REGENERATOR
User manual

Rev. 1.3 26/10/2021

The ***Regenerator*** is an equipment suitable to work on monobloc lead batteries (6V, 8V and 12V), both lead acid and AGM batteries. **It is not suitable for gel, lithium, nickel-cadmium batteries, or other technologies**.

The ***Regenerator*** can perform various processes on batteries:

- REGENERATION: recover capacity in batteries that are not used correctly
- CAPACITY TEST: measure the actual capacity of a battery
- CYCLIC TESTS: evaluate the performance of the capacity through a sequence of charge and discharge cycles
- REFRESH: keep batteries in stock
- EQUALIZATION: balance the batteries that will form a single, large battery

Further details in the respective sections.

RULES OF CONDUCT AND LIABILITY

This equipment is a tool for professional use only.

The operation requires the introduction of correct information on the batteries to be subjected to the processes:

Introducing incorrect information can cause serious damages

Deliberately no controls have been introduced on the congruence between the battery voltage detected by the device and the one inserted manually, because these mechanisms would prevent certain functions.

The operator is responsible for the programming and the correct use of the equipment

The flexibility and power of the device allow the operator to obtain excellent results, but require competence, awareness, training and attention in use.

Using the equipment for other uses than those described in these instructions is strictly prohibited and can cause serious damage.

The operator is responsible for the correct use and any consequences. The manufacturer is not responsible for any damage due to improper use.

INSTALLATION

Install the ***Regenerator*** indoors, in a room free of humidity, acids, dust, roofs

Do not obstruct the ventilation holes.

!!! IMPORTANT!!!

The ***Regenerator*** must be fixed vertically, with the supplied roof applied.

The ***Regenerator*** MAY NOT WORK PROPERLY if not installed in the indicated position.

Room temperature must be between 0 - 35 ° C

To obtain more precise results in measuring capacity, we recommend to use the ***Regenerator*** at a temperature between 15 - 25 ° C

For safety reasons it is essential to use the ***Regenerator*** in well-ventilated places and put the battery in a collection tray made of anti-acid material

ELECTRICAL SUPPLY

Be sure the rating data are compatible with the mains power supply (voltage, frequency, power)

The ***Regenerator*** can remain on even without a battery connected, all process programming and data download operations do not require the battery.

WARNING: absolutely avoid activating a process without the battery connected, the operation could damage the ***Regenerator.***

BATTERY CABLE

The supplied battery cable must not be modified in any way, it must be screwed directly onto the battery poles.

The use of pliers, clamps or other types of temporary connections is prohibited. Uncertain contacts could give rise to sparks in able to detonate the hydrogen produced by the battery under test.

Failure to comply with these provisions could alter the functioning of the device and prevent obtaining the desired results. In case of wear, the cables have to be replaced by the manufacturer.

When the Regenerator is turned on but no test is running, the battery cables can contact without causing damage.

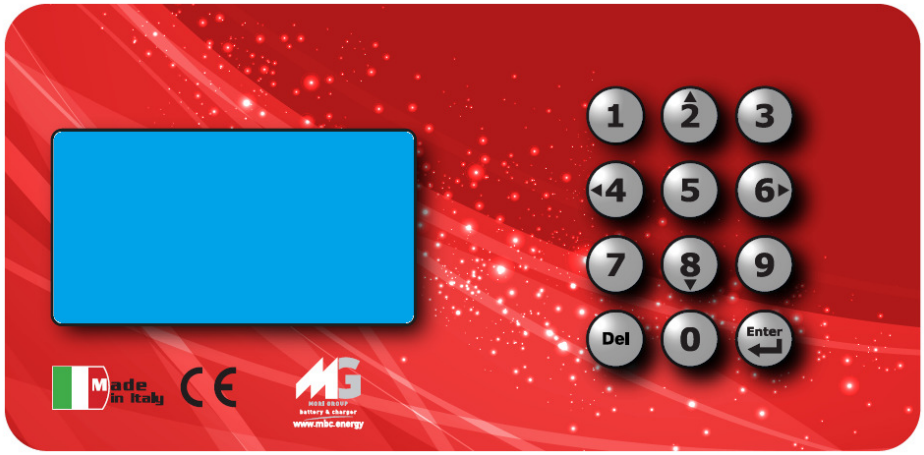
WARNING: Before connecting the cables to the battery, check that the latter has no inverted voltage.

Connect a voltmeter with a red test lead on the positive pole and a black test lead on the negative pole: the voltmeter reading must have a positive sign, if it indicates a " − " in front of the value, it means that the battery is reversed:

Is NOT possible to perform any tests on the battery in these conditions because it creates a dangerous situation for safety, and also damages the Regenerator

KEYBOARD

The ***Regenerator*** is equipped with a keyboard with numeric keys and / or function through which all the device functions are managed. The display provides from time to time all the information and indications of the procedures in progress.



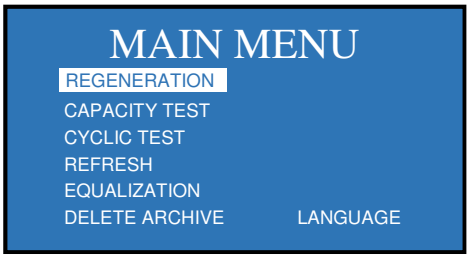
POWER ON

With the switch in the OFF position (0), connect the power cable to the mains and fix the battery cable **DIRECTLY** to the battery poles.

Turn on the device by turning the switch to ON (1).

The ***Regenerator*** beeps for 2 seconds.

The display will show the MAIN MENU screen:



Press 2 and 8 (up/down arrows) to scroll up and down the line of the MAIN MENU.

The selected line is highlighted in a white field.

Press Enter to go in the MENU of the selected function.

If no key is pressed for more than two minutes, the display backlight is deactivated. Pressing any key, the display is reactivated.

FUNCTIONS OF REGENERATOR:

REGENERATION

Regeneration is an exclusively electrical process that aims to restore the electrochemical balance in the cells and thus recover capacity. A positive result cannot be guaranteed in any way because it depends on the unknown initial conditions of the battery under the process. This balance is normally altered by the incorrect use of batteries, therefore the best regeneration results on batteries will be obtained:

- Incorrectly charge / discharge
- Leave for a long time
- Sulfated
- Aged

On the contrary it will be impossible to successfully regenerate batteries:

- With mechanical damage, deformation
- With interrupted or short circuit cells
- Completely exhausted: total absence of active matter on the plates
- Completely dry: total absence of electrolyte with disintegration of the active matter

The manufacturer is not responsible in case of failure of the regeneration process.

