

Automatic Cupping Tester SP4500

V1.0-1219



WARRANTY

TQC Sheen will grant a warranty for a period of 12 months for the Automatic Cupping Tester and 12 months for all related equipment from the date of delivery in respect of any evidence of faulty workmanship and materials.

Should a delivered consignment prove to be contrary to contract upon inspection, the customer shall grant TQC Sheen the opportunity hereunder of removing the fault, or else the customer may demand replacement.

Because of size and weight of the instrument TQC Sheen will strive to give remote support.

Should the supply or delivery of any improvement or replacement not prove possible, the customer may choose between having the purchase price reduced or in demanding the contract of sale to be rescinded (conversion).

Damage resulting from natural wear and tear, mechanical or chemical damage, an act of God or non compliance with the operating instructions shall be excluded from the warranty as well as mechanical interference by the customer or by third parties with Automatic Cupping Tester and related equipment without TQC Sheen's written permission. No liability will be accepted for defects, damage or injury caused due to use not carried out in accordance with the manufacturer's user instructions.

To claim warranty, the rejected product has to be sent to TQC Sheen together with the original invoice, any exchange before the product has been returned to TQC Sheen is not possible. TQC Sheen reserve the right to repair, exchange or supply an equivalent substitute. TQC Sheen is not liable for handling or transport costs. Warranty on the purchase price is limited, all liability for consequential damages or changes in technology is expelled.

This product complies to

- Machinery Directive 2006/42 / EC
- Low Voltage Directive 2006/95 / EC
- EMC Directive 2004/108 / EC



This product is RoHS 2 compliant (2011/65/EU)

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1 GENERAL

1.1 Importance of operating manual

This manual is written in order to become familiar with all the functions and possible applications of the instrument. It contains important instructions about how to use the instrument safely and economically; according to the purpose designated. Following these instructions is not only essential to avoid risks. It also reduces repair costs and down-time and increases the products reliability and service-life.

Anyone who works with the instrument should follow the instructions in this manual, particularly the safety related instructions. Additionally local rules and regulations relating to environmental safety and accident prevention should be observed.

1.2 User-responsibility

The user should

- Only allow persons to work with the instrument who are familiar with the general instructions on how to work safely and to prevent accidents. The use of the instrument should have been instructed duly. The safety chapter and the warnings in this manual should have been read and understood; acknowledged as evidenced by their signature.
- regularly check the safety-awareness of personnel at work.

1.3 Responsibility of personnel

Before commencing work anyone appointed to work with the instrument should pay attention to the general regulations relating to working safety and accident prevention. The safety chapter and the warnings in this manual should have been read and understood; acknowledged as evidenced by their signature.

1.4 Dangers

This instrument has been designed and constructed in accordance with state-of-the-art technology and the acknowledged safety regulations. Nevertheless, working with the instrument may cause danger to the life and health of the operator or to others, or damage to the instrument or other property. Therefore the instrument should only be used for its designated purpose, and in a perfect technical condition. Any defect that could have a negative effect on safety should be repaired immediately.

1.5 Designated purpose

The TQC Sheen Automatic Cupping Tester is exclusively designed to perform cupping tests on painted and coated test panels as described within the specifications.

Other applications constitute improper use. TQC Sheen will not be held liable for damage resulting from improper use.

Designated purpose also includes properly observing all instructions in the operation manual, and adherence to inspection and maintenance schedules.

1.6 Copyright

The copyright of this operating manual remains with TQC Sheen.

This operating manual is intended solely for the user and his personnel. Its instructions and guidelines may not be duplicated, circulated or otherwise passed on to others, neither fully, nor partly. Infringement of these restrictions may lead to legal action may be taken if this restrictions are infringed upon.




1.7 Manufacturer's/Supplier's address

TQC Sheen
Molenbaan 19,
2908LL Capelle aan den IJssel
The Netherlands,
T +31 (0)10 7900 100
F +31 (0)10 7900 111

2 SAFETY INSTRUCTIONS

2.1 Meaning of Symbols

The following symbols for dangers are used in this instruction manual.

Symbol	Explanation	Warning
 Danger	Possible immediate danger to the life or health of personnel	If this guideline is not noted it can lead to severe danger to health,
 Warning	A dangerous situation could be caused	Non observance of this guideline can lead to injury or to damage to equipment.
	Special tips and particular information	Guidelines to make optimal use of the instrument.

2.2 Availability of Safety Information

The instruction manual should be kept at the place where the instrument operates.

In addition to the information contained in the instruction manual, general and local regulations for accident prevention and environmental protection shall be kept available and observed.

Always ensure all guidelines in respect of safety and dangers on the instrument are in readable condition.

In case of danger the instrument has to be switched off by means of the emergency-button on the front of the instrument. Then eliminate danger.

2.3 Training of Personnel

- Anyone who operates the instrument should be trained properly.
- It has to be clear who has which responsibility regarding commissioning, set-up of maintenance and repairs, installation, and operation.
- Anyone who hasn't finished training should be supervised by an experienced person while working with the instrument.

2.4 Dangers from Electrical Energy

- Work on the electrical supply may only be done by a qualified electrician.
- The electrical equipment of the instrument must be checked regularly. Loose connections and cable damaged by heat must be corrected immediately.
- Always make sure the instrument's power is turned off while adjusting any electrical component.

2.5 Points of Special Danger

There are some points of special danger:

- Always have the adjustable test cylinder head locked in place prior to and during testing Keep your hands away from the working area after the instrument has started!
- Never put your fingers / hand in the sample holder



2.6 Care, Maintenance, Repairs

- Always make sure the instrument is connected to an earthed socket.
- Maintenance and inspection should be carried out at the correct intervals
- Operating personnel should be informed before starting with maintenance or repair work
- Always make sure the instrument's power is turned off and the instrument is not connected to a socket while adjusting any electrical component whenever maintenance, inspection or repair work is done.
- Do not open the instrument. In case of malfunction always consult the manufacturer.

2.7 Modifications to the Equipment

- Any modifications or additions or alterations to the instrument may solely be made with permission from the manufacturer.
- All measures involving modifications require written confirmation of approval from TQC Sheen
- Instruments which are not in fault-free condition must immediately be switched off
- Only use replacement parts from the original supplier. Parts used from other sources aren't guaranteed to take the loading and meet the safety requirements.

2.8 Cleaning of the Instrument and Disposal of Materials

- When in use it is not always possible to avoid some spill of paint on the work surface.
- Try to keep the instrument as clean as possible to prevent distortions of functions.
- To clean the instrument properly use a suitable solvent to dispose remains of paint or ink.
- Wear gloves during cleaning; Don't spill an overdose of solvent during cleaning.
- Cleaning materials must always be used and disposed of correctly.

3 TRANSPORT AND STORAGE

3.1 Packing

Please take note of pictorial symbols on the packing.

3.2 User: Check on Receipt

Check packing for damage
After unpacking check complete supply.

3.3 Reporting Transport Damage and Documentation

Any damage should be documented as accurately as possible (possibly photographed) and reported to the relevant insurers or, in the case of sales "delivered to customers works", to the supplier.

3.4 Storage and Protective Measures when not in use

The instrument must be stored in a dry place at a temperature between 10 - 40°C.

The storage period should not be longer than 3 months.
Store instrument in the original packing if possible.

4 INSTRUMENT DATA

4.1 Name / Article

TQC Sheen Automatic Cupping Test – Microprocessor Controlled Automatic Cupping Test

4.2 Scope of Supply

- TQC Sheen Automatic Cupping Test
- Power cord
- Calibration plate
- Loupe & Microscope fixture rod
- Reference panel
- Manual
- Calibration Certificate

4.3 Technical Data

Indenter Speed:	0.01 - 0.70 mm/s
Stroke length:	0 - 12 mm
Max panel width:	105 mm
Max. panel thickness steel:	0.8 mm
Max. speed steel panel:	0.6 mm/s
Max. panel thickness aluminium:	1.2 mm
Max. speed aluminium panel:	0.7 mm/s

4.4 Dimensions and Weight

Depth:	390 mm
Width:	355 mm
Height:	450 mm
Net weight:	approx. 29 kg

4.5 Basic Unit

Power Supply:	100 – 240 VAC, 50 - 60 Hz
Power consumption:	max. 80 Watt
Display:	Full Color 480 x 272 pixel TFT display
Safety:	Emergency button, integrated acoustic alarm
Function:	5-key navigation switch with Triple I Control

4.6 Accuracy

Indenter Speed accuracy:	+/- 1% of set speed
Stroke length accuracy:	+/- 0.01 mm or 0.2% ever is greater

4.7 Noise Level

The continuous noise level from the instrument does not exceed 70 dB.

4.8 Optional accessoires

SP4331	Calibration plate (105mm)
LD6182	USB microscope
SP4375	Foil clamp

5 INSTALLATION AND ASSEMBLY

5.1 Installation and Operation

The instrument has to be installed in a suitable place, preferably on a sturdy table or work area, with normal ambient temperature. Special fixings are not required.

