

C.A 10101

C.A 10401

pH-meter & conductivity-meter

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1. SUMMARY

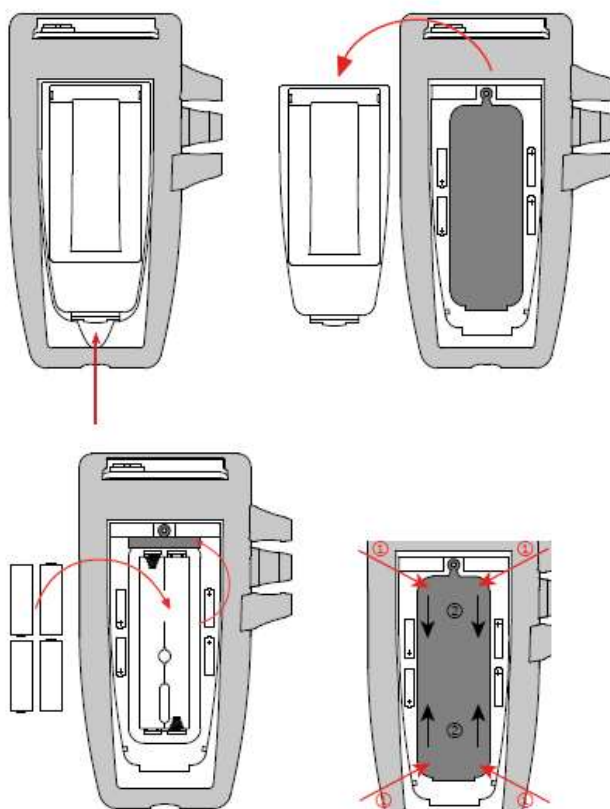
1.1 GENERAL DESCRIPTION

Instrument	C.A 10101	C.A 10141
Function	pH / ORP meter	Conductivity meter

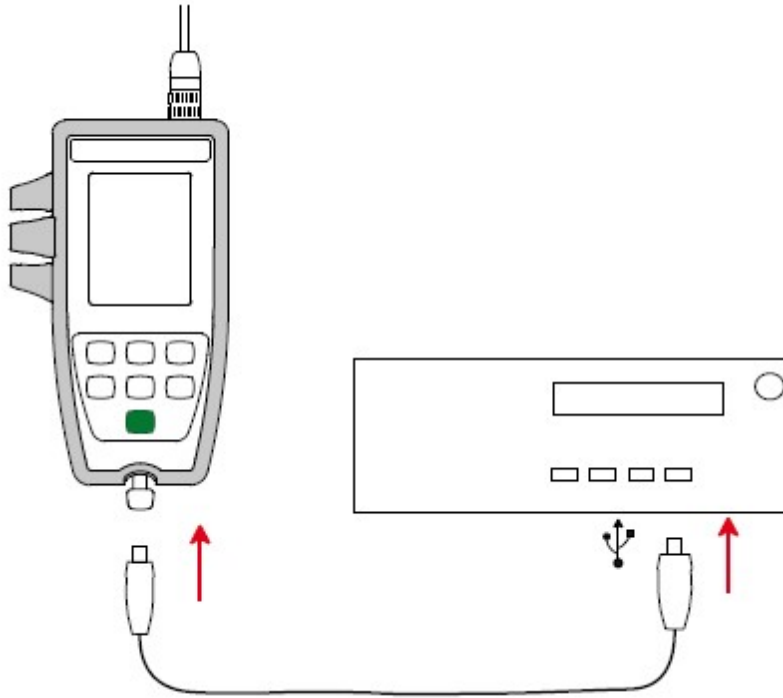
1.2 RUNNING THE DEVICE

There are two ways to power the device:

- Cells: Open the battery cover at the back of the device and insert 4 AA cells.



- USB: open the USB cover at the bottom of the device and connect a micro USB type B cable in.



On the other side, connect to a powered computer or a USB wall plug.

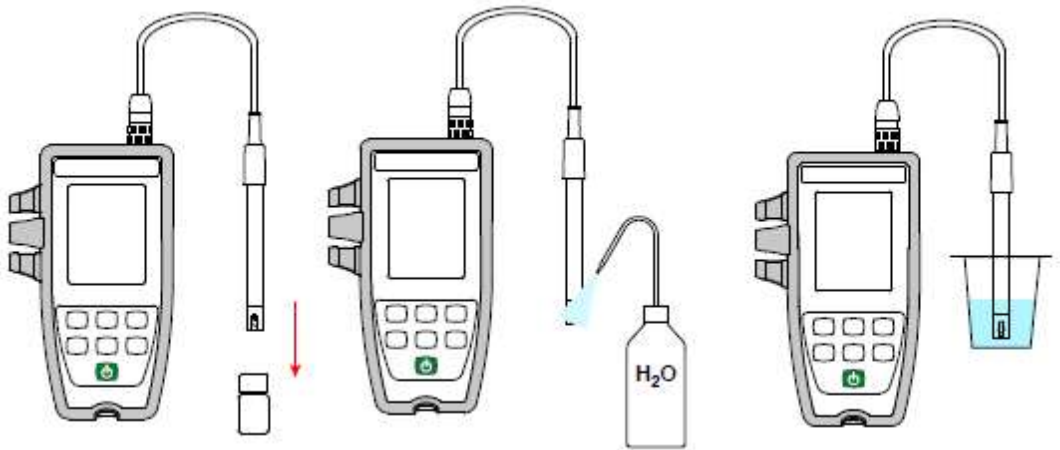





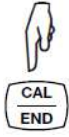





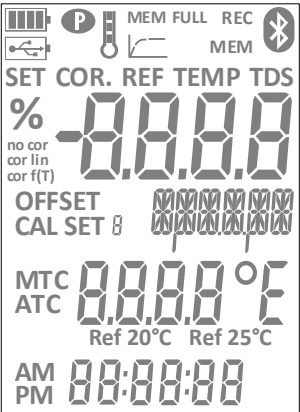
The device should start. If not, press power button for two seconds.

2. FUNCTIONAL VERIFICATION

This process confirms that the device can work properly but it does not verify the device's specifications.