The regeneration process may worsen the condition of the battery undergoing the process.

The manufacturer is not responsible in case of deterioration of the battery under the regeneration process.

The regeneration process is very complex, it can bring the battery into different charging or discharging conditions compared to daily use. This is possible only because it is automatically managed by the device which contains a specific algorithm studied and tested.

It is strongly discouraged to arbitrarily extend these charging / discharging concepts to other contexts, this could cause serious damage not attributable to the manufacturer of the equipment.

Regeneration is considered successfully done when the battery returns to have at least 65% of the capacity compared to the plate value.

It is strongly recommendable to also carry out preventive regeneration (do not wait for the battery to have problems): this treatment allows the operator to more easily recover capacity and therefore extend the life of the battery as it reactivates functionality on the entire surface of the plates and rebalances the elements.

All batteries can be regenerated: starter, deep-cycle, stand-by as long as they are wet lead acid or AGM within the following limits:

6V monoblocks from 10Ah up to 420Ah in C20

8V monoblocks from 10Ah up to 420Ah in C20

12V monoblocks from 10Ah up to 420Ah in C20

The treatment must be carried out on only one battery at a time, it is not possible to regenerate the series or parallel of several batteries: the device must analyse the reaction of a single battery to decide how to proceed and carry out the most suitable treatment for that battery.

The duration of the regeneration depends exclusively on the initial conditions of the battery: a few minutes if there are damages or short circuits and therefore the process fails and stops, up to 120 hours for high capacities or particularly serious cell conditions.

By connecting an efficient battery (with residual capacity greater than 65%) the light (preventive) regeneration is automatically activated; it ends in 24-48 hours.

The regeneration of batteries with a capacity of less than 40Ah is technically possible but not recommended due to the high probability of damaging the battery

It is not recommended to interrupt the regeneration process because the battery would remain in an unknown condition and would require further intervention.

Regeneration can be repeated on the same battery, it is possible but it is not guaranteed that this will produce an improvement: it is also possible the battery will worsen.

In some cases, it is possible that the capacity level reached by the treated battery may not remain stable over time. It is recommendable to check the capacity after a week and possibly decide to repeat the treatment. (see section CAPACITY TEST)

The process starts by evaluating the residual capacity of the connected battery, the regeneration will then develop according to the reactions of the battery subjected to certain stresses (for this reason the overall time is never predictable). At the end the display will show both the initial and final capacity values, highlighting whether the regeneration was successful or not.

At the end of the process the battery is available fully charged, only in case of an internal fault (interruption or short) the battery is not recharged.

The regeneration process is very energetic: a significant thermal increase of the battery is therefore normal. It is possible that the AGM batteries emit slight whistles from the safety valves and it is also possible that the wet lead batteries with open vessel have electrolyte overflows.

For these reasons it is absolutely essential to use the collection tray

and work in a well-ventilated area.

Stop the process if the battery temperature exceeds 80 ° C

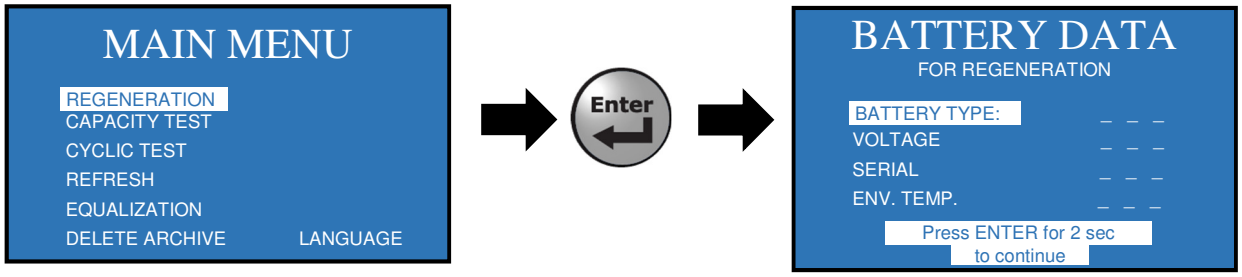
Lead wet acid batteries can only be treated only with the right level of electrolyte in each element, therefore provide for the appropriate refilling before treatment. If the operator wants to try to recover a completely dry battery, it is necessary to gradually fill the battery with distilled water. It is recommendable to introduce a few cc of water per element and wait a few hours, this process takes a long time but guarantees a better result.

The device stores the process data and makes them available for printing in a report (see section REPORT CREATION).

PROGRAMMING AND EXECUTION REGENERATION

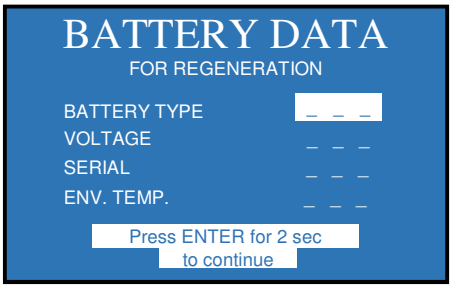
To active the function from MAIN MENU select REGENERATION and press Enter

The display will show BATTERY DATA, where it is possible to set the parameters for the REGENERATION:



WARNING: All the parameters must be filled in with valid values, otherwise test does not start.

Pressing Enter highlights the field (- - -) on the right of the selected parameter



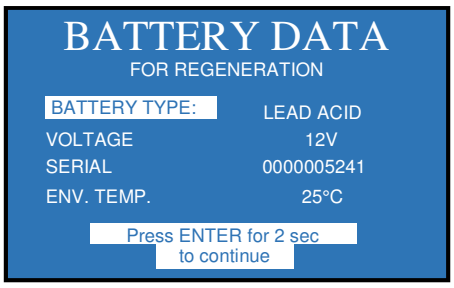
Acting on the 2 and 8 the possible values for the selected parameter are displayed.

