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PCE INSTRUMENTS PCE-RVI 2 Condition Monitoring Viscometer

Specifications

Measuring range	1 … 100 000 cp
Resolution	0.01 cp
Accuracy	±0.2 % F.S. (full measurement range)
Rotor specifications	Spindle L1, L2, L3, L4 Optional: Spindle L0 (see accessories)
Sample volume	300 … 400 ml
Rotation speed	6, 12, 30, 60 rpm
Power supply	Entrada 100…240 V CA / 50, 60 Hz Salida 12 V CC, 2 A

Environmental conditions	5 … 35 °C / <80 % RH without condensation
Dimensions	400 x 200 x 430 mm
Weight	2 kg (without base)

Note: There should be no strong electromagnetic interference, strong vibrations or corrosive gases in the vicinity of the instrument.

User manuals in various languages (français, italiano, español, português, nederlands, türk, polski) can be found via our product search on:www.pce-instruments.com

SAFETY INFORMATION

Read this instruction manual carefully and completely before using the device for the first time. The device should only be used by qualified personnel. No liability is assumed for damage caused by failure to follow the warnings in the instructions for use.

- This device should only be used in the manner described in this instruction manual. If used for other purposes, dangerous situations may arise.
- Only use the device if the environmental conditions (temperature, humidity, etc.) are within the limit values indicated in the specifications. Do not expose the device to extreme temperatures, direct sunlight, extreme humidity or wet areas.
- Do not expose the device to strong shocks or vibrations.
- The device casing should only be opened by qualified PCE Instruments personnel.
- Never use the device with damp hands.
- No technical modifications should be made to the device.
- The device should only be cleaned with a damp cloth. Do not use abrasive or solvent-based cleaning products.
- The device should only be used with the accessories or equivalent spare parts offered by PCE Instruments.
- Before each use, check that the device casing does not show any visible damage. If there is any visible damage, the device should not be used.
- The device should not be used in explosive atmospheres.

- The measuring range indicated in the specifications should not be exceeded under any circumstances.
- Failure to follow the safety instructions may cause damage to the device and injury to the user.
- We are not responsible for any printing errors or the contents of this manual.
- We expressly refer you to our general warranty conditions, which can be found in our General Terms and Conditions.
- If you have any questions, please contact PCE Instruments. The contact details can be found at the end of this manual.

CONTENTS OF THE SHIPMENT

- 1 x PCE-RVI viscometer 2
- 1 x Set of spindles L1 … L4
- 1 x Double open-ended wrench 1 x Mains adapter
- 1 x Carrying case
- 1 x Instruction manual

ACCESSORIES

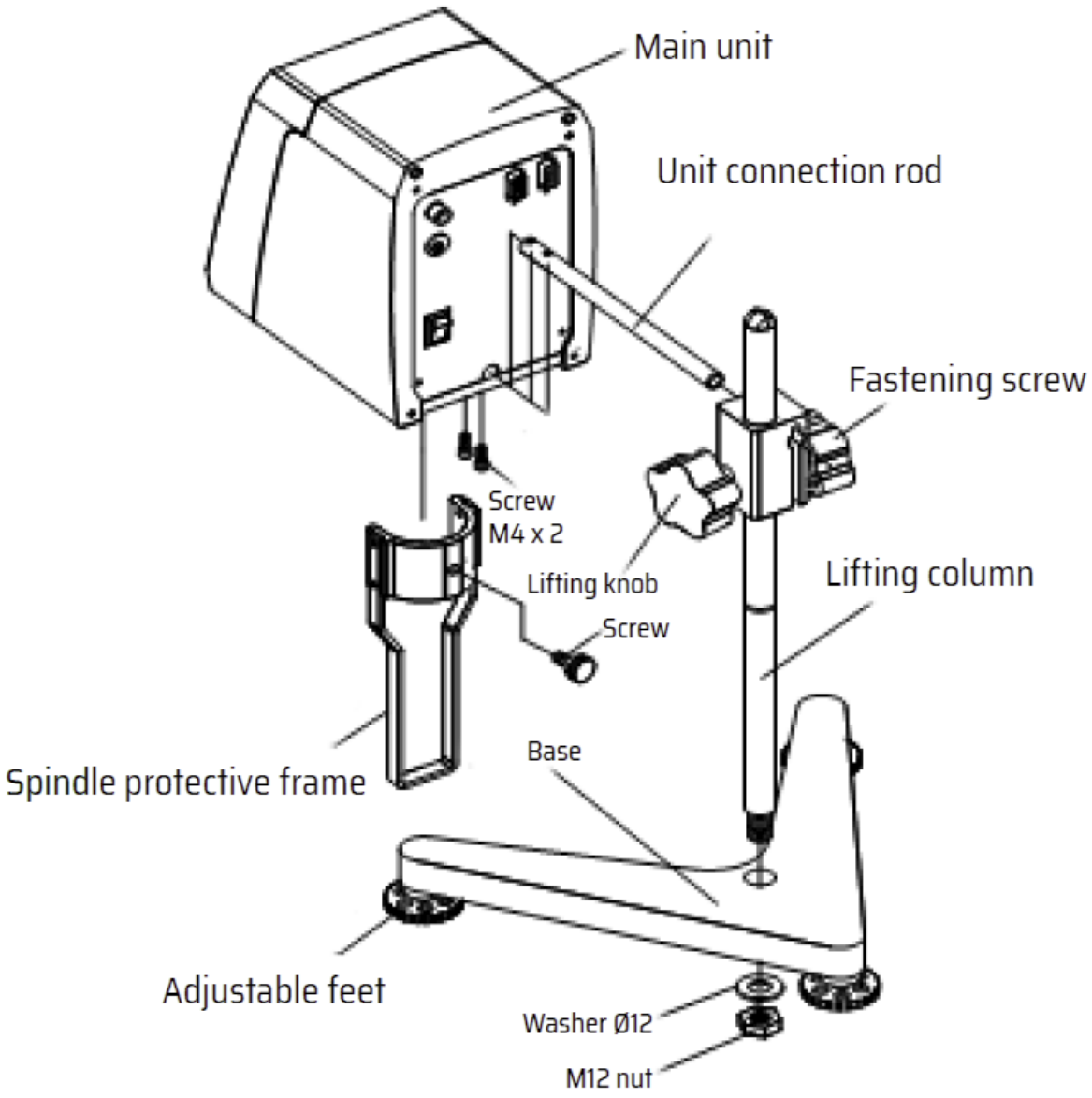
- CAL-PCE-RVI2/3 ISO calibration certificate
- PCE-RVI 2 LVA Spindle L0, for viscosities below 15mPa·s
- TP-PCE-RVI Temperature probe, 0 … 100 ºC
- PCE-SOFT-RVI Software

