



LAMY
RHEOLOGY
INSTRUMENTS

USING MANUAL

RM 100 CP2000 PLUS

VERSION N° RM100CP2K-UK05/2021



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1. INTRODUCTION

The RM 100 CP2000 PLUS is a device able to measure the viscosity, which is capacity of a product to resist to the flow.

The fluid is forced to a shear rate (rotational speed) and the shear stress (motor torque) is measured. The values of shear rate and shear stress then make it possible to calculate the viscosity using the Newton equation and the constants associated with the mobile used.

$$\text{Equation of Newton is: } \eta = \frac{\tau}{\dot{\gamma}}$$

With η for viscosity in Pa.s, τ for shear stress in Pa and $\dot{\gamma}$ for shear rate in s^{-1} .

Shear stress and shear rate are calculated by using constants of each measuring system as:

$$\tau = M \times K_{\tau} \text{ with } M \text{ for motor torque in mNm and } K_{\tau} \text{ in Pa/mNm.}$$

$$\dot{\gamma} = n \times K_D \text{ with } n \text{ for rotational speed in rpm and } K_D \text{ in } s^{-1}/\text{rpm.}$$

The viscometer calculates the viscosity by dividing the shear stress by the shear rate for each measuring point. The K_{τ} and K_D constants used depend on the measuring system selected for the measurement.

Viscosity depends on the temperature, then it must be essential that all viscosity values are associated to a reading of the sample temperature, in order to compare viscosity for different samples.

There are some products for which the viscosity, to a constant temperature, stay unchanged, even if we change the shear rate. Those samples are named **Newtonian fluids**, i.e. : Oils, Water, Glycerol, etc...However, many substances have a variation of viscosity in function of speed of shearing, and the Flow Behaviour of those samples could be determined with measuring instruments able to set many speeds of rotation.

The viscometer is constituted with a continuous current motor with an optical encoder, in order to warranty a great accuracy of the speed of rotation of bob, on all torque range.

The viscometer has an easy touch screen display, on which you could read the **speed, measuring spindle** reference, temperature, the measured torque and the dynamic **viscosity in mPa.s (=cPoises) or Pa.s**.

The viscometer RM 100 CP2000 PLUS can be used with different measuring system. You will find below a list of compatible measuring system with this viscometer.

- **MS CP:** Measuring systems cone or plate compatible with DIN 53019 / ISO 3219 / ASTM D4278-D7395 (316L Stainless Steel). These systems make it possible to set the shear rate in order to carry out viscosity measurements or to obtain curves to study flow behavior, yield stress or thixotropy. They are particularly suitable for measurements on very small quantities for control or development of homogeneous products with or without particles (size <100 μ m), guaranteeing easy cleaning.

1.1. COMPONENTS

Viscometer is delivered inside a foam protection to avoid any problem during transport. RM100 CP2000 PLUS is delivered mounted. You will find some cable, measuring system (according to order) and some tools for installation and using.

In detail, you will find different part in your box as shown below.



RM100 CP2000 PLUS



Cable and power supply for measuring head



Cable for CP2000



Tool for levelling of RM100 CP2000 PLUS



Level indicator



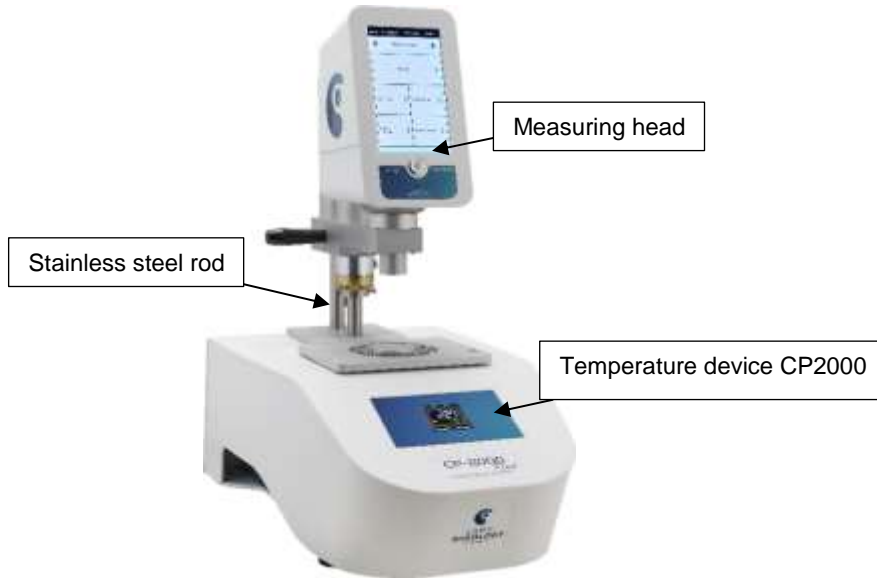
Cable for connexion of measuring head with CP2000 temperature control.



Bottom plate 70

1.2. GENERAL VIEW OF YOUR DEVICE

Once your device will be mounted and installed, it looks like this;

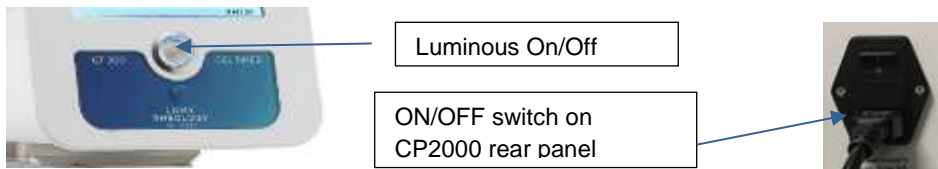


- TOUCH Screen

The new PLUS series is equipped with a 7" colour touch screen. It gives you greater working comfort and a clearer view of your data and analysis results.

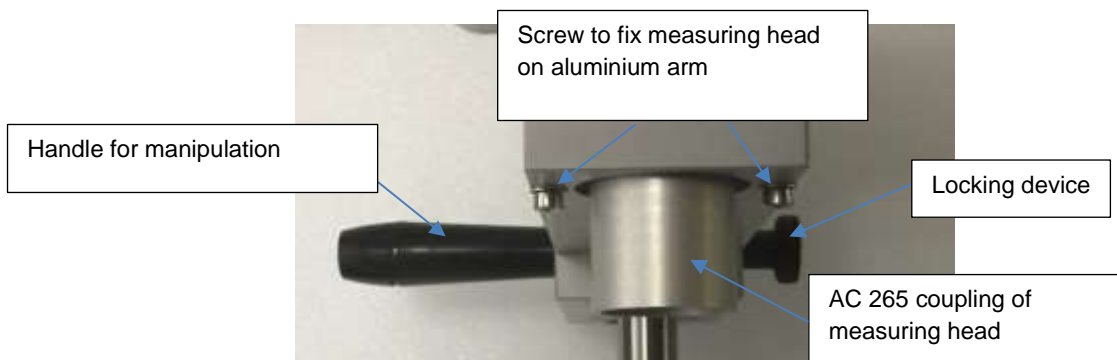
- On / Off Switch

Always with the aim of improving your experience, LAMY RHEOLOGY has decided to equip all of its PLUS range with a luminous and design switch. It has been placed in the centre of the device for greater intuitiveness.



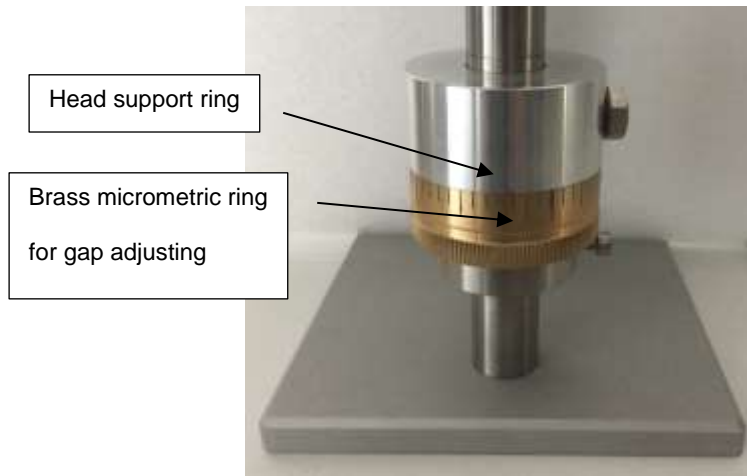
- Aluminium arm

The aluminium arm is equipped with the clamping knob allows you to maintain the height of the measuring head and a handle for easy handling. The measuring head is fixed to the arm by one screw.



