EVALUATION KIT corTEC® KIT xCRC02A

The current version of the corTEC® evaluation kit provides a preview of the range of functionality coming shortly with a new corTEC® based xCRC plattform of products. This evalution kit allows to get familiar with three areas of applications:

- Quality/fluid property detection and control (“QCRC”-products)
- Highly demanding continuos level measurement (“LCRC” -products)
- Touch sensor (“TCRC”-products) – detection of human finger under most difficult conditions

SAFETY AND WARNING NOTES

Evaluation kits are solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of the products. Evaluation kits have no direct function and are not finished products. Evaluation kits shall not be directly or indirectly assembled as a part or subassembly in any finished product. Evaluation kits do not comply with any EMC or other regularatory requirements and operation is subject to the condition that this product cannot cause harme or interference.

Evaluation kits are solely for use by technically qualified, professional electronics experts who are familiar to the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. User assumes all responsibility and liability for proper and safe handling and use and agrees with the restrictions and disclaimer at the end of this document.

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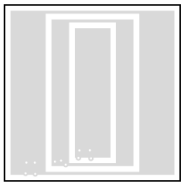
SCOPE OF DELIVERY

Scope of delivery KIT-xCRC02A:

- USB cable
- Interface Box
- Sensor cable
- 2 different prototypes of xCRC sensors

The two prototypes differ by its electrodes and measurement modes to allow a preview of the large range of functionality coming with the xCRC plattform of products:

Active Sensor Area Prototype A1
(outer white rectangle)



Active Sensor Area Prototype A2
(white rectangle)

Prototype A1 (PCB code 4000-0259-0001-00) offers two measurement modes (self and self plus mutual mode). Self measurement mode is a standard mode for TCRC touch sensor functionality, while a combination of self and mutual mode is for general evaluation purpose. We recommend to test both modes also for Quality and Level applications as they might provide advantages in some applications. Please note that influence by touching the sensor surrounding is to be expected.

Prototype A2 (PCB code 4000-0259-0001-01) offers one mutual measurement mode, which is optimized for quality and level and applications as touching of the sensor and sourrounding is mostly compensated in this mode.

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OPERATION AND USE

BASIC TIPS ON ESD

Electrostatic Discharge (ESD) can damage electronic components during the handling of circuit boards. The following tips help to reduce the probability of ESD events:

- Avoid charge separation
  - Do not wear (layers of) polyester clothes
  - Carpets – bad ←→ wood, tile or concrete flooring – good

- Support charge decay
  - Do not wear shoes with insulating (rubber) sole (e.g. Crocs)
  - Higher humidity dissipates static charge (dry heater air in winter → bad)

- Before touching the PCB, users should “ground” themselves, e.g. by touching the bare part of a radiator.

PREPARATION

- Download of EBE Control Software at https://www.ebe.de/en/downloads/
- Minimum software requirements: Windows 10 or Windows 11 with .NET Framework 4.8 installed. .NET Framework can be downloaded from Microsoft for free, if not installed.
- Connecting the interface box via USB cable to the computer
- Connecting the sensor via sensor cable to the interface box
- For mounting of the sensor please refer to sensor Data Sheet

