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INSTRUCTION MANUAL

ATP Meter

P/N:S.113.0046.0

i-know

2018/03

Operating Precautions and Limitations of Use

IMPORTANT: This product is designed and constructed to

be safe and without risk to health when properly used (in accordance with the supplied documentation, etc) and when the operating precautions
outlined in this document are fully observed.

IMPORTANT

IT IS ESSENTIAL THAT THE USER OF THIS MANUAL IS AWARE OF THE POTENTIAL HAZARDS ASSOCIATED WITH THE UNIT AND ITS ACCESSORIES.

ALL OPERATORS SHOULD BE FAMILIAR WITH THE SAFETY PRECAUTIONS AND WARNINGS GIVEN IN THIS SECTION PRIOR TO ATTEMPTING TO OPERATE THE UNIT.

IF THE UNIT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.

The following symbol is used in this manual:

Description: CAUTION / WARNING

The precautions to be observed relate to the transportation and use of all types of solid state electrical/electronic instrumentation and to the handling of the CariScreen Swab devices.

These precautions are outlined below:

Operating Environment and Electrostatic Precautions

WARNING: Do not use the unit in any area which has been, or is thought to have been, exposed to explosive or flammable gases or vapors.

CAUTION: Do not expose the unit to extremes of temperature (see section 13), and minimise any exposure to electrostatic charges.

Unit Handling

CAUTION: Care should be taken not to drop the unit or subject it to rough physical handling.

Batteries

WARNING: Use only non-rechargeable alkaline batteries, or rechargeable NiMH or NiCD batteries, of types specified in section 13.

WARNING: Do not use batteries with individual cell voltages greater than 1.65V, as this will cause permanent damage to the unit.

CAUTION: Old batteries should be disposed of in accordance with your local regulations.

Use and Insertion of CariScreen Swab Devices

CAUTION: Refer to the CariScreen Swab data sheet and kit insert for details before using the device, and observe all federal, state and local environmental regulations.

CAUTION: Do not force CariScreen Swab devices into the unit. Do not attempt to insert any object other than an approved CariScreen Swab device into the unit.

CAUTION: Ensure that the CariScreen Swab device is clean and dry before inserting it into the unit.

Keypad Buttons

CAUTION: Do not use excessive force when pressing any of the buttons on the unit's keypad.

Unit Casework

WARNING: There are no Operator serviceable parts inside the unit. Removal or opening of the unit's casework will void the warranty.

12. Technical Specifications

General:

Unit dimensions (W x H x D)	72mm x 191mm x 32mm
Unit weight (including batteries)	approx. 260g
Operating temperature range	5°C to 40°C
Relative Humidity range	20 - 85%, non-condensing
Storage temperature range	-10°C to 40°C
Relative Humidity Range	20 - 95%, non-condensing

Unit Details:

Measurement range	0 to 9999 RULs
Measurement time	15 seconds
Measurement noise	±5% or ±5 RULs
Programmable result thresholds	100 programs
Result memory size	500 tests
Serial interface	EIA-232 compatible

Batteries:

Battery Size (2 off)	AA, LR6 or E91
Battery Types	
Non-rechargeable	nom. 1.5V Alkaline
Rechargeable (externally charged)	nom. 1.2V NiMH or NiCD
Battery Capacity (for 2600mAh Alkaline)	
Standby mode (at 20°C)	min. 6 months
Continuous reading	min. 500 tests

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11. Glossary of Terms and Abbreviations

ATP	Adenosine Triphosphate – energy carrier molecule
EMC	Electro-Magnetic Compatibility
fmol	Femtomole – 10^{-15} moles
HACCP	Hazard Analysis Critical Control Point
LCD	Liquid Crystal Display
NiCD	Nickel Cadmium – rechargeable batteries
NiMH	Nickel Metal Hydride – rechargeable batteries
Reading	Measurement value in RLUs
Result	Measurement pass (OK), caution (!) or fail (−)
RUL	Relative units of Light (unit of measurement)
RS232	Serial communications protocol for connecting the unit to a PC – Not Used
Unit	The CariScreen unit

10. Warranty and Returns

The supplier warrants the CariScreen unit, when purchased new, to be free from defects in materials and workmanship and will repair or replace, at their discretion, any CariScreenunit which, used under proper conditions, exhibits such defects.