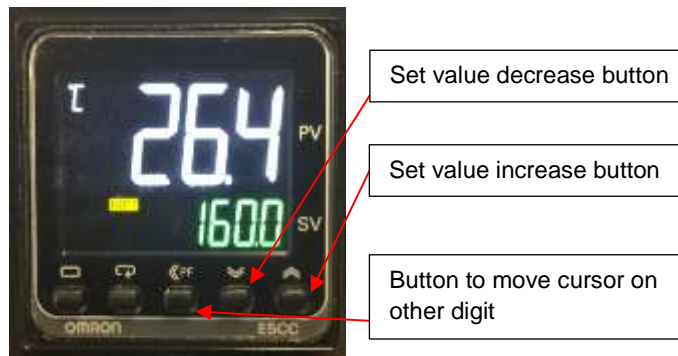
- Stainless steel rod

The support rod is made of stainless steel for a solid hold of the measuring head. It has a very long life. One of them is equipped with a supporting ring for the head in the measuring position and the micrometric ring for adjusting the air gap.



- Temperature unit CP2000

This device regulates the temperature of your sample. It is equipped with a display / regulator (programmer for certain model) OMRON. It exists in Peltier or electric version.



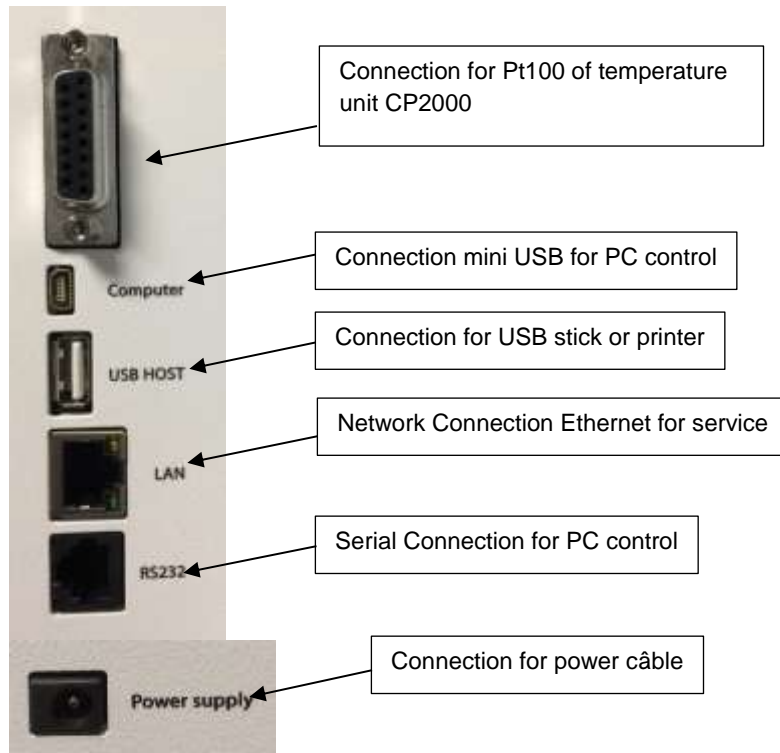
The lower plate is interchangeable to accommodate the diameter of the measuring geometry.



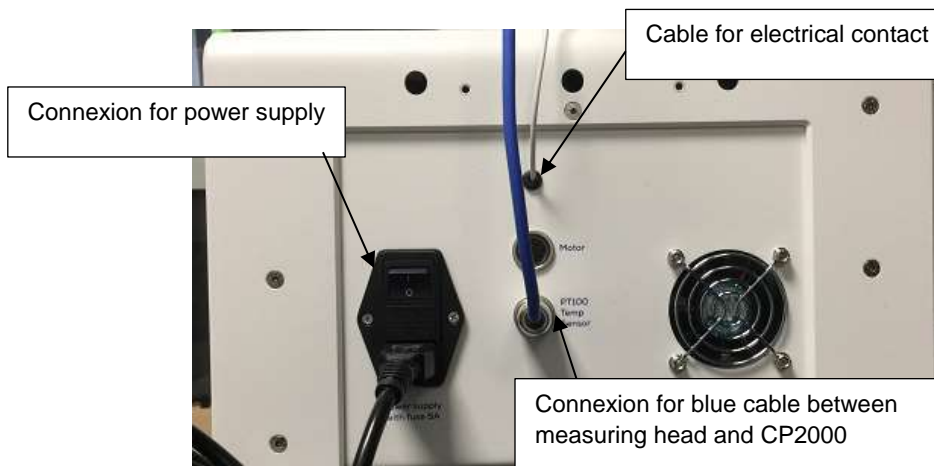
The CP2000 is also equipped with a white cable to make electrical contact between the measurement cone and the lower plate.

1.3. CONNEXIONS

According to your order, rear panel of device get this available connexions.



The rear panel of the CP2000 support has these connections.



1.4. SPECIFICATIONS

Type of instrument: Rotating springless viscometer with 7" Touch screen

Rotation speeds: Unlimited number of speeds between 0.3 and 1500 rpm

Torque range: From 0.05 to 30 mNm.

Accuracy: +/- 1 % of the full scale

Repeatability: +/- 0,2 %

Display: Viscosity – Speed – Torque – Time - Temperature - Choice of viscosity units: cP/Poises or mPa.s / Pa.s

Language: French/English/Russian/Spanish/Turkish/German

Compatible measuring system: MS CP.

Supply voltage: 90-240 VAC 50/60 Hz

Connection: USB and serial.

Options: See brochure

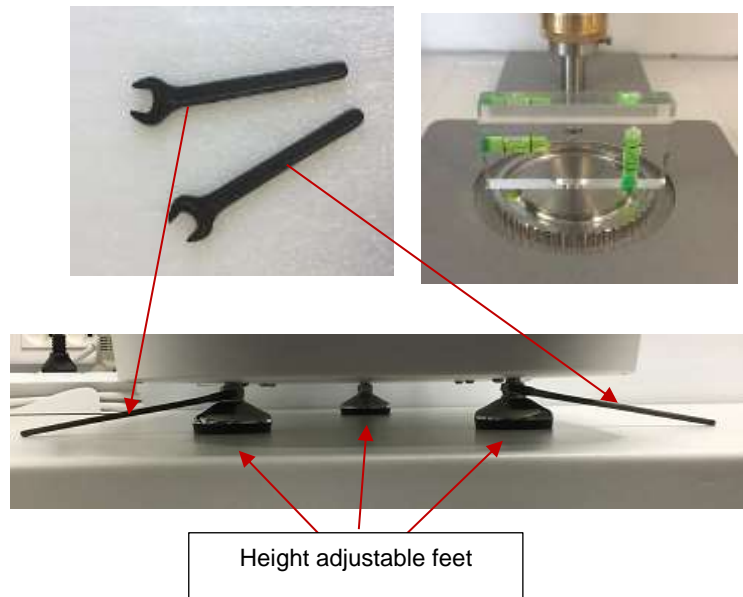
Dimensions and weight: D610 x W340 x H700 mm, Weight: 22 kg.

This is the available models.

