or printer to the RS232 port with the instrument switched off.
2. Open Settings and select the required communication or printing mode before attempting output.
3. Run the measurement, then press Print Output when the displayed result is ready.

Available Settings

Setting	Options
Language	Chinese or English
Theme	Blue, green, red, orange, purple, or black
Date and time	Current date and time
Time format	12 hour or 24 hour
Speed mode	Fixed step or stepless
Output mode	Communication or printing
Timer	On or off

11. Cleaning and Maintenance

After Each Measurement

1. Stop the motor before raising the head or removing the sample vessel.
2. Support the coupling and remove the spindle by turning it to the right. Do not apply sideways force.
3. Clean the spindle and small sample chamber away from the instrument. Never clean a spindle while it is attached to the head.
4. Use a cleaning agent that is chemically compatible with the sample and the measuring parts. Soaking in a suitable solvent may be used when necessary.
5. Do not scrape the spindle with a metal blade or abrasive tool. Scratches and bending can change the result.
6. Dry the components and return them to their storage case.

Routine Care

- Inspect the instrument and accessories before each use.
- Keep the coupling face and threads clean.
- Use the instrument at normal room conditions and protect it from humidity and dust.
- Avoid repeated unnecessary connection and disconnection of the power adapter.
- Do not add lubricant, open the housing, or adjust internal parts.
- Use original replacement parts and contact the supplier or authorized service representative for repair.

Transport and Storage

Switch off and disconnect the instrument. Remove the spindle, ordered probe, and sample chamber as needed. Protect the coupling with the transport restraint supplied with the delivered unit and pack the instrument in its original case. Store all spindles clean, dry, and protected from bending.

12. Troubleshooting and Fault Analysis

Stop the test before making adjustments. After each correction, re-level the instrument and repeat the measurement under the same conditions.

Symptom	Likely Cause	Corrective Action
Bubble cannot be centered	The workbench is tilted too far	Move the instrument to a stable, level workbench, then adjust both leveling feet
Instrument head wobbles	The crossbar connection was not tightened with the wrench	Tighten the crossbar connection with the supplied wrench
Newtonian standard reads incorrectly	Protective frame is not installed	Install the protective frame
Newtonian standard reads incorrectly	The installed spindle does not match the spindle number selected on screen	Install the spindle that matches the displayed spindle number
Newtonian standard reads incorrectly	The instrument is not level or moved out of level during setup	Re-level the instrument after positioning the sample
Newtonian standard reads incorrectly	The sample does not reach the spindle immersion mark	Adjust the instrument height until the liquid reaches the immersion mark
Newtonian standard reads incorrectly	The spindle is not installed correctly	Remove and reinstall the spindle without applying lateral force
Newtonian standard reads incorrectly	The spindle was not cleaned after the previous test	Remove and clean the spindle before repeating the test
Newtonian standard reads incorrectly	The spindle is not compatible with the instrument model	Use the spindle set supplied or specified for this model
Newtonian standard reads incorrectly	The sample temperature is changing	Wait until the sample temperature is stable
Newtonian standard reads incorrectly	Internal mechanical parts are worn or damaged	Stop using the instrument and contact authorized service
Temperature is not displayed	The selected model is not equipped with an RTD temperature probe	Install the compatible optional RTD temperature probe
Temperature display is abnormal	The RTD temperature probe is damaged	Inspect the probe and contact authorized service for repair or replacement
Temperature display is abnormal	The RTD probe plug has poor contact with the instrument socket	Reconnect the plug securely and inspect the plug and socket
Reading changes continuously	The sample temperature or structure is still changing	Allow the sample to stabilize and keep the test method consistent
Reading changes continuously	Internal mechanical parts are worn or damaged	Stop using the instrument and contact authorized service

If the problem remains after these checks, switch off the instrument and contact the supplier or an authorized service representative. Do not open the housing or adjust internal parts.

13. Order Verification and Support

The DV1 product sheet defines model and spindle compatibility, but it does not define one universal packing list or commercial warranty for every order. The sales order, quotation, and seller warranty terms control what is supplied.