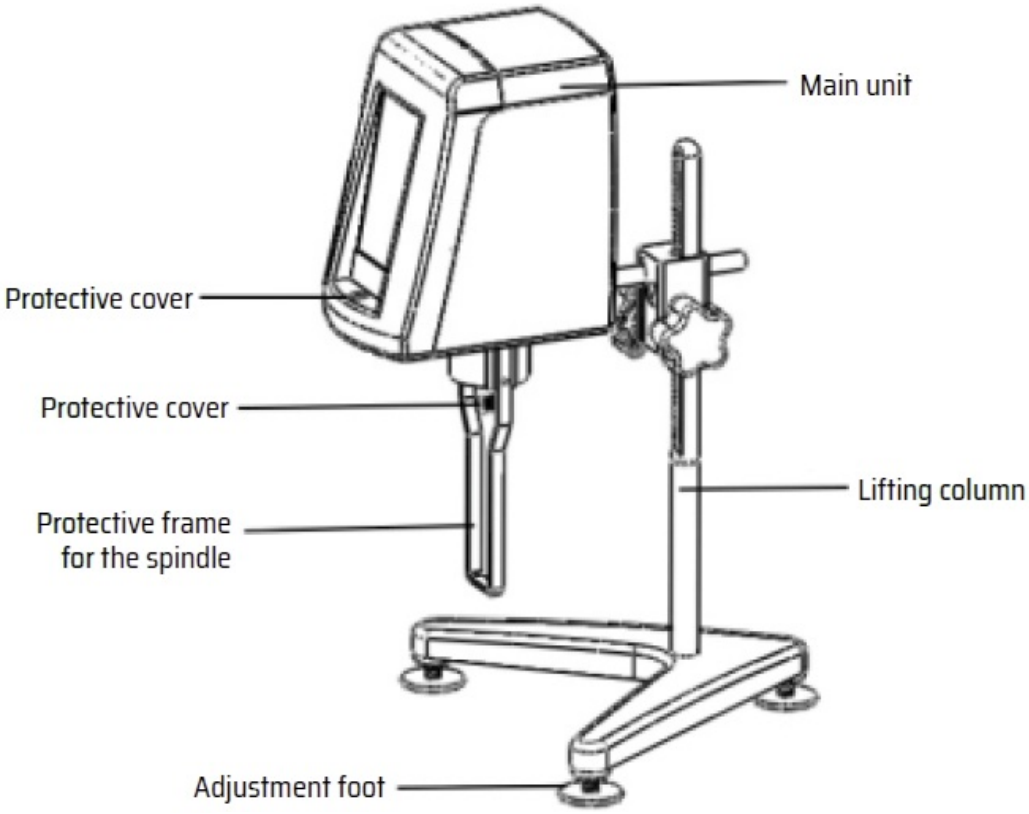
ASSEMBLING THE DEVICE

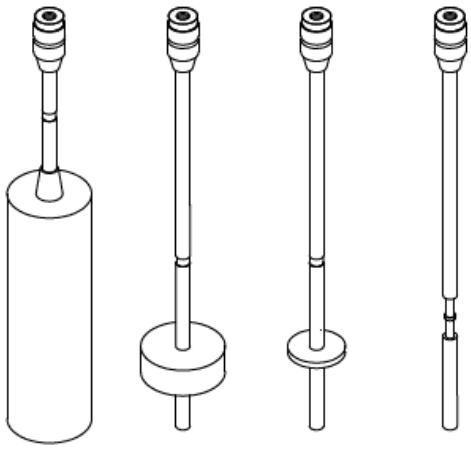
- You will find the following items as shown in Figure 1: the lifting column, main unit, unit connecting rod, mains adapter and the base.
- First, insert the lifting column into the hole provided in the base and secure it with a nut.
    - **Note:** The lifting button is on the right side.
- Hold the fixing screw while simultaneously screwing in the lifting guide. Next, remove the screws from the main unit connecting rod and insert it with the holes facing down into the mounting hole on the bottom of the main unit. Connect the main unit

connecting rod to the main unit base plate using the hexagonal screw that was removed earlier and tighten it.

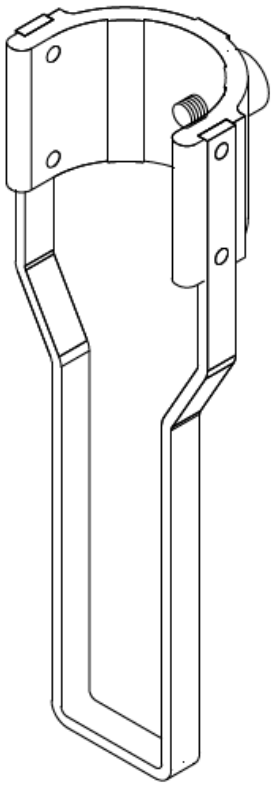
- Then insert the main unit with the connecting rod into the mounting hole of the lifting column, and tighten the fixed knob after straightening it. Adjust the three levelling feet located under the base so that the level bubble on the front of the device is in the centre of the black circle. Remove the protective cover located under the lid of the device, connect the device to the mains and turn on the viscometer.
- Check that it is correctly assembled as shown in Figure 2. Figure 3 shows the spindles L1 … L4 and the spindle protection frame supplied with the machine.