Part Number Instrument	Designation Instrument
N170000	RM 100 CP2000 PLUS VISCOMETER Peltier air-air (+10 to +70°C)
N170100	RM 100 CP2000 PLUS VISCOMETER Peltier air-air (+10 to +70°C) with programmer
N170200	RM 100 CP2000 PLUS VISCOMETER with liquid Peltier (-20 to +100°C)
N170300	RM 100 CP2000 PLUS VISCOMETER with liquid Peltier (-20 to +100°C) with programmer
N170400	RM 100 CP2000 PLUS H VISCOMETER (Room to +300°C)
N170500	RM 100 CP2000 PLUS H VISCOMETER (Room to +300°C) with programmer
N170800	RM 100 CP2000 PLUS VISCOMETER Peltier air-air (+0 to +150°C)
N170900	RM 100 CP2000 PLUS VISCOMETER Peltier air-air (+0 to +150°C) + programmer

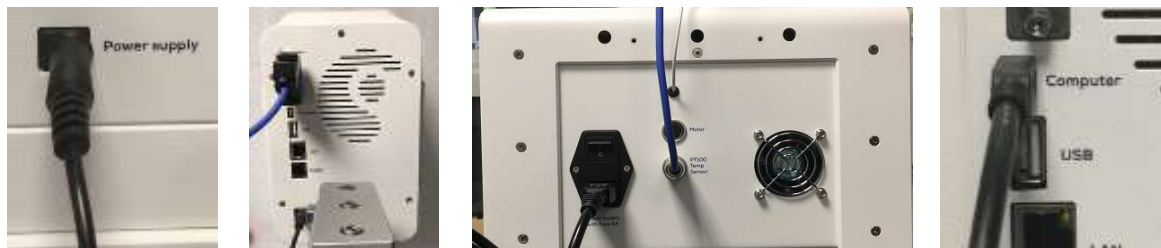
1.5. INSTALLATION

Install the CP2000 on a solid bench. Place the level on the plane and adjust the level using the 2 keys provided by playing on the three adjustable feet in height.



Connect the temperature reading cord (blue): SUB-D 15 connector on rear of the RM PLUS to the DIN plug on the back of the CP-2000 stand

Connect the RM100 PLUS and CP2000 power cable. Connect you viscometer by plugging power cable on to rear panel of device. Also cable for software connection when they are provided.



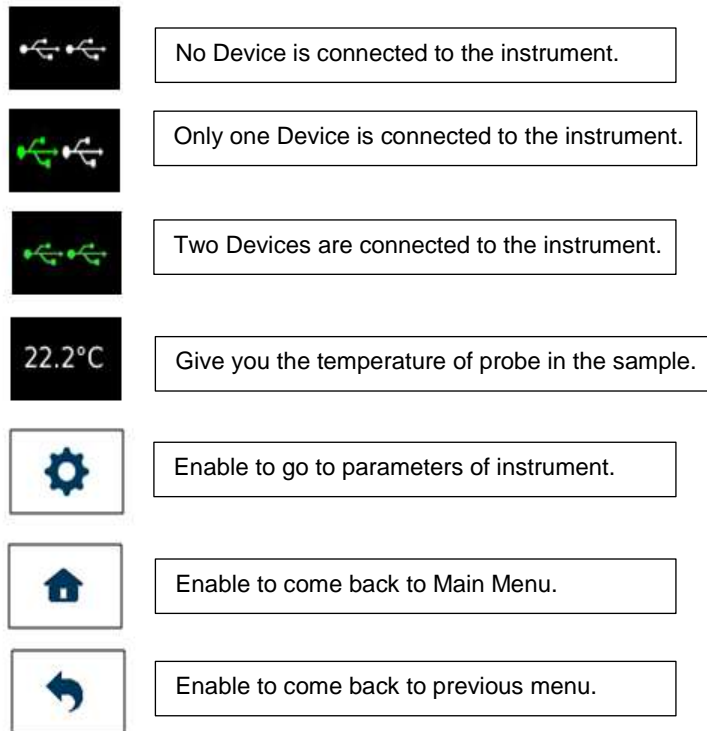
Your viscometer will be used with different measuring system. To know how to mount and use it, please see section 3.

2. GETTING STARTED

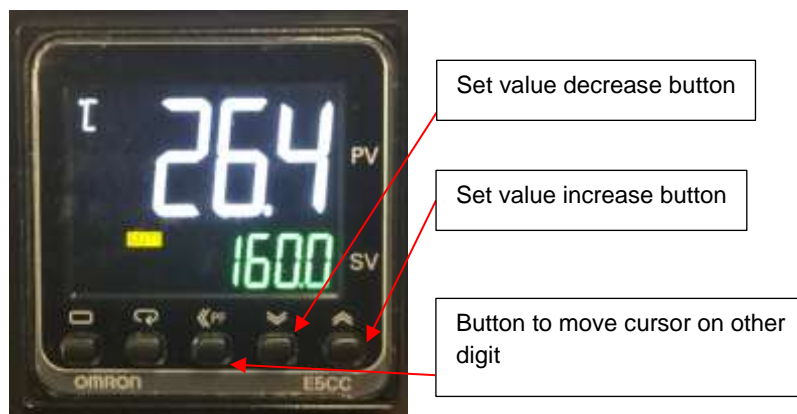
Once power cable has been plugged on rear panel of device (see section 1.3), you can click on button to switch on your device (see section 1.2).

2.1. STATE ICONS

Once your device is switched on, you will see some icons on Touch Screen.




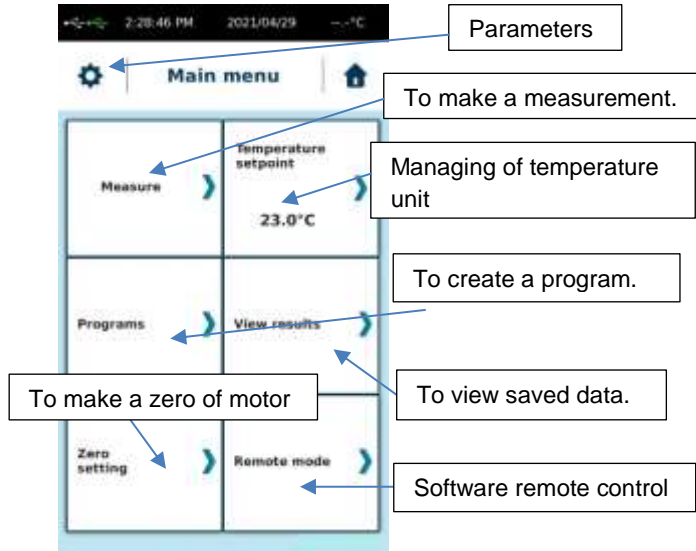
The USB port icon indicates that a USB flash drive has been connected. This is used to update the firmware or to transfer the results.



2.2. PRIMARY CONCEPTS

2.2.1. MAIN MENU

Main menu enable to you to browse between different tabs of your RM 100 CP2000 PLUS. Acces is always available by clicking .

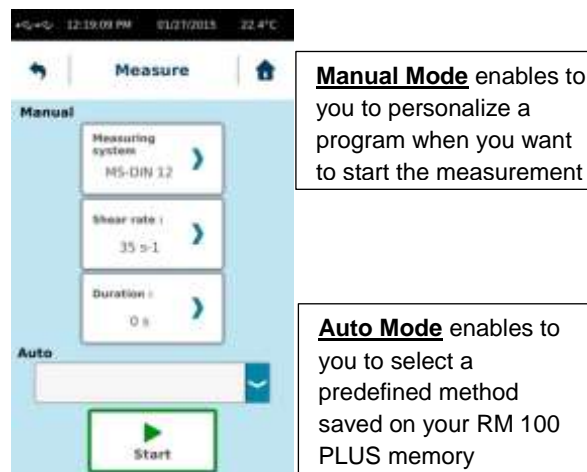


The "Temperature setpoint" button is present when the instrument has been ordered and delivered with a programmable temperature control.

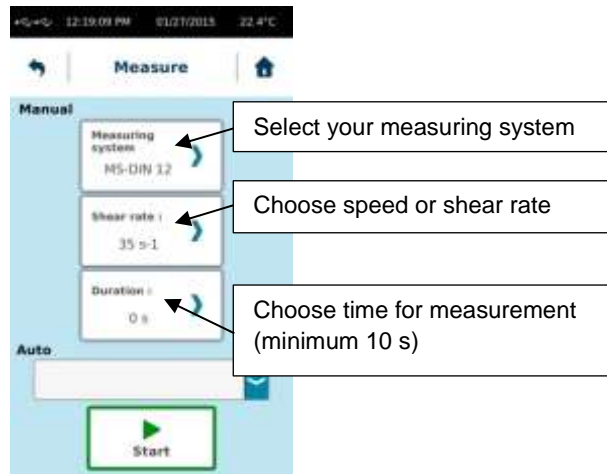
2.2.2. MEASURE

Measure tab is central part of your RM 100 CP2000 PLUS. Before to use it, you should install your measuring system and your sample. Please see section 3.

