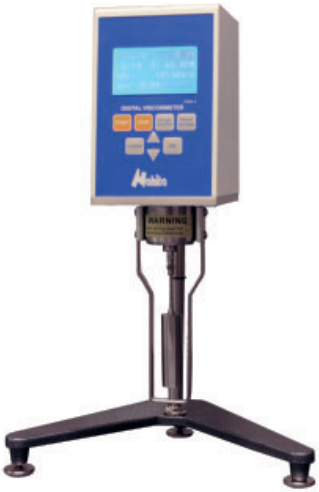
VISCOSÍMETROS DIGITALES
DIGITAL VISCOMETERS
VISCOSIMÈTRES DIGITAUX

MODELO - MODEL - MODÈLE 810/1 (REF.- CODE - RÉF. KNB005 Y KNB008*),
MODELO - MODEL - MODÈLE 810/2 (REF.- CODE - RÉF. KNB006 Y KNB009*),
MODELO - MODEL - MODÈLE 810/3 (REF.- CODE - RÉF. KNB007 Y KNB010*)



* Incluye husillo 0
* Includes spindle 0
* Avec tige 0

Este manual es parte inseparable del aparato por lo que debe estar disponible a todos los usuarios del equipo. Le recomendamos leer atentamente el presente manual y seguir rigurosamente los procedimientos de uso para obtener las máximas prestaciones y una mayor duración del mismo.

This manual should be available for all users of these equipments. To get the best results and a higher duration of this equipment it is advisable to read carefully this manual and follow the processes of use.

Ce manuel est une partie indissociable de l'appareil et doit être mis à la disposition de tous les utilisateurs de l'équipement. Nous vous recommandons de lire attentivement ce manuel et de suivre scrupuleusement les procédures d'utilisation afin d'obtenir des performances maximales et une plus longue durée de vie de l'appareil.

LANGUAGE INDEX

TABLE OF CONTENTS

1. OPERATING PRINCIPLES AND APPLICATIONS

Series 810 digital viscometers (models 810/1, 810/2 and 810/3) are intelligent instruments employing 16-bit high performance single chip micro processing technology. Different with the old method of gear speed regulation, they use stepping motor to ensure stable operation based on set-up program. Torsion sensor drives rotor rotating in a constant speed. When rotor encounters viscous resistance in the tested liquid, after detecting and processing, the viscosity of the tested liquid is shown on the screen.

This instrument features quick and easy operation, high precision measurement, steady rotating speed, excellent anti-interference ability and a wide range of working voltages (110V□220V, 50Hz, 60Hz). It can show measured value's percentage rate of the entire measuring range, which is convenient for the user to choose appropriate rotor and speed for accurate measurement. It is widely used in the measurement of viscosity on solvent-based adhesives, emulsions, bio-chemicals, paints, coatings, cosmetics, printing inks, paper pulp, food, starch, etc.

2. KEY TECHNICAL FEATURES

1. Model 810/1 (codes KNB005 and KNB008)
Measurement range: 10mPa·s - 100000mPa·s (from 1mPa·s using spindle 0)
Measurement accuracy: ±1% (Newtonian liquids)
Spindles in code KNB005: 1, 2, 3 and 4
Spindles in code KNB008: 0, 1, 2, 3 and 4
Rotation speeds: 6 / 12 / 30 / 60 rpm
Dimensions: 95x130x155 mm (without stand)
Net weight: 2 kg (without stand)

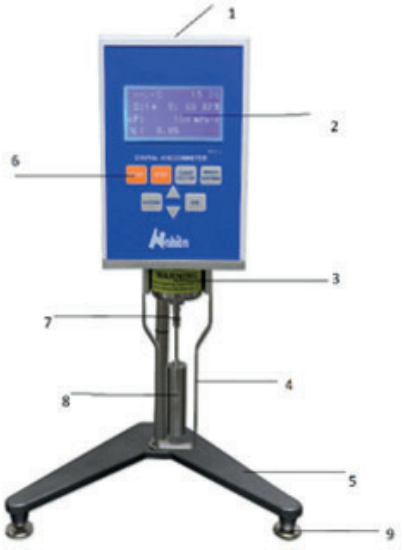
2. Model 810/2 (codes KNB006 and KNB009)
Measurement range: 10mPa·s-2000000mPa·s (from 1mPa·s using spindle 0)
Measurement accuracy: ±1% (Newtonian liquids)
Spindles in code KNB006: 1, 2, 3 and 4
Spindles in code KNB009: 0, 1, 2, 3 and 4
Rotation speeds: 0.3 / 0.6 / 1.5 / 3 / 6 / 12 / 30 / 60 rpm
Dimensions: 95x130x155 mm (without stand)
Net weight: 2 kg (without stand)

3. Model 810/3 (codes KNB007 and KNB010)
Measurement range: 10mPa·s-6000000mPa·s (from 1mPa·s using spindle 0)
Measurement accuracy: ±1% (Newtonian liquids)
Spindles in code KNB007: 1, 2, 3 and 4
Spindles in code KNB010: 0, 1, 2, 3 and 4
Rotation speeds: 0.1 / 0.3 / 0.6 / 1.5 / 3 / 6 / 12 / 30 / 60 rpm
Dimensions: 95x130x155 mm (without stand)
Net weight: 2 kg (without stand)

3. ENVIRONMENTAL CONDITIONS

Temperature range: 5 ºC~35 ºC
Relative humidity: ≤80%
Power supply: In 100-240ACV, 50/60Hz, 0.5Amax, Output 12VDC
No strong electromagnetic interference, drastic vibrations, corrosive gases in the vicinity of the instrument.

