



TVC - 7 type Viscometer Operating Manual



SAFETY PRECAUTIONS

- Read these safety precautions carefully before use, and use the product properly.
- Be sure to observe the precautions shown here as they are all important descriptions regarding safety.

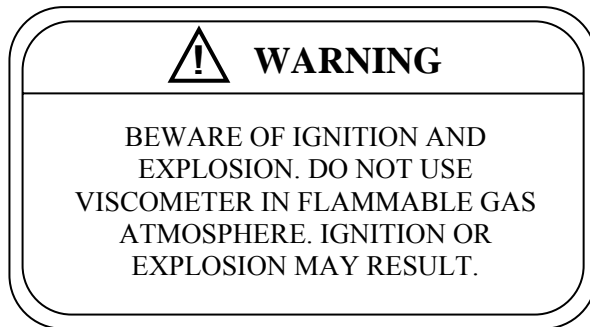
1. This manual and all product use the following safety precautions:

	WARNING	Indicates that improper operation of the viscometer disregarding this precaution may result in the death or serious injuries to the operator or other personnel.
	CAUTION	Indicates that improper operation of the viscometer disregarding this precaution may cause personal injuries to the operator or other personnel or only physical damage.

2. The TVC-7 type viscometer bear the following warning labels (safety labels):

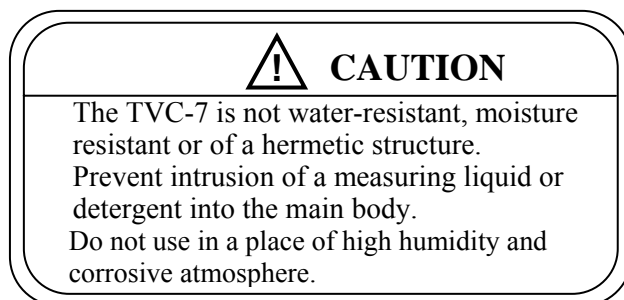
(1) Warning

① Warning on ignition and explosion

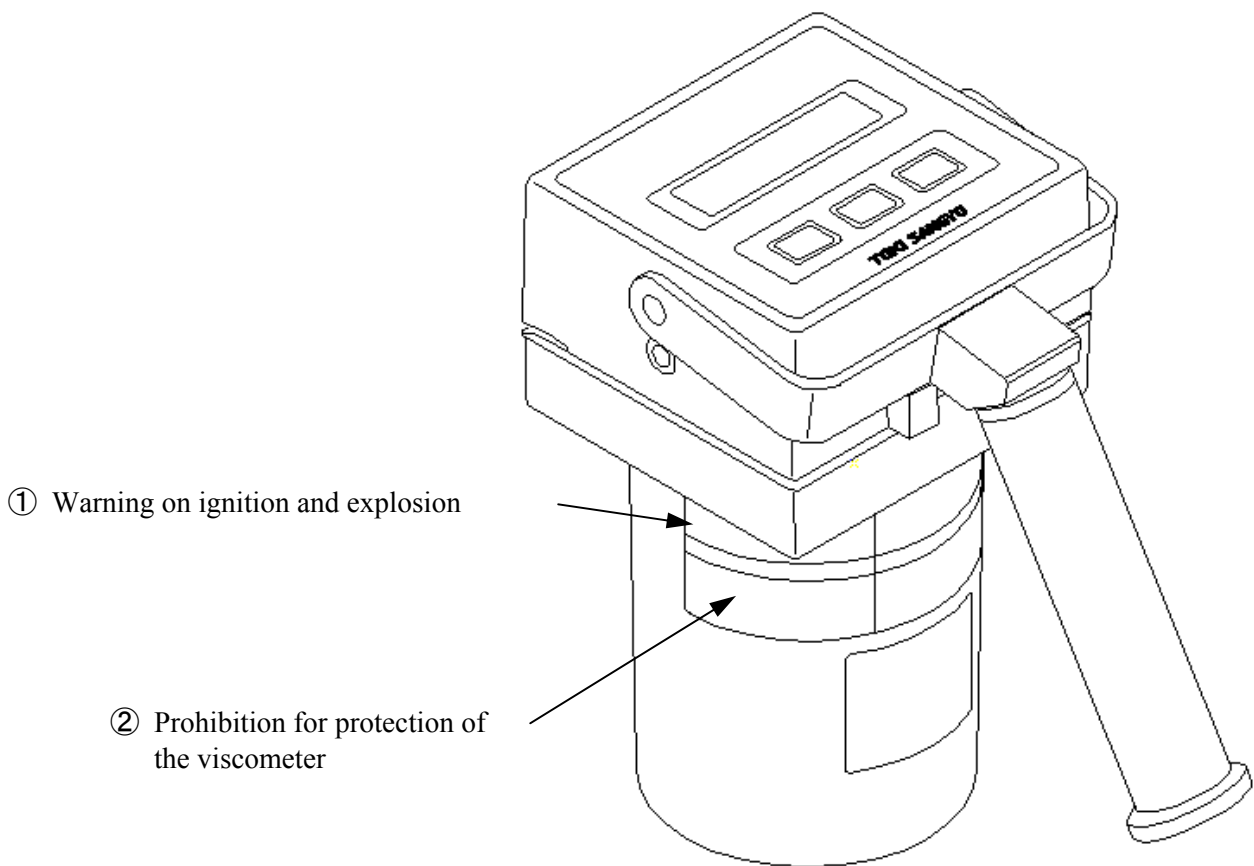


(2) Caution

② Prohibition for protection of the viscometer



4. The warning labels (safety labels) are attached in the positions of the TVC-7 type viscometer shown in the following figure:



INTRODUCTION

This manual contains detailed descriptions of the safety precautions, specifications, structure, operation, troubleshooting, and maintenance and inspection of the TVC-7 type viscometer. Familiarize yourself with the product, and use it properly.