Power up the device with cell as seen previously and then follow the process according to the device part number

Instrument	C.A 10101 or C.A 10141
Needed material	Computer with Windows ® 7 or later Micro USB type B cord.
Process	Connect the sensor and do a measurement in a reference solution.
Measure	 <p>Note: A sensor calibration is requested to have a precise measurement. Refer to the user's manual (to be downloaded from the website) for procedure</p> <ul style="list-style-type: none"> - Reset sensor calibration
Keyboard	<p>Press the backlight button , the backlight should be on.</p> <p>Press the pH/mV  button (or the toggle measurement button ). Measurement displayed should change.</p> <p>Press the MEM button, MEM should appear temporarily on the display.</p>

Instrument	C.A 10101 or C.A 10141
	<div></div> <p>Press  , the last calibration coefficients should be displayed. Do a long press on the same button to back to measurement.</p> <p>Disconnect the sensor, and press  or  : temperature (Manual Temperature Setting) should increase or decrease.</p>
Display	<div></div> <p>Device off, keep pressing  . All the symbols of the display should be on</p> <div></div>
USB	Connect the device to the computer through the USB cord. Windows should mount the USB Mass storage drive and may ask to format it.

3. ERROR MESSAGES

Instrument may detect some errors, and signal these errors displaying “Er.XX”, with XX the error code.

Error	Signification	Action
01	Hardware malfunction detected	The instrument must be sent back to customer service.
02	Error in internal memory	Format it using Windows.
03	No longer exists on electrochemistry.	The instrument must be sent back to customer service.
10	The instrument has not been adjusted or is not correctly adjusted.	Apply the embedded adjustment procedure.
11	The update of the internal software is not compatible with the instrument (the software is that of another instrument of the line). Not implemented yet.	Install the correct internal software in your instrument.
12	The update of the internal software is not compatible with the electronic boards in the instrument.	Reload the previous internal software into your instrument.
13	Recording scheduling error.	Check that the instrument's time and the time of the Data Logger Transfer software are the same.
14	Calibration error. The measured value is too far from the value of the standard solution of the selected calibration set.	Check that the solution used in fact belongs to the selected set. If necessary, return to the initial calibration.
15	Calibration error. The stabilization time is too long.	
16	pH calibration error. Two buffer solutions having the same value were used for the calibration.	
17	Calibration error (ORP and pH). The calculated offset is too large (configurable threshold in production, typically 58 mV)	Redo the calibration. If the error persists, check the buffer solution or replace the electrode.
18	pH calibration error. The calculated slope is too large (> 105%) or too small (< 85%). (Configurable threshold in production)	Redo the calibration. If the error persists, check the buffer solution or replace the electrode.
19	Calibration error. The temperature (ATC or MTC) is outside of the specifications of the standard solutions.	Redo the calibration in a room where the temperature lies within the specifications of the buffer solution
20	Calibration error. The file defining the set of calibration solutions is missing.	Download it from our web site: www.chauvin-amoux.com
21	Calibration error. The file defining the set of calibration solutions is not in conformity	Check that it is the right file. If you have modified it, check the format; in particular, the decimal separators must be points, not commas.
22	Recording error. Power was cut off while recording was in progress.	
50	Calibration error. Measurement error for the calibration.	

4. FIRMWARE UPDATE

The procedure is the same for both instrument, but the firmware to download is specific to each ones.

4.1 FIRMWARE UPDATE USING BOOT LOADER

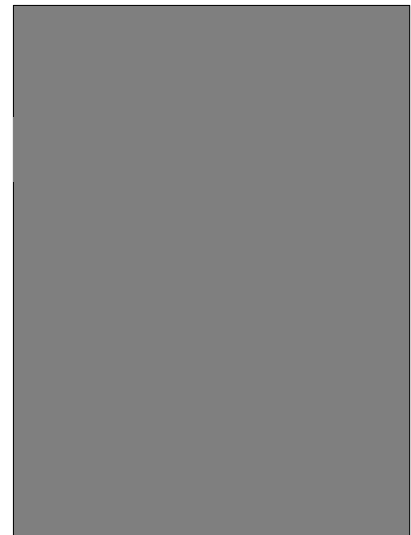
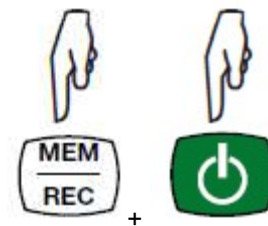


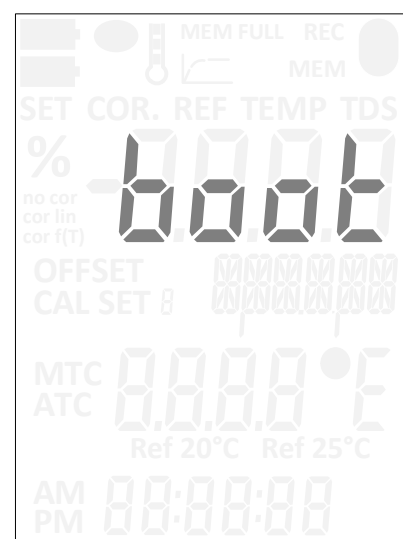
Figure 1 LCD OFF

Start with the instrument off, nothing is displayed on the screen.

Press “MEM/REC” then “ON/OFF” the boot loader goes in the “wait for firmware update” and display “boot”:



Remark: While “MEM/REC” is kept pressed “boot” is displayed.
The Bootloader revision may be displayed pressing the “Backlight” button.



Once all buttons are released, LCD screen then shows “COPY” and a virtual USB drive is mounted on the PC: Connect the instrument to the PC with a micro USB cable.

The user can copy the firmware (file name “firmware.bin”) on the mounted disk.

Once the file is copied, or if the file is already present on the virtual USB drive, it can be copied to internal Flash with a short press on “MEM/REC”.

If the user wants to stop the procedure, it makes a long press on “ON/OFF”.



Figure 2 power ON for a firmware update

When the user decide to copy the firmware in the internal Flash, the bootloader

- Check the firmware integrity (check sum...)
- Erase the whole flash dedicated to applicative firmware.
- Write the internal Flash with the update.

During this step ($\approx 5s$) the screen displays ‘LOAD’.



Figure 3 update in progress

At the end of the firmware copy, we have a message FAIL or PASS.

Pressing “ON/OFF” will turn OFF the product (back to “backup mode”).

Pressing another button will launch the applicative firmware.

In case of “Fail”, pressing a button will turn OFF the product.



Figure 4 update PASS message


5. INSTRUMENT CALIBRATION

5.1 CALIBRATION OF C.A 10101

5.1.1 Requirement

- In order to proceed to the calibration of C.A 10101, it is recommended to use the C.A 10101 powered by batteries. If it is powered by USB, an USB isolator shall be used to connect the C.A 10101 to the PC (You also need an USB cable with a Micro-B connector on one end and a Type A on the other)
- Following equipment is needed:
 - Calibration cable 695779
 - For pH input : voltage calibrator with following performance: $0V \pm 10\mu V$ ($20\mu V$ max), $2V \pm 100\mu V$ ($200\mu V$ max) and an adaptor to connect it on the BNC input of the calibration cable
 - For temperature input: resistors of $1000\Omega \pm 0.15\Omega$ (0.3Ω max) and $1500\Omega \pm 0.15\Omega$ (0.3Ω max) and an adaptor to connect to the jack input of the calibration cable.