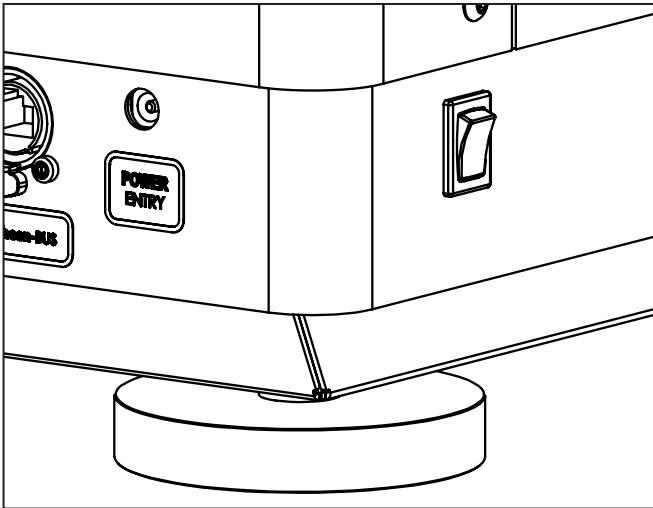
Carefully unpack the apparatus and the accessories and check complete supply.

Place, if necessary, a spirit level on the work surface and adjust the height of the feet.

5.2 Preparation of Energy Connections

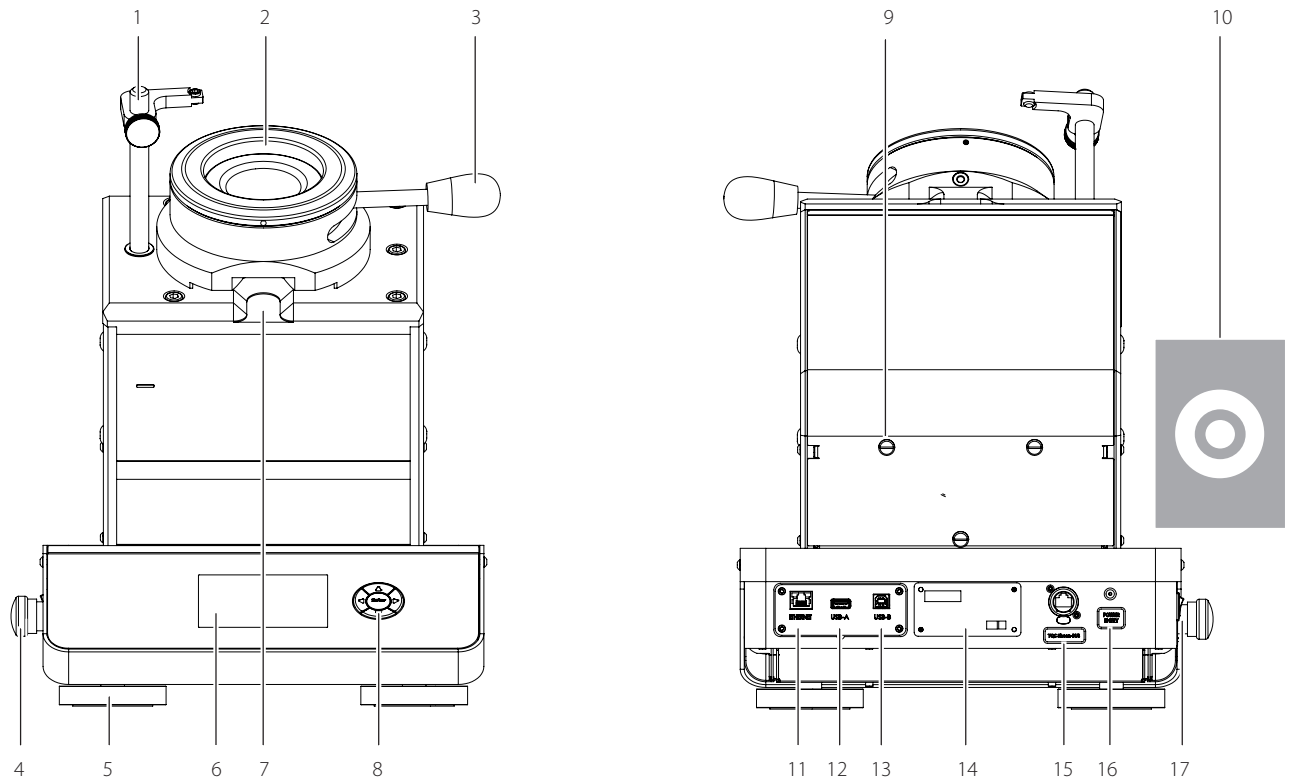
The instrument is equipped with a safety tested mains supply cable and may only be connected to plug sockets with earth connection complying with the safety regulations.

The mains connection is located at the rear of the instrument. Plug in the female plug in the socket on the rear of the housing. The ON/OFF Switch is located at the right hand site near the end of the instrument.

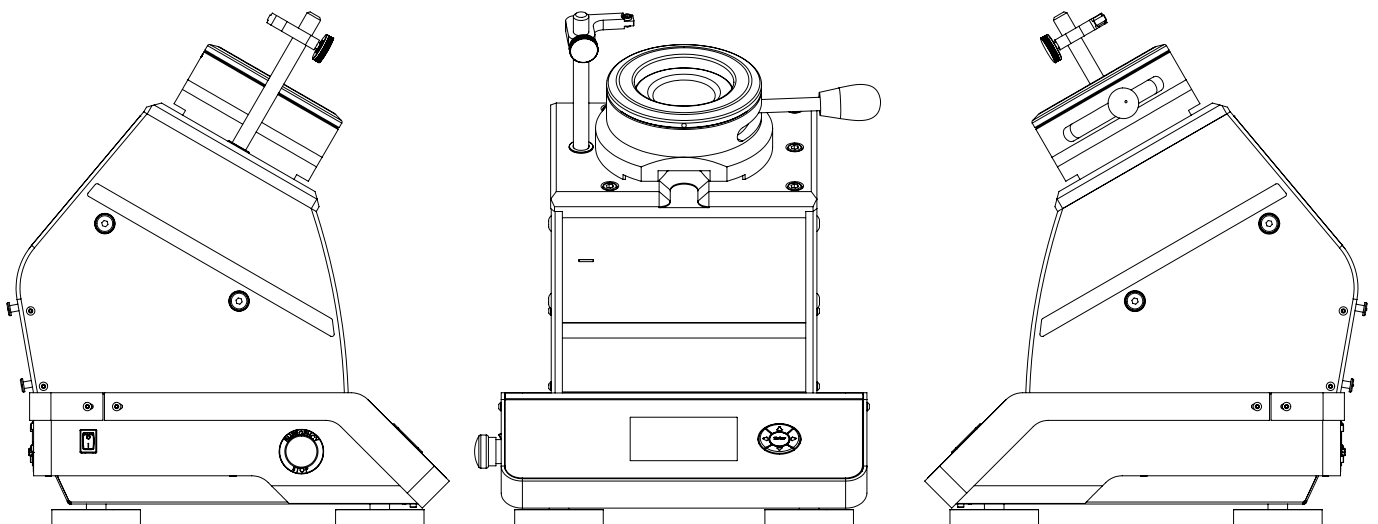


The power switch is a digital "toggle" switch, which always stays in the same position.

6 INSTRUMENT CONTROLS AND FUNCTIONS



- | | | | |
|---|----------------------------------|----|--------------------------|
| 1 | Microscope support rod | 9 | Calibration plate holder |
| 2 | Panel clamp with LED ring | 10 | Calibration plate |
| 3 | Brake and lock for sample holder | 11 | Ethernet |
| 4 | Emergency button | 12 | USB-A |
| 5 | Levelling supports | 13 | USB-B |
| 6 | Display with process information | 14 | Machine ID-tag |
| 7 | Panel slot | 15 | TQC Sheen bus |
| 8 | 5-key navigation switch | 16 | Power entry |
| | | 17 | ON/OFF Switch |



7 INSTRUMENT PREPARATIONS

When using an optional Loupe or USB microscope please insert the supplied optical tool fixture rod in the designated hole according to the instruction manual.

7.1 Test Panels

We supply a range of test panels

In aluminum or steel in different sizes.
All with a protective PE film.

For more details go to <https://www.tqcshen.com/en/product/knock-out-testpanels/>

7.2 Calibration plate

The TQC Sheen Automatic Cupping Test is supplied with the SP4331 Cupping Test reference board. This specially designed calibration tool is stowed on the rear of the TQC Sheen Automatic Cupping Test. This precision engineered reference board allows the user to calibrate the TQC Sheen Automatic Cupping Test at custom set intervals.

7.3 Optical tool fixture rod

Insert the Optical tool (LD6182 USB microscope) fixture rod with side with the length groove first into the designated hole in the cupping test. After insertion turn the tool either direction until it clicks into place. The Optical tool fixture rod is necessary in case you want to use an optional loupe or USB Microscope (see Annex A).