Press Enter to go back to the parameter confirming the selected value

BATTERY DATA AND POSSIBLE SETTING VALUES FOR REGENERATION IS THE FOLLOWS:

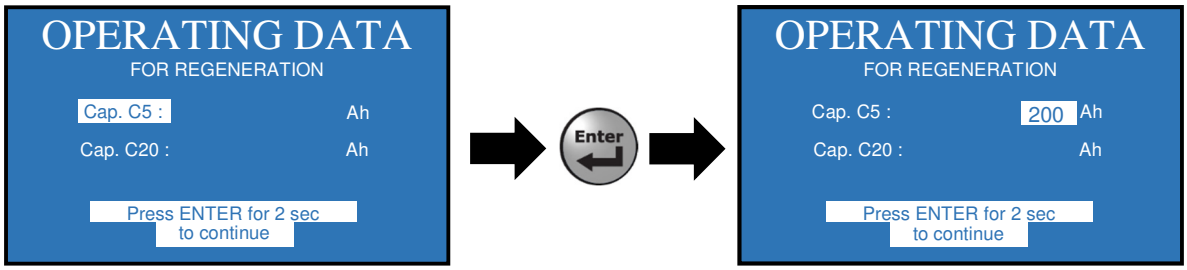
- BATTERY TYPE
  - WET LEAD ACID
  - AGM
  - STARTER
- VOLTAGE
  - 6V
  - 8V
  - 12V (it is the only value available for STARTER batteries)
- SERIAL NUMBER
  - 0000000000 (Default proposed value - Max. 10 characters)
    Enter the serial number of the battery; this number will appear in the test REPORT.
    The digits on the left are automatically filled in with Zero.
- ENVIRONMENT TEMPERATURE
  - Setting value from -10°C to 50°C – Default 25°C

Here is an example of compiling BATTERY DATA FOR REGENERATION:



When all the fields are filled with valid values, keep pressed for Enter at least two seconds to go to the OPERATING DATA display.

Press Enter on the selected parameter to activate the introduction of the relative value:



It is necessary to write both capacity values C5 and C20 indicated on the battery under test, missing a value the Regeneration does not start

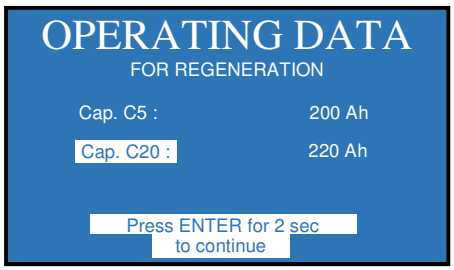
If you know only one of the two values, the other can be estimated with a simple calculation:

- Known C5 can calculate C20 = C5 * K
- Known C20 can calculate C5 = C20 / K

The indicative value of K can be chosen between 1.15 and 1.2

Press Enter to confirm the set value.

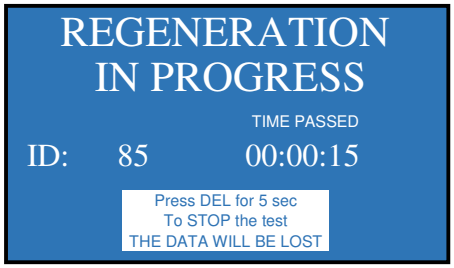
Allowed maximum value of C5 = 350Ah
Allowed maximum value of C20 = 420Ah



From anywhere on the BATTERY DATA and OPERATING DATA screens, press Del for 2 seconds to go back to the MAIN MENU screen. The previous data entered will be lost.

When the compilation of the OPERATING DATA is completed, press Enter for 2 seconds to start the REGENERATION procedure.

The display shows REGENERATION in PROGRESS:



Information displayed:

ID: identification number of the test in progress automatically assigned by the device in increasing order. This ID will appear in the test REPORT.

TIME PASSED: duration of the current test expressed in DAYS: HOURS: MINUTES

Pressing Del for 5 seconds with REGENERATION IN PROGESS will stop the process and lose the data.

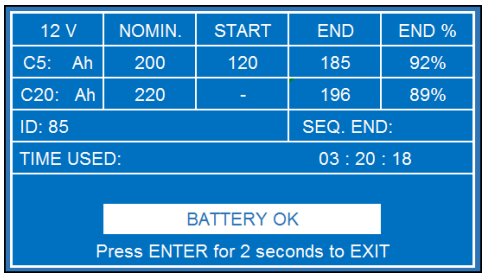
It is recommended NOT to stop the regeneration process because the battery may remain in an unknown condition and require further intervention.

The Regeneration stops automatically.

The ***Regenerator*** emits an intermittent beep to signal the STOP.

The Display shows the REGENERATION data summary screen relating to the test performed.

For example:



The general result of the test will be indicated in the field highlighted in white. The posible results can be the following:

- BATTERY OK (at least 65% of capacity has been recovered)
- BATTERY KO (insufficient recovered capacity)
- BATTERY DAMAGED
- EVALUATE ACCEPTANCE (it is necessary that the operator evaluates the data for acceptance of the outcome).

The REGENERATION data are saved in the device memory.
See the DATA DOWNLOAD and REPORT CREATION sections for the management of such data.

Press Enter for 2 seconds to go back to MAIN MENU .

The values shown in the table at the end of the regeneration can be incomplete because they are generated according to these rules:

- The initial battery evaluation is carried out only on C5 (therefore the initial C20 value does not appear)
- Based on the battery reaction, the C20 test may not be done, therefore the final C20 value may not be reported
- Treatment may end with only one of the two values (C5 or C20) greater than 65%

These rules aim to reduce the duration of regeneration without reducing its effectiveness.

Remember that if it is necessary to know the missing value (C5 or C20) it is always possible to also perform a specific CAPACITY TEST. See next paragraph.

CAPACITY TEST

This test allows you to accurately measure the real capacity of a battery. It can be useful to check the nominal capacity of a new battery or to evaluate the condition of an used battery.

You can also use this test to reactivate the batteries already in use, after a long period of inactivity: the complete discharge and recharging allow you to reactivate the functionality on the entire surface of the plates.

The test automatically performs a charge, a 100% constant current discharge and then a full charge leaving the battery perfectly charged at the end of the test.

The test does not perform any capacity estimation, but it is a real measurement of the Ah discharged.

Capacity can be measured in the following ways:

- C20 in 20 hours, up to a maximum of 420Ah
- C5 in 5 hours, up to a maximum of 350Ah
- C2 in 2 hours, up to a maximum of 140Ah

The duration of the test can vary from 12 hours to a maximum of 48 hours ca.

The device stores the test data and makes them available for printing a report (see section REPORT CREATION).

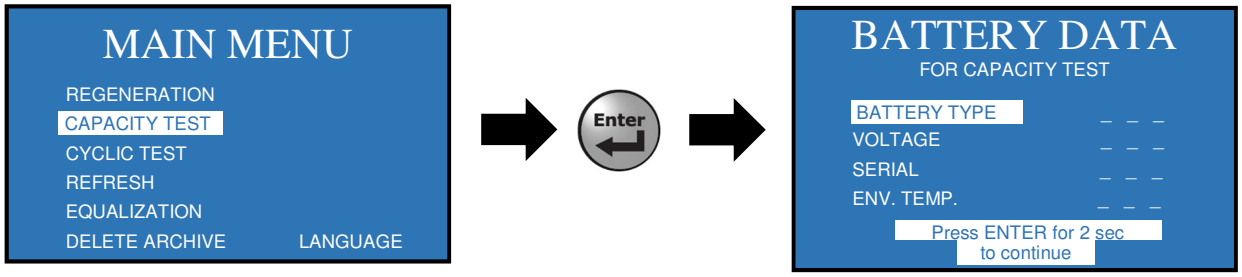
It is possible to perform the capacity test on all types of batteries: starting, deep-cycle, stand-by as long as they are free lead acid or AGM.