5.1.2 Calibration connection

- If you want to power the C.A 10101 with USB, connect it to the USB PC via the USB isolator.
- Power it on by a long pressing on  button.

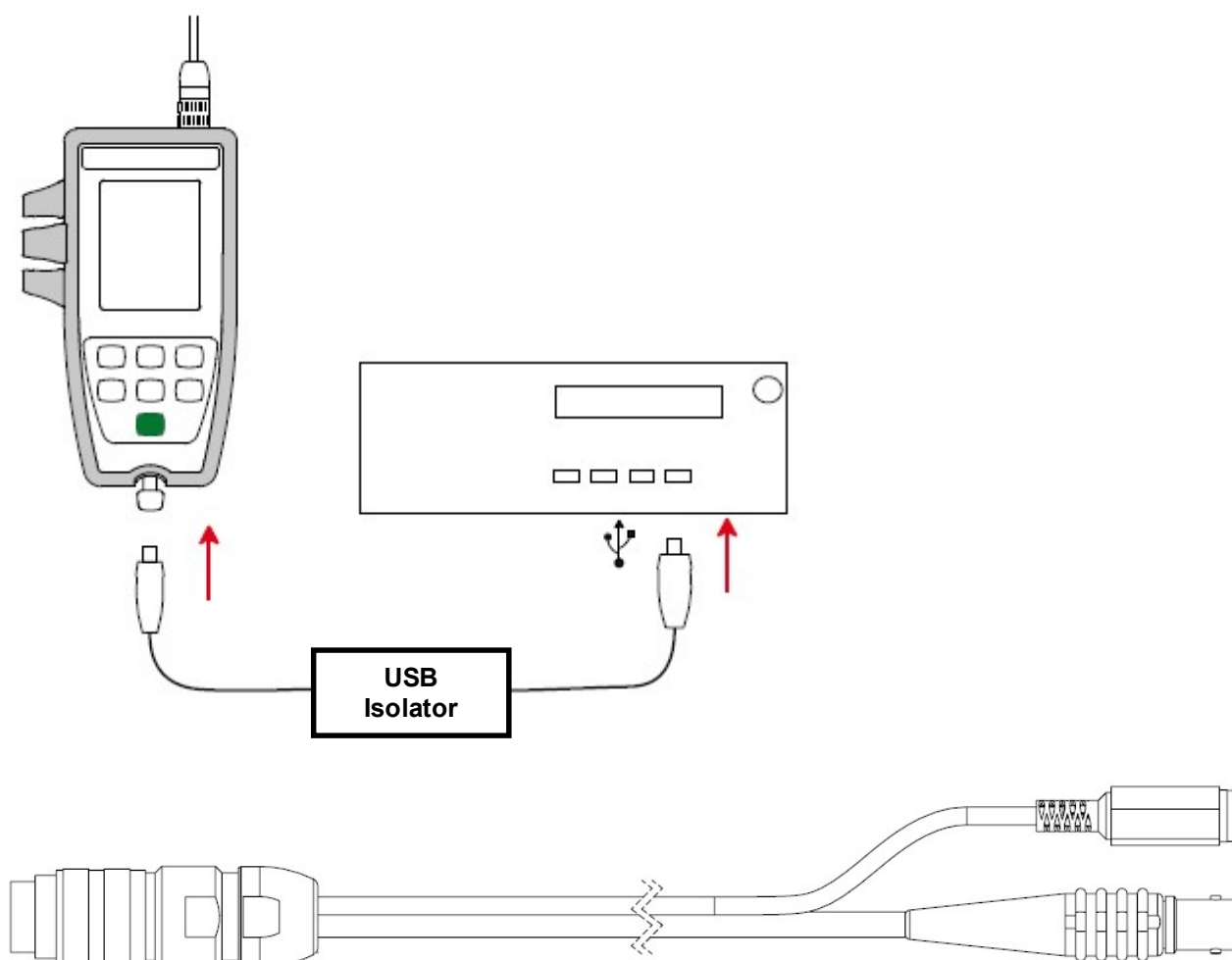
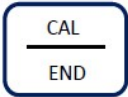



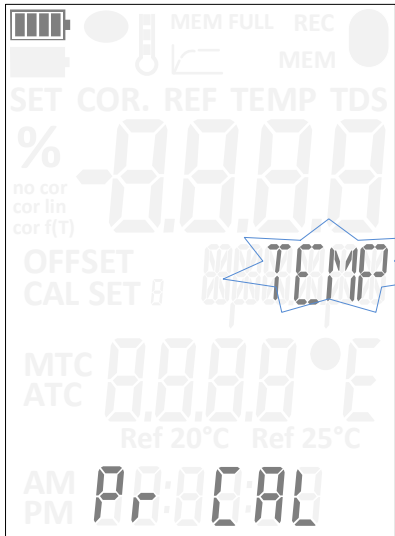
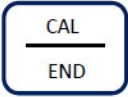
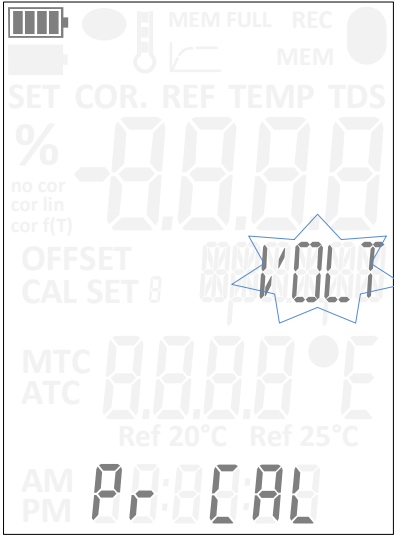




Figure 5 Calibration cable (695779)

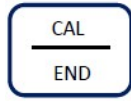
5.1.3 Calibration operation

<p>During this mode, measurement type selection button is disabled.</p>	
<p>Instrument calibration is done by first entering into calibration mode.</p> <div data-bbox="434 495 561 591" data-label="Image"> </div> <p>After a short press on  and during the 3 seconds which the last sensor calibration values are displayed, a short press on both MEM/REC and BACKLIGHT will makes the device entering in calibration mode.</p>	
<p>The user will have the choice of either adjusting the temperature measurement parameters or the pH measurement ones.</p> <div data-bbox="373 1081 488 1169" data-label="Image"> </div> <div data-bbox="536 1081 647 1169" data-label="Image"> </div> <p>A short press on  or  arrows will display the choice.</p> <p>“TEMP” is for Temperature calibration “VOLT” is for pH calibration</p>	
<div data-bbox="373 1460 501 1556" data-label="Image"> </div> <p>A short press on  will validate the choice.</p>	

	
<p>TEMP: the resistor value to be applied physically in place of the PT1000 is displayed.</p>	
<p>“Set” blinks waiting for the user to plug the right value of</p> <div data-bbox="518 875 646 969"><div>CAL</div><div>END</div></div> <p>resistor and a short press on to validate and start the calculation of new parameters for the instrument.</p>	

In a second step, the display requests another resistor value (1500 Ohm) to be applied physically in place of the PT1000 is displayed.