4. INSTRUMENT STRUCTURE AND INSTALLATION



1.bubble level
2.LCD
3.outer cover
4.spindle protection bracket
5.base
6.control panel
7.spindle connector
8.spindle
9.base adjusting knob

Installation:
1. Take out base, lifting column, handle from the packing box. Screw the column into the base (rack side towards the user). Fix handle onto the lifting block.
2. Adjust lifting button for tightness. Put T-shaped block on the rear of the instrument into handle and get it fixed, making the instrument balanced.
3. Adjust 3 screws on the base to keep the level bubble at the center of the black circle.
4. Take off the protection cap at the bottom of the instrument.
5. Plug in.

5. PREPARATION FOR MEASUREMENT

1. Prepare liquid sample to be tested, pour it into beaker or flat container with diameter no less than 60 mm. Control the temperature of the liquid sample correctly. (Variations of temperature will affect viscosity directly.)
2. Screw anti-clockwise protection bracket (T-shape) into the bottom end of the instrument.
3. Choose appropriate spindle and screw it anti-clockwise into the connector. Attention: slightly lift direction connector up when spindle is installed to avoid damages to the pivot.
4. Turn lifting button to slowly immerse spindle into the liquid until the marker on the spindle (groove or marking line) is aligned with the liquid level.
5. Adjust the balance of the instrument again.
6. Should keep testing temperature stable to ensure accurate read out. Otherwise readout may fluctuate.

6. CONTROL PANEL

To set date and time:

Turn on the instrument and the date and time will appear on the screen; if you want to modify press the AUTORUN key, with the up and down keys modify the value and move with the AUTORUN key. Once all the values have been changed, press the OK key for autosave and the main work screen will be displayed directly.

For selection, use the up and down keys. With the AUTORUN key activate the selector mode to be able to modify any of them. To confirm, press the OK key. For autosave hold down the OK key.

By turning on the power switch located on the back of the apparatus, the following information will be shown on the screen:

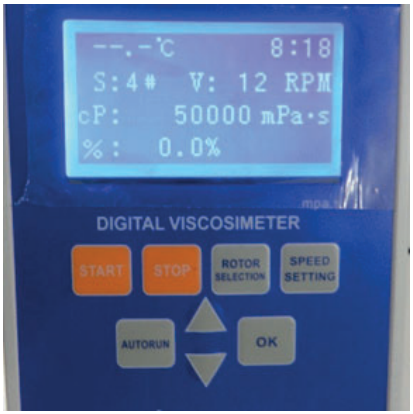
S1 (S refers to the spindle number; No. 1 by default)
V6 (V refers to rotation speed; 6 RPM by default)
T ºC (sample temperature)
cP (measured viscosity value, expressed in mPa·s)
% (% that represents the measured value in relation to the maximum viscosity value of a specific measurement range)

If spindle # 1 is to be used at 6 RPM, the START button on the control panel can be directly pressed to begin the measurement. When the value stabilizes it will be shown on the screen (if the viscosity is relatively low we should expect 3-5 rotations and if the viscosity is relatively high, it will be enough to wait 1-2 rotations).

If you want to change the parameters S (spindle number) and V (rotation speed) that come by default, you must proceed as follows:

To change the spindle number we will press the ROTOR SELECTION key and with the up and down keys we will indicate the number of the spindle that we will use, with the OK key we will confirm. To modify the rotation speed, press the SPEED SETTING key, with the up and down keys we will select the desired speed and confirm with the OK key. When the configuration is done press the START key to begin the sample measurement.

In the following tables are shown the viscosity ranges for the different combinations of spindles and rotation speeds.



Model 810/1

Rotating speed \ Rotor	0#	1#	2#	3#	4#
6 rotations	100	1.000	5.000	20.000	100.000
12 rotations	50	500	2.500	10.000	50.000
30 rotations	20	200	1.000	4.000	20.000
60 rotations	10	100	500	2.000	10.000

Models 810/2 and 810/3

Rotating speed \ Rotor	0#	1#	2#	3#	4#
0.1 rotations	6.000	60.000	300.000	1200.000	6.000.000
0.3 rotations	2.000	20.000	100.000	400.000	2.000.000
0.6 rotations	1.000	10.000	50.000	200.000	1.000.000
1.5 rotations	400	4.000	20.000	80.000	400.000
3 rotations	200	2.000	10.000	40.000	200.000
6 rotations	100	1.000	5.000	20.000	100.000
12 rotations	50	500	2.500	10.000	50.000
30 rotations	20	200	1.000	4.000	20.000
60 rotations	10	100	500	2.000	10.000