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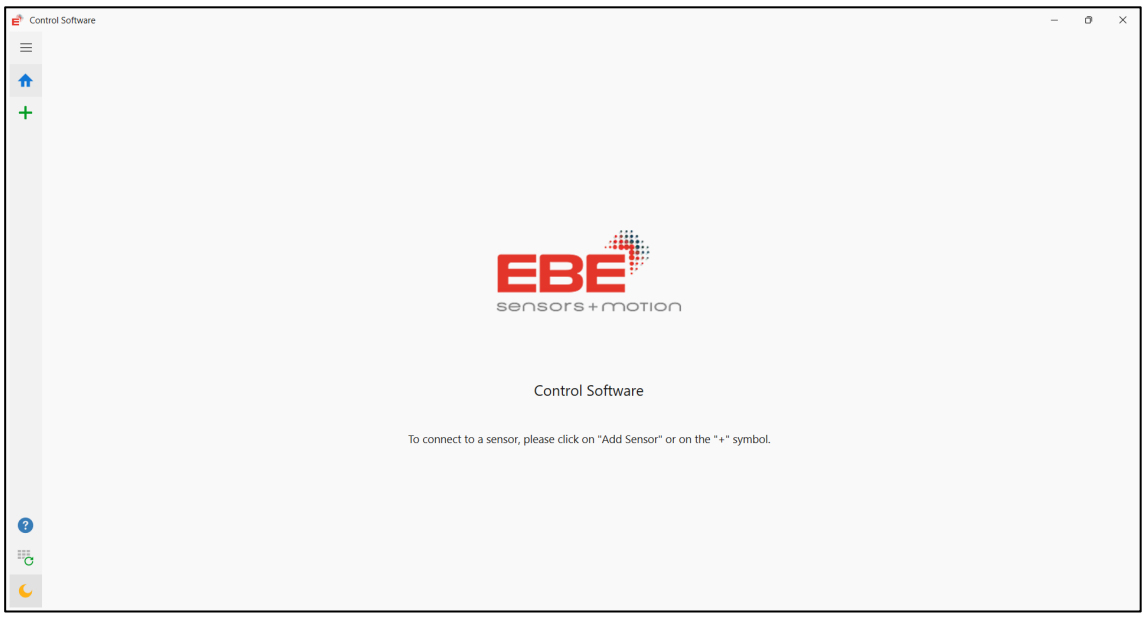
OPERATION

Starting the Control Software will lead to the following starting page:



On the left side the menu band is located:

-  Allows to expanding the menu band
-  Home - Guiding back to the starting page.
-  Sensors can be added to the Control Software by auto detection. Measurements can only be done with connected sensors.
-  Sensor symbol – a senor is connect to the Control Software. General information and measurement options are shown. Information's may vary on sensor type.
-  Help – support contact information of EBE.
-  This option checks if there is a new version of the Control Software available. If so, the EBE homepage will open for downloading the new version.
-  The day/night mode can be changed.

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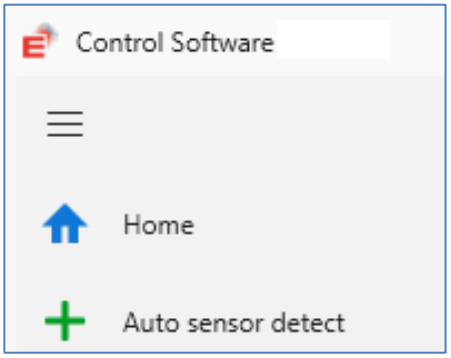
SENSOR CONNECTION

The Control Software can detect EBE sensors automatically. Connection can be established by clicking on the green cross symbol / “Auto sensor detect” text.



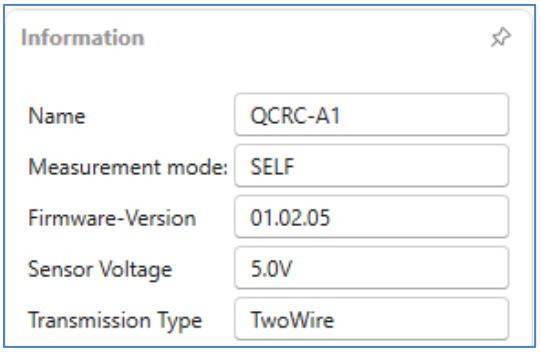
After a short time, the Control Software establishes the communication with the sensor. If this operation is succesful, the sensor is added to the menu band and three windows appear: Information window, Sensor data window, Measurement and logging window.

When autodetection was not successful, a manual connection can be tried with selection of sensor box and sensor type. This might occure with older sensor firmware versions, where autodetection mode was not supported. For sensor firmware upgrade, please contact EBE.

To disconnect a sensor, press the icon  next to the sensor name. This must be don explicit, before a new sensor can be detected.

Sensor information window

This window provides general information’s about the actual connected sensor:



- Name
  The EBE name of the sensor (here a QCRC-A1).
- Measurement mode
  Shows which measurement mode is active.
- Firmware-Version
  The firmware version of the sensor.
- Sensor Voltage
  The applied sensor supply voltage.
- Transmission Type
  One- or TwoWire communication.