Then you click on "Measure", you will see a new window.



Manual Mode enables to choose your measurement parameters like «Measuring System», «Speed or shear rate» then «Time of measurement».



Rq : If « Time » = 0, you could modify « speed » during the measurement. This could help you to define the best conditions to work on your sample.

If your measuring system is not in list, you may have to create it. Please refer to section 2.2.5.6.

Choice between “Speed” or “Shear rate” is according to your measuring system. For MS CP, you should have only possibility to set shear rate. You can force device to show “Rpm” instead “s-1” by changing setting of device (see section 2.2.5.9). If you need to know what is the corresponding speed then you are using shear rate, you have to use constant K_D of your measuring system (information available in section 2.2.5.6).

$$\text{SPEED} = \text{SHEAR RATE} / K_D$$

With speed unit in rpm, shear rate in s^{-1} and K_D is rpm/s^{-1} .

Auto mode allows you to select pre-recorded programs (see section 2.2.7). Select the program from the list and click "Start" to start your measurement. The display automatically adjusts to show the current measurement as in Manual mode.



Then your settings are ok, you can click “Start” to start your measurement.

During your measurement, you will see a torque gage (on the bottom side of the display). Boundaries of this gage give you minimum and maximum viscosity you can measure with your selected spindle and set speed/shear rate. You have also value in % corresponding of measured torque vs maximum torque of device. This maximum torque or viewing % can be set on device (see section 2.2.5.8 and 2.2.5.9).



You must verify that the measured torque is not too close to the upper or lower limit, because you can get message as “Lower Torque” or “Torque Overload” and measurement will stop automatically. If this is the case, increase speed/shear rate or take a larger measurement system if you are close to the lower limit. Please decrease speed/shear rate or choose a smaller measurement system if the torque reading is close to the upper limit.

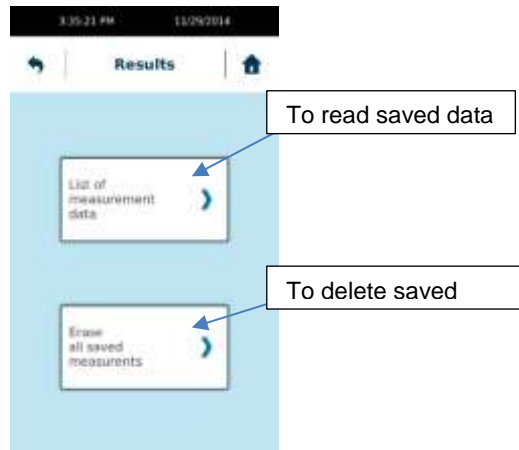
You will find several information available on the screen such as torque (mN.m), stress (Pa), temperature (° C), time (s) or viscosity (mPa.s). If the units do not suit you, you can change them in parameters (see section 2.2.5.5).

Then your measurement is finished, you will get this windows below. You will find all data you need and get possibility to save them into internal memory or print it if printer is connected (see section 2.2.3 and 2.2.5.11). If you choose “Save”, viscometer will ask you to give a name of your measurement. You will have after possibility to read it later (see section 2.2.3.).



2.2.3. VIEW, PRINT, EXPORT OR DELETE RESULT

This menu allow you to read, export or delete data from internal memory. Press on « View results » tab in Main menu.



You will have two choice: See list of data to read them or delete data.

2.2.3.1. READ AND PRINT SAVED DATA

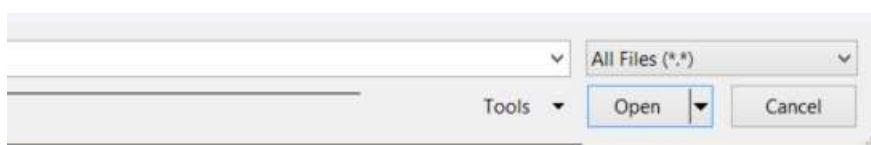
By click on tab “List of measurement data” you could see all saved measurement made with your RM 100 CP2000 PLUS. You could select which one you want to read. According to external device connected to viscometer, you will have possibility to export or print result (see section 2.2.5.11).



2.2.3.2. EXPORT DATA

Then USB flash drive is connected, “Global Export” will give you possibility to transfer all saved measure and “Export” will transfer only shown data.

The format of the data generated and saved by the viscometer is ASCII (*.txt). Once your data has been copied to the USB drive, you can open the files using the EXCEL spreadsheet. To do this, simply copy the data from the USB key to your computer. Then open Excel, choose "File", "Open", taking care to select "All files *.*".

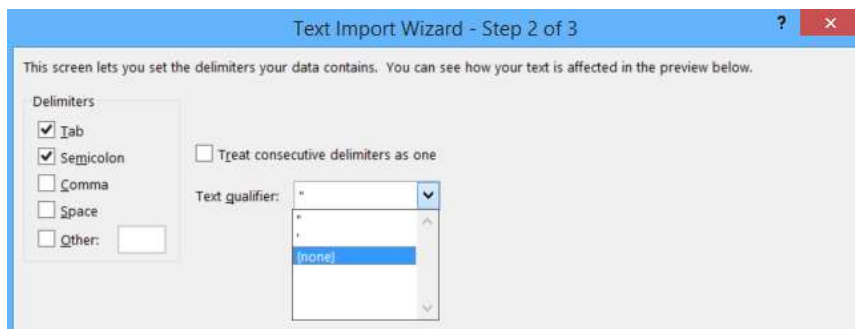


Find your file and click “Open”. Excel will offer you to convert your data by displaying three successive windows.

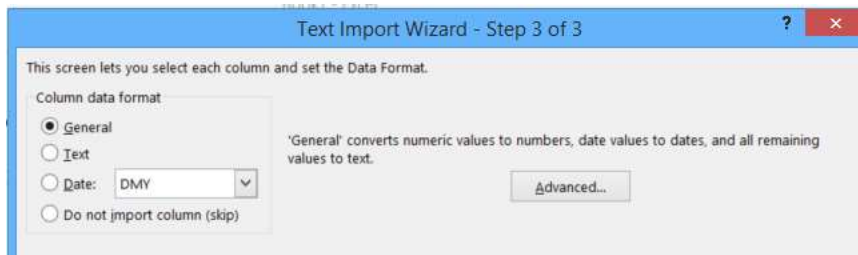
Select “Unicode UTF8” and “My data has Header” (last selection available according Office version) and click “Next”.



On second step, it will be necessary to choose the option “Tab” and “Semicolon” for separation of the columns. For “Text qualifier”, you should set “none”.



On last step, please choose “General” and click “Finish”.



You can then see your measurement results with the possibility to save a new file in Excel format.

2.2.3.3. DELETE SAVED DATA



By click on tab you could delete all saved measure one by one as you want from your RM 100 CP2000 PLUS memory. Then you click on “Delete”, saved data will be completely deleted from internal memory without any new confirmation.

2.2.4. ZERO SETTING

The zero setting allows you to calibrate your RM 100 CP2000 PLUS to take account of the engine's empty friction.




The rotation speed for zero adjustment can be changed to suit your needs, giving you much more accurate measurements at specific speeds close to your measurement parameters.