Spindle L1 | Spindle L2 | Spindle L3 | Spindle L4

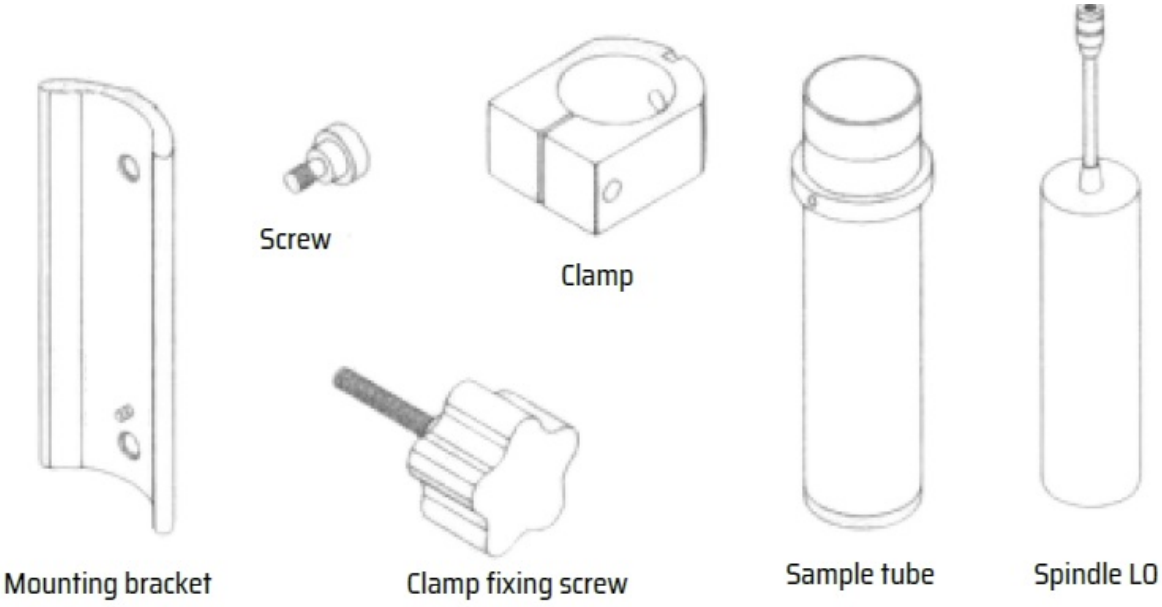


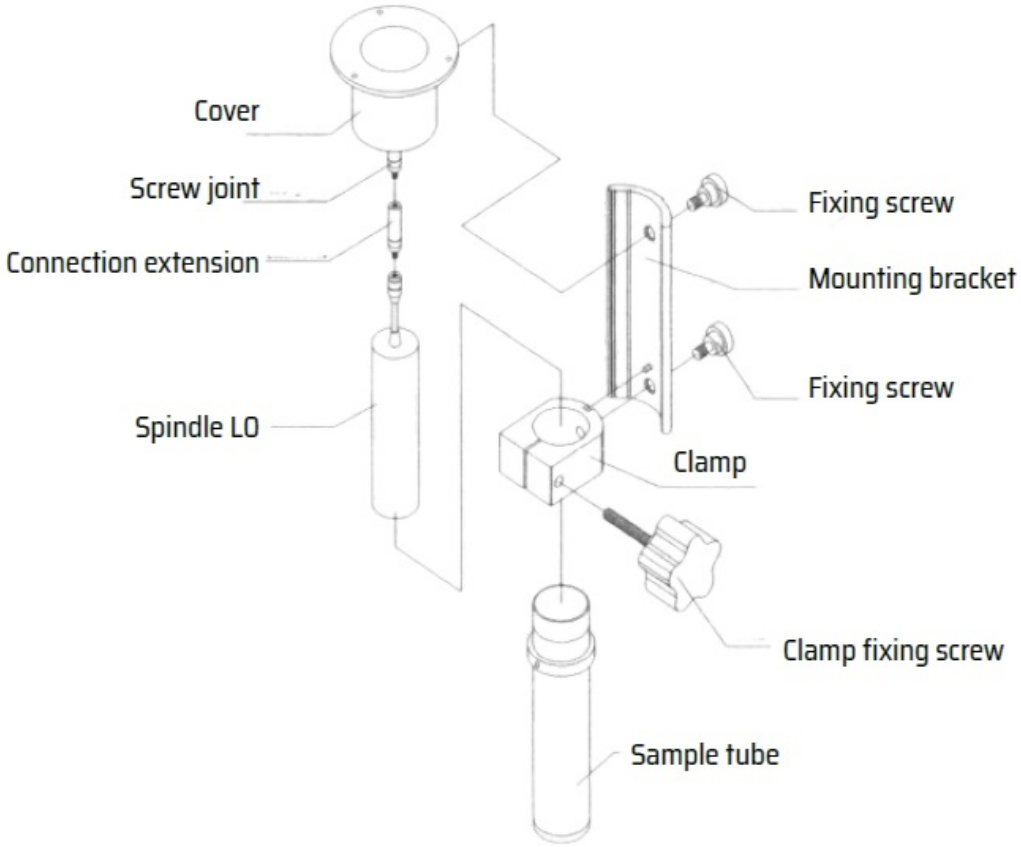