“Set” blinks waiting for the user to plug the right value of



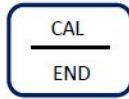
resistor and a short press on to validate and start the calculation of new parameters for the instrument.

During calibration, “run” is displayed blinking meaning that it is ongoing.

When there is no more value to use as input, “tESt” is displayed thus allowing the user to check the validity of the new instrument parameters.

Different values of resistors can be measured to test it.

A short press on



will bring on the save screen

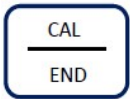
where the user can use



or

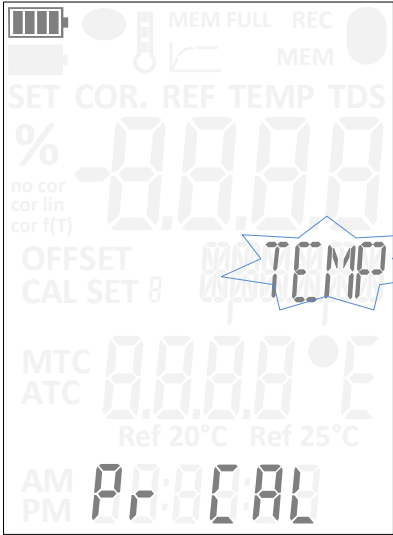
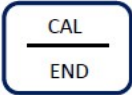




arrows to select “yES” or “no” for saving or not saving the new parameters. Choice must be validate by a short press on



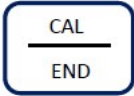
The display returns to the screen to select the measurement parameters (temperature or pH) to be adjusted.




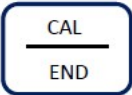
	
<div data-bbox="365 719 497 813"> <div>CAL</div> <div>END</div> </div> <p>A long press on  will terminate the instrument calibration and return it into measurement mode. “Cancel” is displayed.</p> <p>The values considered will be the ones from the last calibration.</p>	
<div data-bbox="491 1279 633 1379"> <div>ON / OFF</div> </div> <p>A long press on “ON/OFF”  will turn off the instrument and the values from the last calibration are restored.</p>	

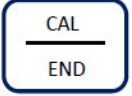


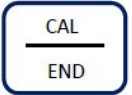

VOLT: The first step request to place a Short Circuit” (or $0V \pm 10\mu V$, $\pm 20\mu V_{max}$) at the input of the pH sensor.


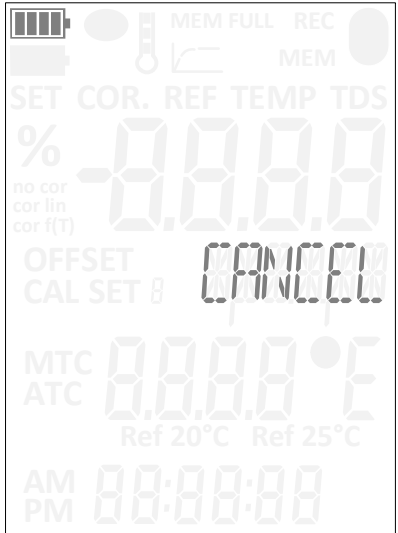
The instrument waits for the user to apply the short circuit by

displaying “SET” blinking. A short press on  will validate and start the calibration

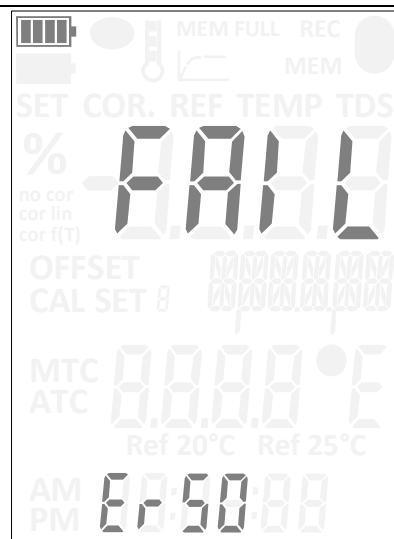
During calibration, “run” is displayed blinking meaning that it is ongoing.

<p>When it is finished, the next value required as input is displayed. "SET" is again blinking waiting for validation</p>	
<p>The instrument waits for the user to apply this voltage by displaying "SET" blinking. A short press on  will validate and start the calibration</p>	
<p>During calibration, "run" is displayed blinking meaning that it is ongoing.</p>	

<p>When there is no more value to use as input, "tEst" is displayed thus allowing the user to check the validity of the new instrument parameters. A voltage can be measured to test it.</p> <p>Only apply a voltage in [-2.000V, 2.000V].</p>	
<p>A short press on  will bring on the save screen</p> <p>where the user can use  or  arrows to select "yES" or "no" for saving or not saving the new parameters. Choice must be validate by a short press on .</p> <p>The display returns to the screen to select the measurement parameters (temperature or pH) to be adjusted.</p>	

	
<div data-bbox="373 810 510 913" data-label="Image"> </div> <p data-bbox="167 891 901 1064"> A long press on CAL / END without validating the new setup will terminate the instrument calibration and return it into measurement mode. “Cancel” is displayed. The values considered will be the ones from the last calibration. </p>	
<div data-bbox="373 1370 510 1473" data-label="Image"> </div> <p data-bbox="167 1451 885 1518"> A long press on ON / OFF will turn off the instrument and the values from the last calibration are restored. </p>	

Before testing new values, an error screen is displayed if offset and/or gain values are out of range. The device calibration mode is thus left and instrument is back in real time measurement mode.




5.2 CALIBRATION OF C.A 10141

5.2.1 Requirement

- In order to proceed to the calibration of C.A 10141, it is recommended to use the C.A 10141 powered by batteries. If it used powered by USB, an USB isolator shall be used to connect the C.A 10141 to the PC (You also need an USB cable with a Micro-B connector on one end and a Type A on the other)
- Following equipment is needed:
 - Calibration cable 695780
 - For conductivity input: resistors of 10M Ω , 20K Ω , 2K Ω , 200 Ω and 1 Ω with an accuracy of 0.05% (0.1% max)
 - For temperature input: resistors of 1000 Ω ±0.15 Ω (0.3 Ω max) and 1500 Ω ±0.15 Ω (0.3 Ω max) and an adaptor to connect to the jack input of the calibration cable.