Under the terms of this warranty, the product must be returned in the original packaging, transportation prepaid, To Future Cleaning Technologies (FCT) B.V

Contact Future Cleaning Technologies (FCT) B.V to receive authorization to return the instrument, and enclose a detailed description of the problem.

10.1 Warranty Duration

This warranty is provided to the original purchaser for one year from the date of purchase.

In no event will Future Cleaning Technologies (FCT) B.V be liable for indirect, incidental or consequential damages; the original user's remedies being limited to repair or replacement of the unit at the manufacturer's option.

10.2 Particular Exclusion

Unauthorised modification of any part of the CariScreen unit or the attachment of any peripheral not supplied by Future Cleaning Technologies (FCT) B.V will void this Warranty.

⚠WARNING: Use only the accessories and consumables supplied by Future Cleaning Technologies (FCT) B.V The use of any non Future Cleaning Technologies (FCT) B.V supplied accessories and consumables will invalidate the warranty.

1. Introduction

The CariScreen system is intended to provide a fast, easy screening test for dental caries via the use of an ATP bioluminescence test.

The CariScreen system consists of two elements: the CariScreen handheld meter unit and the disposable CariScreen swab.

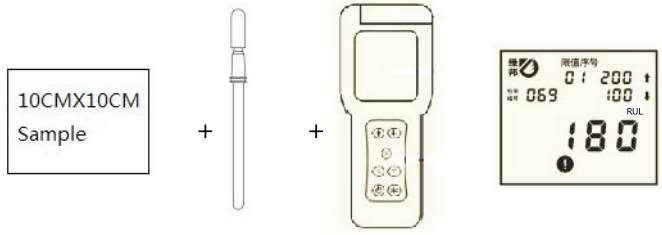
This Operator's Manual provides a detailed description of how to use the CariScreen unit, and how to handle maintenance and troubleshooting.

For full details on the CariScreen swab device, please refer to the CariScreen swab kit insert.

1.1 Principle of Operation

The CariScreen Swab device uses bioluminescent chemistry technology to convert an invisible concentration of ATP (present in the swabbed sample) into a visible light output.

The low-level light output is measured by the CariScreen unit to produce both a quantitative and qualitative result.



The quantitative result is a number in the range 0 to 9999, expressed in terms of Relative units of Light– RULs.

Although Relative units of Light are not a tangible unit of light measurement (such as lux), they do provide a real measure of the amount of light output by the ATP bioluminescent test.

In this application, 1 RUL is roughly equivalent to 1 fmol of ATP.

The quantitative RUL reading is further compared against user programmable thresholds to provide an overall qualitative low (OK), medium (!) or high (–) result.

The CariScreen unit is a highly sensitive measurement device and, as such, should be treated with respect at all times.

E6 *Self-calibration failed*	✓ Unit environment unstable ✓ Protective pocket dirty or severely scratched ✖ Protective pocket damaged ✖ Unit damaged or fault
E7 *Internal memory failure*	✓ Batteries are flat or loose ✖ Unit's memory damaged or faulty
E8 *Internal reader fault*	✓ Batteries are flat or loose ✖ Unit's sample reader is damaged or faulty
E9 *Internal error*	✓ Batteries are flat or loose ✓ Unit dropped or subjected to shock or vibration ✖ Unit's damaged or faulty