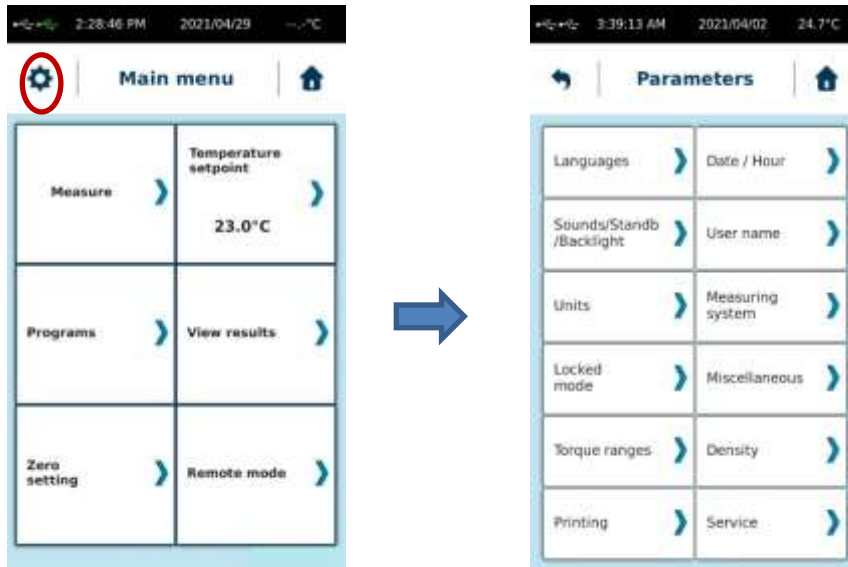


This operation must be done without measuring system. Then zero is finish you can click on OK and internal motor friction will be automatically saved inside memory of viscometer. If problem occur during zero setting, please try again. If problem still present, please contact your local distributor or society LAMY RHEOLOGY.

2.2.5. PARAMETERS

This parameters menu allow you to change settings of your device. It is reachable by clicking on icon “” in upper left corner of touch screen.

This icon is only available then you are in “Main menu”.



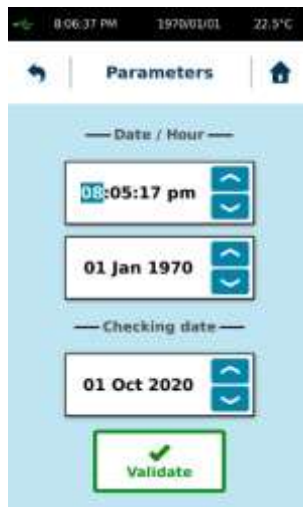
2.2.5.1. LANGUAGES

Enable you to select language of your RM 100 CP2000 PLUS. You have choice between French, English, Russian and Spanish. Then you have selected your desired language, you have to click on “Ok” and device will reboot automatically to show new language. In this menu you will be able to see Firmware version of your device.



2.2.5.2. DATE / HOUR

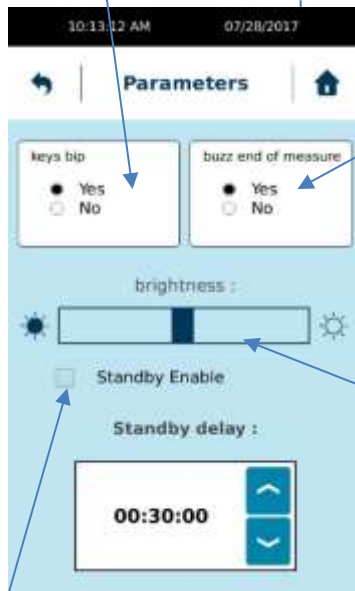
Enable you to adjust hour and date of your RM 100 CP2000 PLUS. On this location, you can also set date for next checking of device. Soon this date will be reached, device will show you message as device need to be checked.



2.2.5.3. SOUNDS/STANDBY/LIGHTING

Allow you to modify sounds, lighting and activate or not the Standby mode of your RM 100 CP2000 PLUS.

Choose if you want to get sound during using touch screen.



Choose if you want to get sound then measurement is finished.

Choose if you want to change brightness of Touch Screen.

Choose if you want to switch off automatically your device after no using. After selecting "Standby enable", you will have to set time. Your device will be switch off after this time.

2.2.5.4. USER NAME

Operator mode will allow you to create different operators for your RM 100. The use of the operators makes it possible to identify the person making the measurement (to save name on saved file and see later who made this measurement) or lock some function on device for simple user.

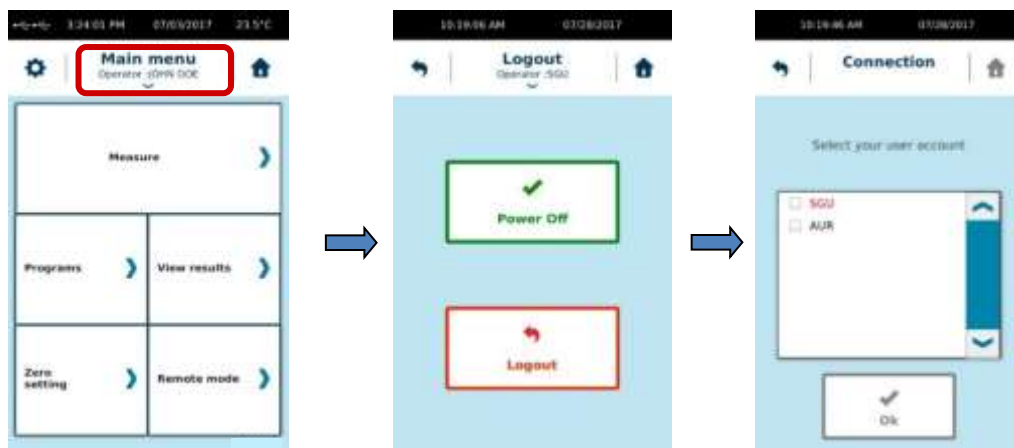
Operator management must always begin with the creation of the first account, which will become the administrator and thus create or delete another operator account. Click on "Create new user with PIN code". After specifying the name and password, the administrator will be named in red in the list.



You can now create another operator. The account of an operator may or may not be associated with a password (here called PIN code).

To delete an account, the administrator account must be used. Select the account you want to delete from the list and click on "Delete user name".

To use the operator accounts you must activate the mode by click "Enable User mode". Device will ask you to select user name you want to use. By returning to the Main Menu, you will see the name of the operator in use. By clicking on the arrow below the name of the operator, you can switch off the RM 100 or change operator. Click on "Logout" and device will ask you operator account you want to use



If the instrument is switched OFF and ON while operator mode is activated, device will ask you to select the operator you want use.

When User mode is enabled, some functions will be not editable for simple user as picture below shows it.



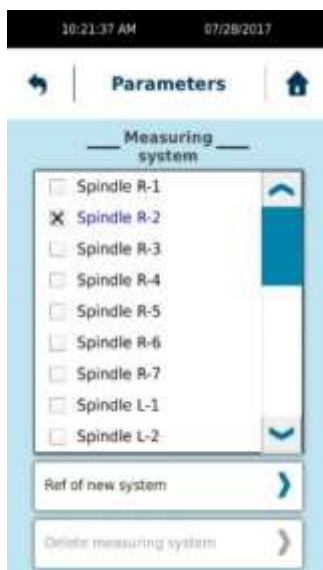
2.2.5.5. UNITS

Enable to you to change unit of viscosity values.



2.2.5.6. MEASURING SYSTEM

Allows you to add or remove a Measurement System.



All measurement systems stored by default in memory are not removable. Only those you have created yourself can be removed. To delete a measuring system, select it from the list and choose "Delete Measuring System". If this function remains greyed out when you have selected a system, it is part of the default mobile stored in the instrument's memory.

To add a new measuring system, you have to use "Ref of new system" function. Device will ask you name and constants for this measuring system.

As RM100 CP2000 PLUS can be used only with cone plate system, don't forget to start name of new measuring system with "CP.....".

You are not allowed to change the constant of an existing measuring system. If you want to use a new constant for an existing measuring system, you have to create a new one. Note that the KD constant is used to convert rotational speed to shear rate and K τ to convert torque to shear stress. Shear rate and shear stress are used to calculate the viscosity value. If you use a different constant value, you will get a different viscosity result.

Here is the list of constants used for measuring systems compatible with the RM 100 CP2000 PLUS.