Protective frame
for the spindles

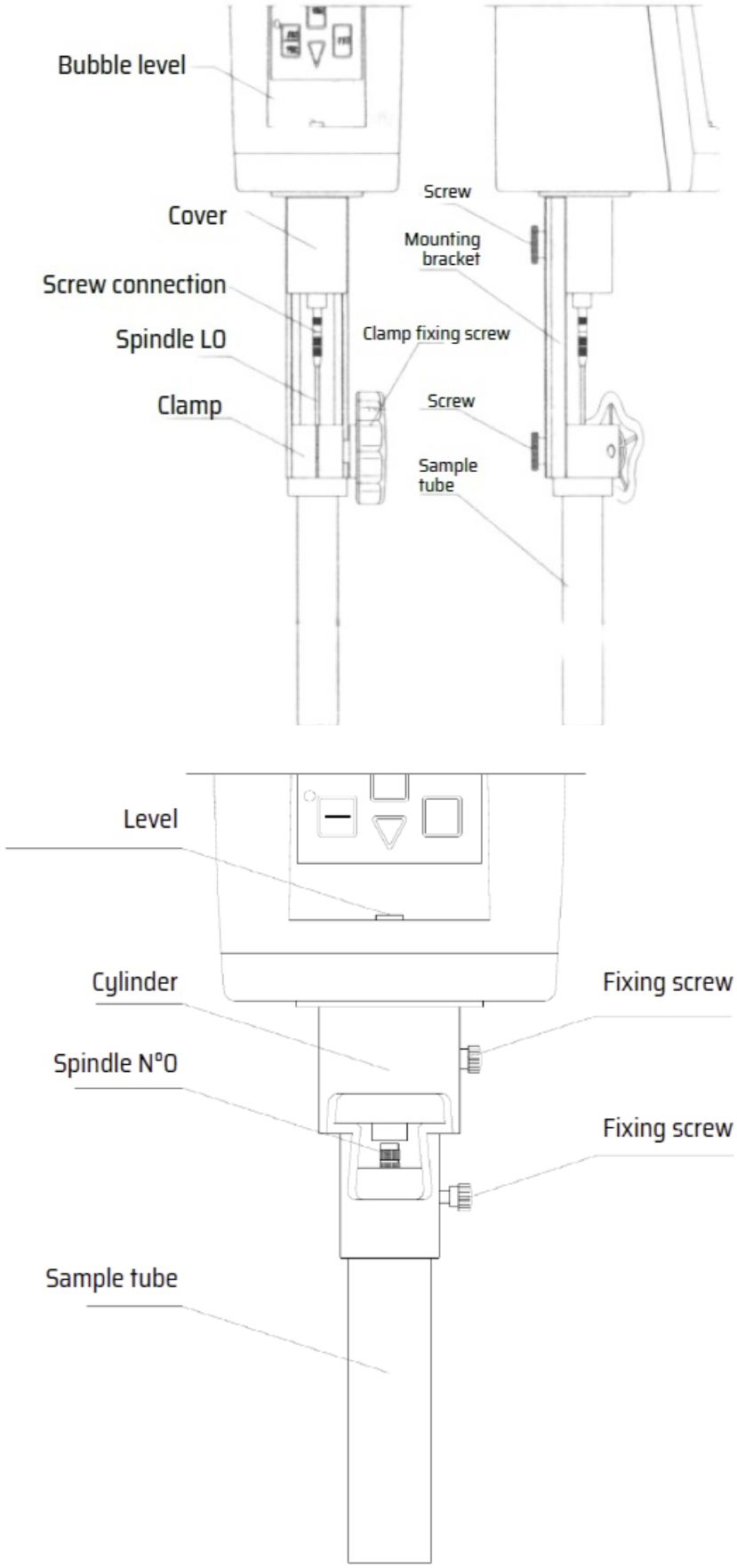
Spindle L0 (optional)