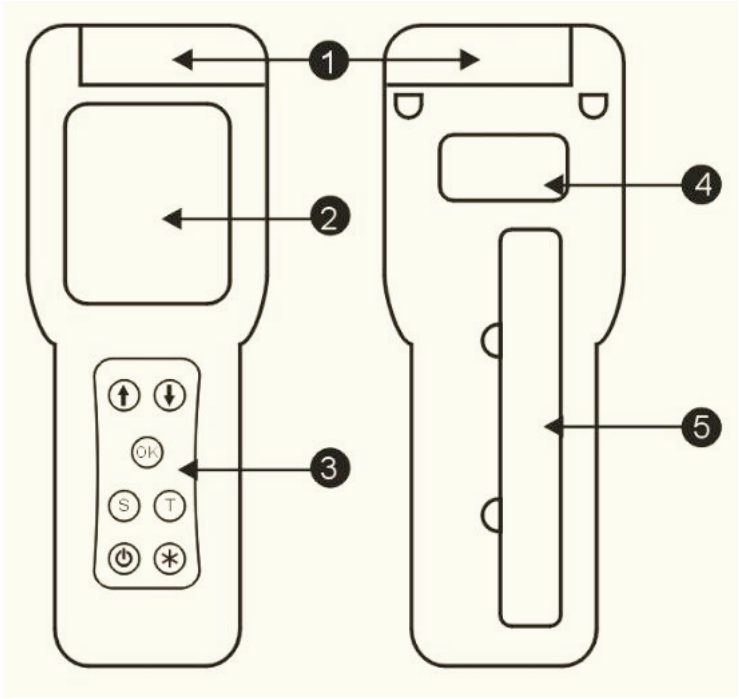
Error Code	Possible Causes
E1 Temperature out of range	✓ The unit is being used outside of the specified operating temperature range (see section 13) ✓ The unit has been stored in an environment which is outside of its specified operating temperature range – allow unit to acclimatise before use ✗ Unit damaged or faulty
E2 Self-calibration failed	✓ Unit environment unstable ✓ Protective pocket dirty or severely scratched ✗ Protective pocket damaged ✗ Unit damaged or fault
E3 Internal memory failure	✓ Batteries are flat or loose ✗ Unit's memory damaged or faulty

2. Before You Begin!

IMPORTANT: Please ensure that you have read and understood all the "Operating Precautions and Limitations of Use" section at the beginning of the manual before continuing any further.

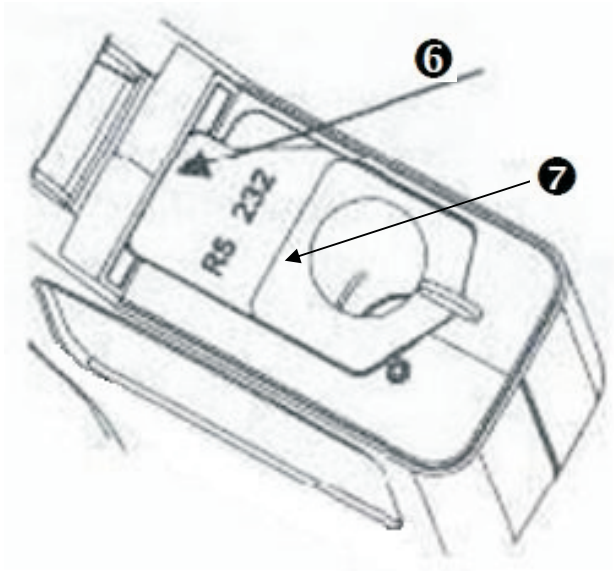
2.1 Unit Description

The unit has the following external front and rear features:



1. Unit lid
2. Liquid crystal display
3. Keypad
4. Serial number label
5. Battery compartment

Opening the lid reveals the following internal features:



6. RS232 connector cover (or USB Connector cover)
7. Protective pocket and sample insert port

Measurement reading always shows zero RLU, or is much lower or high than expected	✓ Incorrect use of CariScreen Swab device ✓ CariScreen Swab devices are out-of-date ✓ Unit being used in an unstable environment – turn off unit and then back on again ✓ Protective pocket dirty or severely scratched ✗ Protective pocket damaged ✗ Unit damaged or faulty

9.3 Unit Error Codes

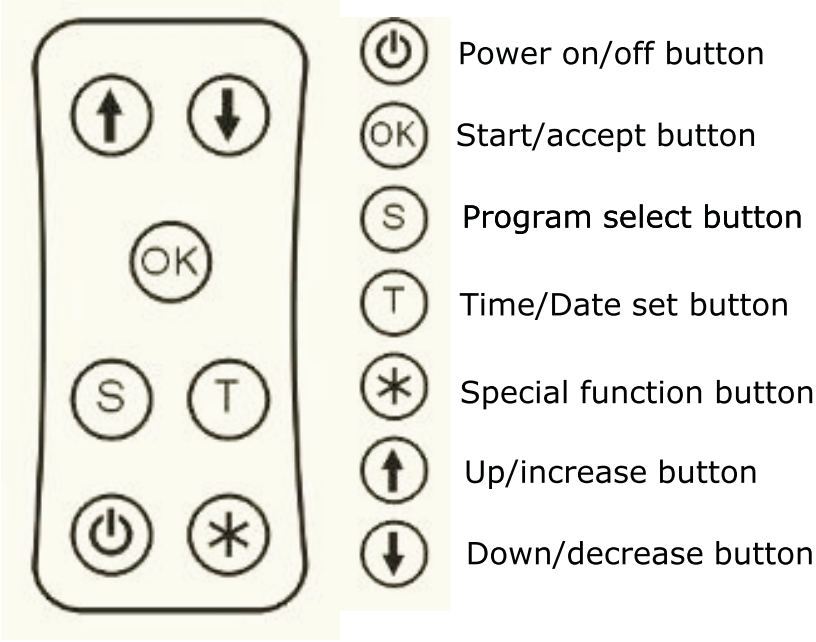
During normal operation, the unit performs various self-checks on its internal components. If a problem is detected, the display will show an error number:

TIP: Most problems may be transient, and can be cleared by pressing the button, or by removing the batteries for 10 seconds and inserting them again. If the problem persists, please seek technical assistance.

The display appears washed out or very dark	✓ Unit is too hot or too cold ✓ Unit is being used in inappropriate lighting
Segments missing from display or garbage displayed	✓ Display window is dirty ✗ Display window is scratched or dented ✗ Display or unit damaged or faulty
Keypad button has no effect when pressed	✓ Some buttons only work when selecting particular unit functions ✗ Keypad or unit damaged or faulty
The CAL icon flashes and the unit beeps periodically	✓ Internal self-calibration required – remove CariScreen Swab device, close the lid and wait for the calibration to complete ✗ Unit damaged or faulty

2.2 Keypad Symbols

The keypad is arranged with the following buttons:

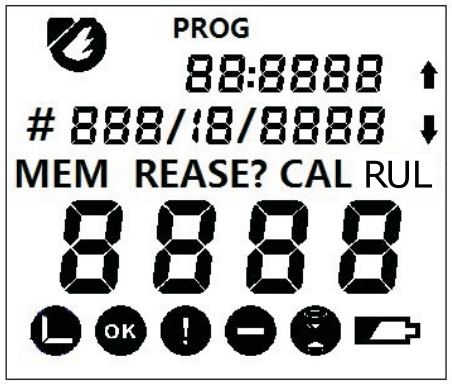


The function of the buttons is explained in more detail in the following sections.

TIP: Holding down the ⓘ or ⓘ button will make it automatically repeat. The longer you hold it down, the faster it goes.

2.3 Display Layout and Icons

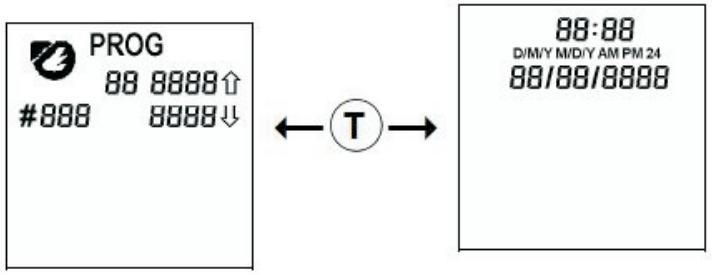
The liquid crystal display has the following layout:



The top section of the display has dual functions, which are switched between by pressing the (T) button:

Program and test

Time and date



The program and test functions are:

PROG 88	Program number
8888 ⬆	Program upper threshold
8888 ⬇	Program lower threshold
#888	Test number

7. Operator Maintenance

The CariScreen unit does not require any routine operator or service engineer maintenance.

7.1 Cleaning the Casework

Clean the unit casework when required using a dry or slightly damp cloth only.

⚠ WARNING: Never clean the unit using a wet cloth, or by washing it under running water.

⚠ CAUTION: Do not use solvents or strong cleaning solutions as these may attack and deform the unit's plastic components, and seriously degrade its performance.

7.2 Replacing the Batteries

For best results, the batteries should be replaced when the low battery icon appears.

Refer to section 2.4 for how to fit new batteries – taking care not to mix the old batteries with the new ones.

IMPORTANT: Always dispose of old batteries in accordance with your local regulations.

7.3 Cleaning and Replacing the Protective Pocket

The unit is designed with a special protective pocket, which can be removed for cleaning or replacement if required.

See diagrams and cautionary notes below;

6.3 Erasing the Results Memory

The results memory can be completely erased by entering the results review mode (see section 6.2 above) and then pressing and holding down the ✳ button for 2 seconds.