NOTE: for a more reliable outcome, it is recommended to repeat the test at least 2 times, see section CYCLIC TEST.

PROGRAMMING AND EXECUTION CAPACITY TEST

To active the function from MAIN MENU select CAPACITY TEST and press Enter

The display shows BATTERY DATA, where it is possible to set the parameters for CAPACITY TEST:



WARNING: All the parameters must be filled in with valid values

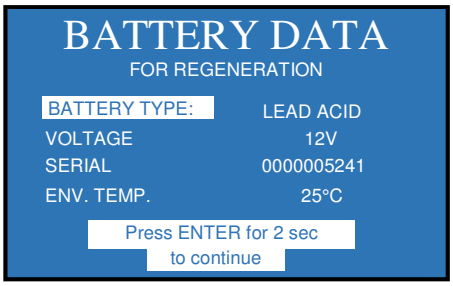
Pressing Enter highlights the field (- - -) on the right of the selected parameter.

Acting on the 2 and 8 the possible values for the selected parameter are displayed.

Press Enter to go back to the parameter confirming the selected value

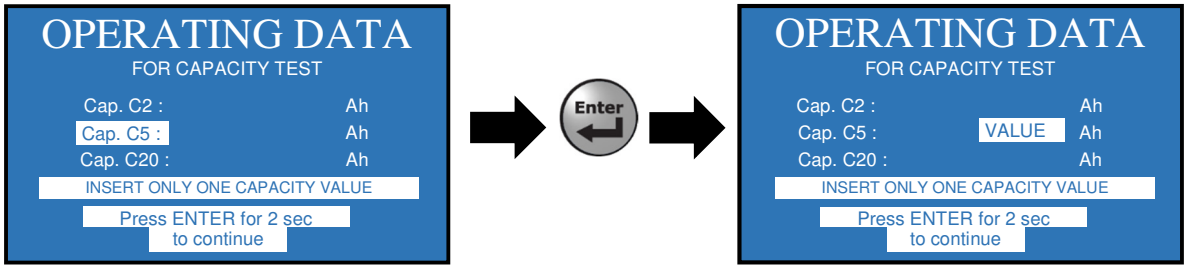
THE BATTERY DATA TO SET FOR THE CAPACITY TEST ARE THE SAME OF REGENERATION TEST, see the relative section (pag.4 and 5).

Here is an example of compiling BATTERY DATA FOR CAPACITY TEST:



When all the fields are filled with valid values, keep pressed Enter for at least two seconds to go to the OPERATING DATA display.

Press Enter on the selected parameter to activate the introduction of the relative value:

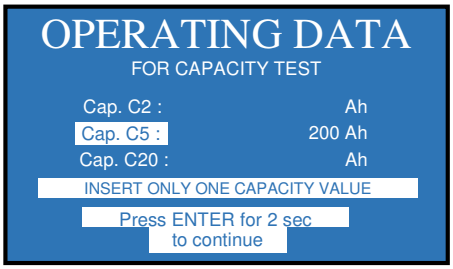


It is required to write only one CAPACITY value of the battery among the possible ones proposed below:

- If the selected battery type is STARTER: the only capacity available is C20
- If the selected battery type is LEAD ACID: capacity available are C5 or C20
- If the selected battery type is AGM: capacity available are C2, C5 or C20.

Allowed maximum value C2 = 140Ah
Allowed maximum value C5 = 350Ah
Allowed maximum value C20 = 420Ah

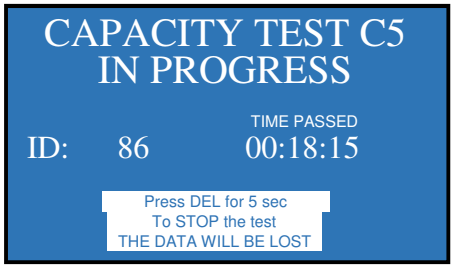
Press Enter to confirm the set value



From anywhere on the BATTERY DATA and OPERATING DATA screens, press Del 2 seconds to go back to the MAIN MENU screen. The previous data entered will be lost.

When the compilation of the OPERATING DATA is completed, press Enter 2 seconds to start the CAPACITY TEST procedure.

The display shows CAPACITY TEST (C2, C5, C20 according to first choice) in PROGRESS:



Information displayed:

ID: identification number of the test in progress automatically assigned by the device in increasing order. This ID will appear in the test REPORT.

TIME PASSED: duration of the current test expressed in DAYS: HOURS: MINUTES

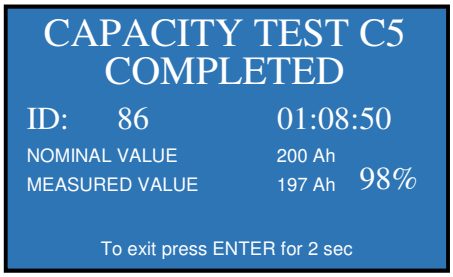
Pressing Del for 5 seconds with CAPACITY IN PROGESS will stop the process and lose the data.

It is recommended NOT to stop the test because the battery may remain in an unknown condition and require further intervention.

The process stops automatically.

The ***Regenerator*** emits an intermittent beep to signal the STOP.

At the end of CAPACITY TEST the display shows:



Near to the MEASURED VALUE there is the percentage of capacity reached at the end of the test with respect to the nominal one.

The CAPACITY TEST data are saved in the device memory.

See the DATA DOWNLOAD and REPORT CREATION sections for the management of such data.

Press Enter for 2 seconds to go back to MAIN MENU

CYCLIC TEST

This test allows the operator to see how the capacity of the battery changes by subjecting it to subsequent charging and discharging cycles. This trend is interesting especially for deep-cycle batteries.

By setting the number of N cycles (maximum 10), the device repeats the CAPACITY TEST described above for N times.

The conditions of use are the same as for the CAPACITY TEST.

Since this test drains the battery 100%, it is recommended not to abuse it in order not to damage it.

For this reason it is not foreseen on starter batteries.