Check the Delivery Before Use

Check	Acceptance Point
Instrument model	DV1 LV, RV, HA, or HB matches the order and application range
Standard spindle family	1 to 4 for LV; R2 to R7 for RV, HA, and HB
Small-sample system	Adapter and each required spindle number are listed on the order
Temperature measurement	Compatible probe is included only when shown on the order
Data output	Required RS232 cable, printer, or software is separately confirmed
Power	Adapter input is 100 to 240 V AC, 50 to 60 Hz; destination plug is suitable
Condition	No shipping damage, bent spindle, loose part, cracked chamber, or damaged cable
Documents	Invoice, warranty terms, calibration or conformity documents match the purchase

Report a Problem Efficiently

- Stop using a damaged or electrically unsafe instrument.
- Record the model, serial number, spindle, speed, sample, temperature, torque percentage, displayed message, and firmware screen where applicable.
- Provide clear photos or video of the issue and keep all packaging if shipping damage is suspected.
- Contact the supplier for the warranty and return procedure that applies to the sales order. Do not send the instrument without return authorization.

14. Small Sample Range Tables(Optional accessory)

The values below are the measurable viscosity ranges for the small sample adapter. Units are mPa·s, numerically equal to cP. K means 1,000 and M means 1,000,000.

Spindle	DV1 LV	DV1 RV	DV1 HA	DV1 HB
21	4.69 to 46.9K	50 to 500K	100K to 1.0M	400K to 4.0M
27	23.4 to 234K	250K to 2.5M	500K to 5.0M	2.0M to 20.0M
28	46.9 to 469K	500K to 5.0M	1.0M to 10.0M	4.0M to 40.0M
29	93.7 to 937K	1.0M to 10.0M	2.0M to 20.0M	8.0M to 80.0M
18	3 to 30.0K	32 to 320K	64 to 640K	256K to 2.56M
14	117.2K to 1.2M	1.25M to 12.5M	2.5M to 25.0M	1.0M to 100.0M

Required Sample Volume

Spindle	14	18	21	27	28	29
Volume	2.1 mL	6.7 mL	7.1 mL	10.4 mL	11.0 mL	13.5 mL

Result Record

Field	Recorded Value
Sample identification	
Spindle and speed	
Sample temperature	
Torque percentage	
Measurement time	
Viscosity	

For repeatable work, record sample preparation and all test conditions with the result.