The display then shows the total number of results that will be erased, with the ERASE? Icon flashing:

The erase function is completed by pressing and holding down the OK button for 2 seconds, or can cancelled by pressing any other button.

It takes approximately ten seconds to erase a full 2000 results.

⚠ CAUTION: Once the results have been erased from memory they are permanently deleted and can no longer be viewed.

While the time and date functions are:

88:88 Time

Date

88/88/8888

The lower section of the display has the following digits and icons meanings:

MEM	Memory icon – flashes when the memory is over 95% full; lit when in memory review mode
ERASE?	Memory erase confirmation prompt
CAL	Calibration icon – flashes when internal self-calibration is required
RUL 88:88	Sample measurement reading in Relative units of Light–(RULs.)
88/8 88	Busy icon
OK	Result pass icon
!	Result caution icon
	Result fail icon
	Lid icon – flashes when the lid needs to be closed
	Low battery icon

2.4 Fitting the Batteries

The unit is designed to operate from both non-rechargeable alkaline batteries and rechargeable Nickel Metal Hydride (NiMH) or Nickel Cadmium (NiCD) batteries:

Type	Nominal Voltage	Relative Capacity
Alkaline	1.5V	1.0
NiMH	1.2V	0.6
NiCD	1.2V	0.5

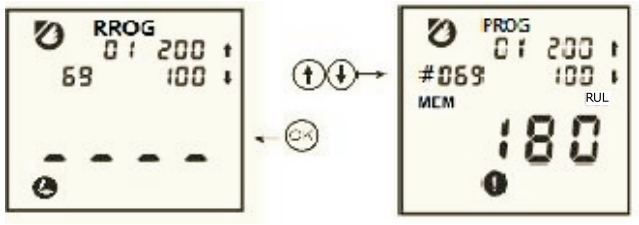
⚠**WARNING:** Never mix batteries of different types, and never use recharged alkaline batteries as these are prone to leaking and overcharging and will cause permanent unit damage.

The unit requires two batteries of the size AA, LR6 or E91.

The batteries are fitted by unclipping the battery compartment cover on the back of the unit, and inserting two batteries with the positive ends (+) towards to top of the unit:

6.2 Viewing Stored Test Results

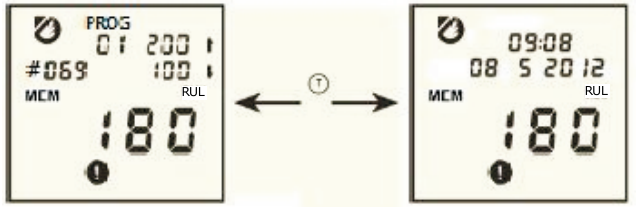
With the unit ready to perform a reading, the previous stored test results can be viewed by pressing the ⬆ and ⬇ buttons:



The display then shows the latest test result, with the MEM icon lit and the test number flashing.

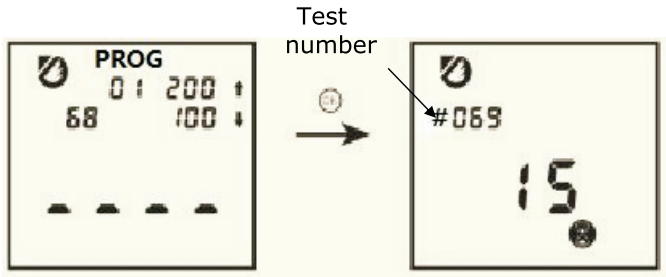
Now use the ⬇ button to scroll backwards through the stored test results and the ⬆ button to scroll forwards.

Pressing the Ⓣ button toggles between the result program number and thresholds and test number, and the time and date that the test was performed:



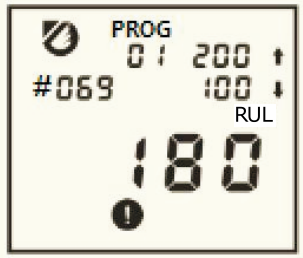
To exit the results review mode, simply press the OK button.