The duration of this test could take many days (N times the duration of the capacity test) so, it is recommended to well evaluate this practical aspect.

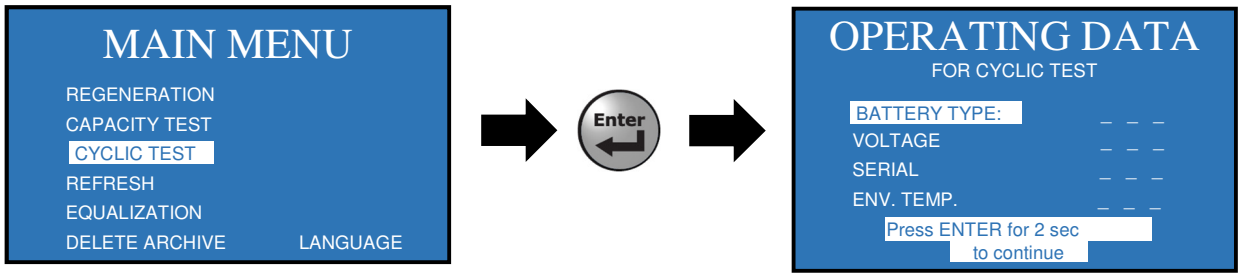
The device stores data test and makes them available for printing a report (see paragraph REPORT CREATION).

It is possible to interrupt the cyclic test at any time, the report will report only the data of the completed cycles.

PROGRAMMING AND EXECUTION CYCLIC TEST

To active the function from MAIN MENU select CYCLIC TEST and press Enter

The display shows OPERATING DATA, where it is possible to set the parameters for the CYCLIC TEST:



WARNING: All the parameters must be filled in with valid values

Pressing Enter highlights the field (- - -) on the right of the selected parameter.

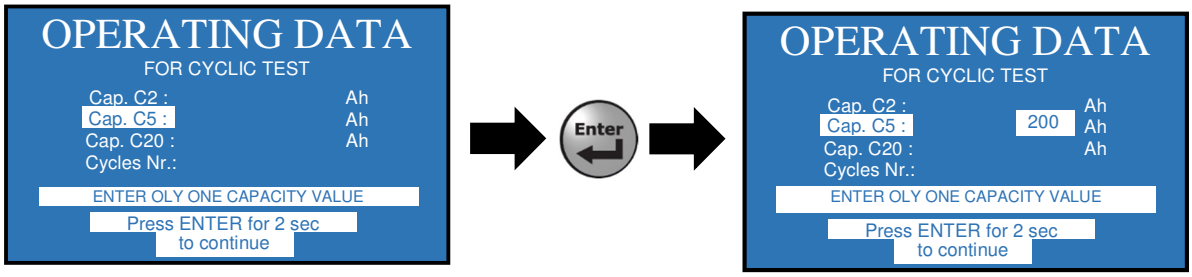
Acting on the 2 and 8 the possible values for the selected parameter are displayed.

Press Enter to go back to the parameter confirming the selected value.

THE BATTERY DATA TO SET FOR THE CYCLIC TEST ARE THE SAME OF REGENERATION TEST, see the relative section (pag.4 and 5) excluding STARTER batteries.

When all the fields are filled in with correct values, press Enter to go to OPERATING DATA screen.

Press Enter on the selected parameter to enter the value:

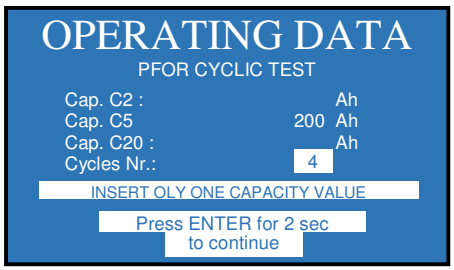


It is required to write only one CAPACITY value of the battery among the possible ones proposed below

- If the selected battery type is LEAD ACID: capacity available are C5 or C20
- If the selected battery type is AGM: capacity available are C2, C5 or C20.

Allowed maximum value C2 = 140Ah
Allowed maximum value C5 = 350Ah
Allowed maximum value C20 = 420Ah
Allowed maximum value Cycles Nr = 10

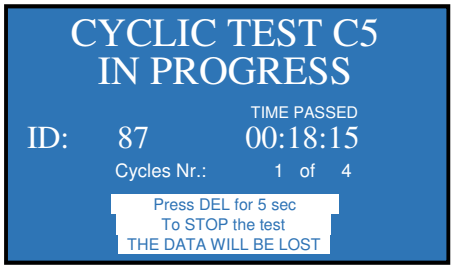
Press Enter to confirm the set value.



From anywhere on the BATTERY DATA and OPERATING DATA screens, press Del for 2 seconds to go back to the MAIN MENU screen. The previous data entered will be lost

When the compilation of the OPERATING DATA is completed, press Enter for 2 seconds to start the CAPACITY TEST procedure.

The display shows CYCLIC TEST in PROGRESS:



Information displayed:

ID: identification number of the test in progress automatically assigned by the device in increasing order. This ID will appear in the test REPORT

TIME PASSED: total duration of the current test expressed in DAYS: HOURS: MINUTES

Cycles Nr.: stands for the number of the cycle in progress compared to the total number set.

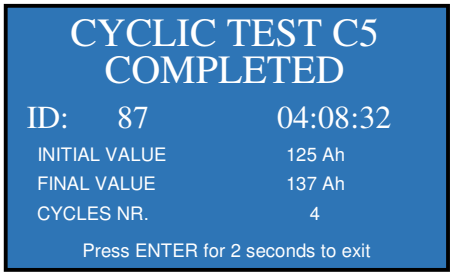
Pressing Del for 5 seconds with CYCLIC TEST IN PROGESS will stop the test and lose the data.

It is recommended NOT to stop the test because the battery may remain in an unknown condition and require further intervention.

The process stops automatically.

The ***Regenerator*** emits an intermittent beep to signal the STOP.

At the end of the CYCLIC TEST (C2, C5 or C20) the display shows



If test automatically ends the displayed CYCLES NUMBER will be the one set during the programming of the operating data.
If the operator interrupts the test, it will see the number of the executed cycles
The DATA REPORT shows only the data of the finished cycles.

The CYCLIC TEST data are saved in the device memory.
See the DATA DOWNLOAD and REPORT CREATION sections for the management of such data.

Press Enter for 2 seconds to go back to MAIN MENU

REFRESH

This treatment allows the operator to properly reactivate batteries that have been in stock for a long time

The treatment alternates charges with micro-discharges to obtain the activation of the entire surface of the plates and the balancing of the cells.