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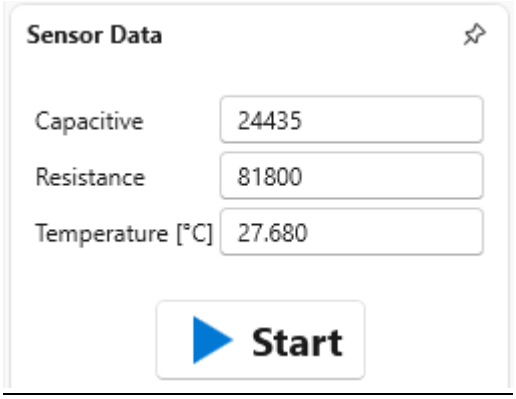
Sensor Data window

Displays the actual sensor output values – capacitive measurement value, resistance measurement value and temperature.



Data acquisition is started by pressing the button “Start”.

Measurement and Logging window

This window is divided in several tabs providing information and setting possibilities for the sensor data:

Sensor Live Chart

After pressing the Start button located in the Sensor Data window the Sensor Live Chart shows the capacitive and resistance measurement values as well as the temperature values. The temperature values are collapsed by default.

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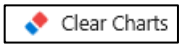
Features:

- While hovering with the mouse over a graph, the timestamp and the measurement value are displayed.
- Zoom in and out is possible (mouse wheel).
- Fade out and fade in of graphs.
- With the clear charts button 

the live chart is cleared and the time stamp starting from 00:00:00 again. Please note, that the data recorder is not affected by clearing the charts.

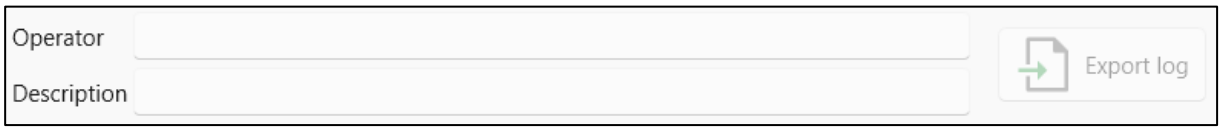
Data Recorder

In this tab, the recorded data is shown in a table view. Data recorder will start automatically when Start Button was pressed in the sensor data window, as described above.

Features:

- Listed capacitive, resistance and temperature values with the particular timestemp.
- Clear previous logged data using the clear button 

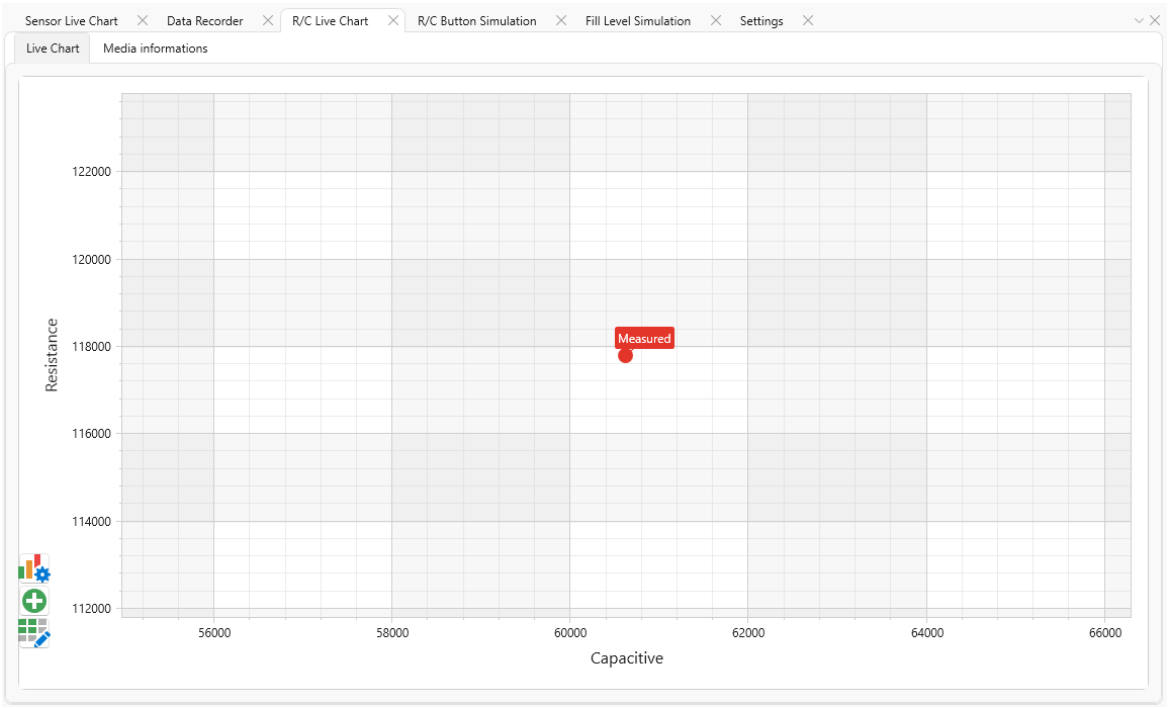
.
- Export logging data to a .csv or .xls file. The .csv data format is recommended for taking long term measurements.
- Possibility to provide further information in the Log File by using the operator and description window.