While the measurement is being performed, the display shows the new test number while the timer counts down to zero:



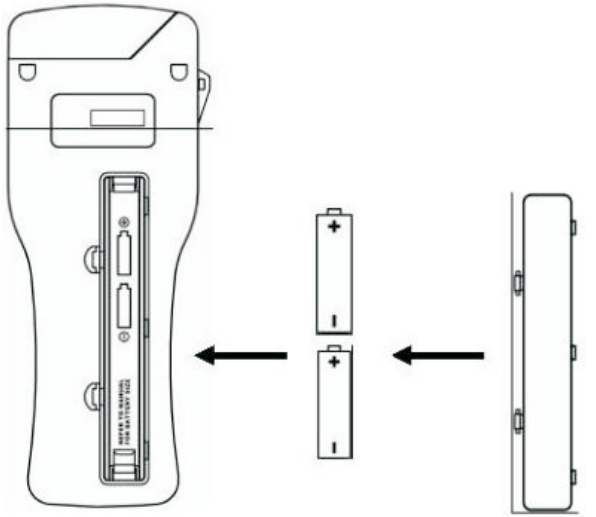
NOTE: For consistent results, always keep the unit upright and steady while it is performing a measurement to ensure that the liquid in the CariScreen Swab device is at the bottom of the tube.

When the measurement is complete, the new test reading and pass/caution/fail result (see section 5) are displayed:



TIP: For best results, and to prevent dust and dirt ingress, always keep the unit lid closed when not inserting or removing a CariScreen Swab device.

⚠ WARNING: Always ensure that the exterior of the CariScreen Swab device is clean and dry before inserting it into the unit. Never insert anything other than a CariScreen Swab device into the unit. Never insert a device when the protective pocket has been removed for cleaning (refer to section 8.3).



(1) Remove cover (2) Insert batteries (3) Replace cover

⚠ **CAUTION:** Be careful not to insert the batteries the wrong way round, as this may cause permanent damage to the unit's electronics.

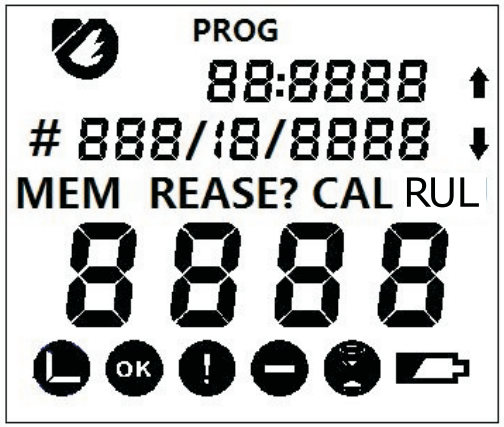
When the batteries are inserted correctly, the unit automatically turns on and enters the clock set-up mode. Refer to section 4 on how to set the time and date.

TIP: For best results, use a quality brand of alkaline batteries and replace them as soon as they become low (see section 3.6).

3. Basic Unit Operation

3.1 Turning On the Unit

To turn the unit on, press the ⏻ button. The unit will beep once and display the power-up self-check display:



Following this the unit will perform its internal self-calibration routine (see section 3.2).

NOTE: If the clock is not set, the unit will enter the time and date set-up mode first (see section 4) and then perform its self-calibration when the clock is set.

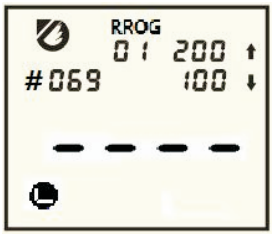
NOTE: If the batteries are flat, the unit may not turn on at all; or may turn on, flash the icon and beep three times, and then turn off again. If this happens, change the batteries.

6. Sample Measurements and Test Results

IMPORTANT: Please refer to the CariScreen Swab data sheet and Kit Insert for full details on how to use the CariScreen Swab device.

6.1 Taking a Measurement

With the unit turned on, and having performed its internal self-calibration checks, it is then ready to perform a new sample measurement:



The display shows the PROG number, the program upper (⬆) and lower (⬇) thresholds, and the total number of test results stored in the memory (e.g. 47).

NOTE: When the results memory is more than 95% full (i.e. space for less the 25 results remaining), the MEM icon will flash. When the memory is completely full, no more tests can be performed until the memory has been erased or uploaded to the PC – refer to sections 6.3 and 7 respectively.