- Spindle L0 consists of a fixed sleeve, the spindle itself and a test cylinder. Its structure is shown in Figure 4. This component can only be used when measuring spindle L0 and is not suitable for other spindle tests.
- Installation of the L0 spindle is carried out as shown in figure 5. First, turn the L0 spindle clockwise on the spindle connection screw (universal joint).
- Insert the fixing sleeve from below into the cylinder of the lower unit cover. Be careful not to touch the L0 spindle, and tighten it with the sleeve fixing screw.
- Pour 22 ml of sample into the test vessel.
- Slowly insert the sample tube into the spindle and secure it with the clamp and the fixing screw. All the installed parts of the L0 spindle are shown in figure 6. Check the temperature of the liquid and adjust the height.
    - **Note:** When using the L0 spindle, make sure there is always liquid in the sample tube. On the other hand, when using the L0 spindle, remove the protective frame for the spindles (see figure 3) and place the mounting bracket for the L0 spindle in its place. Note that when using the L0 spindle, no-load rotation is not allowed when it is not filled with fluid.

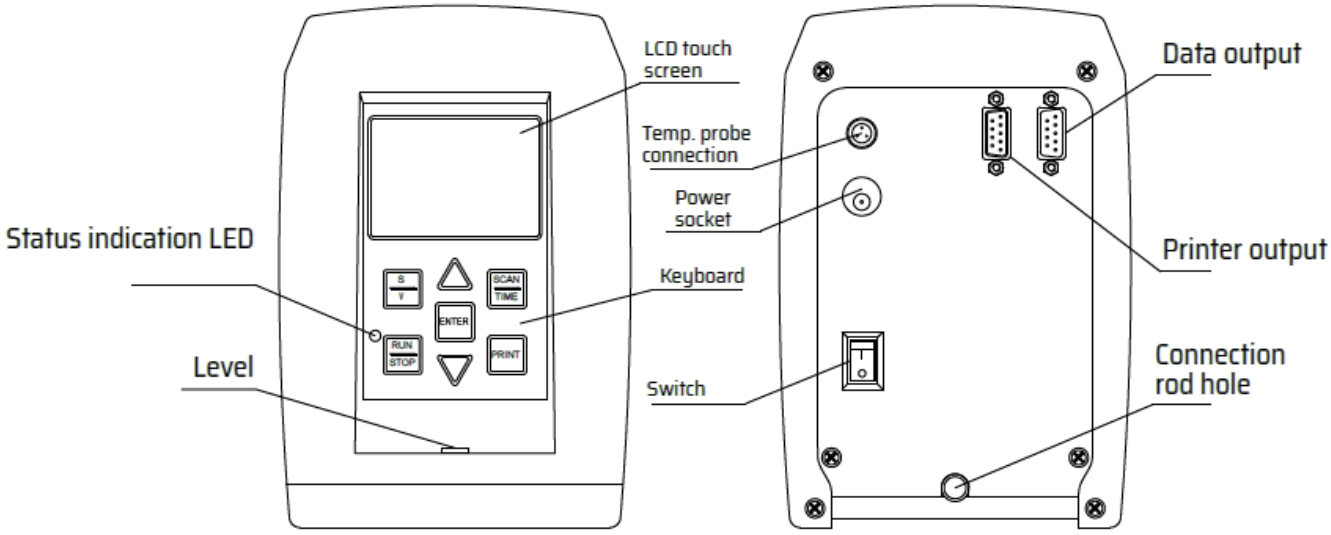
- When using the L0 spindle, it is not necessary to install a spindle protection frame.