It is possible to refresh all types of batteries: starter, deep cycle, stand-by as long as they are wet lead acid or AGM and with a maximum capacity of 420Ah.

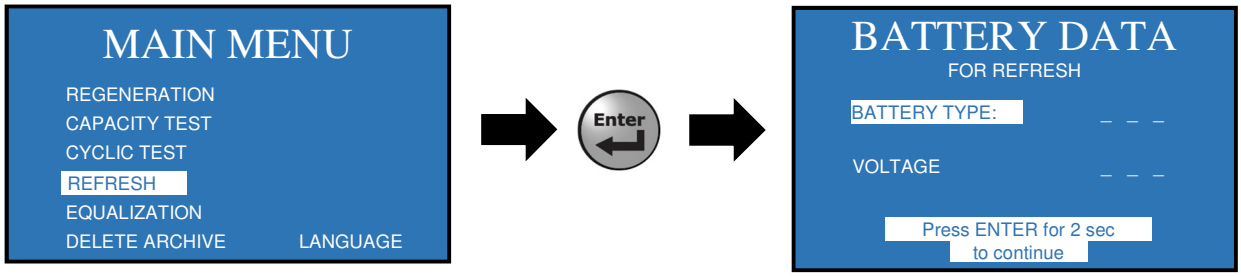
It is not recommended to use this treatment on batteries of less than 40Ah capacity.

The duration of the treatment varies from 7 to 20 hours, no report is generated.

PROGRAMMING AND EXECUTION REFRESH TEST

To activate the function from MAIN MENU select REFRESH and press Enter

The display shows OPERATING DATA, where it is possible to set the parameters for the REFRESH



WARNING: All the parameters must be filled in with valid values

Pressing Enter highlights the field (- - -) on the right of the selected parameter.

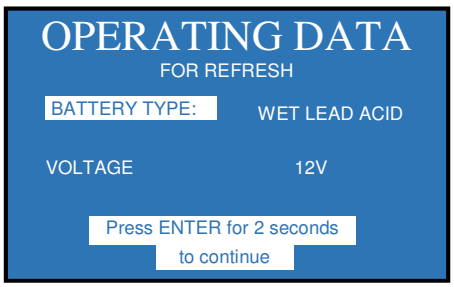
Acting on the 2 and 8 the possible values for the selected parameter are displayed.

Press Enter to go back to the parameter confirming the selected value

THE DATA YOU CAN SET FOR THE BATTERY REFRESH ARE THE FOLLOWING:

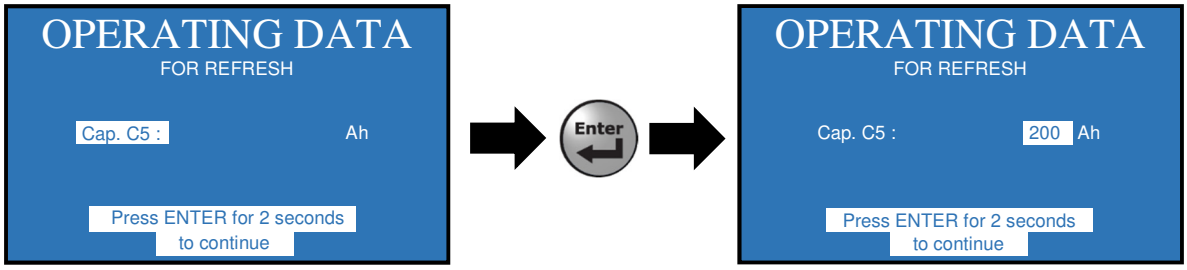
- BATTERY TYPE
  - WET LEAD ACID
  - AGM
  - STARTER
- VOLTAGE
  - 6V
  - 8V
  - 12V (it is the only value available for STARTER batteries)

Here is an example of compiling BATTERY DATA for REFRESH:



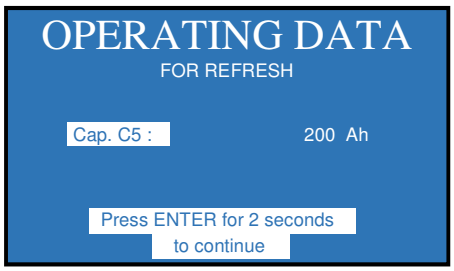
When all the fields are filled in with valid values, press Enter to go to OPERATING DATA screen.

Press Enter on Cap. C5 parameter to enter the value:



It is necessary to write only the value of battery capacity in C5.
Allowed maximum value C5 = 350Ah

Press Enter to confirm the set value.



From anywhere on the BATTERY DATA and OPERATING DATA screens, press Del for 2 seconds to go back to the MAIN MENU screen. The previous entered data will be lost.

When the compilation of the OPERATING DATA is completed, press Enter for 2 seconds to start the REFRESH TEST procedure.

The display shows REFRESH in PROGRESS:

Information displayed:

ID: identification number of the test in progress automatically assigned by the device in increasing order. This ID will appear in the test REPORT
TIME PASSED: duration of the current test expressed in DAYS: HOURS: MINUTES.

Pressing Del for 5 seconds with CYCLIC TEST IN PROGESS will stop the process.

At the end of REFRESH TEST, the display shows:

The ***Regenerator*** emits an intermittent beep to signal the STOP
The REFRESH does not involve saving data. This test does not produce reports.

Press Enter for 2 seconds to go back to MAIN MENU.

EQUALIZATION (BALANCE)

This treatment allows the operator to properly prepare the batteries that will be used to assemble a larger battery by connecting them together in series and / or parallel.

To maximize performance and durability, in these applications it is essential to start from identical new batteries: same model and with the same charge level (preferably from the same production batch). The Equalization treatment has this purpose: to bring all the cells and therefore the battery to the same charge level.

The Equalization treatment alternates charges, micro-discharges, levelling process to obtain activation of the entire surface of the plates, cell balancing and the same final charge level.

It is possible to equalize all types of batteries: deep-cycle, stand-by as long as they are free lead acid or AGM and with a maximum capacity of 420Ah.