Requirements Regarding This Manual

- **Below are the requirements to follow with regard to this manual:**

- (1) Read this manual carefully.
Carefully read the important instructions contained in this manual.
- (2) Retain this manual with care.
This manual is required to use the product (including the accessories and peripheral devices). Retain the manual with the product so that you can consult it whenever necessary. Appoint a person to take care of the manual, and determine a location for keeping it.
- (3) Pass this manual to the user (operator).
Any sales agency or agent of this product (including the accessories and peripheral devices) is requested to pass this manual to the user (operator).
- (4) If this manual is lost, contact the distributor of the product. A copy of the manual is available at charge.
- (5) Use constant care to see that the warning labels (safety labels) are in position.
If any of the warning labels (safety labels) is stained or detached, contact the distributor of the product. New labels are available at charge.

Inhibitions and Precautions to Protect the Product (for Prevention of Damage to the Product and Maintaining Quality)

- **Observe the following instructions to prevent damage to the product and maintain its quality. For details, see the corresponding pages of this manual.**

- (1) Prohibitions (“**The things that should not be done**” are as follows.)
 - a) Do not let the measured liquid or washing liquid intrude into the viscometer’s body.
 - b) Do not use solvents to clean the viscometer body.
 - c) Do not use the viscometer at places with corrosive gas.
 - d) Do not apply an impact or vibration to the viscometer body.
 - e) Do not bend or damage the rotor.
- (2) Cautions (“**The things that should be taken care of**” are as follows.)
 - a) When install the battery in the viscometer, please do not to make a mistake in a polarity of the battery.
 - b) When change the batteries, please change 3 batteries at the same time.
 - c) Please do not mix the different batteries of the kind.
 - d) When do not use a viscometer for a long term, please remove the batteries.
 - e) When measure it, please attach the guide.
 - f) Make sure to clean and wash the rotor and guard after completion of measurement.
In addition, remove a rotor and a guard, and please keep it when do not use a viscometer.

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1. Summary, Principle of Operation

1-1. Summary

The TVC-7 provides measurement as a simple and handy C type viscometer which has been favorably used for a long time and is LCD displayed and easier to read, and the simultaneous indication of % and SI unit(mPa·s/Pa·s) was enabled.

The TVC-7 type viscometer enabled the working for about 30 hours with battery, and usable without worry about the running out of battery.

Table 1

Rotor No.	0	1	2	3	4	5
Measuring Range	10 -100	50 - 500	0.2 - 2.00	1-10.0	5 - 50.0	20 -200
	mPa·s		Pa·s			

2. Components

Standard parts:

- Main body with guard
- C-size batteries x 3
- Operating manual
- Hand strap

Optional parts:

- Rotors
- Stand
- AC adapter
- Carrying case

3. Name and function of each part

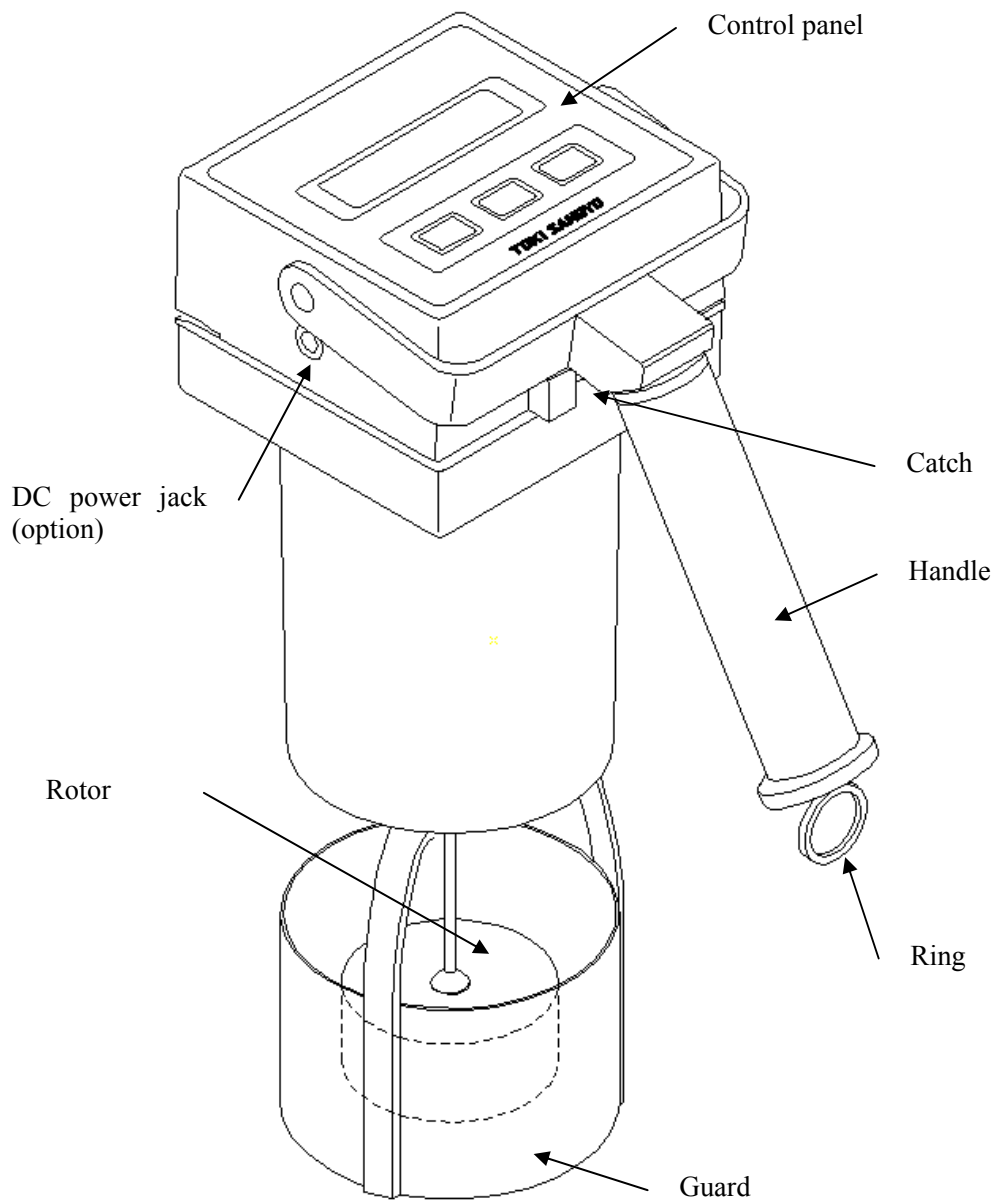
3-1. General configuration

Refer to <Fig. 3-1: General drawing of TVC-7 type viscometer>.