7.4 Panel clamp

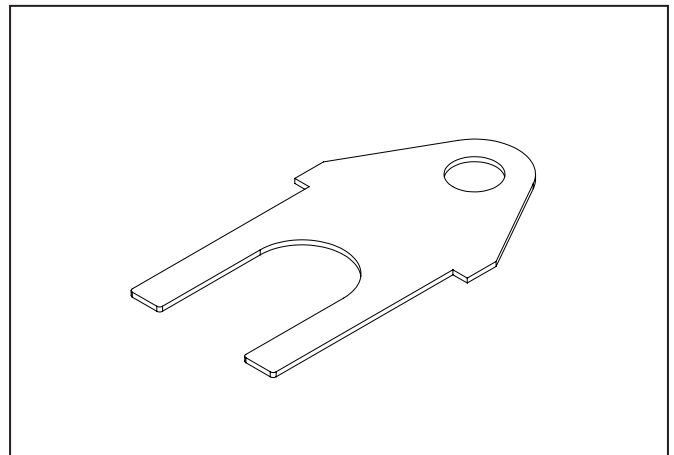
The sample panels are clamped by means of the red handle. This handle is moved backwards to release the panel and to the front to fix the panel.

For use with thin substrates (foils) like metal sheet brass and copper, an optional foil clamp (SP4375) can be ordered.

Thin substrates tend to curl on the sides and then cannot be removed properly from the clamping mechanism of the cupping test.

Sliding the foil clamp on top of the sample after the sample has been locked into the cupping test standard clamping mechanism will prevent the sample material to curl.

After test the foil clamp is removed and the standard clamp is released where after the sample can be removed properly.

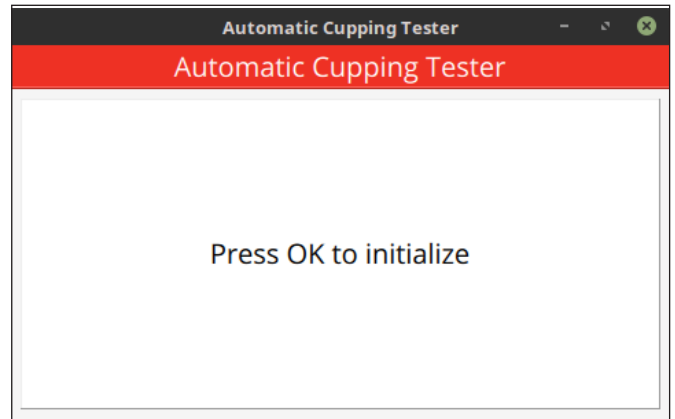


Art. Nr. SP4375

8 MENU DISPLAY INFORMATION AND OPERATION

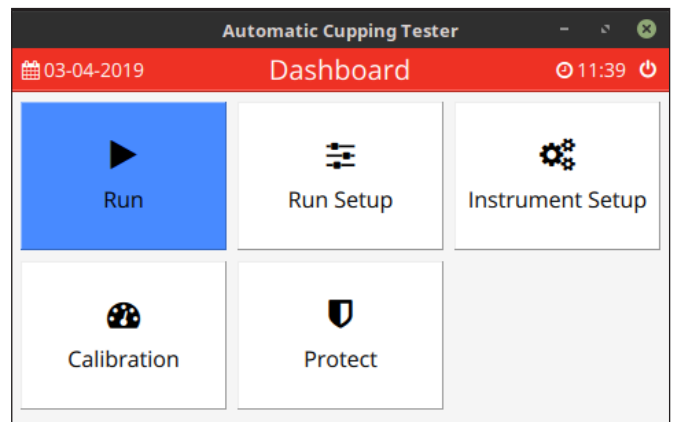
8.1 Start screens after switch on

Switch on instrument by mains switch at the left side on the housing. The logo is the first screen shown after switching on the instrument. After a few seconds the screen appears to press OK to initialize.



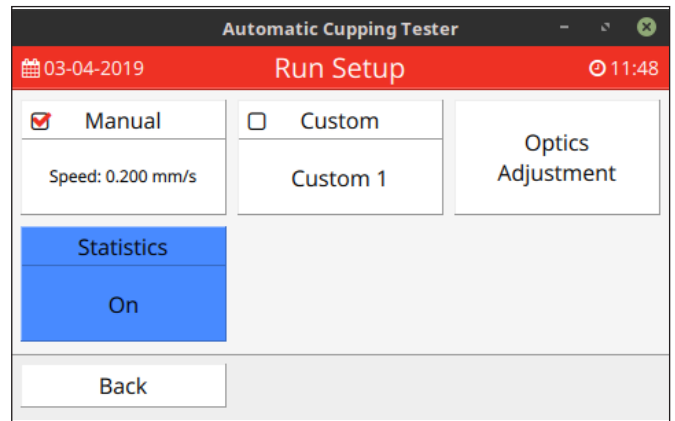
8.2 Dashboard

The TQC Sheen Automatic Cupping Test has an advanced menu structure. The Dashboard allows the user to access all the features available.



8.3 Run Setup

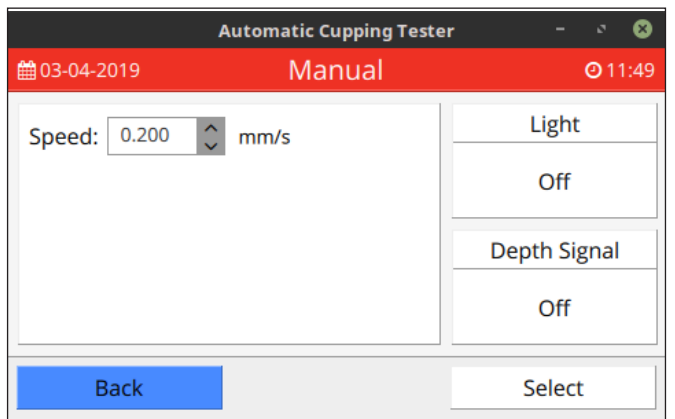
The TQC Sheen Automatic Cupping Test is able to operate in two modes. Manual and Custom mode. It is also possible to use statistics and adjust the optics.



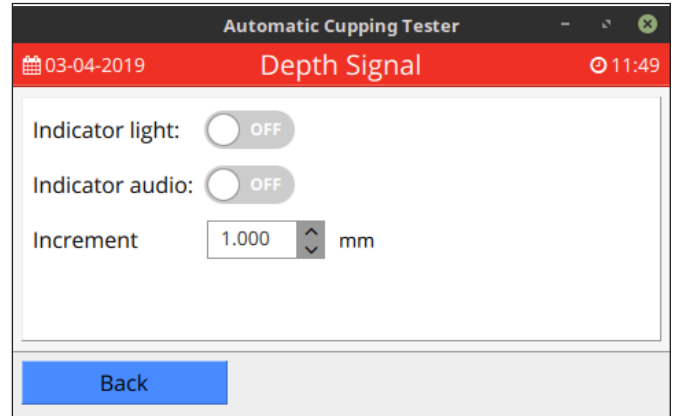
8.3.1 Run Setup – Manual mode

Manual Test can be performed to determine when cracks start to appear and allow the user to start and stop the movement at the indenter at his or her discrepancy.

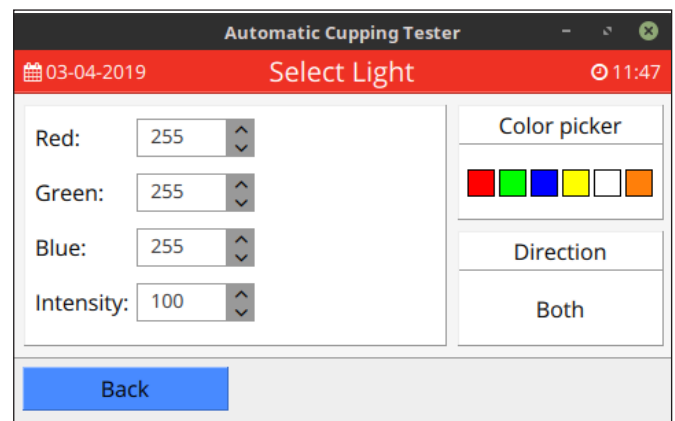
The speed has to be entered. The TQC Sheen Automatic Cupping Test is able to operate at speeds from 0.01 mm/s up to 0.70mm/s. The speed can be set in 0.01 mm/s increments. The nominal speed according to the ISO 1520 is 0.20 mm/s.



When operating in manual mode the user only wants to look at the test panel and should not have to look at the display in order to know how far the indentation is. This problem is solved by setting up the Depth signal menu. The TQC Sheen Automatic Cupping Test can give visual and audible warnings at set depth intervals. The increments of the warnings can be set with the increment option. Audible alarm will be a short beep and the visual change in light intensity.