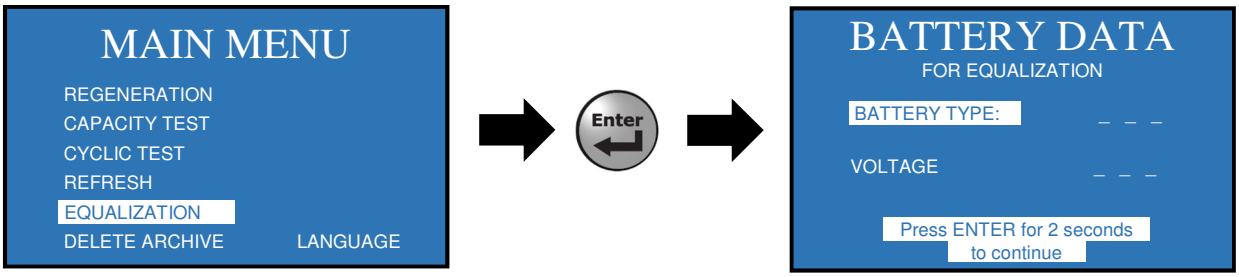
It is not recommended to use this treatment on batteries of less than 40Ah capacity

The duration of the treatment varies from 12 to 24 hours, no report is generated

PROGRAMMING AND EXECUTION EQUALIZATION

To active the function from MAIN MENU select EQUALIZATION and press Enter

The display shows BATTERY DATA, where it is possible to set the parameters for the EQUALIZATION



WARNING: All the parameters must be filled in with valid values

Pressing Enter highlights the field (- - -) to the right of the selected parameter.

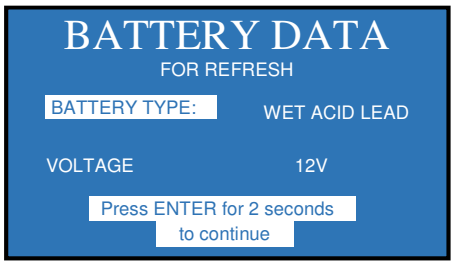
Acting on the 2 and 8 the possible values for the selected parameter are displayed.

Press Enter to go back to the parameter confirming the selected value.

THE BATTERY DATA TO SET FOR THE EQUALIZATION ARE THE SAME OF REFRESH.

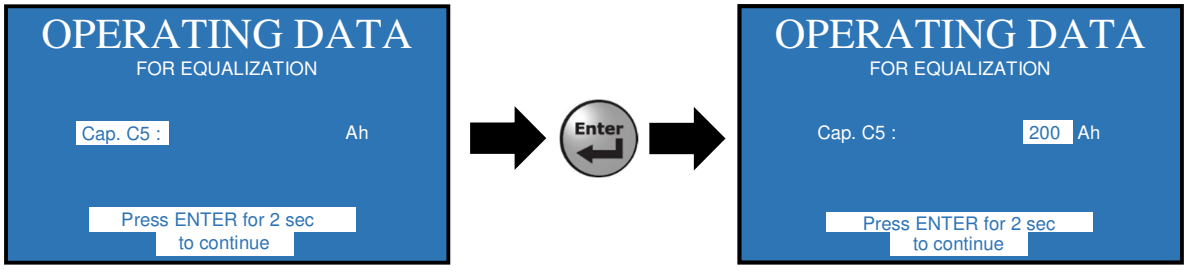
Equalization treatment cannot be performed on STARTER batteries.

Here is an example of compiling BATTERY DATA for EQUALIZATION:



When all the fields are filled in with correct values, press Enter to go to OPERATING DATA screen.

Press Enter on Cap. C5 parameter to enter the value:



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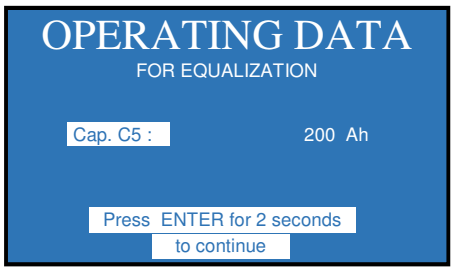
Via Pietro Nenni, 17 / 19 - 25019 Colombare di Sirmione (BS) - ITALY
Tel. +39 030 9906010 - Fax +39 030 9906011 - E-mail: mori@moriraddrizzatori.it - www.moriraddrizzatori.it
P. IVA/VAT: 03394860989 REA: BS-530507

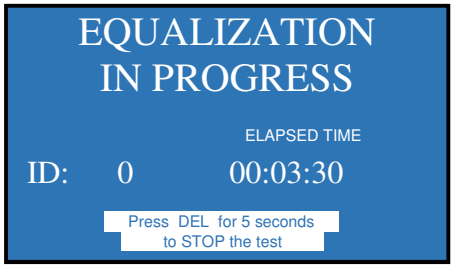
It is necessary to write only the value of battery capacity in C5.
Allowed maximum value C5 = 350Ah

Press Enter to confirm the set value



From anywhere on the BATTERY DATA and OPERATING DATA screens, press Del for 2 seconds to return to the MAIN MENU screen. The previous data entered will be lost.

Completed the compilation of the OPERATING DATA, press Enter for 2 seconds to start the EQUALIZATION.
The display shows the EQUALIZATION IN PROGRESS:



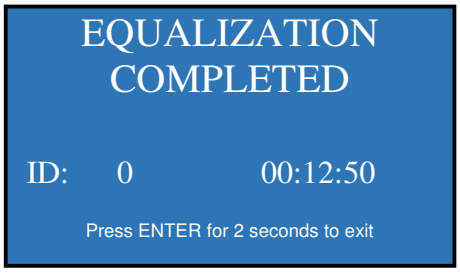
Information displayed:

ID: The EQUALIZATION treatment DOESN'T provide for REPORT generation
The ID value is ALWAYS displayed "0".

ELAPSED TIME: duration of the current test expressed in
DAYS : HOURS : MINUTES

Press Del for 5 seconds to stop the EQUALIZZATION process.

At the end of the EQUALIZATION the display shows the EQUALIZATION COMPLETED:



The ***Regenerator*** emits an intermittent beep to signal the STOP.

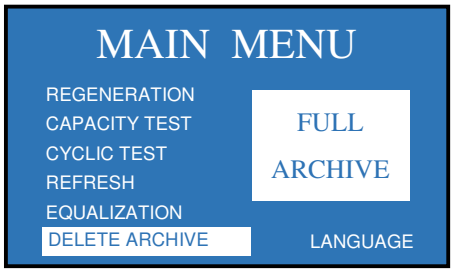
EQUALIZATION does not involve saving data. Non è possibile produrre i relativi REPORT.

Press Enter 2 seconds to return to MAIN MENU.