Table 3-1: Name function of each part of the TVC-7 type viscometer

No.	Name	Function
①	Control panel	Panel on which a display and key switches are arranged
②	Handle	Handle for stand by hand
③	Guard	To stabilize the measurement
④	Rotor	The measurement of a wide range is enabled by changing a rotor
⑤	DC power jack (option)	Jack to connect an external DC power supply
⑥	Catch	The lock lever of the main body case (for battery exchange)
⑦	Ring	for hand strap installation

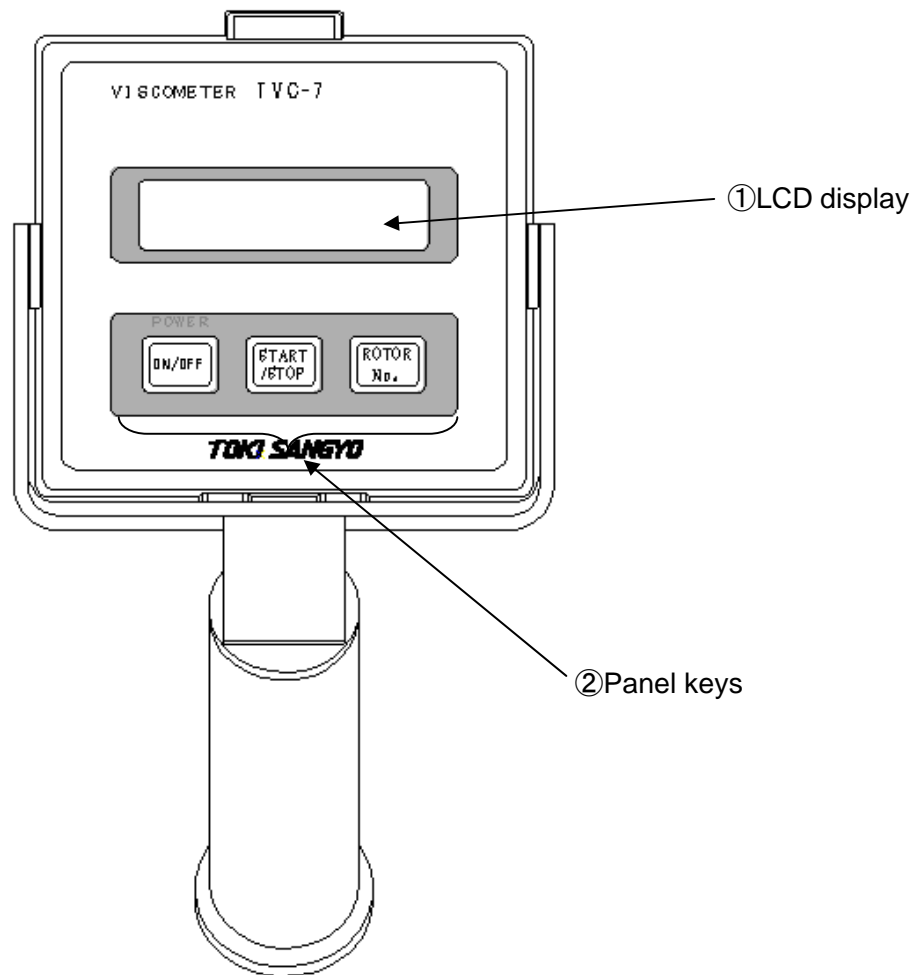
Fig. 3-1: General drawing of TVC-7 type Viscometer



3-2. Control panel

3-2-1. Names of the control panel

Fig. 3-2: Names of the control panel



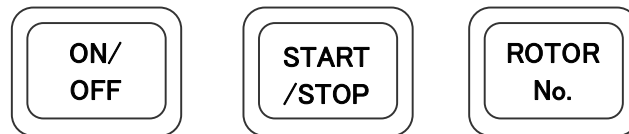
3-2-2. Functions of the control panel

Table 3-2: Functions of the control panel

No.	Name	Function
①	LCD display	The indication of measurement data and various set points.
②	Panel keys	Refer to <Fig. 3-3: Key arrangement of the control panel >

3-2-3. Key arrangement of the control panel

Fig. 3-3: Key arrangement



3-2-4. Name and function of keys

Table 3-3: Name and function of keys

Signage	Name	Function
ON/OFF	“Power on and off” key	Power supply ON or OFF (continue pushing key more than two seconds) of TVC-7
START /STOP	“Motor rotation and stop” key	Start-up and stop of the rotor (motor), in other words, start and end of the measurement.
ROTOR No.	“Rotor No. setting” key	Read of “Rotor No. setting screen”

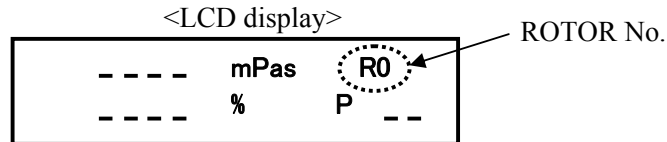
4. Panel operation

4-1. Turning ON/OFF the power



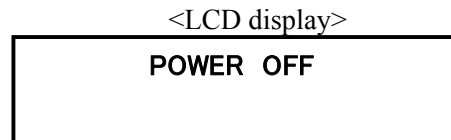
4-1-1. Turning ON the power

If this is depressed with <POWER OFF> → Turn <POWER ON> and the rotor No. is displayed.



4-1-2. Turning OFF the power

If this is depressed for 2 seconds or longer → Turn <POWER OFF>.

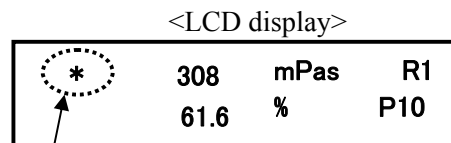


4-2. START/STOP key



4-2-1. Start of measurement (Motor on)

If this is depressed with <STOP> → Turn <START> and the measurement is started. During the measurement, “*” mark flashes.