It is recommended to change the sample rate in the tab “Settings” for taking long term measurements to reduce the number of measurement and prevent the software from memory overflow, slowing down the application.

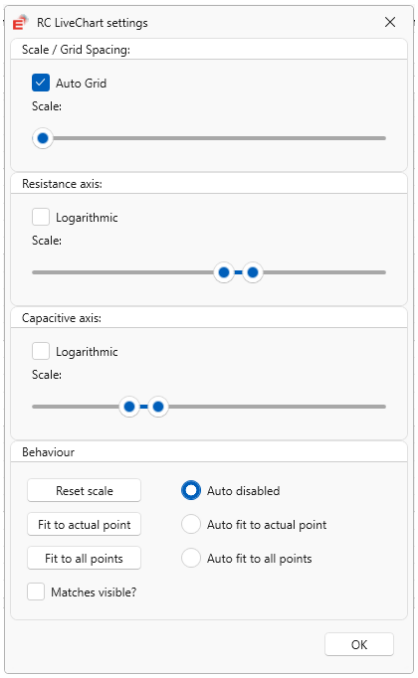
R/C Live Chart

The R/C Live Chart tab shows the capacitive and resistance measured value in a two-dimensional diagram. The capacitive value is plotted on the X-axis, the resistive value on the Y-axis:



In addition to show the two measured values in a X-Y diagram, the R/C Live Chart offers various options for adjustment.

Adjustment and behavior of the graph can be made via the chart settings:



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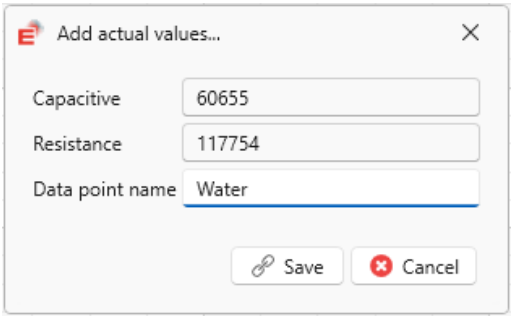
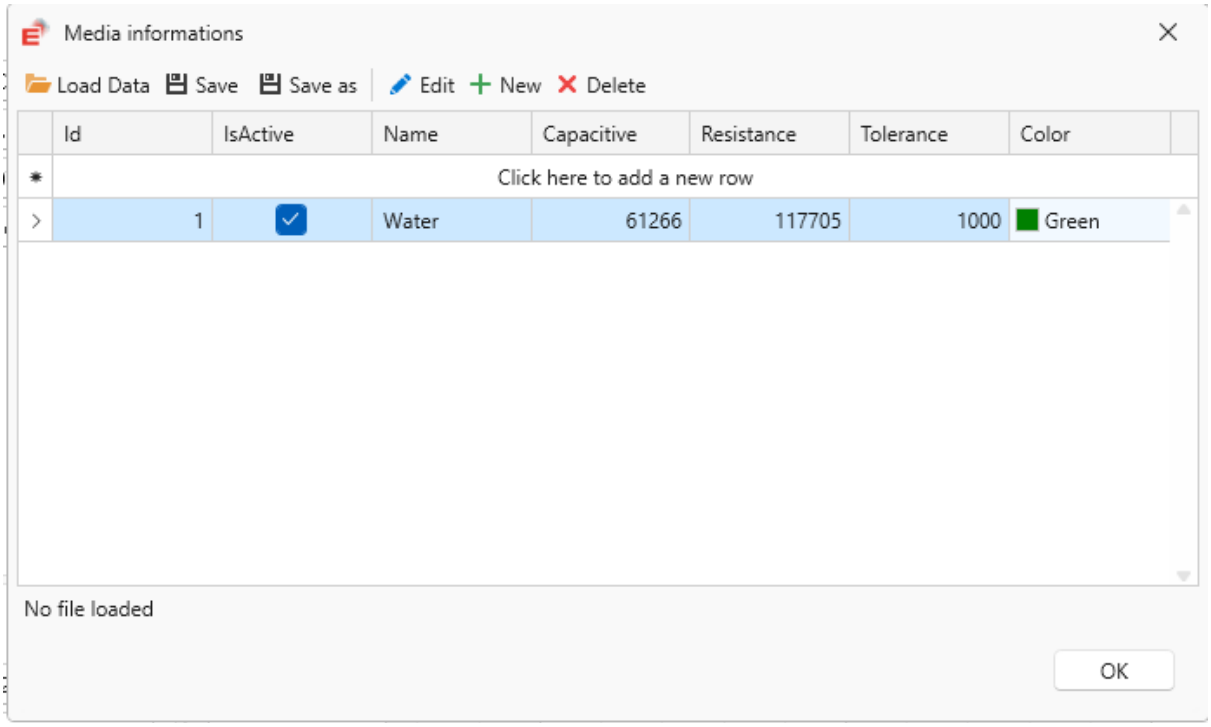
The green plus symbol can be used to save and name data points, for example for different media, which are then displayed in the diagram.