7. THE VISCOSITY OF NON-NEWTONIAN LIQUIDS

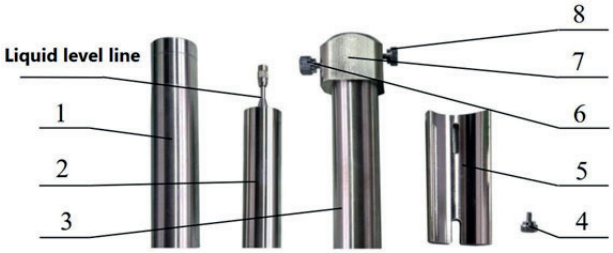
A non-Newtonian liquid does not have a defined and constant viscosity value, unlike a Newtonian liquid. Most of the liquids encountered are non-Newtonian. The viscosity measured under different conditions will have different results. So there is usually a standard measurement procedure, detailed steps as below:

Install spindle 1 (select before spindle 1 by pressing ROTOR SELECTION key and the up and down keys), immerse it into the sample and press AUTORUN key to search the appropriate speed.
A. If it is found that parameter "%" is between 20% - 80% at a certain speed, press the START key to begin measurement, and take the viscosity value after the spindle rotates for 3-5 turns as the viscosity of the current sample.
B. If it is found that parameter "%" of spindle 1 is still greater than 80% after searching all speeds, install spindle 2, continue to search for the appropriate speed, and so on until the appropriate spindle and speed are selected, that is, the parameter "%" is between 20% - 80%. Then press START and take the viscosity value after the spindle rotates for 3-5 turns as the viscosity of the current sample.
Note: If it is found that parameter "%" of spindle 1 is less than 20%, it is recommended to use spindle 0. During the use of spindle 0, it is only necessary to ensure that parameter "%" is between 10% ~ 90%.

8. RECOMMENDATIONS

1. When the viscometer works at room temperature, the tolerance of the test temperature should be ± 0.1ºC, otherwise the measurement accuracy will be substantially affected.
2. Pay attention to the obtained viscosity values and the corresponding percentages in relation to the measurement range. For a more accurate measurement of Newtonian liquids, a percentage between 15% and 85% must be achieved, it is recommended to achieve a percentage close to 50%; for this, different spindles and rotation speeds will have to be tested.
3. Viscometer accuracy could be affected if the indicated voltages and frequencies are not used.
4. Be careful not to apply too much force when inserting and removing the spindles.
5. Clean the spindles after each use.
6. When instrument goes down, it should be held by hands to avoid vibrations which could do damages to the pivot.
7. When instrument is moved or transported, we must put the protective cap on the pivot.
8. Many liquids with suspended particles, emulsions, high molecular weight polymers, and other high-viscosity liquids are non-Newtonian fluids, whose viscosity values change with changes in cutting speed and time. It is normal, therefore, that the measurement results may be different using different spindles, rotational speeds or times.
9. To achieve accurate measurement results it is recommended:
   - To have exact control of the sample temperature and maintain a uniform ambient temperature.
   - The spindle and the liquid must be at the same temperature and this temperature must be constant.
   - Use bigger spindle with higher rotating speed for low viscosity liquid; use smaller spindle with lower speed for high viscosity liquid.
   - Keep the surface of the rotor clean.

9. SPINDLE 0



1 Test cylinder without bottom
2 Spindle No. 0
3 Test cylinder with bottom
4 Fixing block screw
5 Fixing block
6 Test cartridge fixing screw
7 Fixing sleeve
8 Fixing screw of the set

Assembly steps

1) Screw the No. 0 spindle onto the instrument connecting screw.
2) Place the fixing block (5) on the bottom cylinder of the instrument with the fixing block screw (4).
3) Put the test cylinder with bottom (3) into the fixing sleeve (7), from bottom to top, and fix it with the test cartridge screw (6).
4) Pour approx. 30 ml of the sample liquid into the test cylinder with bottom (3).
5) Gently attach the test cartridge (3+7+6) to the block (5) by means of the fixing screw of the set (8).
Note: When rotating the fixing screw of the set, pay attention to the position on the spindle of the V-shaped liquid level line (the spindle must be immersed in the liquid up to the point where the conical

shape of the spindle shaft begins) and whether the spindle is well centered in the test cylinder.
6) The test can be conducted after the temperature of the sample liquid is controlled.

Picture of finished assembly

10. TEST REPORT

The following Viscometer Test Report, performed by the factory as part of quality control, is included with the instrument.

Viscometer Test Report

Calibration liquid Silicone oil mPa.s	Spindle	RPM	Acceptable Data		Actual Test Data			Temperature
			-2%FS	2%FS	1	2	3	
Brookfield 4.7								
219.2								
376.2								
441								
5989								
6149								
8964								
163300								

11. PACKING LIST

1. Series 810 digital viscometer (master device)	1 unit
2. Support rod and base	1 piece
3. Spindle protector	1 piece
4. Spindles	1 for each size
5. External power supply (adapter type)	1 piece
6. Briefcase	1 piece
7. T-shaped block	1 piece
8. Temperature probe	1 piece
9. Test Report	1 copy
10. User's Manual	1 copy