5.2.2 Calibration connection

- If you want to power the C.A 10141 with USB, connect it to the USB PC via the USB isolator.
- Power it on by a long pressing on  button.

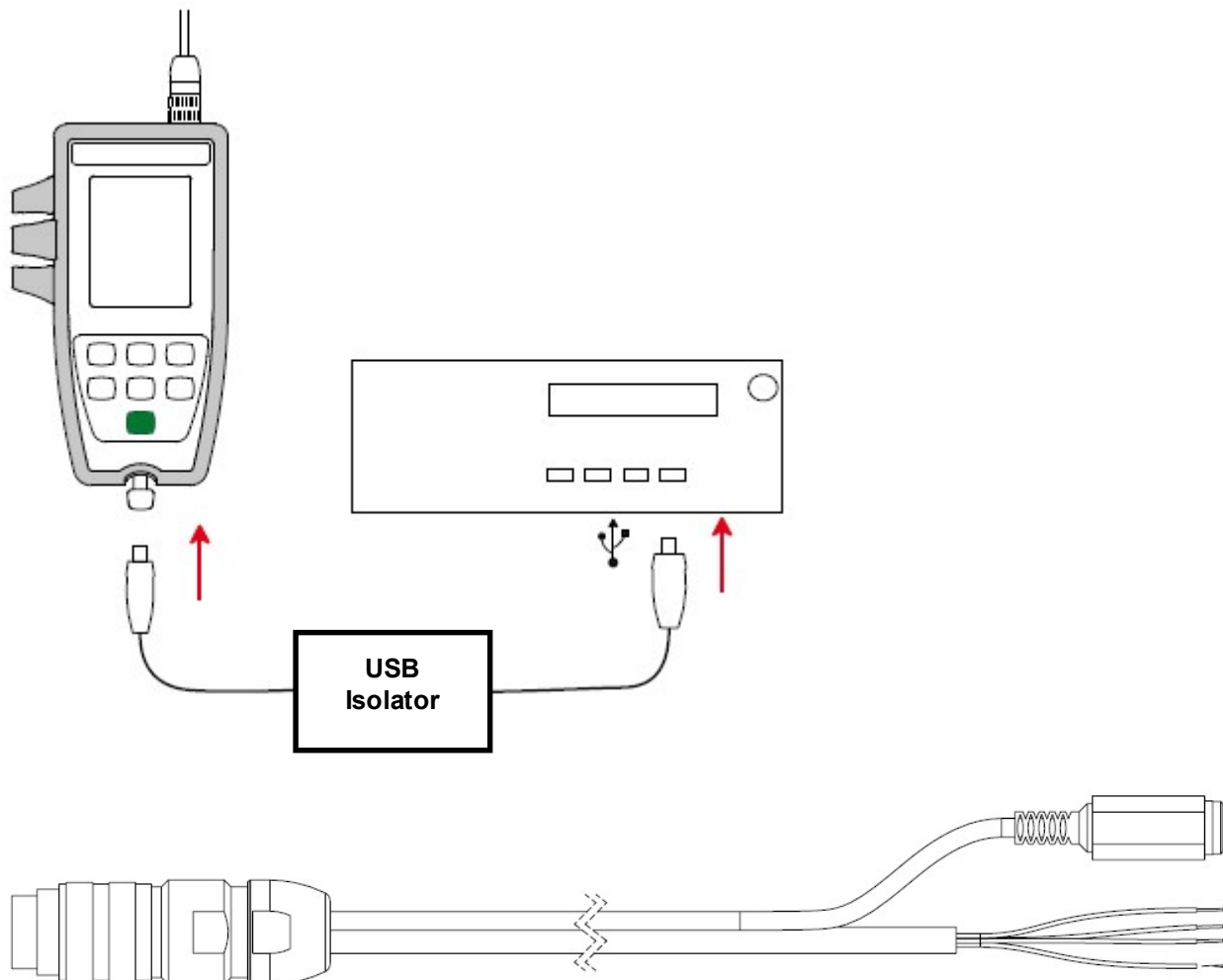
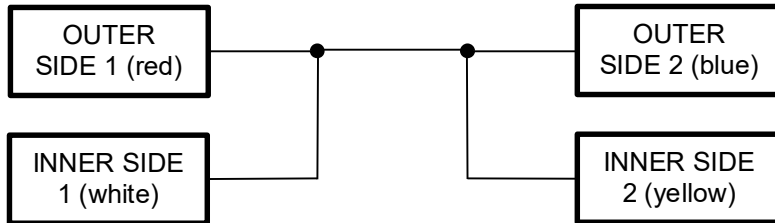


Figure 6 Calibration cable (695780)

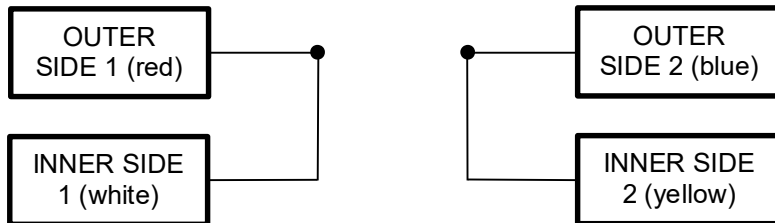
In order to keep good measurement precision and avoid calibration failure, care must be taken for the connection of the resistors via the cable 695780.

During conductivity calibration, the device will ask for some resistor value and connection must be done properly as follow:

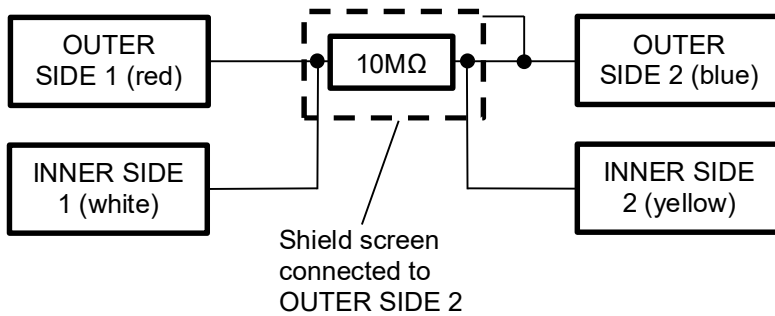
- Short circuit (SC):