One of the most innovative features of the TQC Sheen Automatic Cupping Test is its ability to produce any colour of light to illuminate the test surface. Not only enhancing the visibility but also significantly reducing operator strain. Either one of the six present colours can be selected. The intensity setting makes it possible to set the strength of the light. It is also possible to set the direction of the light. Cracks can best be seen when a colour complementary to the test panel is used to illuminate the panel.

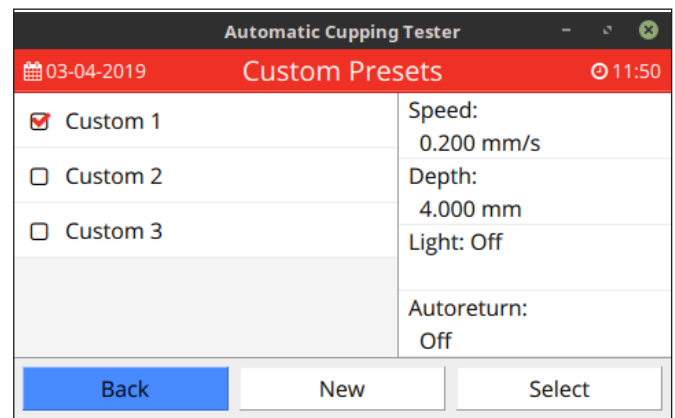


8.3.2 Run Setup – Custom mode

When the Custom mode is selected the indenter will stop at a set depth.

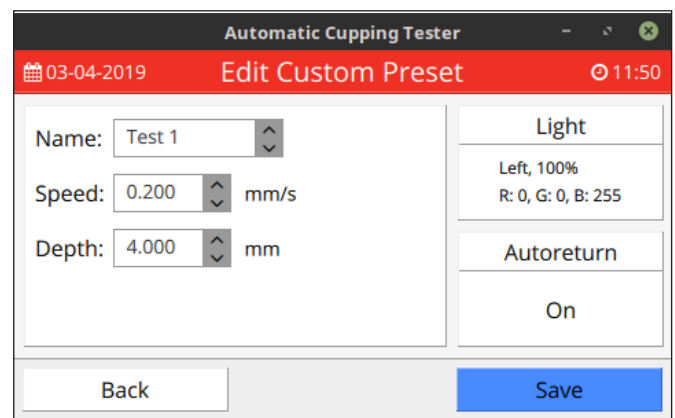
The Speed has to be entered. The Automatic Cupping Test is able to operate at speeds from 0.01 mm/s up to 0.70 mm/s. The speed can be set in 0.01 mm/s increments. The nominal speed according to the ISO 1520 is 0.20 mm/s.

One of the most innovative features of the TQC Sheen Automatic Cupping Test is its ability to produce any colour of light to illuminate the test surface. Thus not only enhancing the visibility but also significantly reducing operator strain. Either one of the six present colours can be selected. The intensity setting makes it possible to set the strength of the light. It is also possible to set the direction of the light. Cracks can best be seen when the complementary colour to the test panel is used to illuminate the panel.



When Custom mode is selected it is possible to use Autoreturn if the indenter should automatically return to its base position after the set depth is reached. When used on substrates that are elastic or tend to want to recover to their initial shape the Autoreturn option is best turned off.

It is also possible to change the Names from Custom 1, 2, 3 to any other desired name.

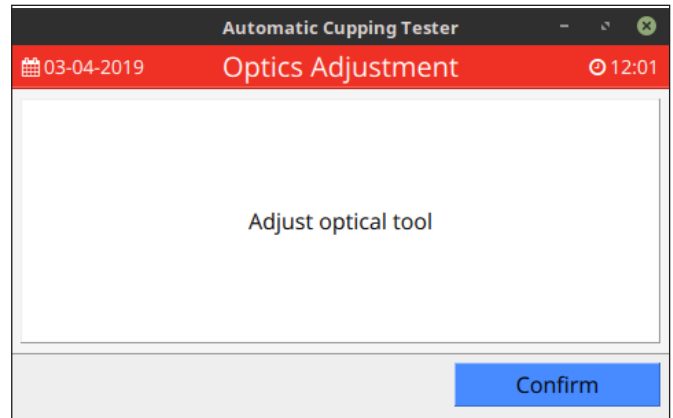
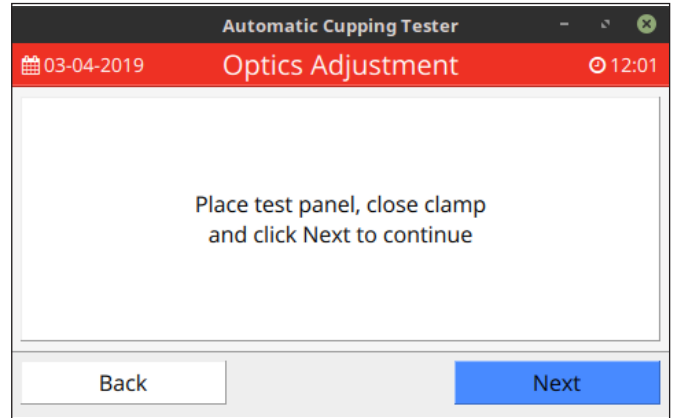


8.3.3 Run Setup – Optics Adjustment

The unique design of the TQC Sheen Automatic Cupping Test allows the user to use optical available loupe or USB microscope. The latter has a limited depth of focus and needs to be adjusted to zero level. In its base position the indenter is about 0.5mm below the test panel. An USB microscope can only be adjusted when the indenter is against the test panel. In order to bring the indenter to its zero position the optical adjustment menu can be used.

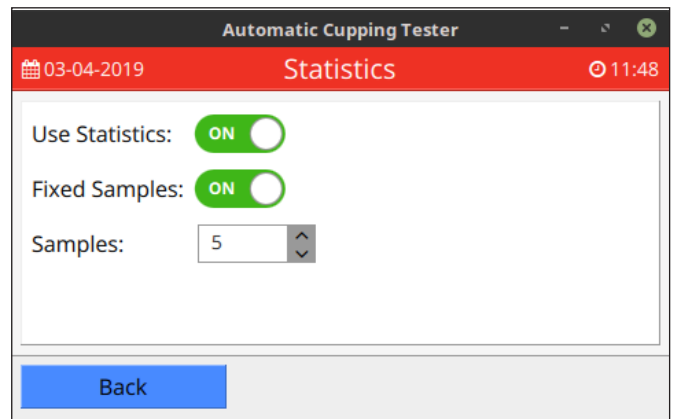
When the TQC Sheen Automatic Cupping Test informs you to adjust the optical tool you are able to adjust the camera. Always adjust the camera on the panel you are planning to do your test on. The thickness of a panel and coating will influence your focus. Select back for the indenter to move back to their base position.

In the base position both the indenter and the camera focus are 0.5mm below the panel. The camera support is not fixed to one position. It moves along with the indenter to keep your camera focused on the top of the indentation, allowing you to always have a perfect picture.

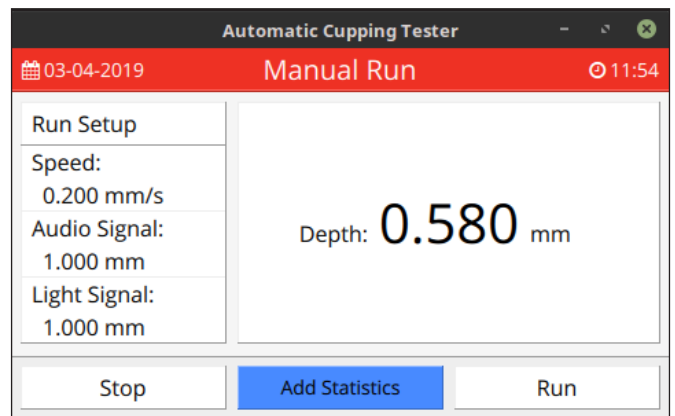


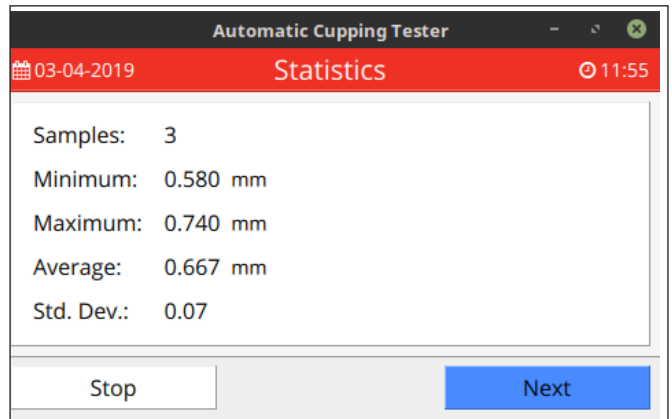
8.3.4 Run Setup – Statistics

You can choose to use the Statistics or not. If you want to choose then you also can use fixed samples or not fixed samples.