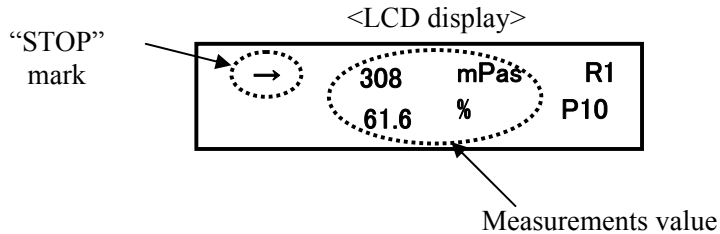


A mark during the measurement
(Blinking indication)

4-2-2. Stop of measurement (Motor off)

If this is depressed with <START> → Turn <STOP>.

While <STOP>, “ → “ mark is displayed, and the final measured value is held.



※If it remains for about 3 minutes or longer in a state of < STOP>, it automatically turns <POWER OFF>

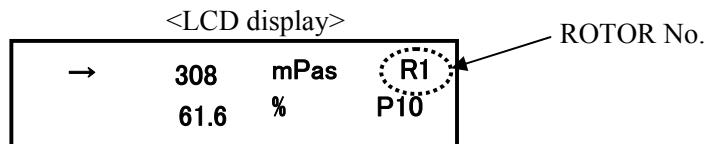
4-3. ROTOR No. key



4-3-1. Setting of the ROTOR

When <STOP>, ROTOR No. can be set.

Each time the key is depressed, the number displayed changes, therefore, set to the ROTOR No. used.



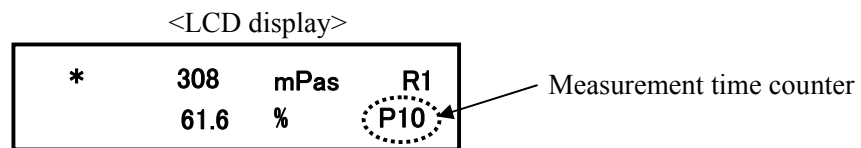
※The setting of the rotor is not possible in <START>.

5. Display function

5-1. Measurement time counter

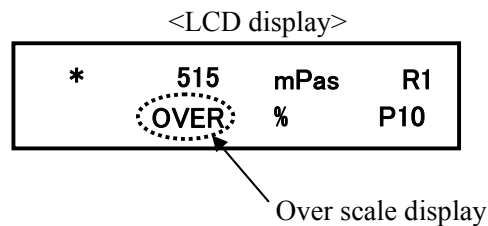
When <START>, numerical value is count up it every interval for about 1 second. It is displayed to 99 up to counts (about 99 seconds) and is useful for the measurement time.

※ It is not a highly precise timer function. Please use it as reference time.



5-2. Over scale display

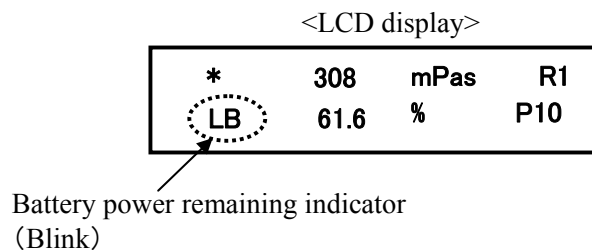
“OVER” is displayed when measured values exceed 102% of the measurement range.



5-3. Battery power remaining indicator

Flashing of the “LB” indicating, it is warning a battery voltage shortage. Please change the batteries.

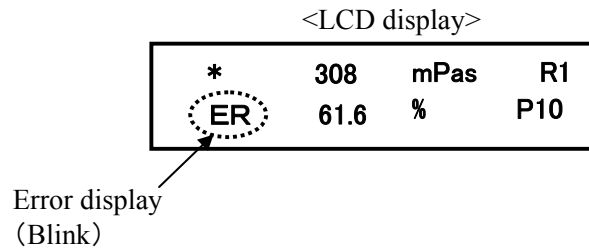
※ When change the batteries, please change 3 batteries at the same time.



※ Continued operation with a battery voltage shortage causes <POWER OFF> automatically

5-4. Error display

Flashing of the “ER” indicating, it is warning of the hardware trouble.
Please repair it.



※When “ER” is displayed, <POWER OFF> automatically.

6. Measurement preparation

(1) Open the upper casing of TVC-7 as in Fig. 1.

Put 3 C-size batteries into the battery case.

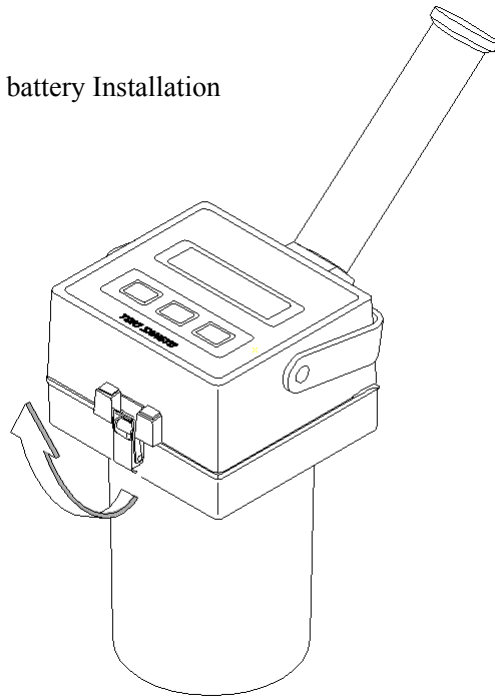
※When install the battery in the viscometer, please do not to make a mistake in a polarity of the battery.

When change the batteries, please change 3 batteries at the same time.

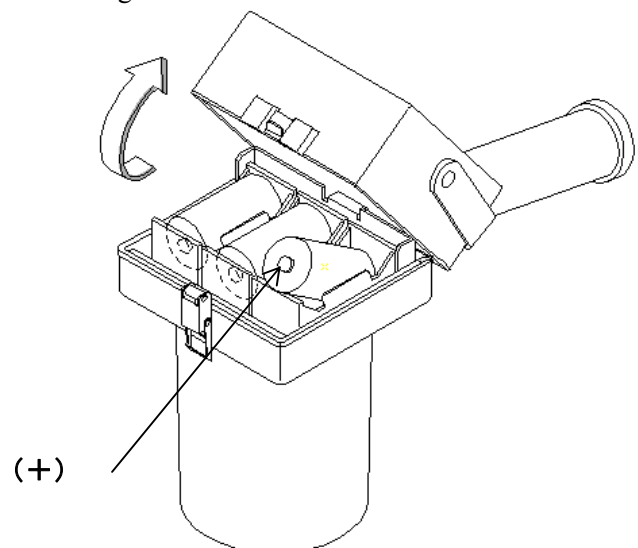
When using the AC adapter for power, connect the plug to the power jack of the main body.