MS CP

SYSTEM	Kτ / 1 mNm in Pa	Kd / 1 RPM in S-1	Ri / Ra
CP1005	3820	12	1
CP1010	3820	6	1
CP1020	3820	3	1
CP1030	3820	2	1
CP06	1380	3,3	1
CP03	552	13,3	1
CP05	552	3,3	1
CP09	552	2	1
CP2005	477,5	12	1
CP2010	477,5	6	1
CP2015	477,5	3,8	1
CP2020	477,5	3	1
CP02	276	13,3	1
CP2404	276	13,3	1
CP2405	276,3	12	1
CP51Z	276	4	1
CP04	276	3	1
CP2420	276,3	3	1
CP52Z	276	2	1
CP01	139	13,3	1
CP10	139	5	1
CP08	139	2	1
CP3510	89	6	1
CP4005	59,7	12	1
CP4010	59,7	6	1
CP4015	59,7	3,8	1
CP4020	59,7	3	1
CP4040	59,7	1,5	1
CP07	35	2	1
CP40Z	35	7,5	1
CP42Z	35	4	1
CP41Z	35	2	1
CP5005	30,6	12	1
CP5010	30,6	6	1
CP5020	30,6	3	1
CP6005	17,7	12	1
CP6010	17,7	6	1
CP6020	17,7	3	1
CP6030	18	2	1
CP6050	18	1,2	1
PP 25 (0.5 mm)	326	2.618	1
PP 25 (1mm)	326	1.309	1
PP 25 (2mm)	326	0.654	1
PP 40 (0.5mm)	79.5	4.188	1
PP 40 (1mm)	79.5	2.094	1
PP 40 (2mm)	79.5	1.047	1

2.2.5.7. LOCKED MODE

This option allow you to block measuring parameters. It should be set by an administrator or responsible of the device.

This function is not comparable to the "User name" menu (please see section 2.2.5.4). It should be use if you want to protect measurement settings on your device. All settings will be not lock by this function. You will see below which settings are concerned.

This function will block also parameters for measure. In this way, if you want to use all the time same parameters for measurement, you should enable this locked mode to be sure that nobody will change settings for measurement.



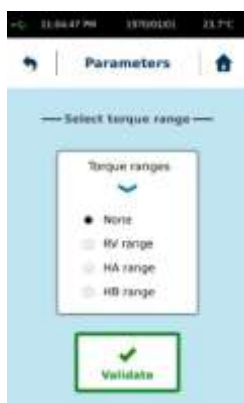
When you click "Enable", the RM 100 will ask you to save a 4-digit code that will be required to disable this protected mode. Each activation is independent and can be done with a different code. The protected mode is indicated by the presence of a padlock-like icon. **BUT TO DISABLE THIS LOCKED MODE, YOU SHOULD USE 4-digit CODE USED TO ENABLE IT.**

Once protected mode is activated, you will see this icone on RM 100 Screen (see picture below). Protected mode protect programs, measuring parameters and some menu as shown on pictures below.



2.2.5.8. TORQUE RANGE

Enable you to adjust the torque range of device according to spring viscometer technology. This setting will have effect on torque in % shown while measurement and viscosity limits.

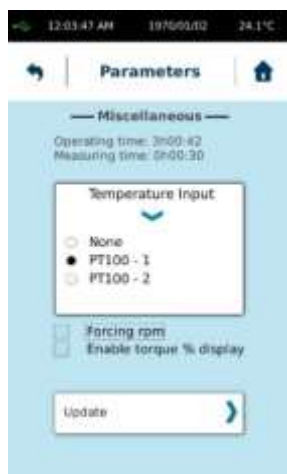


Please see below torque covered by specific range:

- RV Range : From 0.07187 to 0.7187 mNm.
- HA Range : From 0.1437 to 1.4374 mNm.
- HB Range : From 0.5749 to 5.7496 mNm;
- None means no limits. So it will be complete range (from 0.05 to 30 mNm).

2.2.5.9. MISCELLANEOUS

This menu allows you to select the temperature sensor used by the viscometer. The RM 100 allows the use of an external probe (Pt100-2) which must be connected to the back of the viscometer (see section 1.3). This setting is not available by default on RM 100 CP2000 PLUS if this device is delivered without external temperature probe. If you buy it later and want to activate this function, please contact your local agent or LAMY RHEOLOGY.



“Update” function is used when updating the machine software is necessary. Do not go in this menu without being invited by the company LAMY RHEOLOGY. The update is done via a USB key connected to the "USB" port. You can then click on "Update" to update your instrument. At the end, your device will turn off and you will have to turn it on again.

“Operating time” and “Measuring time” settings indicate time while device has been switched ON and time while it was used for measurement.

“Forcing rpm” allow you to force device setting only speed in rpm instead shear rate (s-1) when you are using measuring system compliant with DIN 53019 norm (as MS DIN, MS ULV, MS SV).

“Enable torque % display” allow device to show torque in % above torque gage while measurement.

2.2.5.10. DENSITY

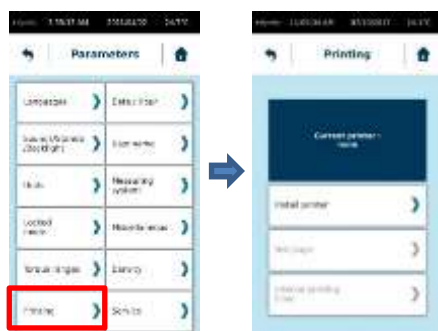
Enable you to enter density value of your product to measure in order to calculate his kinematic viscosity.



If you set a density value, you will get all the time viscosity in cStoke. Please remove density information if you want to get back Pa.s or Poise for unit of viscosity.

2.2.5.11. PRINTING

Allows you to connect a printer, print a test page, and choose the print interval time you want during measurement. The RM 100 can be connected to all printers with a PCL5 print protocol. This includes many A4 printers. The connection is made to the "USB host" port on the back of the instrument.



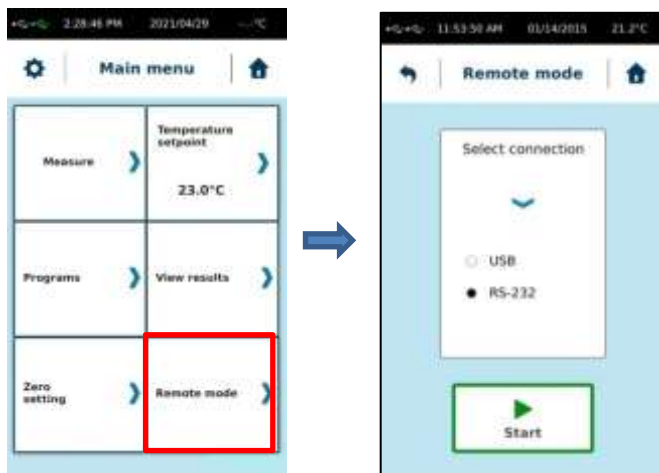
Once the printer is connected, simply click on "Install Printer". You can also print page for test or set time interval for automatic printing. Then you print data at the end of measure or a saved file, you will have only information shown on device screen as final result. If you want to have more data printed, you have to select "Interval printing" time to get data printed between start and end of your measurement.

2.2.5.12. SERVICE

Reserved to LAMY RHEOLOGY engineers.

2.2.6. REMOTE CONTROL

This mode enables to drive RM 100 CP2000 PLUS by external RheoTex software, supplied on option. This function is available on the main menu.



Once the device is connected to the PC, you must select the type of port (USB or RS232) and click on "Ok" to start the communication. As long as communication is not established, a "Waiting Connection ..." message appears on the screen. Then launch the software and check that the screen switches to the display below. If this is not the case, check the connections and make sure that the COM port number set in the default settings of the RheoTex software is correct and identical to that recognized by WINDOWS in "Control Panel", then "System and "Device Management" (see the operating instructions for the RheoTex software).