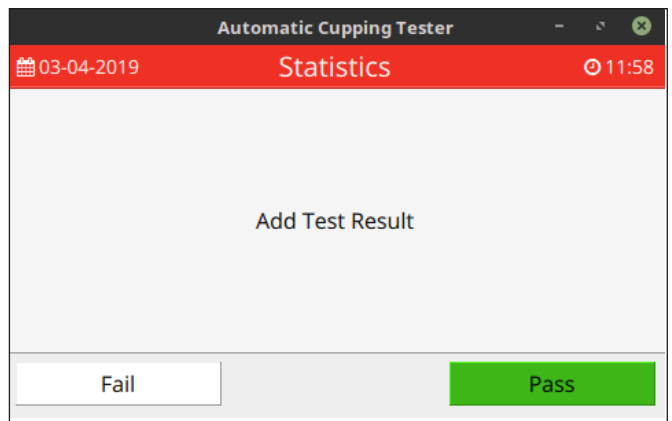


In manual mode you can add Statistics. If you don't choose the fixed samples the Statistics will be shown after every single run. If you choose fixed samples the statistics will be shown after the number of samples you select to fix.

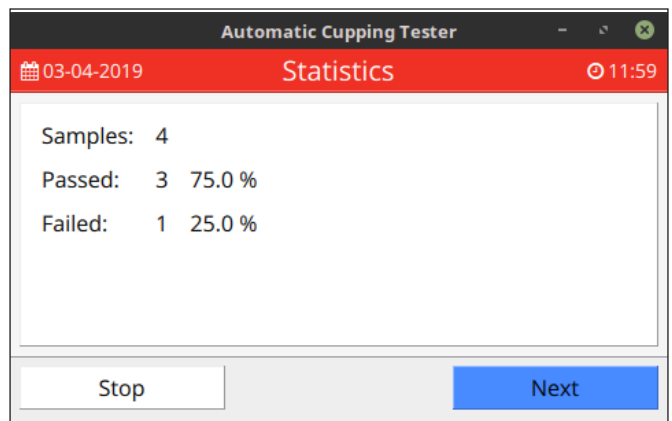




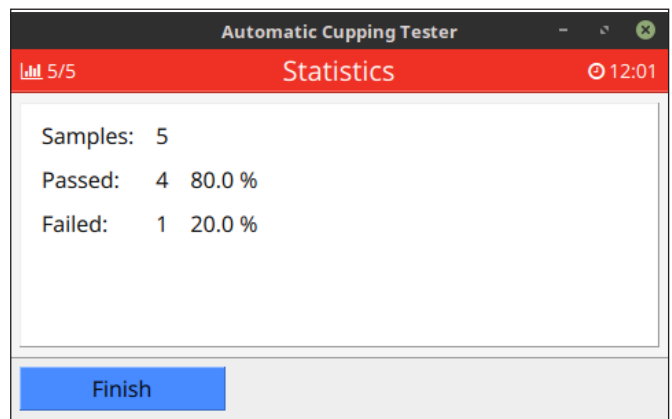
In custom mode you can also add Statistics where you just can choose Pass or Fail.



If you don't choose the fixed samples the Statistics will be shown after every single run.

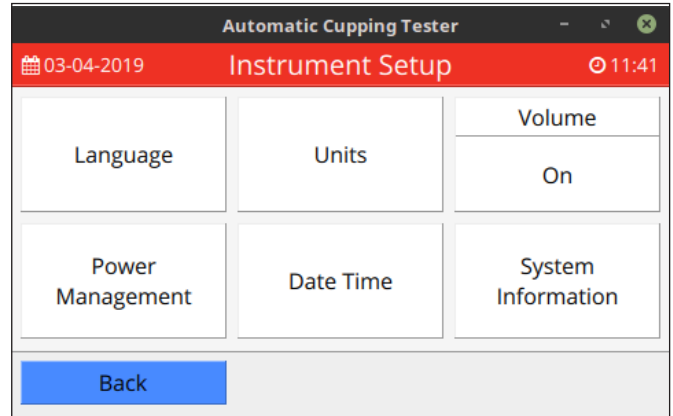


If you choose fixed samples the statistics will be shown after the number of samples you select to fix.



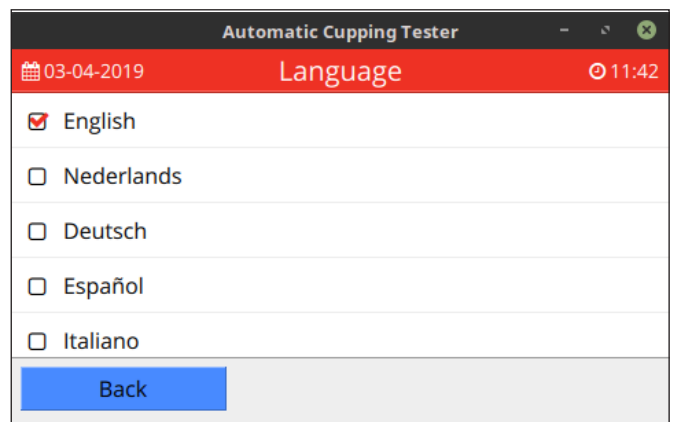
8.4 Instrument Setup

The Instrument Setup menu gives the user access to more advanced settings allowing him or her to fine tune the instrument to their specifications.



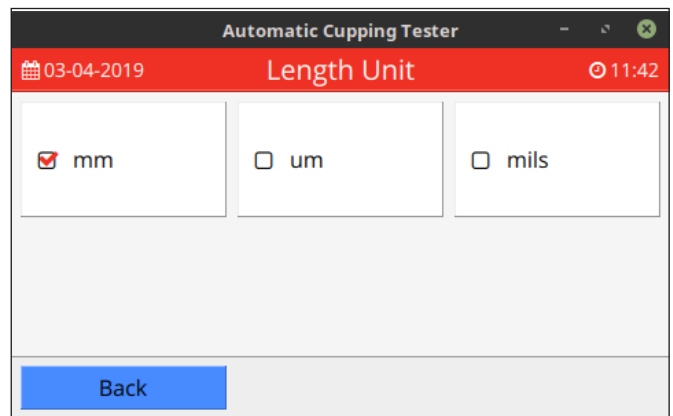
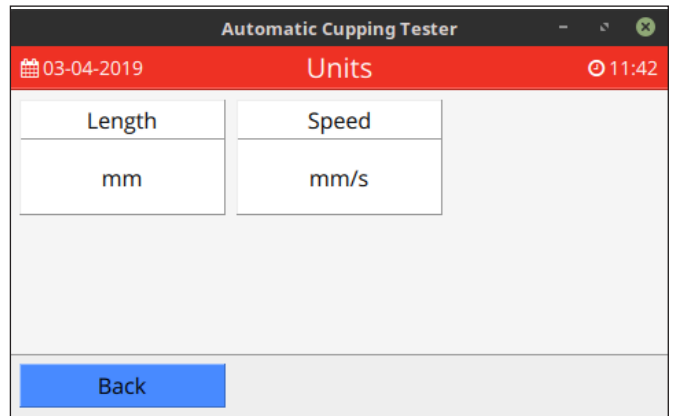
8.4.1 Instrument Setup – Language

The TQC Sheen Automatic Cupping Test is equipped with a multi-language menu. In this part of the menu you can select the desired language. Set the tick mark in front of the desired language.