Fig.7 Method of the battery Installation

① Unlock the catch in the main body case.



② Open the upper part of the main body case and change the batteries.



③ After the batteries exchange, lock the catch of the main body case surely.

- (2) Suspend the rotor used for the hanger at the bottom of the main body.
The hook to suspend the rotor appears by lowering the sleeve as in Fig. 2.
The rotor No. is described in the position of Fig. 3.
- (3) The guard can be removed by twisting against the main body as in Fig. 4.
Check if the guard is securely installed.
The TVC-7 is adjusted so that it indicates the correct value when the guard is installed.
Measure with guard installed.
- (4) Hold the handle so that the viscometer does not tilt.
- (5) Dip so that the measuring liquid level matches with the upper edge of the guard.
Dip liquid mark is attached on the middle of the rotor shaft.
- (6) Measurement can be made even if the TVC-7 is supported with the stand (optional part) as in Fig 5.

Fig.2

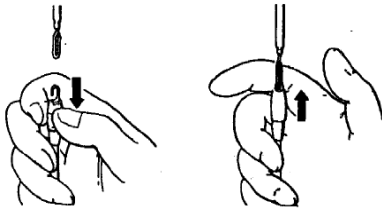


Fig.3



Fig.4

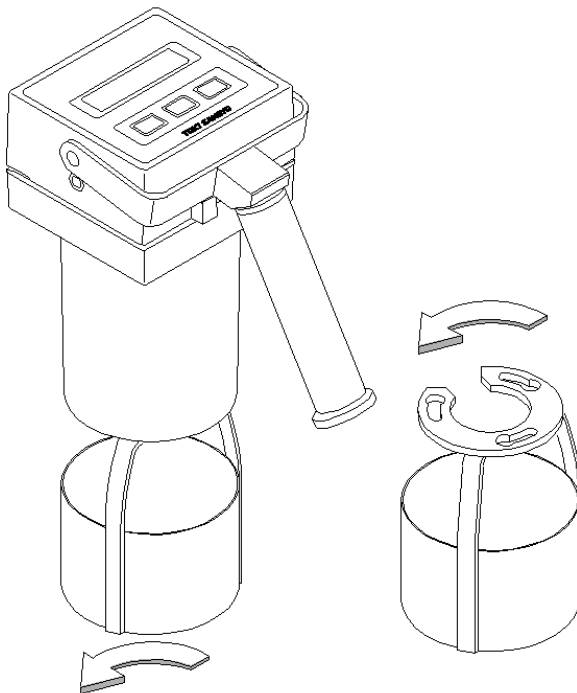
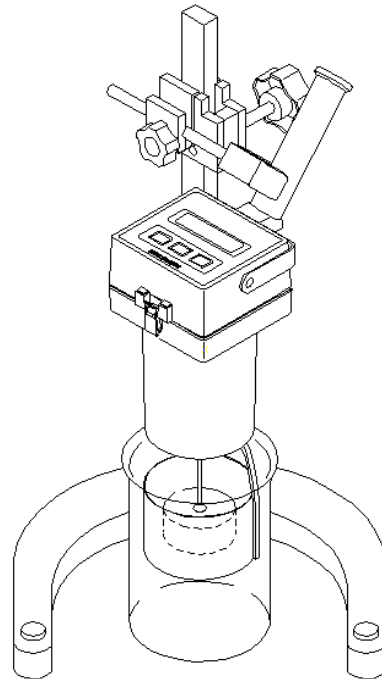


Fig.5



7. Calibration

7-1. General calibration for the measuring instrument control

The accuracy of this viscometer is judged to be “within $\pm 4\%$ (Rotor No.0, 1, 5) or within $\pm 3\%$ (Rotor No.2 - 4) of the full scale.”

Please confirm it in either of following ① or ②.

- ① For this, there is a need to perform calibration by attaching the guard, which is a standard accessory to this viscometer, and pouring the standard liquid for calibrating viscometer (JIS Z 8803) in a beaker (inside diameter: more than approx. 100mm).

There are 13 types of standard liquids according to viscosity. Select the liquid which covers the viscosity you want to calibrate.

Table -2 shows the standard liquid (25 °C) suitable for calibration for each rotor as a reference.

Table 2

Rotor No.	0	1	2	3	4	5
Standard liquid suitable for calibration	JS 100	JS 500	JS 2000	JS 14000	JS 52000	JS 160000

<Note> When measuring and calibrating without the guard, the measuring range differs from that in the specification, and the Table -1 is not applied.

We also offer standard liquids.

- ② When there is not a beaker to use by a method of ①, you can confirm it for facility by the following methods.

You remove guard and put rotor No.2 in a container of SC2000 directly and confirm it.

We also offer SC2000.

7-2. Traceability

To guarantee the traceability of the viscometer calibration, the following two points are important.

- ① To maintain traceability to the viscosity standard, perform calibration by using the standard liquid for calibrating viscometer (JIS Z 8809).
(As a simplified method, calibration can also be performed by <7-5. Silicone calibration liquid>.)
- ② Use a thermometer the traceability of which to the national standard is guaranteed.

7-3. Interval of calibration

Determine this according to the measuring instrument control standard of the user side.

We recommend a calibration cycle of 1 year in the case where there is no such control standard, and 3 to 6 months in the case where it is frequently used.

7-4. Calibration accuracy

The accuracy of the calibration is the total of the following “uncertainties.”

- ① Uncertainty of the viscosity of the standard liquid for calibrating viscometer (hereinafter referred to as standard liquid).

JS2.5 – JS2000	0.1%
JS14000 -	0.2%

- ② Uncertainty of viscosity calculation at an arbitrary temperature.