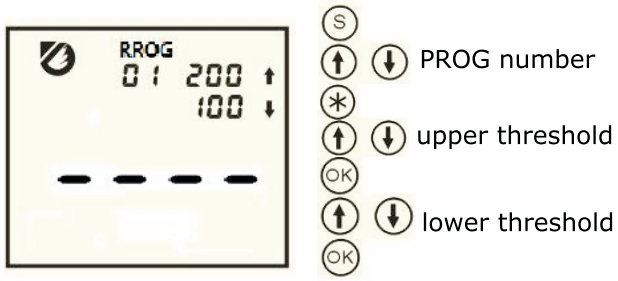
To perform a sample measurement, follow the steps below:

1. Activate the CariScreen Swab device (see Kit Insert)
2. Ensure that the outside of the CariScreen Swab device is clean & dry
3. Open the unit lid, insert the CariScreen Swab device into the unit, and close the lid.
4. Press the OK button and wait 15 seconds for the result to be displayed

5.2 Changing the Program Thresholds

To change the program upper (⬆) and lower (⬇) thresholds, press the (S) button, use the (⬆) and (⬇) buttons to select the required PROG number, and then press the (✳) button.

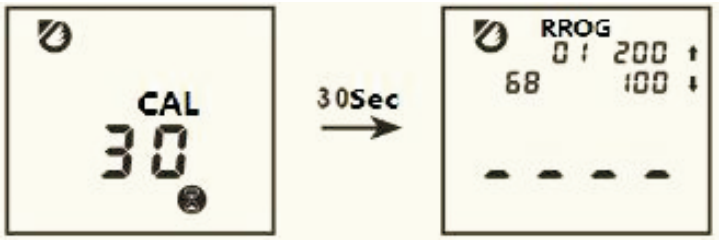
Now use the (⬆) and (⬇) buttons to first change the value of the upper threshold (⬆) followed by the (OK) button; and then to change the value of the lower threshold (⬇), followed by the (OK) button to store the new values:



TIP: Pressing the (✳) button at any point will exit this set-up mode, leaving both the PROG number and program thresholds unchanged.

3.2 Internal Self-Calibration

When the unit is turned on (see section 3.1), it performs an internal self-calibration check, with the display counting down from 30 to 0 seconds:



NOTE: During self-calibration, there must be no CariScreen Swab device in the unit and the lid must remain closed. If the icon is flashing, close the lid.

The unit will automatically perform the self-calibration routine (as above, with the flashing CAL icon) under the following circumstances;

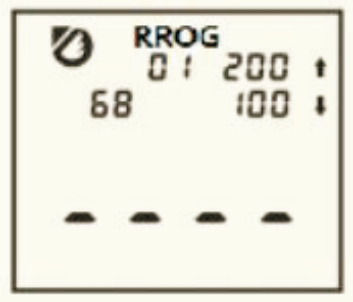
a) When the instrument is in continuous operation for a prolonged period of time (typically >30 minutes), and
b) The instrument is used in an environment where the temperature changes significantly (typically >5℃).

TIP: If the protective pocket is missing or incorrectly inserted, the unit will show an E1 error code (see to section 10.3). In this event, turn off the unit, open the lid and ensure that the pocket is fully inserted. Refer to section 8.3 for further details.

When self-calibration is complete, the unit is ready to perform a measurement.

3.3 Ready for Use

Once the unit has successfully performed its self-calibration, it is ready to perform a measurement:



At this point several keypad options are available, all of which are explained in more details in the following sections:

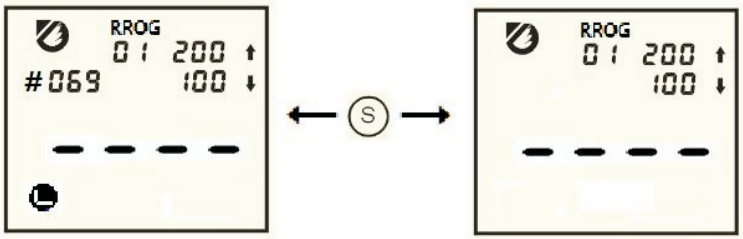
Button	Action	Section
T	Show current time and date	4
✱	Set new time and date	4
S	Select program number	5
OK	Start new measurement	6
↑ ↓	View previous test results	6.2
⏻	Turn off unit	3.4

NOTE: The ✱ button performs different functions depending on the unit mode – see individual sections of specific details.

Refer to section 9 for a quick overview of the available keypad options.