8.4.2 Instrument Setup – Units

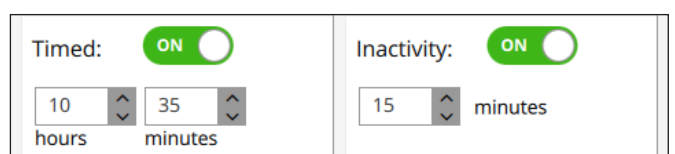
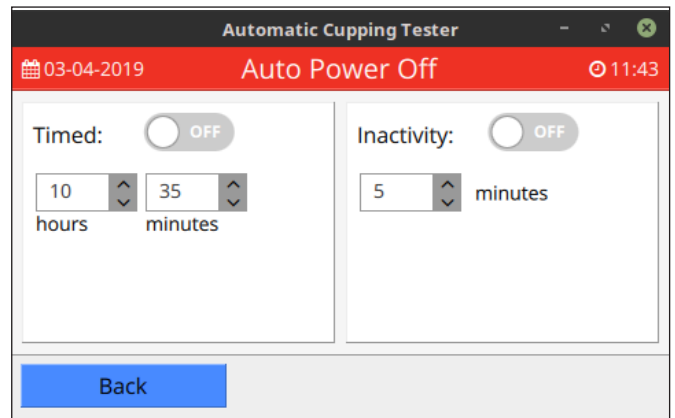
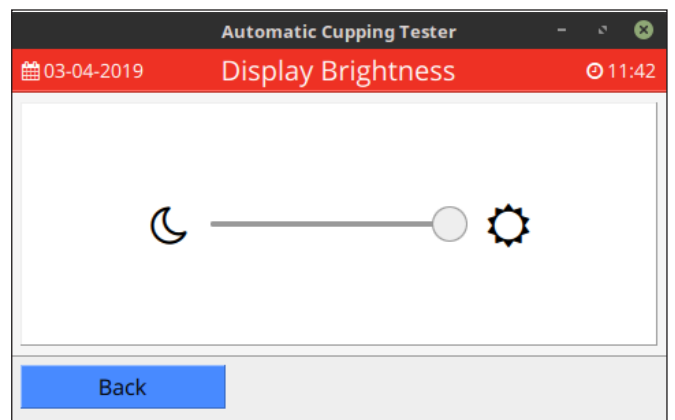
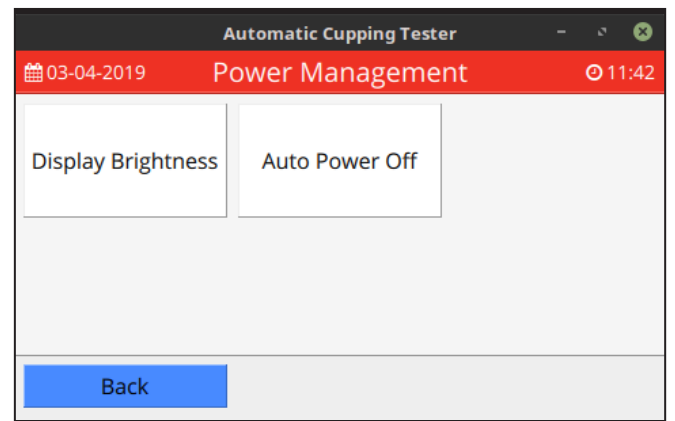
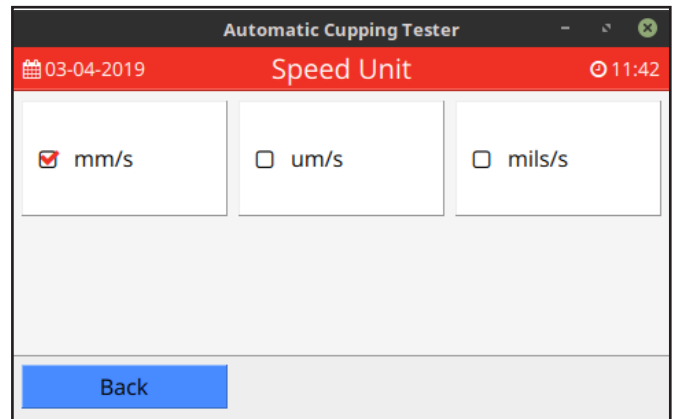
The units used in the display which are Length and Speed can be set to one of the three available units. The selected unit will be displayed in all other menus.



8.4.3 Instrument Setup – Power Management

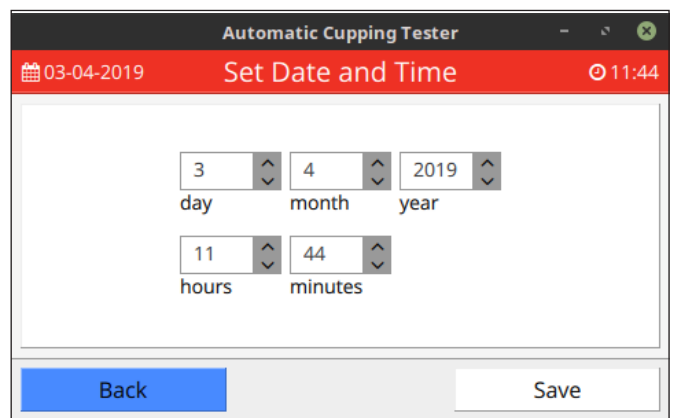
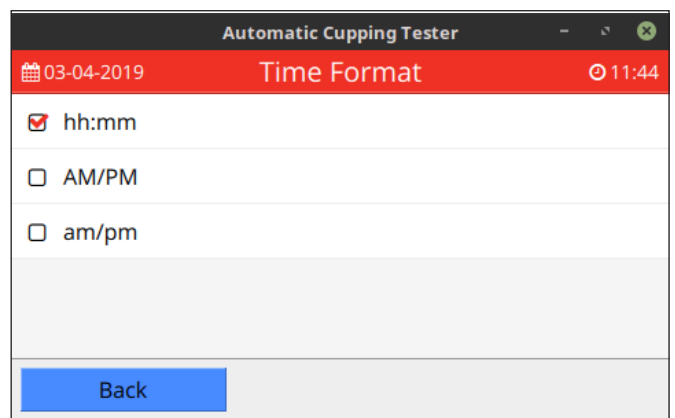
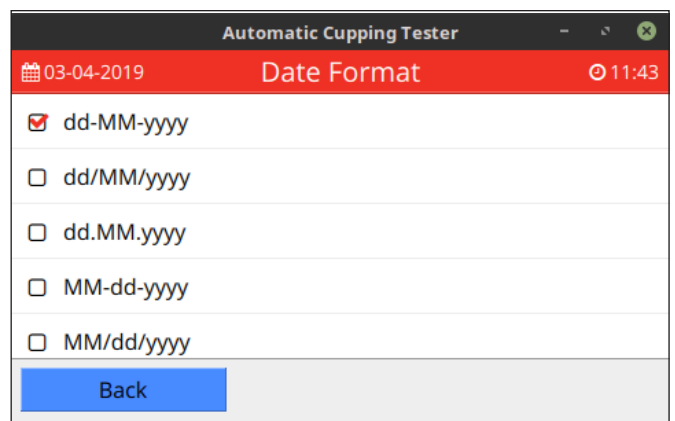
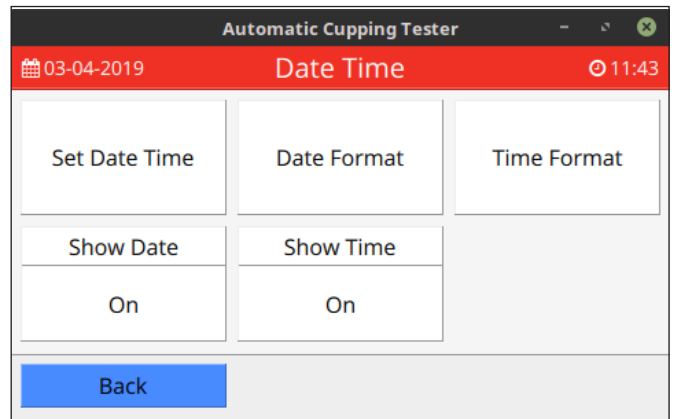
The display brightness is changeable here.

The TQC Sheen Automatic Cupping Test contains also an Auto Power Off function where it is possible to time when the device turns off automatically or turns off after a set inactive time.



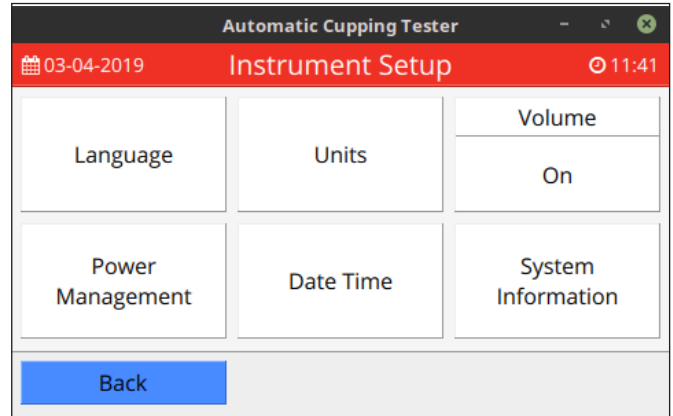
8.4.4 Instrument Setup – Date Time

The TQC Sheen Automatic Cupping Test contains a real time clock to store the time and date with each calibration. Time and date are also used for setting the calibration interval. In this menu the time and date can be set by selecting the desired figure.



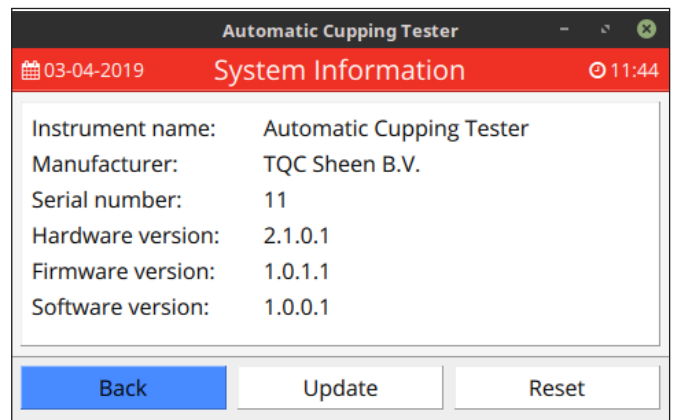
8.4.5 Instrument Setup – Volume

All the audio Signals can be chosen on or off.