The method of obtaining viscosities at temperatures other than 20, 30 and 40°C described in the report of the standard liquid is explained in JIS Z 8809 “Standard liquid for calibrating viscometer.” The viscosities obtained by the method of precision-calculation in this explanation are described in the report of the standard liquid. (As the data for this calculation, the viscosities at 20, 30 and 40°C in the report are used.)

In this explanation, the following calculation errors are shown:

- Low-viscosity area (JS2.5 – JS2000) : Approx. ±0.04%
- High-viscosity area (JS14000 – JS160000) : Approx. ±0.11%

- ③ Uncertainty of the viscosity of the standard liquid due to uncertainty of the temperature.

The degree of this uncertainty depends on the type of the standard liquid used. For example, assume that the standard liquid JS100 is used and calibration is performed at around 20°C and the temperature measurement error is 0.2°C. The uncertainty of the viscosity of the standard liquid due to this temperature measurement error of 0.2°C is equivalent to the error of about 1.2% as shown in the following calculation. From the following <Table 12-1>, the viscosity – temperature coefficient of JS100 is 5.8%/°C, and the viscosity at 20°C is 86 mPa·s.

$$\begin{aligned} 5.8 \text{ [%/}^\circ\text{C]} \times 0.2 \text{ [}^\circ\text{C]} &\cong 1.2 \text{ [%]} \\ 86 \text{ [mPa}\cdot\text{s]} \times 1.2 \text{ [%]} &\cong 1 \text{ [mPa}\cdot\text{s]} \end{aligned}$$

Table 12-1: Viscosity – temperature coefficient of the standard liquid for calibrating viscometer

Type of standard liquid	Viscosity at 20°C (mPa·s) reference value	Viscosity - temperature coefficient (% of RS/°C) reference value	Type of standard liquid	Viscosity at 20°C (mPa·s) reference value	Viscosity - temperature coefficient (% of RS/°C) reference value
JS2.5	2	2.0	JS500	440	7.3
JS5	4.1	2.7	JS1000	890	7.7
JS10	8.4	3.3	JS2000	1800	8.4
JS20	17	4.2	JS14000	12000	10
JS50	43	5.1	JS52000	46000	10
JS100	86	5.8	JS160000	140000	10
JS200	170	6.6	Reference : silicon oil		1 or less

* The viscosity values and viscosity – temperature coefficients in the table are all rough reference values.

In this manner, the uncertainty of the viscosity of the standard liquid due to temperature

measurement error is rather a large value than ① Uncertainty of the viscosity of the standard liquid for calibrating viscometer and ② Uncertainty of viscosity calculation at an arbitrary temperature.

More specifically, the accuracy of calibration depends on the accuracy of the temperature control and the temperature measurement of the measured liquid in most cases. Therefore, if the temperature control and the temperature measurement of the measured liquid are carried out exactly, highly accurate calibration can be obtained accordingly.

7-5. Silicone calibration liquid

We sell calibration liquid having a small viscosity – temperature coefficient and high physical stability. Due to the use of a wide-mouthed bottle, calibration can be performed by simply removing the lid of the container, without pouring the calibration liquid into a beaker.

7-6. Precautions

7-6-1. Selection of the standard liquid for calibrating viscometer

Generally select the standard liquid covering the range of the viscosity that is usually measured. However, take the following points into consideration.

- Standard liquid for calibrating viscometer of high viscosity requires a long time to remove air bubbles in the liquid.
(Mixing of air bubbles may cause measurement errors.)
- Standard liquid for calibrating viscometer of high viscosity requires a long time to make the temperature uniform inside the container since convection is difficult and heat disperses only by conduction.
- Standard liquid for calibrating viscometer of high viscosity, having a large viscosity - temperature coefficient, is greatly affected by temperature errors.
- Select standard liquid with which the index of the viscometer to be calibrated becomes 50 – 100%.
- The higher the viscosity of the standard liquid, the longer time it takes to control it at a target temperature.

From the above points, calibration using standard liquid for calibrating viscometer of high viscosity (JS 14000 or more) produces calibration errors more easily and the work becomes more difficult.

We recommend using a standard liquid for calibrating viscometer of as low a viscosity as possible (JS 2000 or less).

7-6-2. Selection of the rotor

Generally, make a selection centering on the usually-used rotor. However, also take the following into consideration. Care should be taken in handling the standard liquid for calibrating viscometer of high viscosity as shown in the above-mentioned “Selection of the standard liquid for calibrating viscometer.”

From the above, the rotor No.3 - 5 can be said to be hard to calibrate with a high degree of accuracy; therefore, it is advisable not to use them for calibration unless otherwise specially required.

7-6-3. Range of measured value

The desirable range of the measured viscosity at the time of calibration (display value) is 50 – 100% of the measurement upper limit (full scale) in terms of accuracy. Likewise, avoid calibration at 10% or less of the measurement upper limit value (full scale) because it is not preferable from the standpoint of accuracy.

7-6-4. Place for calibration

A constant temperature room whose room temperature can be controlled at an arbitrary constant temperature is the most suitable.

In the case where there is no such room, choose a place where the temperature is almost the same through the day and the room temperature is hard to raise even with heat from the thermo tank and measuring instruments.

7-6-5. Calibration temperature

Generally a constant temperature water tank is used to control the temperature of the standard liquid for calibrating viscometer.

At this time, for uniformity of the standard liquid temperature (liquid level temperature), it is better to set the temperature of the standard liquid (temperature of the constant temperature water tank) to as close to the room temperature as possible.

If a place with constant and stable room temperature can be secured, calibration can also be performed at a stable temperature by simply leaving it at room temperature without using such a constant temperature water tank.

7-6-6. Thermometer

- ① Use a thermometer with the as-needed accuracy and guaranteed traceability that can read 0.1°C.
- ② To read the measured viscosity of the viscometer, it is safer to take the thermometer out of the container in terms of viscosity measurement accuracy.
If the thermometer is near the rotor, errors may occur in the measured viscosity. In the case where it is impossible to take out the thermometer, attach the thermometer to a position that does not have an influence on the viscosity torque, such as the shade of the guard, from the beginning.