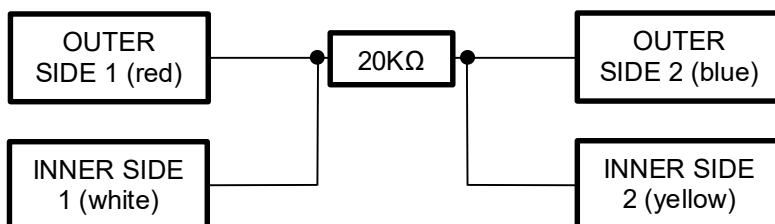
- Open circuit (OC):



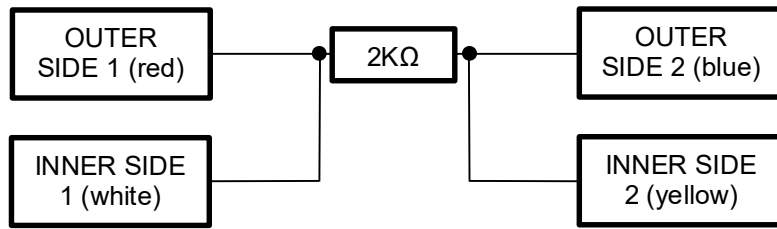
- 10M Ω :



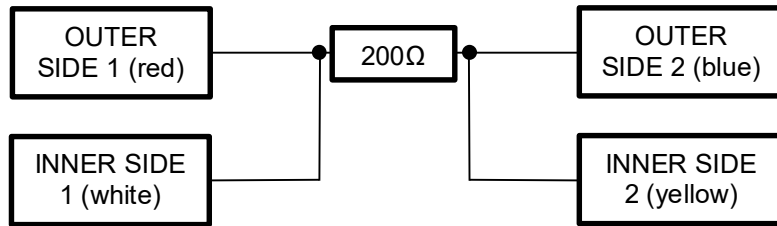
- 20K Ω :



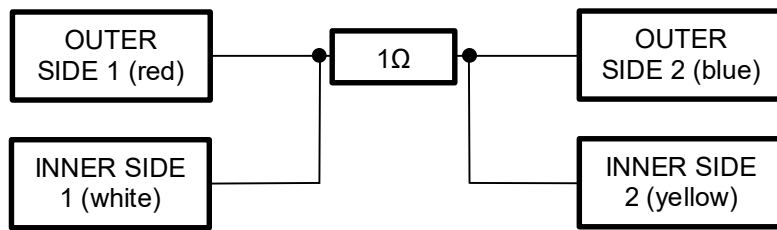
- 2K Ω :

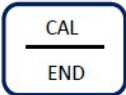





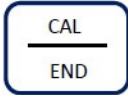
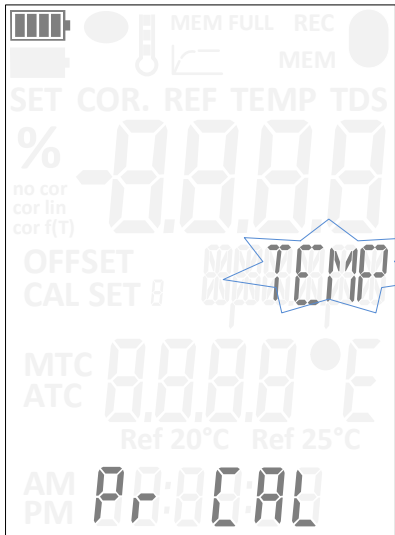
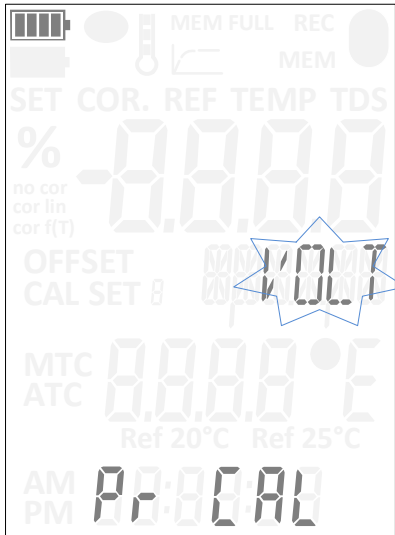


- 200 Ω :



- 1 Ω :

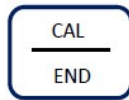


<p>Note: During this mode, measurement type selection button is disabled.</p>	
<p>Instrument calibration is done by first entering into calibration mode.</p> <div data-bbox="435 360 560 454"> <div>CAL</div> <div>END</div> </div> <p>After a short press on  and during the 3 seconds which the last sensor calibration values are displayed, a short press on both MEM/REC and BACKLIGHT will makes the device entering in calibration mode.</p>	
<p>The user will have the choice of either calibrate the temperature measurement parameters or the conductivity measurement ones.</p> <div data-bbox="419 947 531 1032" data-kind="parent" data-rs="2">  </div> <div data-bbox="579 947 691 1032" data-kind="parent" data-rs="2">  </div> <p>A short press on the  or  arrows will display the choice :</p> <p>“TEMP” is for Temperature calibration</p> <p>“VOLT” is for Conductivity calibration</p> <div data-bbox="371 1232 499 1326"> <div>CAL</div> <div>END</div> </div> <p>A short press on  will validate the choice.</p>	
	

Temperature calibration

TEMP: the resistor value to be applied physically in place of the PT1000 is displayed.

“Set” blinks waiting for the user to plug the right value of

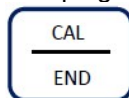


resistor and a short press on to validate and start the calculation of new parameters for the instrument.

During calibration, “run” is displayed blinking meaning that it is ongoing.

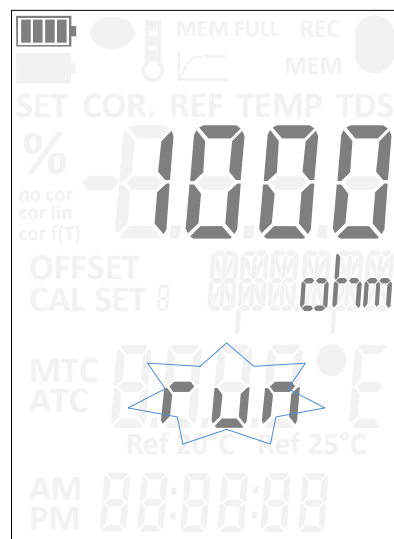
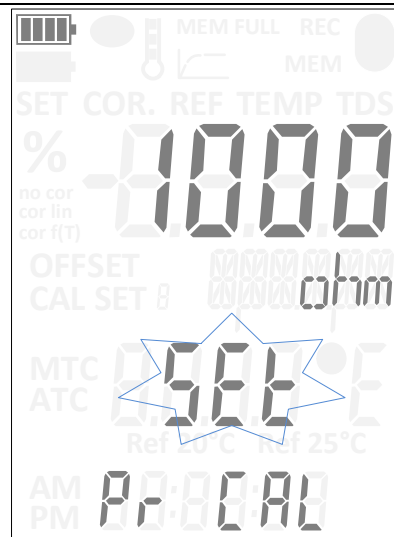
In a second step, the display requests another resistor value (1500 Ohm) to be applied physically in place of the PT1000 is displayed.