5.1 Changing the Program Number

With the unit turned on and ready for a measurement, the PROG program number can be changed by pressing the S button:



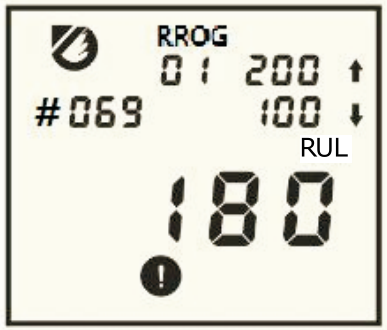
Now use the ↑ and ↓ buttons to change the flashing PROG number, then press the OK button to accept the new value.

TIP: Pressing the S button again will exit this set-up mode, leaving the program number unchanged.

NOTE: If the selected program number does not have any thresholds defined, they must be set by pressing the ✱ button (see below) before the program can be used.

5. Programmable Result Thresholds

The unit can store up to 100 programs (**PROG** 0 to 99), each of which defines a pair of upper (↑) and lower (↓) thresholds for the measurement result:



When a measurement reading is displayed, it is compared against these thresholds to determine the overall pass/caution/fail result:

Banding	Result
Reading ≦ lower threshold	OK Low
Reading ≧ lower threshold but ≦ upper threshold	! Moderate
Reading > upper threshold	− High

For details on how to determine the appropriate program thresholds for your particular operating procedures, please contact your local distributor.

3.4 Turning the Unit Off

To turn the unit off, press the ⏻ button. The unit will beep once and the display will go blank.

NOTE: To avoid accidental turn off, the ⏻ button is disabled while the unit is performing a sample measurement.

3.5 Power Saving Standby Mode

If the unit is turned on, but has not been used for more than 10 minutes, it will automatically enter a power saving standby mode.

To turn the unit back on, simply press the ⏻ button, as per section 3.1.

3.6 Low Battery Indicator

The 🔋 icon indicates the state of the batteries:

🔋 Icon	Battery State
Not visible →	Good
Visible →	Low – replace soon
Flashing →	Flat – replace now!

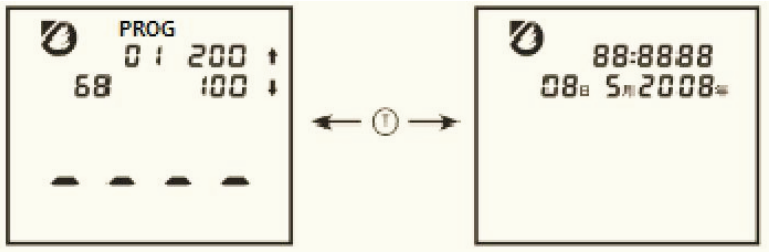
When the batteries are flat, the unit will flash the 🔋 icon, beep three times, and then automatically turn off.

NOTE: If the batteries are too flat, the unit will not turn on at all.

TIP: Store the unit in a cool dry place when not in use, as elevated temperatures will shorten the battery life.

4. Checking and Setting the Clock

With the unit turned on, and having performed its internal self-calibration checks, the current time and date can be displayed by pressing the (T) button:



To change the time and date, pr(✳)the button. Then use the(▲) and(▼) buttons to change the flashing value, and the (OK) button to accept each new value in turn.

TIP: Pressing the (✳)button at any point will cancel this set-up mode, leaving the time and date unchanged.

NOTE: When the batteries are first inserted (or removed and replaced) the unit will automatically enter the clock set-up mode. Once the clock is set, the unit will continue with its internal self-calibration.

NOTE: The clock does not have automatic daylight saving adjustment. If this is required, the time must be manually changed when necessary.

(▲)(▼) **D/M/Y** or **M/D/Y**
(OK)
(▲)(▼) date (D/M/Y) or month (M/D/Y)
(OK)
(▲)(▼) month (D/M/Y) or date (M/D/Y)
(OK)
(▲)(▼) year
(OK)

TIP: Pressing the (✳) button at any point will cancel this set-up mode, leaving the time and date unchanged.

NOTE: When the batteries are first inserted (or removed and replaced) the unit will automatically enter the clock set-up mode. Once the clock is set, the unit will continue with its internal self-calibration.

NOTE: The clock does not have automatic daylight saving adjustment. If this is required, the time must be manually changed when necessary.