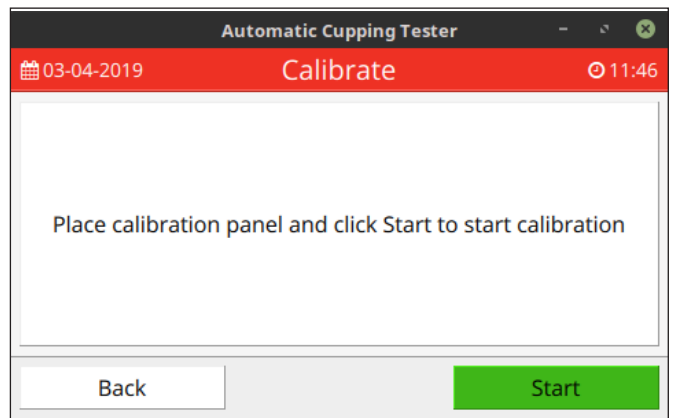
8.4.6 Instrument Setup – System Information

The Instrument shows its own information about the Version and Serial Number in a compact way. In this Setup it is possible to Update and Reset the Version.

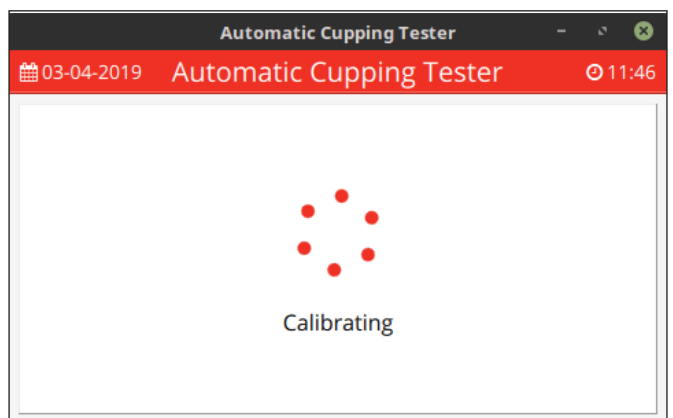


8.5 Calibration

After calibration is selected in the calibration menu the TQC Sheen Automatic Cupping Test asks for the reference board to be inserted. Take care that the reference board is free of contamination at all times. Place the board from either side of the sample holder into the panel slot until the stop-per at the TQC Sheen logo side. When the reference board is inserted lock it in place with the panel clamp handle. Select Start to verify that the reference board is in place.



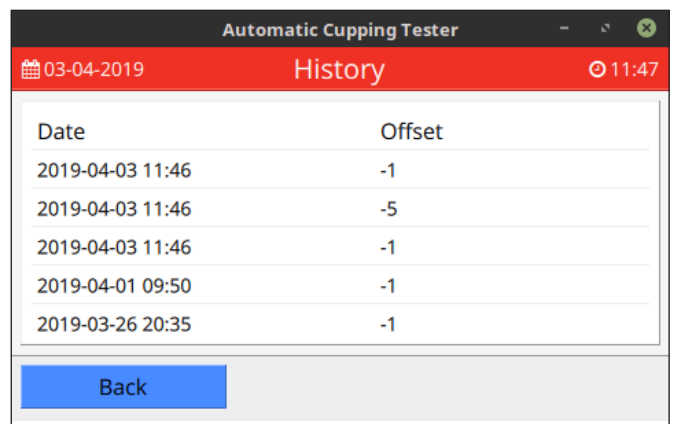
The TQC Sheen Automatic Cupping Test starts to search for the calibration plate. By slowly moving the indenter towards the plate. This can take several seconds for the calibration to be finished. While the calibration is in progress Calibrating ... is shown.



When the Calibration is finished the Cupping test shows the offset of the TQC Sheen Automatic Cupping Test. Now the calibration is ready and the cupping test is the most accurate available. Normally the offset will be low. High offsets can occur when the cupping test was turned off while performing an indentation or when turned on after transport.

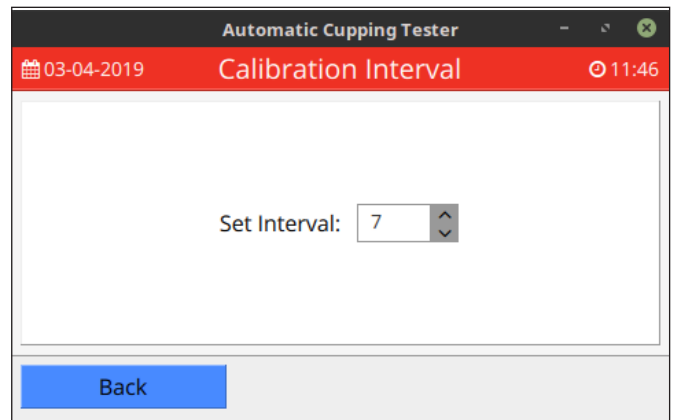
8.5.1 Calibration – History

The TQC Sheen Automatic Cupping Test stores the last calibrations. Date and calibration value are recorded. The top value is the latest.



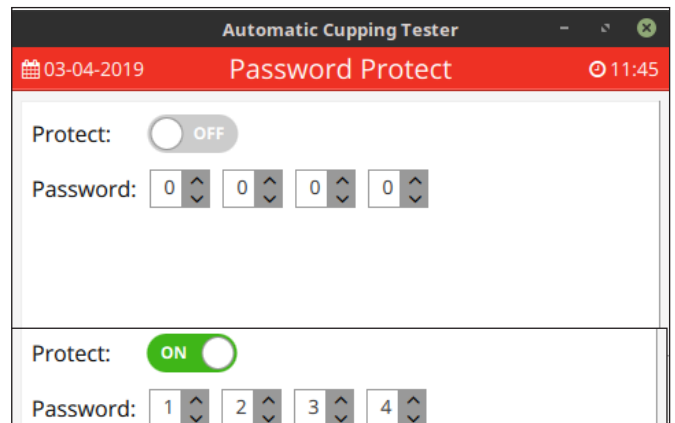
8.5.2 Calibration – Interval

In the Calibration Setup it is possible to enter at which interval (days) the TQC Sheen Automatic Cupping Test reminds the user to carry out a calibration. The user will be reminded at the entered interval.

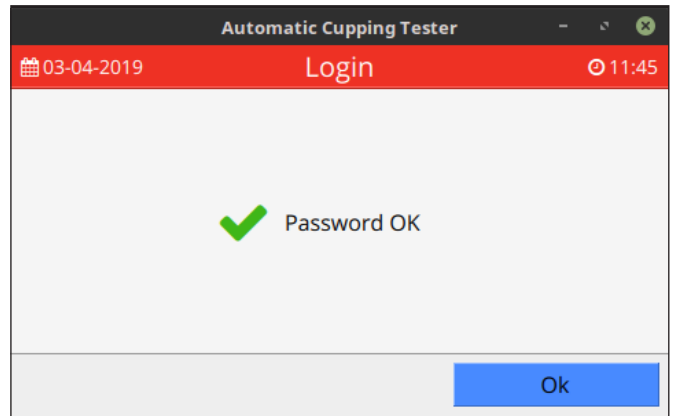
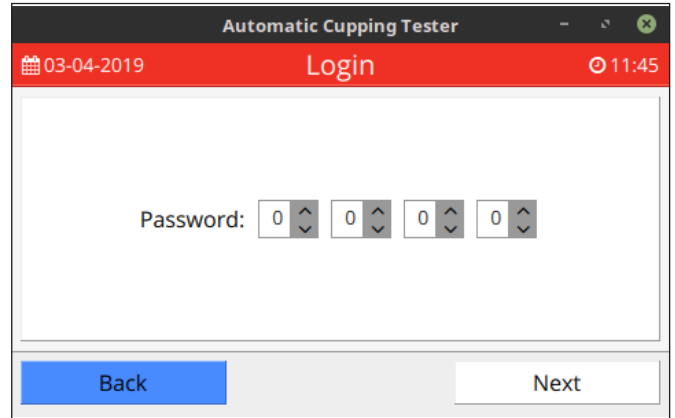


8.6 Protect/Login

The TQC Sheen Automatic Cupping Test contains a Password Protection. The password is changeable and is composed of 4 Numbers. The speed will be protected in Custom mode.

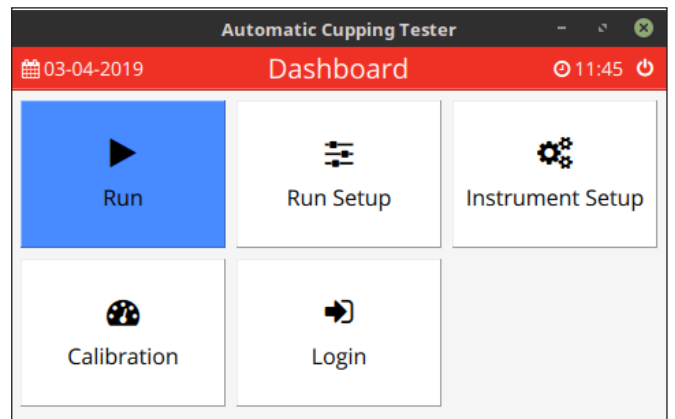


After saving the desired Password, the next user has to enter the password to run the Custom mode.