“Set” blinks waiting for the user to plug the right value of



resistor and a short press on to validate and start the calculation of new parameters for the instrument.



During calibration, “run” is displayed blinking meaning that it is ongoing.

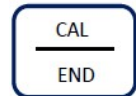


When there is no more value to use as input, “tESt” is displayed thus allowing the user to check the validity of the new instrument parameters.

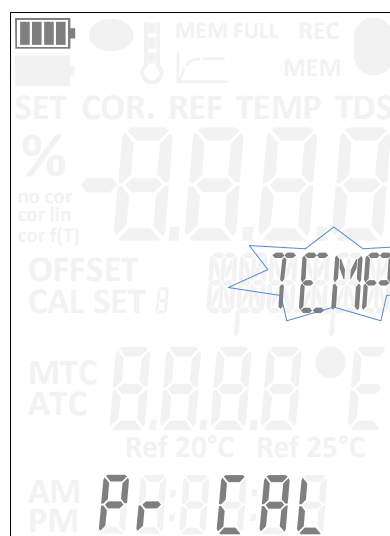
Different values of resistors can be measured to test it.

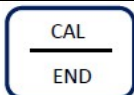
A short press on  will bring on the save screen

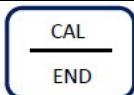
where the user can use  or  arrows to select “yES” or “no” for saving or not saving the new parameters. Choice must be validate by a short press on



The display returns to the screen to select the measurement parameters (temperature or conductivity) to be adjusted.



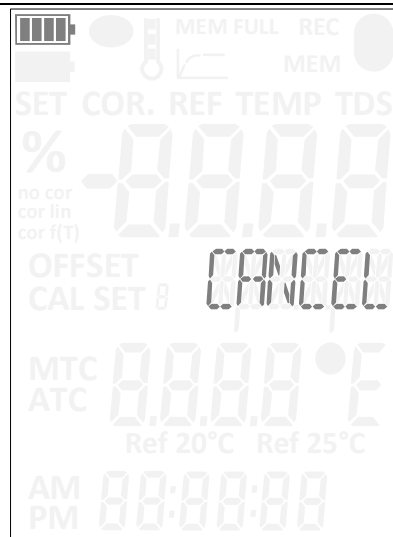


A long press on  will terminate the instrument calibration and return it into measurement mode. "Cancel" is displayed.

The values considered will be the ones from the last calibration.









A long press on  will turn off the instrument and the values from the last calibration are restored.




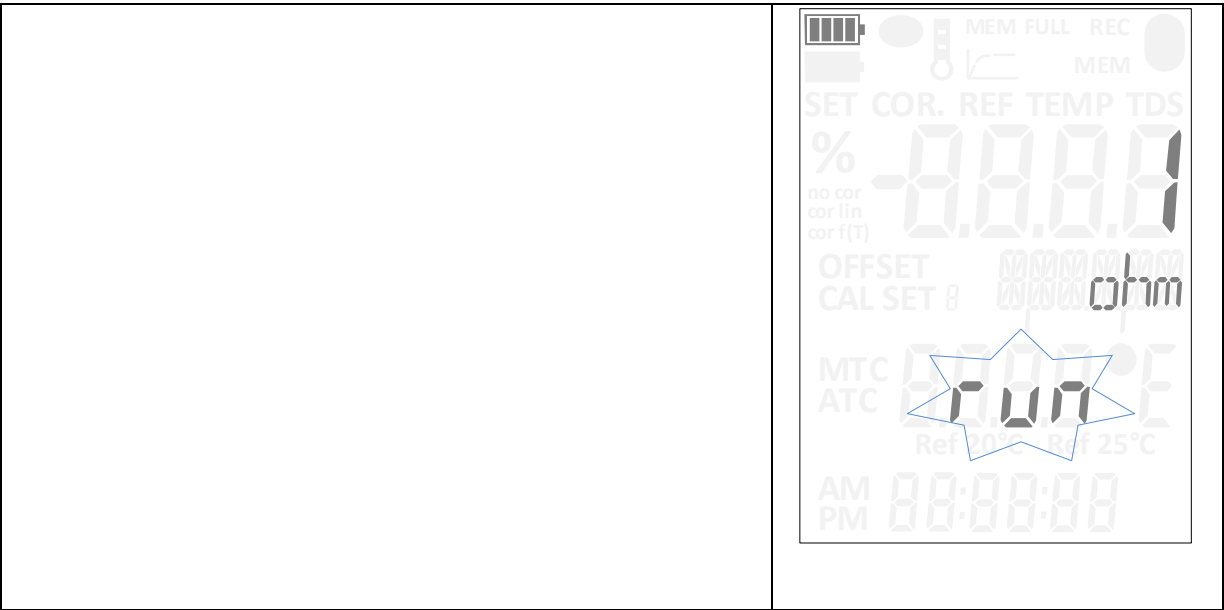
<p><u>Conductivity calibration</u></p> <p>Select VOLT: The first connection to be applied physically in place of the conductivity sensor is displayed.</p> <p>Note: different connection will be required for all steps of calibration: short circuit (SC), open circuit (O.C), 10Mohm, 20kohm, 2 kohm, 200ohm and 1ohm.</p>	
<p>For each measurement point, The instrument waits for the user to apply the request connection, displaying "SET" blinking. A</p> <div data-bbox="347 683 481 779" data-label="Image"> </div> <p>short press on will validate and start the calibration</p> <p>During calibration, "run" is displayed blinking meaning that it is ongoing.</p> <p>When it is finished, the next value required as input is displayed. "SET" is again blinking waiting for validation</p>	
<p>Here, a set of values representing the value of resistor to use as input is displayed.</p> <p>After a measurement is done for an input, the next one is displayed automatically as shown in the example.</p> <p>After the last value is done, the instrument switches to a test state. The user can check if the calibration is correct by setting a random resistor value as input and checking if its right value is displayed.</p>	