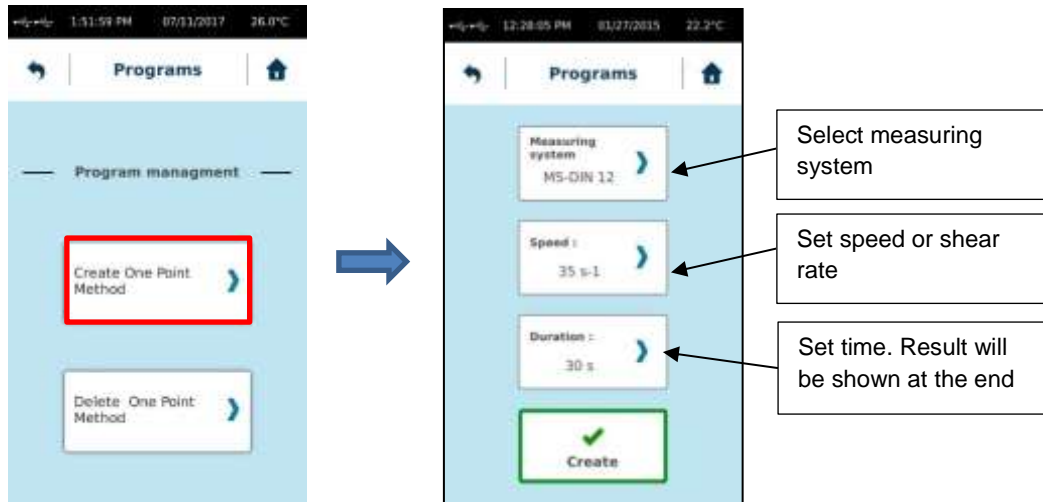
2.2.7. PROGRAMS

With **Programs** tab, you could define parameters for your standard measuring program and also delete it. We have one kind of program: “One point method”.



In One point method, you will have one viscosity value at one speed or one Shear rate. When your Program is created, you will find it in **AUTO** list of **Measure** tab.

Click on “Create One Point Method” to start programming



Depending on the mobile selected, the instrument will suggest that you set the shear gradient (s-1) instead of the speed (rpm) as is the case for MS CP measurement systems. To force the display in rotation speed see section 2.2.5.9. When you click on "Create", a new screen prompts you to name your program. Then you click on create, you will get this screen where name of program need to be given.

To delete “One Point Method”, please use button “Delete One point Method).

2.2.8. TEMPERATURE SETPOINT

This function is available in the main menu.



As described in paragraph 2.2.2, this function is only available if your device is delivered with a temperature control that can be controlled by the RM. By default this function is inactive. If you subsequently acquire such a heating unit, you should contact LAMY RHEOLOGY or your local agent.

This mode does not allow temperature ramps to be carried out via the instrument. For this type of method, the use of RheoTex software is required.

3. MEASURING WITH YOUR DEVICE

This section will show how use the different measuring system with your device.

Viscometer need to be installed before next section of this manual (see section 1.5).

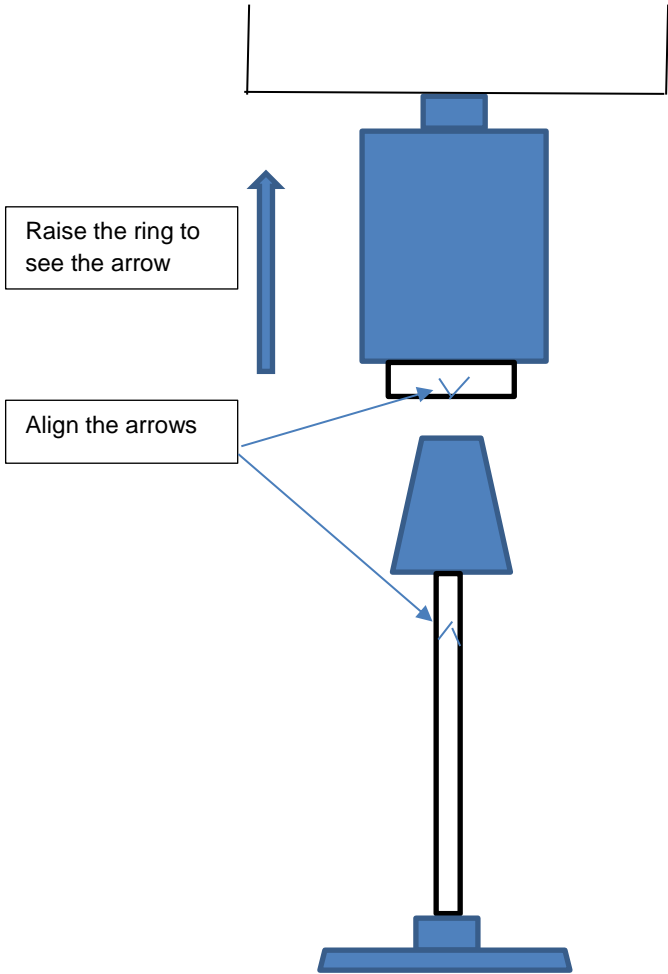
3.1. INSTALLATION OF MEASURING SYSTEM

Read the installation of your measuring system in the following sections before inserting it on your viscometer. Indeed some measuring systems require the installation of accessory before the insertion of the spindle. Don't forget also to make a zero of measuring head before installing of measuring system (see section 2.2.4).

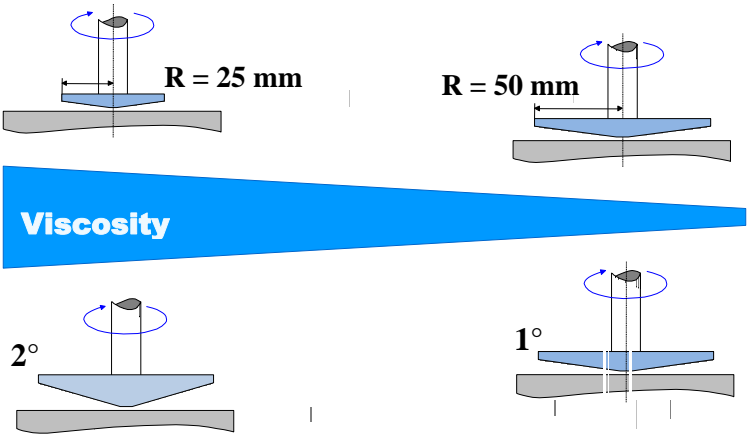
Unlike the RM100 PLUS, the CP2000 version can only be used with cone-plane or plane-to-plane geometries. The coupling of the RM 100 CP2000 PLUS is of type AC 265. It is a system allowing the insertion and the quick fixing of the measuring mobiles. A simple vertical action of the ring upwards (release) or downwards (locking) allows easy manipulation of the measuring tool.



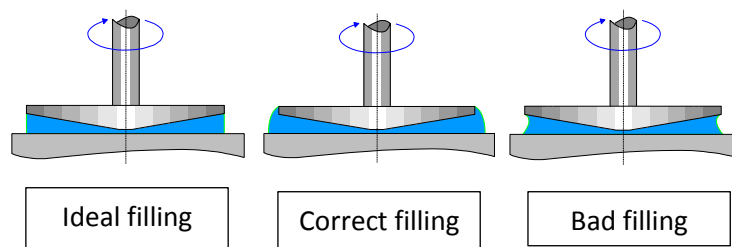
For a good rotation please respect the alignment of arrow on measuring cone and arrow on the coupling.



Choice of measuring system must be done according to the product to be measured. Favor wide diameters for low viscosities as shown on diagram below.



The amount of sample should be sufficient to completely fill the space between the cone and the bottom. In the case of a liquid sample, you can take the recommended volume for the dimensions of your cone-plane (see table below). For thicker samples, you need to draw enough with a spatula or similar tool.



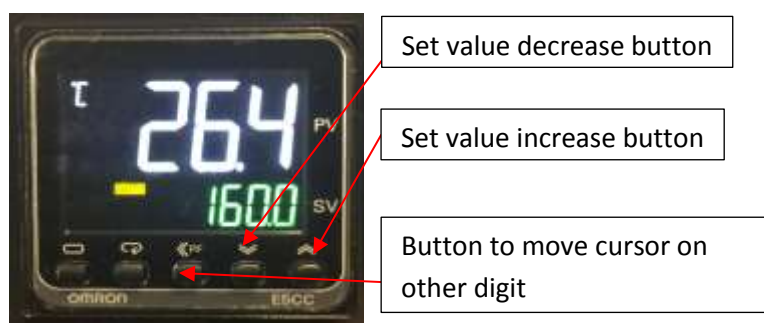
Sample volume for Plate measuring system depends on gap used. But filling need to be perfect as for cone.