INTERFACE AND OPERATING MODE



Description of the interface and outputs

The keypad has 7 keys and an LED indicator on the front of the unit.

- S/V Select a rotor and speed
- RUN/STOP Start / Stop the device
- UP/DOWN Set the corresponding parameter
- ENTER Confirm a parameter or option
- SCAN/TIME Start automatic scan and auto-off time
- PRINT Print all measured data (external printer required)

The rear of the main unit contains the following elements:

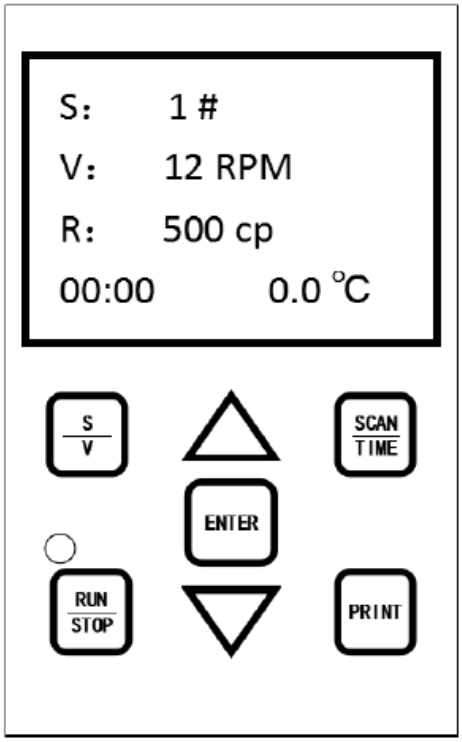
- Temperature sensor socket
- Power socket
- Power switch
- Data output port for PC
- Data output port for printer

Description of the LCD screen

When the device is switched on, the model information is displayed first, then it goes into standby mode three seconds later, and four rows of parameters are displayed on the LCD screen (Fig. 8):

- **S**: code of the selected spindle

- **V**: current rotation speed
- **R**: The total value of the measurement range for the corresponding rotor and speed combination
- **00**:00: the predefined time to stop the timed test, 60 minutes in the longest and 30 seconds in the shortest, and not defined by default
- **0.0 °C**: the current temperature detected by the temperature sensor (0.0°C is displayed if no temperature sensor is inserted).



Press the “S/V” key, select the spindle number and the appropriate speed, and press the “RUN” key to start the test.

- S L2# Number of the spindle selected for the test.
- V 60.0 RPM Speed selected for the test.
- ŋ 300.00 cP Viscosity value obtained in the test.
- 60.0% Torque value in % at current rotor speed.
- 25.5 ºC Temperature value obtained in the temperature sensor test.
- 05:00 Actual start of the viscosity test, which lasts 5 minutes (this time is only shown once the viscometer has started the test).

After starting the measurement, it is necessary to wait until the instrument has rotated between 4 and 6 times. After rotating the instrument between 4 and 6 revolutions, first look at the “%” value on the bottom line. This value should only be between 10 and

90%. It is only valid if it is within these percentages, and its viscosity value can be read at that moment.

- If the percentage value “%” is less than 10% or greater than 90%, it means that the current range selection is incorrect and another measuring range must be selected.
- The specific method of operation is as follows: if the value of the “%” is less than 10% because the range selection is too large, you must reduce the range, you can increase the speed or replace the rotor with a larger one; if the value of the “%” is greater than 90%, you must increase the range, you can reduce the speed or replace the rotor with a smaller one. This instrument has an over-range alarm function.
- When the torque value is greater than 95%, the viscosity value is displayed as “EEEEEE” with an audible alarm. At this point, you should switch to a higher viscosity range for the test.
- To measure the viscosity of an unknown sample, the viscosity of the sample must first be estimated before choosing the corresponding spindle and speed combination. If it is difficult to estimate the approximate viscosity of the sample, it should be assumed that the sample has a high viscosity before proceeding with the measurement with small to large spindles (cubing) and low to high speed.
- The principle of viscosity measurement is as follows: a small spindle (cubing) and low rotational speed for a high viscosity fluid; a large spindle (cubing) and high rotational speed for a low viscosity fluid.

The measuring range for each spindle and speed combination is shown in the following table.