	 <p>The digital display shows various status indicators at the top: a battery level icon, a thermometer icon, and 'MEM FULL REC' and 'MEM' labels. Below these are 'SET COR. REF TEMP TDS' and a percentage sign. The main display shows '-0.0.0.0' with 'no cor', 'cor lin', and 'cor f(T)' below it. Below this is 'OFFSET CAL SET 8' and a series of zeros. The central display shows 'MTC ATC' and 'run' in a blue starburst, with 'Ref 20°C' and 'Ref 25°C' below it. At the bottom is 'AM PM' and a time display '00:00:00'.</p>
	 <p>The digital display shows various status indicators at the top: a battery level icon, a thermometer icon, and 'MEM FULL REC' and 'MEM' labels. Below these are 'SET COR. REF TEMP TDS' and a percentage sign. The main display shows '-0.0.0.0' with 'no cor', 'cor lin', and 'cor f(T)' below it. Below this is 'OFFSET CAL SET 8' and a series of zeros. The central display shows 'MTC ATC' and '5.00' in a blue starburst, with 'Ref 20°C' and 'Ref 25°C' below it. At the bottom is 'AM PM' and a time display '00:00:00'.</p>  <p>The digital display shows various status indicators at the top: a battery level icon, a thermometer icon, and 'MEM FULL REC' and 'MEM' labels. Below these are 'SET COR. REF TEMP TDS' and a percentage sign. The main display shows '-0.0.0.0' with 'no cor', 'cor lin', and 'cor f(T)' below it. Below this is 'OFFSET CAL SET 8' and a series of zeros. The central display shows 'MTC ATC' and 'run' in a blue starburst, with 'Ref 20°C' and 'Ref 25°C' below it. At the bottom is 'AM PM' and a time display '00:00:00'.</p>

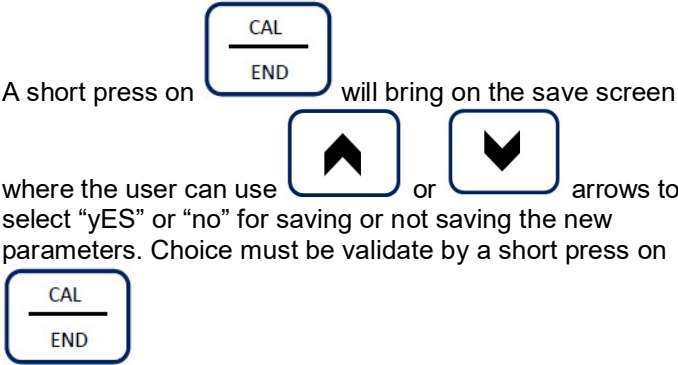
	
	
	

	 <p>MEM FULL REC MEM</p> <p>SET COR. REF TEMP TDS</p> <p>% -0.000</p> <p>no cor cor lin cor f(T)</p> <p>OFFSET CAL SET 8 0000 kohm</p> <p>MTC ATC</p> <p>Ref 20°C Ref 25°C</p> <p>AM PM 00:00:00</p>
	 <p>MEM FULL REC MEM</p> <p>SET COR. REF TEMP TDS</p> <p>% -0.000</p> <p>no cor cor lin cor f(T)</p> <p>OFFSET CAL SET 8 0000 kohm</p> <p>MTC ATC</p> <p>Ref 20°C Ref 25°C</p> <p>AM PM 00:00:00</p>
	 <p>MEM FULL REC MEM</p> <p>SET COR. REF TEMP TDS</p> <p>% -0.000</p> <p>no cor cor lin cor f(T)</p> <p>OFFSET CAL SET 8 0000 kohm</p> <p>MTC ATC</p> <p>Ref 20°C Ref 25°C</p> <p>AM PM 00:00:00</p>

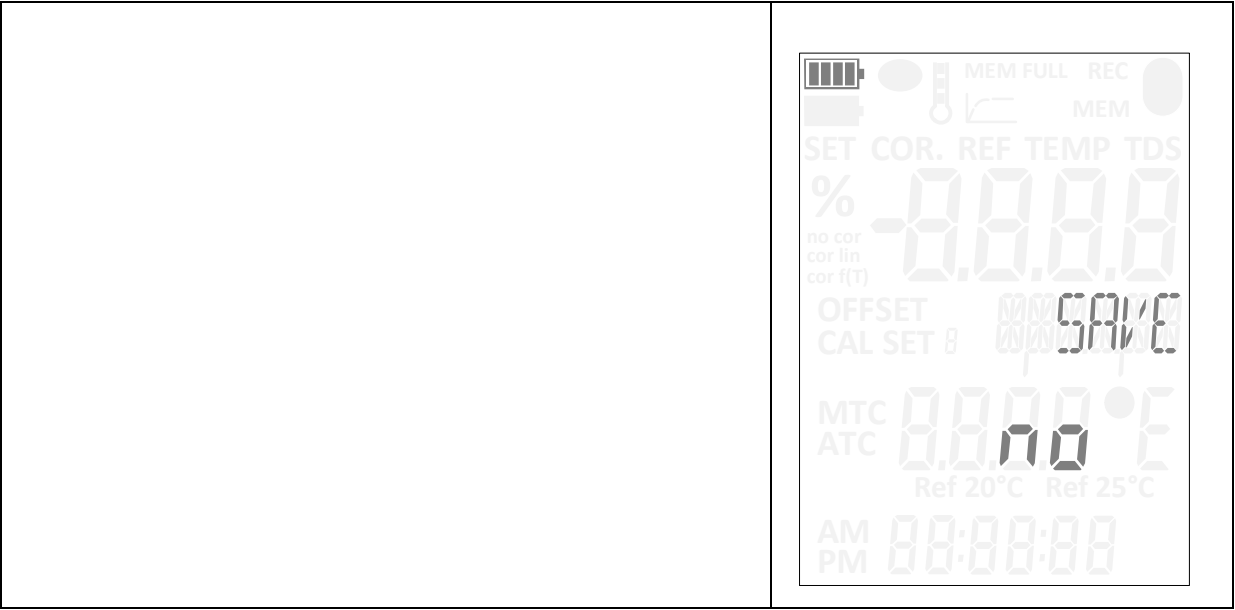


When there is no more value to use as input, “tES” is displayed thus allowing the user to check the validity of the new instrument parameters. A resistor can be measured to test it.



The display returns to the screen to select the measurement parameters (temperature or conductivity) to be adjusted.





<div data-bbox="365 208 504 309" data-label="Image"> </div> <p>A long press on CAL / END without validating the new setup will terminate the instrument calibration and return it into measurement mode. “Cancel” is displayed.</p> <p>The values considered will be the ones from the last calibration.</p>	<div data-bbox="954 208 1350 734" data-label="Image"> </div>
<div data-bbox="365 763 504 864" data-label="Image"> </div> <p>A long press on ON / OFF will turn off the instrument and the values from the last calibration are restored.</p>	

<p>Before testing new values, an error screen is displayed if offset and/or gain values are out of range. The device calibration mode is thus left and instrument is back in real time measurement mode.</p>	<div data-bbox="954 983 1350 1509" data-label="Image"> </div>
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