All saved values can be viewed and edited pressing this symbol or choosing the Media Information tab above the graph. Individual points can be differentiated by color, set to active/inactive and a tolerance field can be defined around the measurement point. New measured values can also be created manually. Tables with saved values can also be exported so that they can be imported again later:



For media detection, a tolerance value can be defined. If a measured value is in the area of the defined tolerance, the assigned media is shown in the R/C chart.

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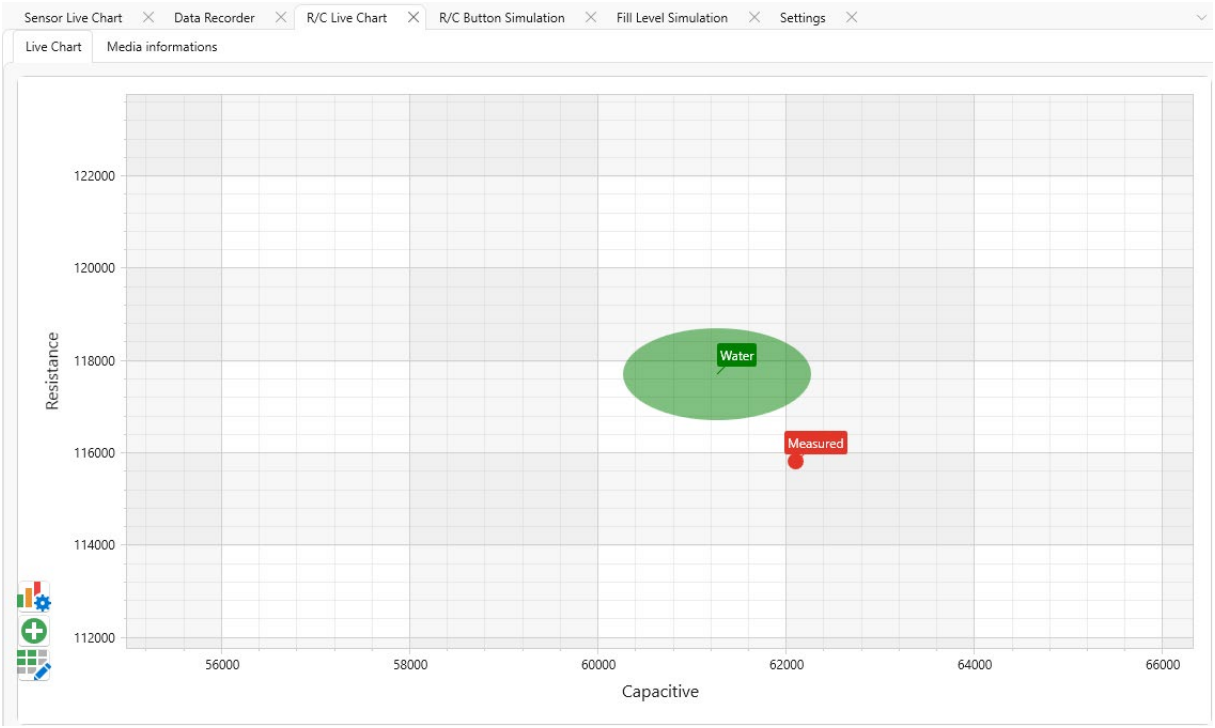