RPM	**Spindle L0**	**Spindle L1**	**Spindle L2**	**Spindle L3**	**Spindle L4**
	Full measuring range mPa·s				
6 rpm	100	1000	5000	20 000	100 000
12 rpm	50	500	2500	10 000	50 000
30 rpm	20	200	1000	4000	20 000
60 rpm	10	100	500	2000	10 000

PRECAUTIONS

- As viscosity depends on temperature, the temperature value must be controlled to ±0.1°C when the instrument is operating at normal temperature, otherwise the measurement accuracy will be reduced. If necessary, a constant temperature tank can be used.
- The surface of the spindle must always be clean. The spiral has a linear part, so the percentage angle must be checked during measurement, and this value must be between 10 … 90%. If the angle percentage is too high or too low, “EEEEE” will be displayed for torque and viscosity.
- In this case, the spindle or speed must be changed, otherwise, the measurement accuracy will be reduced.
- The spindles should be mounted or dismounted with care, gently lifting the universal joint. The spindle cannot be forced by horizontal tension or pulled downwards, otherwise, the shaft will be damaged.
- Given that the spindle and the universal joint are joined by a left-hand thread, the spindle must be mounted or dismounted in the correct direction of rotation (Figure 11), otherwise, the universal joint will be damaged.

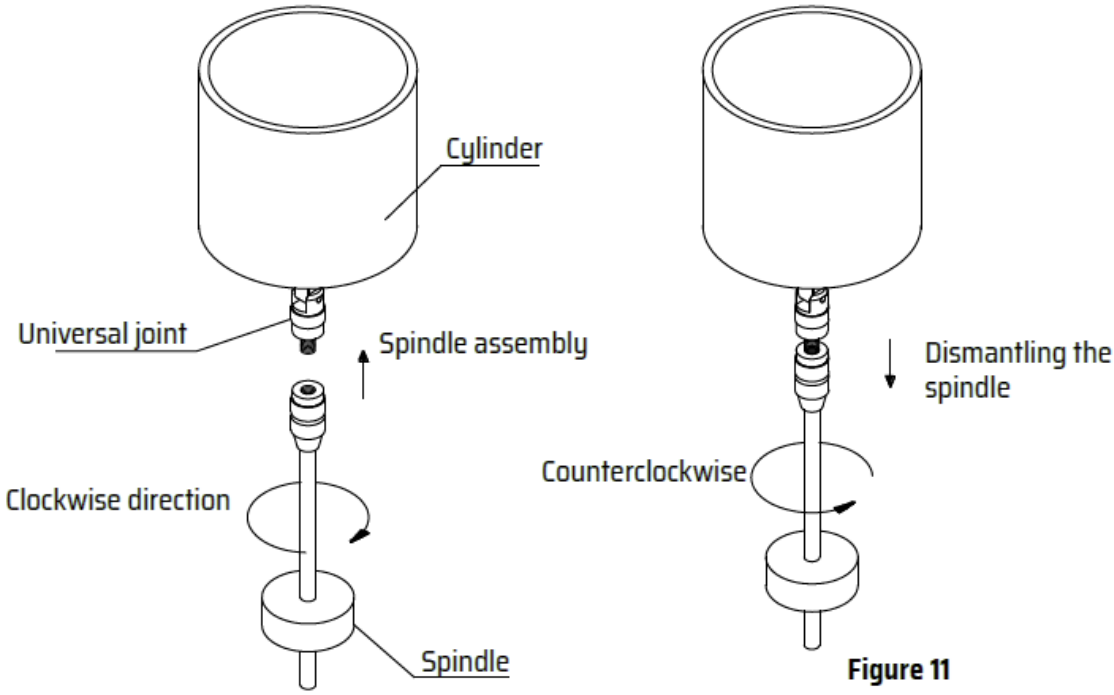


Figure 11

- The universal joint must be kept clean.
- The instrument must be lowered slowly, holding it with the hand to protect the shaft from vibrations.
- The universal joint must be protected by the lid when the instrument is transported or handled.

- Suspended liquids, liquid emulsions, high-content polymers and other high-viscosity liquids are, for the most part, “non-Newtonian”. Their viscosity varies with shear rate and time, so the values measured will be different if measured with different rotors, rotation speeds and times (the result will also vary if a “non-Newtonian” liquid is measured with the same rotor at different rotation speeds).
- For the installation of the temperature sensor, see the following figure (this accessory is optional, it is not included in the delivery).