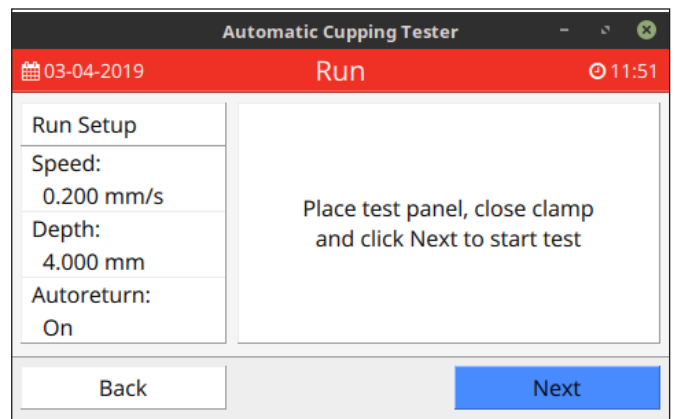
8.7 Run

When performing a run the displayed screens vary depending on the in "Run setup" selected type of run.

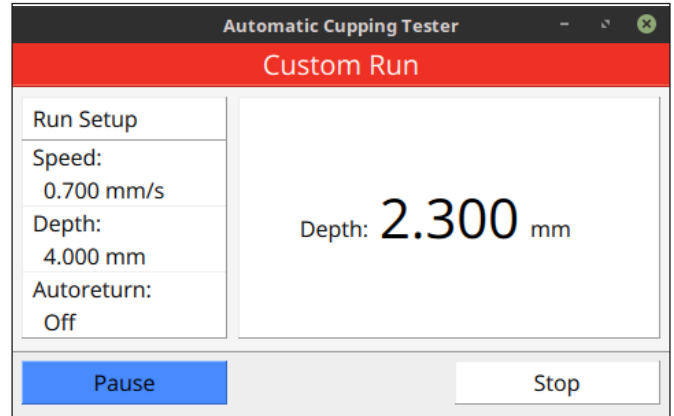


8.7.1 Run – Custom mode

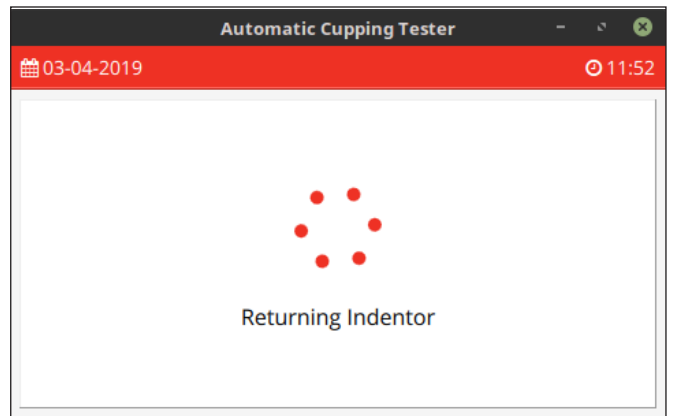
In the first screen the TQC Sheen Automatic Cupping Test asks the user to place the test panel and close the clamp. When done select Next to continue.



The actual position of the indenter is shown. During the test “stop” can be selected to stop the test and have the indenter return to base position. It is also possible to pause /continue the indenter in Custom Run mode

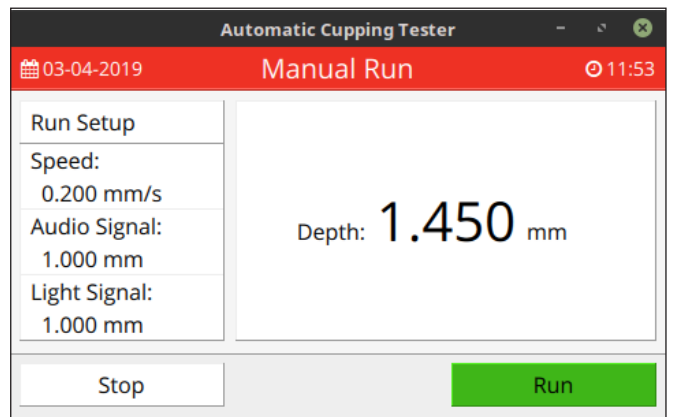


After the test has been completed depending on the autoreturn setting the indenter automatically returns to base position or after confirmation by pressing back.



8.7.2 Run – Manual mode

During manual run only the set speed is shown in the top of the screen. The sample placement steps are the same as in Custom mode. In this case only the “Run” needs to be selected to run and needs to be hold.



9 OPERATION

9.1 Preparatory Work

- Connect the instrument to the mains at the rear side of the housing.
- When using a loupe or microscope insert the fixture rod according to illustrations.
- Adjust Test cylinder such that good visibility of the test surface is guaranteed.

9.2 Performing a Cupping Test

For performing a cupping test a suitable panel is required. Please see the specifications and required standards for further specifications.

9.3 Start the instrument

Start the instrument following the steps listed in Section 8.

9.4 Warning signals

There are circumstances in which the machine displays a warning signal.

“Release the emergency knob”

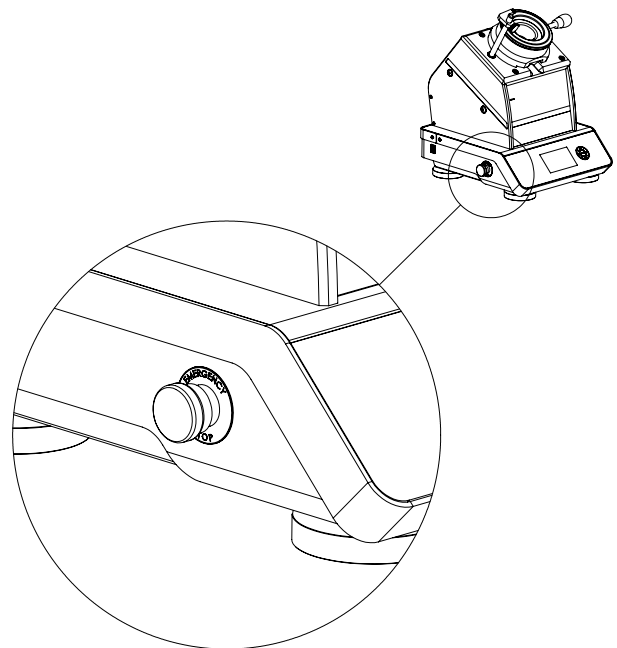
Cause: The red emergency button has been pushed.

Solution: Check the fault or wrong handling. If everything is safe, pull the emergency button.

“Place test sample and close clamp”

Cause: The panel is not placed correctly or the clamp is not tightened enough.

Solution: Replace the test panel and close the clamp.



10 CARE AND MAINTENANCE

10.1 Inspection and Maintenance

- Though robust in design, this instrument is precision-machined. Never drop it or knock it over.
- Always clean the instrument after use.
- Clean the instrument using a soft dry cloth. Never clean the instrument by any mechanical means such as a wire brush / abrasive paper. This may cause, just like aggressive cleaning agents, permanent damage.
- Do not use compressed air to clean the instrument.
- Never touch the indenter with bare hands. Grease from your hand may reduce electrical contact and cause the indenter to falsely locate.
- Generally the TQC Sheen Cupping Test does not require any maintenance.



Make sure that no paint or other liquids are spilled on the electronics or left in the holes.

10.2 Disposal of Materials

Disposal of materials used in the operation of the instrument or for auxiliary functions and exchanged items should be dealt with safely and in a manner that will not harm the environment. Follow the local regulations.

10.3 Customer Service

Customer service is provided on request by

TQC Sheen HQ
Molenbaan 19
2908LL Capelle aan den IJssel
The Netherlands
T +31 (0)10 7900 100
F +31 (0)10 7900 111

DISCLAIMER

The right of technical modifications is reserved.

The information given in this manual is not intended to be exhaustive and any person using the product for any purpose other than that specifically recommended in this manual without first obtaining written confirmation from us as to the suitability of the product for the intended purpose does so at his own risk. Whilst we endeavour to ensure that all advice we give about the product (whether in this manual or otherwise) is correct we have no control over either the quality or condition of the product or the many factors affecting the use and application of the product. Therefore, unless we specifically agree in writing to do so, we do not accept any liability whatsoever or howsoever arising for the performance of the product or for any loss or damage (other than death or personal injury resulting from our negligence) arising out of the use of the product. The information contained in this manual is liable to modification from time to time in the light of experience and our policy of continuous product development.

11 ANNEX A | HOW TO INSTALL LD6182 USB MICROSCOPE