7-7. Procedures for calibration

7-7-1. Appearance check

- Check the viscometer for flaws, dents, peeling of painted parts, etc., and check the storage condition.
- Check that the rotor and guard are free from flaws, dents, bends, etc., because big flaws and bends will affect the measurement accuracy.

7-7-2. Performance check

1) Check of rotational operation

Without a rotor, check the rotational operation. Check that the operations of starting and stopping of rotation.

2) Zero check during idle running

Attaching the rotor to use by the measurement, check the sufficiently stable index percentage in rotation. Check that the index is within $\pm 0.2\%$ (0% is desirable).

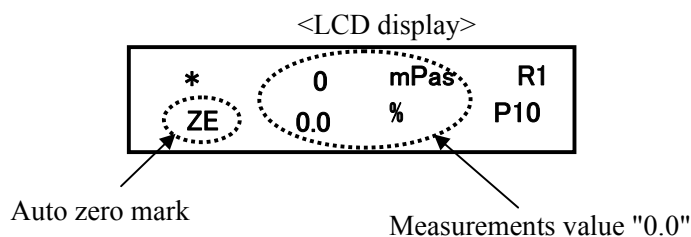
※ If $\pm 0.2\%$ is exceeded, The following auto zero adjustment is required.

< Auto zero adjustment >

Make zero point adjustment manually.

Normally, make zero point adjustment by auto zero. Execute this adjustment if you want to make forced correction as needed.

- Attaching the rotor to use by the measurement and <POWER ON> and <START>.
- Keep the stability of the TVC-7 and wait till measurement value does stability (the state that a value does not change).
- Continue pushing the <ROTOR No.> key. (More than about 5 seconds)
- "ZE" is displayed, and measurement value becomes "0.0".



3) Installation check of the rotor and guard

Install the rotor and guard, and check them for looseness or rattling.

7-7-3. Measurement preparation

- Set the standard liquid in the container.
- Attach the rotor to the container containing the standard liquid. At this time, be careful not to allow bubbles to get into the rotor. Set the rotor depth with the immersion mark.
- Place the container so that the shaft center of the rotor comes at the center of the container.
- If there are variations in the temperature of the standard liquid in the container, stir it with a spatula or the like so that the liquid temperature becomes uniform. Rotate the rotor of the viscometer (into a measuring state), and wait until temperature equilibrium is reached.
 - ※ If a constant temperature water tank is used, cover the container with cardboard, etc. (For thermal insulation with the guard and rotor section relieved.)
- Check the temperature of the standard liquid for calibrating viscometer, and read and record the temperature and measured viscosity when the temperature in the container is uniform and the calibration temperature has been reached.

7-7-4. Measurement

- Before measurement, run in the motor for approx. 10 minutes to make the viscometer condition stable.
- Check the temperature of the standard liquid, and when it is uniform (within $\pm 0.2^{\circ}\text{C}$, or within $\pm 0.1^{\circ}\text{C}$ if high accuracy is required) and a state of equilibrium has been achieved, make a measurement and keep a record.

Note: For measurement with a thermometer set, place it away from the rotor so as not to affect the measurement. (It is desirable to take it out of the container.)

7-8. Comparison of test results

The accuracy (allowable error) of the viscometer can be obtained by the following expression:

$$\text{Accuracy} = \frac{\text{Measured value} - \text{Reference viscosity}}{\text{Measurement upper limit}} \times 100 \quad (\%)$$

(The ratio of the error for the full scale.)

Measured value: Indicated value of the equipment to be calibrated (mPa·s, Pa·s)

Reference viscosity: Viscosity of the standard liquid for calibrating viscometer at the measure-time temperature.

Obtain the viscosity using the “temperature-viscosity calculation table” attached to the standard liquid.

Measurement upper limit: Full-scale value (mPa·s, Pa·s) of the measurement range under measurement conditions (the model of the viscometer and the rotating speed of the rotor).

Refer to the appendix <Measurement upper limit value table>.

Note: The accuracy of the TVC-7 type viscometer is within $\pm 4\%$ (rotor No.0, 1, 5) or within $\pm 3\%$ (rotor No.2 - 4) (of the full scale).

<Measurement upper limit value table>

ROTOR No.	0	1	2	3	4	5
	100 mPa·s	500 mPa·s	2.00 Pa·s	10.0 Pa·s	50.0 Pa·s	200 Pa·s

7-8-1. Action to be taken against accuracy deviation

If the accuracy is not high enough regardless of making measurement, the following can be considered:

Vibration of the stage on which the viscometer is installed/Mixing of air bubbles or foreign matter/Improper temperature measurement/Run out of the rotor, etc.

In the case of inadequacies even with the above taken into consideration, repair is required.