15. Instrument Structure and Connections

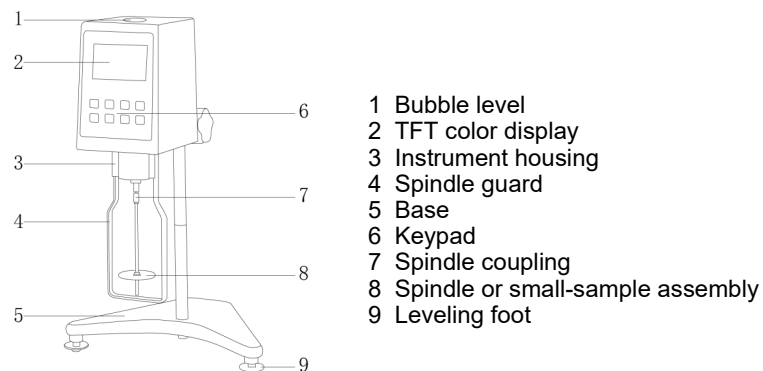


Figure 9 Main instrument assembly

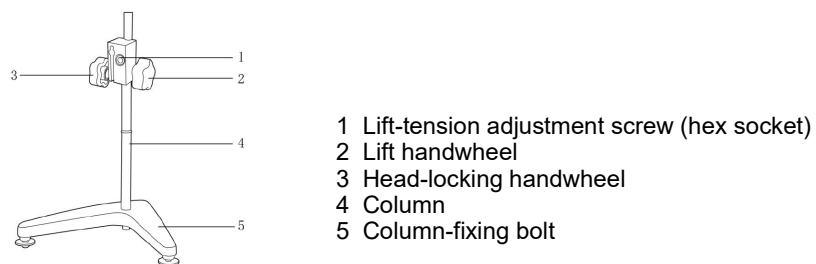


Figure 10 Stand and lift assembly

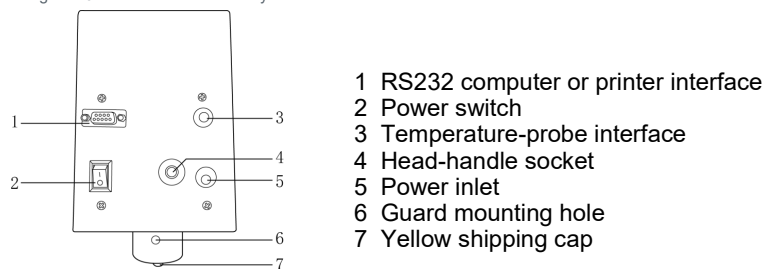


Figure 11 Rear-panel connections

Remove the yellow shipping cap before switching on the instrument. Refit it before transport. The stand also includes the lift-tension screw, lift handwheel, head-locking handwheel, column, and column-fixing bolt shown above.

16. Standard Spindle Range Tables

DV1 LV Standard Spindle Selection

The table gives the maximum measurable viscosity in cP for each speed and standard spindle. One cP is numerically equal to one mPa·s. K means 1,000 and M means 1,000,000.

Speed rpm	Spindle 1	Spindle 2	Spindle 3	Spindle 4
0.3	20K	100K	400K	2M
0.6	10K	50K	200K	1M
1.5	4K	20K	80K	400K
3	2K	10K	40K	200K
6	1K	5K	20K	100K
12	500	2.5K	10K	50K
30	200	1K	4K	20K
60	100	500	2K	10K

How to Use the Table

1. Estimate the sample viscosity and choose a spindle-speed combination with a maximum range above the expected result.
2. If viscosity is unknown, start with a higher-viscosity combination, then adjust one setting at a time.
3. Run the test and keep the displayed torque between 10% and 90% for reliable results.
4. The table is a selection aid, not a statement that one spindle and speed cover the complete model range.

DV1 specification note

Use the combined DV1 LV range of 6 to 6.0M mPa·s on page 5 as the model specification. The standard-spindle chart above is translated from the supplied color-screen manual.

16. Standard Spindle Range Tables Continued

DV1 RV Standard Spindle Selection

rpm	R1*	R2	R3	R4	R5	R6	R7
0.5	20K	80K	200K	400K	800K	2M	8M
1	10K	40K	100K	200K	400K	1M	4M
2	5K	20K	50K	100K	200K	500K	2M
2.5	4K	16K	40K	80K	160K	400K	1.6M
4	2.5K	10K	25K	50K	100K	250K	1M
5	2K	8K	20K	40K	80K	200K	800K
10	1K	4K	10K	20K	40K	100K	400K
20	500	2K	5K	10K	20K	50K	200K
50	200	800	2K	4K	8K	20K	80K
100	100	400	1K	2K	4K	10K	40K

HA and HB Conversion

Model	Convert the RV Table	DV1 Combined Model Range
DV1 RV	Use values as shown	40 to 40M mPa·s
DV1 HA	Multiply RV values by 2	80 to 80M mPa·s
DV1 HB	Multiply RV values by 8	320 to 320M mPa·s

* R1 is optional. Confirm that it is compatible with the delivered instrument and included on the sales order before use.

17. Packing Warranty and Service

Packing List

Item	Quantity	Supply
Instrument head	1	Standard
Spindles 1 to 4	1 set	DV1 LV
Spindles R2 to R7	1 set	DV1 RV HA HB
Power adapter	1	Standard
Spindle guard	1	Confirm order
Base	1	Standard
Lift column assembly	1	Standard
Hex key	1	Standard
Open-end wrench	1	Standard
No. 0 spindle No.14 spindle No.18 spindle No.21,27,28,29 spindles	As ordered	Optional
Small-sample adapter	As ordered	Optional
Temperature probe	As ordered	Confirm order
Certificate and warranty card	1 set	Confirm order
User manual	1	Standard

Warranty

The supplied color-screen manual states a one-year warranty from the date of sale. The warranty card, invoice, quotation, and seller terms determine the warranty that applies to the purchased unit.

The stated warranty excludes expired coverage, user-caused damage, operation contrary to the manual, damage from radioactive or corrosive substances, and damage caused by unauthorized disassembly, repair, or adjustment.

Unpacking and Service

Inspect all parts immediately after unpacking. Keep the packaging and document any missing or damaged item with photographs. Stop using an unsafe or damaged instrument and contact the supplier for service or return authorization. Do not open the housing or add lubricant.