Diameter (mm)	Angle (°)	Sample volume (ml)
10	0.5	0.0023
20	0.5	0.018
20	0.5	0.018
20	1.59	0.058
20	2	0.073
24	0.5	0.031
24	2	0.126
40	0.5	0.146
40	1.59	0.465
40	2	0.585
40	4	1.17
50	0.5	0.285
50	2	1.142
60	0.5	0.5
60	1	1
60	2	2
60	3	3

3.2. TEMPERATURE SETTING

The value read on this display is the set temperature. The value read on the screen of the RM 100 CP2000 PLUS is the actual value of temperature.

To change the set point, press the arrows to adjust the desired temperature, the new set point will be taken into account after a few seconds without validation. If your device is with Programmer function, you can also set temperature through measuring head (See section 2.2.8).



3.3. GAP SETTING

Your RM 100 CP2000 PLUS is equipped with a manual adjustment of the gap. This setting is very important for the measurement position to be as ideal as possible. This adjustment must be made with the mobile but without sample. And it is necessary to do this at the measuring temperature. Lower plate need to be cleaned with solvent (acetone or ethanol) before following information.

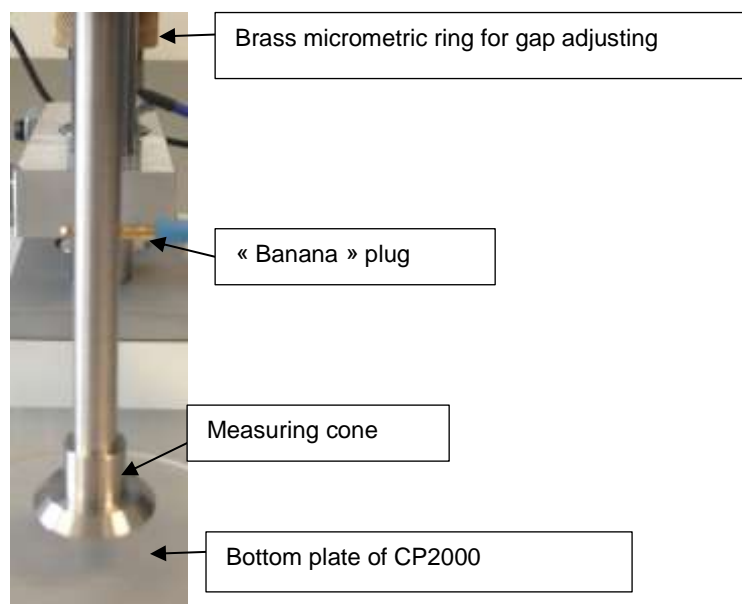
Some cone used with RM100 CP2000 PLUS are truncated. It means that tip of cone is cut at 50 μm . Measuring systems truncated get part number with three first number « 365... ». For these cones, you should use 50 μm metallique spacer that will be place between cone and bottom plate.

The first step is to heat up your measuring plate (see paragraph 3.2). Also, especially if the test temperature is different from that of the room, place the measuring geometry on the bottom plate to also bring it to temperature.

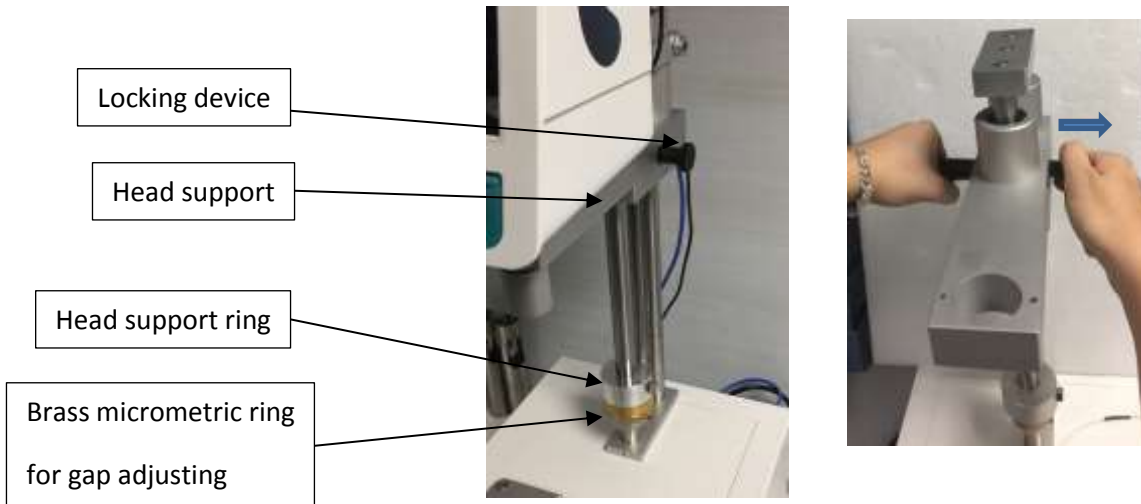


When the temperature has stabilized, you must leave your geometry in this position for a minimum of 5 minutes.

You must then attach the mobile to the viscometer (see paragraph 3.1). Insert the "banana" plug located at the end of the white wire into the hole located on the axis of the measuring cone. This makes it possible to establish an electrical contact between the measuring cone and the lower plane.



Lower the arm of the RM 100 CP2000 PLUS by pulling on the locking device and holding the head with the handle.



Go to its low position in such a way that the arm rests on the grey ring. If a beep sounds and the head cannot be lowered completely because the geometry already touches the plate of the RM 100 CP2000 PLUS before the arm is in contact with the grey ring, it is important not force and raise the head completely up to the upper stop. Before descending the head, turn the brass ring a few turns anticlockwise to raise it. Move the head down again until it stops on the grey support ring, making sure that the geometry does not touch the plate of the RM 100 CP2000 PLUS. Repeat the operation on the brass ring if it is not.

Gently turn the bronze ring clockwise to gently lower the arm of the RM 100 CP2000 PLUS until the "beep" is heard; this means that the measuring cone is in contact with the lower plane. Then remove banana plug from axis and keep it in your hand and start a measurement without sample (for example put time at 0 and shear rate at 250 s⁻¹ to get continuous rotation). During rotation, touch axis with banana and ear if a continuous "bip" is present. If this is not the case, use brass ring to get a constant "bip". Then you get it, stop the test. Raise your measurement head, release banana plug place your sample and then go to measure. The gap is then adjusted for the cone used. Do not touch the brass ring again and raise the RM100 PLUS head. See section 2.2.2 for your measure.



4. VERIFICATION OF YOUR DEVICE

Your device has been calibrated and checked before delivery according to an internal procedure using a cylindrical MS DIN 11 mobile, an oil viscosity 1000 mPa.s and a temperature control system (EVA DIN) at 23 ° C.

We inform you that the cone-plane geometries are never used internally for our checks and calibrations. Indeed, this type of geometry can lead to measurement errors due, for example, to the problems of gap filling, slippage, product ejection or wrong gap distance.

You can nevertheless check your RM 100 CP2000 PLUS using your own geometry and a Newtonian standard oil of known and certified viscosity (preferably close to 1000 mPa.s). The tolerance on the accuracy of the viscosity measurement is at best 10% of the expected value with a cone-plane at a temperature whose viscosity value is known.

Here is the procedure to follow for your verification:

- 1) Perform a motor zero (see section 2.2.4).
 - 2) Warm up your geometry and the lower plane according to the procedure described in paragraphs 3.2 and 3.3.
 - 3) Install your measuring system (see section 3.1).
 - 4) Set Gap as described in section 3.3.
 - 5) Put standard oil on lower plate and lowering measuring cone in measuring position (see section 3.1 to check good filling of gap).
- 3) Select a measurement method in manual mode by choosing a measuring time of 120s minimum and a shear of 100 s⁻¹ (see section 2.2.2).

The measured value must be within the tolerance of 10%. If the value is out of tolerance, check that all previous steps have been completed. If the problem persists, please contact LAMY RHEOLOGY.



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