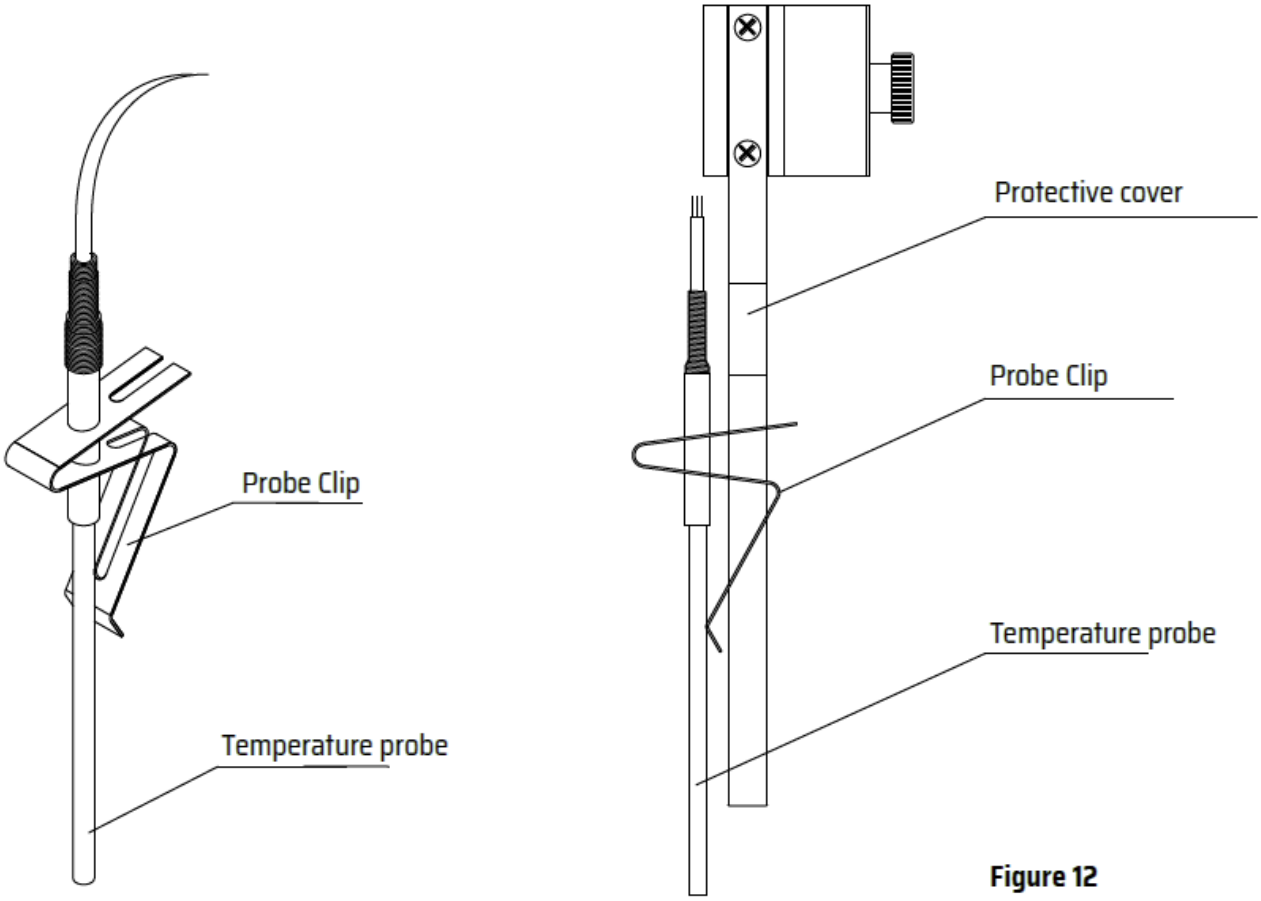


Figure 12

DISPOSAL

For the disposal of batteries in the EU, the EU 2023/1542 directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose. To comply with the EU directive 2012/19/EU, we take our devices back. We either re-use them or give them to a recycling company, which disposes of the devices in line with the law. For countries outside the EU, batteries and devices should be disposed of according to your local waste regulations. If you have any questions, please contact PCE Instruments.

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Frequently Asked Questions

Q: What should I do if the viscometer shows an error?
A: If you encounter an error with the viscometer, refer to the troubleshooting section in the instruction manual or contact PCE Instruments for assistance.

Q: Can I use spindle L0 instead of the provided spindles?
A: Yes, spindle L0 can be used as an optional accessory if needed. Ensure proper calibration and setup when using different spindles.

Q: How do I clean the viscometer after use?
A: To clean the viscometer, follow the cleaning instructions provided in the manual. Use appropriate cleaning agents and methods to maintain accuracy and performance.

Documents / Resources

	PCE INSTRUMENTS PCE-RVI 2 Condition Monitoring Viscometer [pdf] User Manual PCE-RVI 2, PCE-RVI 2 Condition Monitoring Viscometer, PCE-RVI 2, Condition Monitoring Viscometer, Monitoring Viscometer, Viscometer

References

- User Manual

PCE Instruments
Condition Monitoring Viscometer, Monitoring Viscometer, PCE Instruments, PCE-RVI 2, PCE-RVI 2 Condition Monitoring Viscometer, Viscometer

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