8. Specifications

8-1. General specifications

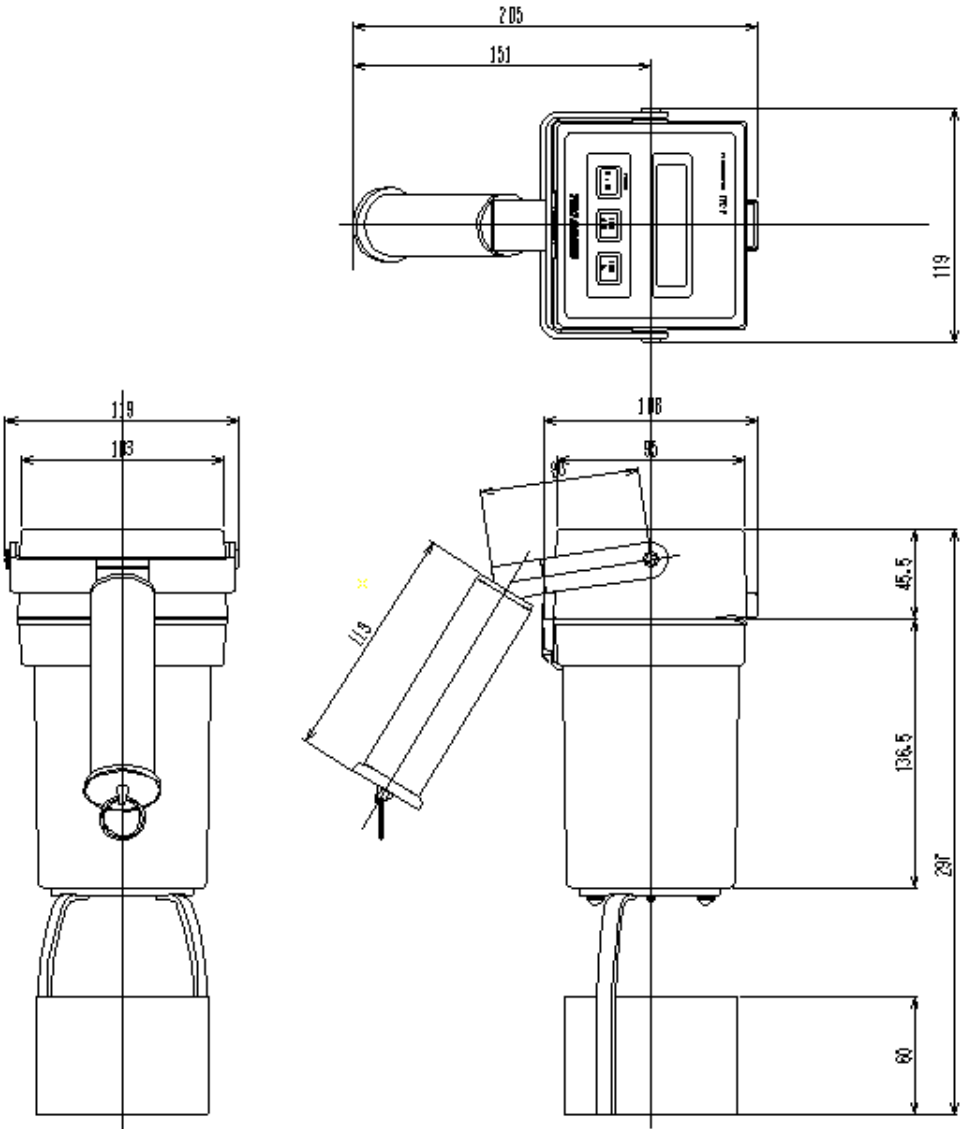
- Model: TVC-7
- Rotation speed: 20rpm
- Accuracy: $\pm 3\%$ of full scale (Rotor No. 2~4)
 $\pm 4\%$ of full scale (Rotor No. 0, 1, 5)
- Repeatability: less than $\pm 2\%$ of full scale
- Power: C-size batteries x 3
- Continuation operating time with the battery: About 30 hours (At ambient temperature 25°C, new alkali batteries use)
- AC adapter 6V DC is usable
- Material of parts contacting liquid: Stainless steel
- Material of case: PBT resin molded
- Display of measurement: Digital 3 digits (LCD)
- Unit: the simultaneous indication of SI (mPa·s / Pa·s) and %
- Mass: 1140g \pm 100g (not include the batteries)
- Operating Environment: 5°C to 40°C temperature range
Less than 90%R.H. (non-condensing atmosphere)

- Measuring range:

Rotor No.	0	1	2	3	4	5
Measuring Range	10 -100	50 - 500	0.2 - 2.00	1-10.0	5 - 50.0	20 -200
	mPa·s		Pa·s			

- Specification of AC adapter:
 - Output: 6V DC 100mA or more
 - DC Power jack name: EIAJ-3
(+pole pin diameter ϕ 1.65, -pole hole diameter ϕ 5.15)
- ※Please do not use the AC adapter without a CE marking.
- Electrical Certifications: CE

8-2. Outline drawing



9. Compatibility of data

As for our respective B type, TV series Viscometers, the rotating speed (20rpm) is the same as TVC-7; in a case using the rotor of table 3 of data is compatible.

※There is the case that data error between the compatible rotor is big depending on measurement samples. Therefore, depending on the purpose of use, we recommend our respective B type, R type, and TV series with higher performance.

Table 3 <Table of rotor correspondence>

Model of viscometer	Interchangeable rotor No.					
TVC-7	0	1	2	3	4	5
BH, B8H, TV-10H, TVB-20H, TVB-30H	/	1	2	4	6	7

10. Afterward

The TVC-7 has been designed with priority in easy handling, strength and high durability and low cost so as to be suitable in on-site checks during a production process. Therefore, depending on the purpose of use, we recommend our respective B type, R type, and TV series with higher performance.

11. Repair, guarantee

11-1. Repair



Warning

Modification, repair prohibited

Do not disassemble, modify or repair at places other than designated agencies. It may cause breakdown or electric shock.

Cautions

1. When this equipment is broken, return it to TOKI SANGYO CO., LTD. together with the guarantee.
2. Always return this equipment following the "method of returning."

"Method of returning"

Store the viscometer's body, accessories, etc in the "dedicated cardboard box used to store the viscometer, etc. at the time of purchase" or store them in a cardboard box protected with a cushioning material such as sponge.

3. We shall not bear responsibility for damage or breakdown caused as the result of not following the designated method of returning or when the guarantee becomes invalid or the repair is at a cost even within the guarantee period.

11-2. Guarantee

A guarantee is attached to the TVC-7 type viscometer.

This guarantee promises that we will repair the equipment without charge if the TVC-7 type viscometer is broken by the normal handling (handling explained in the instruction manual) for 1 year from the delivery date by presenting the guarantee.

However the repair is at a cost in the following cases.

Cautions

In the case where the cause of the breakdown is one of the following, we shall not bear responsibility for the breakdown or no conformation and the guarantee becomes invalid even within the guarantee period and the repair is at a cost.

- a) In the case of disassembled, repaired, modified, etc. other place than TOKI SANGYO CO., LTD..
- b) In the case of the designated method of returning is not observed when returning the viscometer.
- c) In the case of the contents of the instruction manual for the method of use, environment of use, etc. are not observed.
- d) In cases due to natural disasters such as fire, earthquake, flooding, lightning.
- e) In the case where the guarantee is not presented even within the guarantee period.

The contents specified in this manual are subject to change without prior notice due to improvements in the performance and other reasons.

Contact the seller, **Toki Sangyo Co., Ltd.**, to order a viscometer and the accessories and for more information on the method of use, sample measurement, repair and general rheology.

<http://www.tokisangyo.co.jp>

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