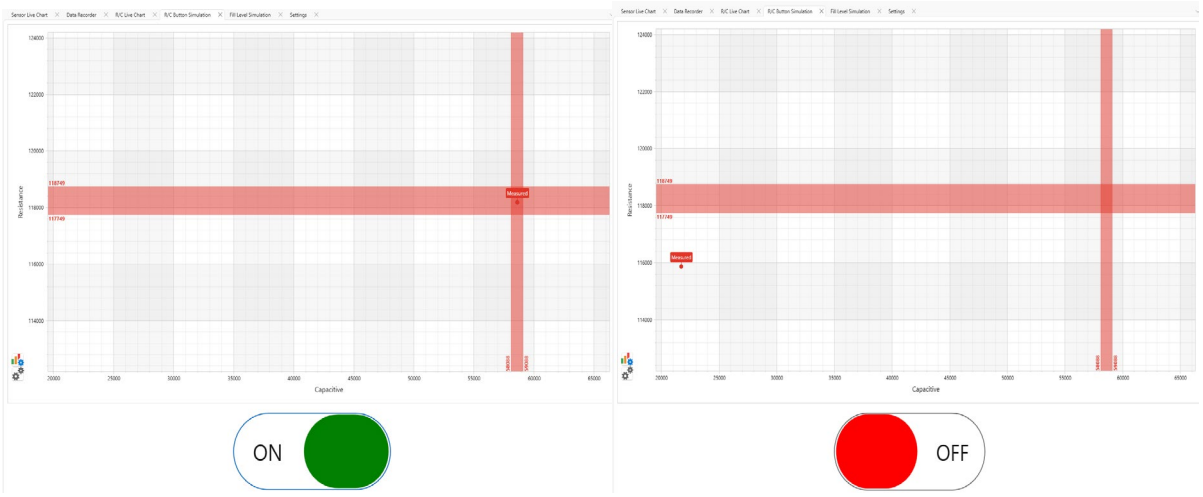
Result:



R/C Button Simulation

The R/C Button Simulation tab allows you to simulate the function of the QCRC as a capacitive button. A relevant switching range can be defined for both the capacitive and the resistive measured value. The intersection of the two ranges defines the trigger area for swicth state change.



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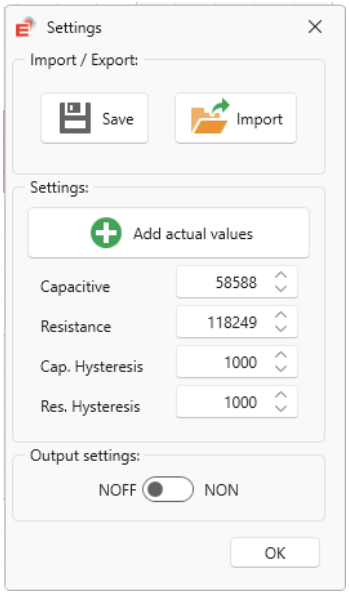
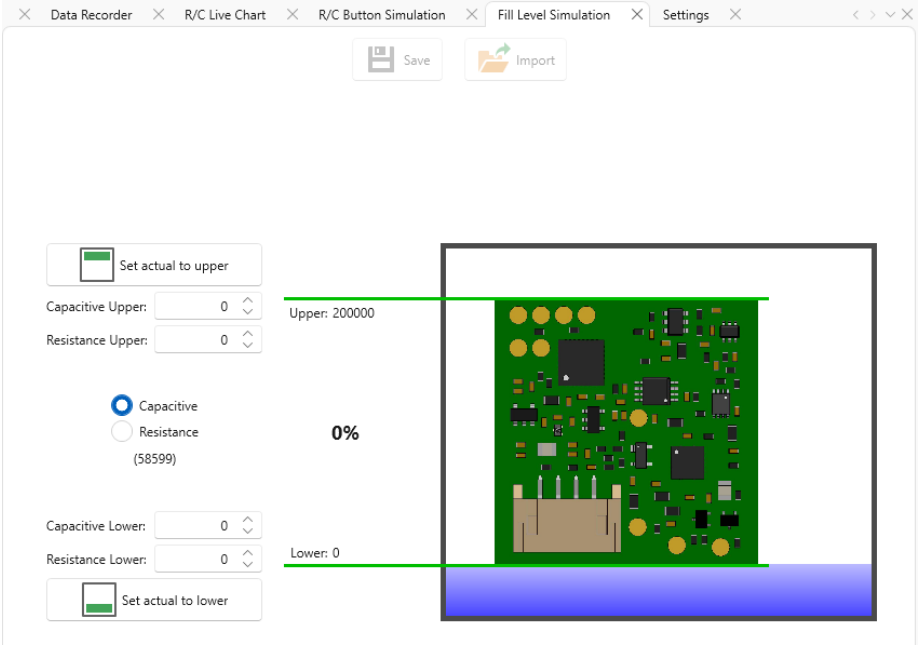
This symbol can be used to set the measured values of the switching point and their hysteresis:



The determined settings can be saved as a .json-File so that they can be imported again at a later date.

Fill Level Simulation

The Fill Level Simulation tab will demonstrate the possibility to use the QCRC as a continuous level sensor. Fill level is calculated by setting a minimum and maximum value and do a linear approximation to get a percentage value in the teached condition.



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To be able to simulate a fill level, you must first define the limit values. To do this, follow the steps below:

Step 1: Fill the target medium in the application to the lower sensor electrode edge like shown in the picture above and press the button “Set actual to lower”

Step 2: Fill the target medium in the application to the upper sensor electrode edge like shown in the picture above and press the button “Set actual to upper”

Step 3: You can now fill the application to a various level and the fill level is shown in percent in die picture. You can also choose, if you want to use the capacitive or the resistance measurement value for the demonstration.

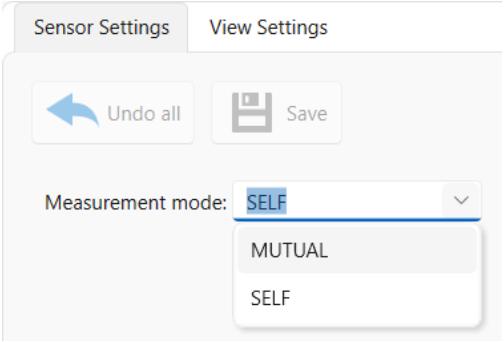
Step 4: The determined limits can be saved as a .json-File so that they can be imported again at a later date.

To get repeatable results, proper mounting of the sensor is necessary. Variation in air gap will create different values and therefore not a proper scaling of the fill level.

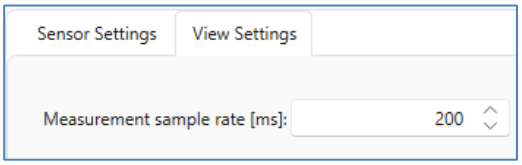
Settings

The Settings tab is seperatet in two more tabs: the Sensor Settings and the View Settings.

With the Sensor Settings tab, you can switch the measurement mode from SELF (standard) to MUTUAL, when more than one mode is supported by the sensor. As mentioned above this option is only available for QCRC-A1 prototypes. The change of the measurement mode is only possible while the measurement is not active and has to be saved to the sensor by using the Save button.



The View Settings tab provides the posibility to change the sample rate of the sensor. The sample rate can be changed from 200ms (0,2s) to 10.000ms (10s).



It is recommended to change the sample rate for taking long term measurements to reduce the number of measurement and prevent the software from crashing and data from being lost.

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The technical values stated are based on laboratory tests. Tests are always carried out in a free field and do not comply with any standard, why approximate values are given. The user is responsible for determining the suitability of the technical information referred to herein for his evaluation. The information contained in this document is for general guidance only. On delivery of the component, EBE is only obliged to implement those properties set out and agreed upon in this document. Further properties are not included. No guarantee is given. Warranty is limited to forementioned extend.
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