ARCHIVE DELETION

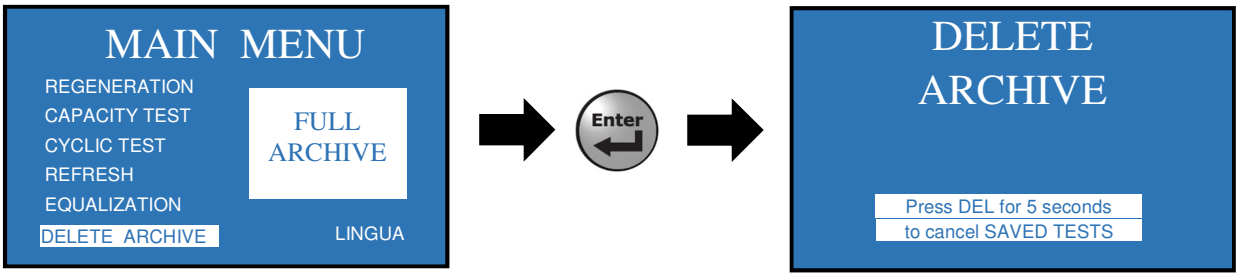
The archive inside the Regenerator can contain the results of 128 REGENERATION or CAPACITY tests and another 64 CYCLIC TESTS.

When the archive is complete, the warning is displayed in the MAIN MENU:



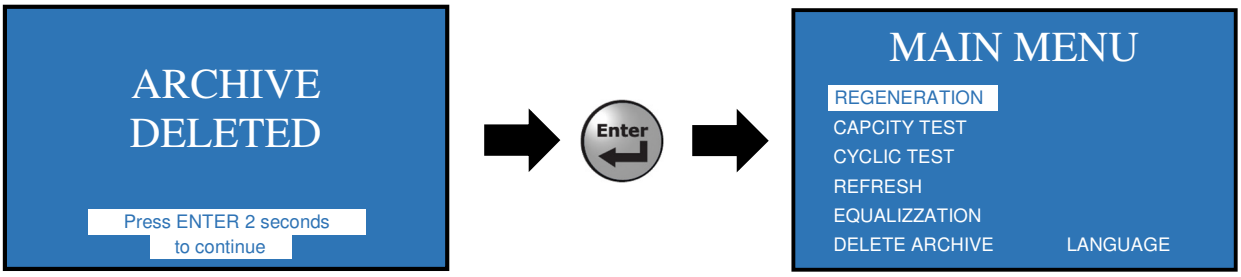
At this point it is necessary to delete the contents of the ARCHIVE to proceed with other tests.

Select DELETE ARCHIVE from the MAIN MENU:



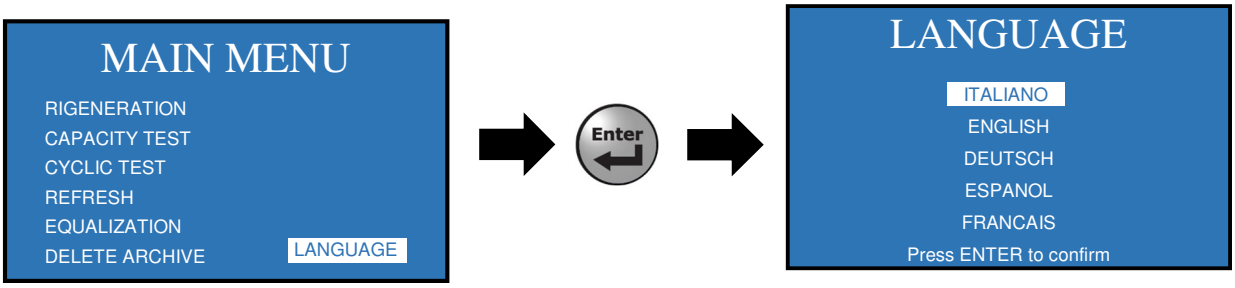
WARNING: make sure you have generated and saved all the contained reports on an external memory before deleting the archive, because the deletion is irreversible, and the data will in no way be recoverable.

After deletion:



LANGUAGE

Select LANGUAGE from MAIN MENU:

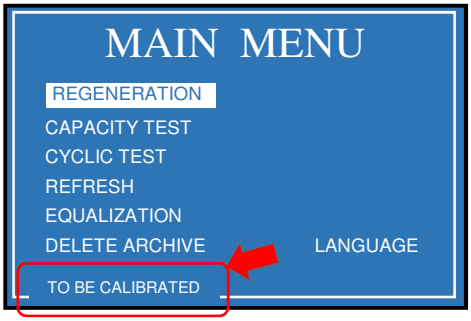


Depending on the version of the ***Regenerator*** Firmware, ONLY the available languages will be presented in the list.

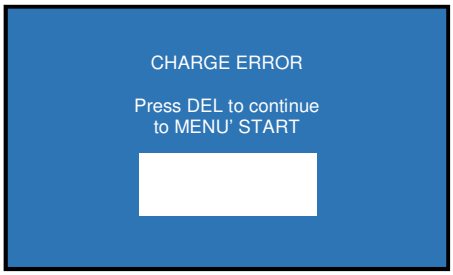
Make selection with 2 and 8, press Enter to confirm and return to MAIN MENU.

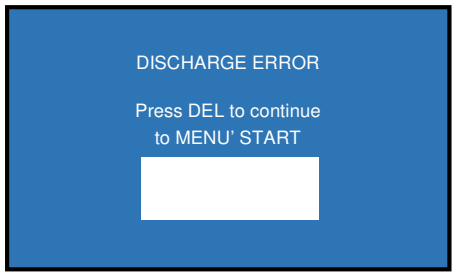
ANOMALIES AND ERRORS

If the "TO BE CALIBRATED" warning appears in the main screen, at the bottom left, when you switch on the device, you will need to send the regenerator to the Assistance service.



During operation, in the event of a fault or HW anomalies inside the system, the cycle in progress is interrupted and the display may have one of the following two screens, depending on the error found:





The ***Regenerator*** emits an intermittent beep to signal the ANOMALY.
If this situation occurs again, send the device to the assistance centre.

VARIOUS

The absence of a network interrupts the ongoing process which will automatically resume when the network returns, without loss of data.

Pauses are present in all available processes; it is therefore normal to perceive an apparent temporary inactivity of the Regenerator. Refer to the indications on the display to understand if the process is really over.

The display backlight turns off automatically after 2 minutes from the last key pressed; press any key to turn it on again.

The capacitance values measured in the various tests are the actual ones of the battery in question and therefore correspond to reality.

Percentage values are calculated with respect to the nominal value introduced by the operator, by introducing inaccurate values, inaccurate percentage values will be obtained.

The progressive number of tests (ID) is managed independently by the Regenerator, it cannot be reset or modified. It can assume a maximum value of about 65000 beyond which it will automatically reset.

The duration of the processes indicated in this document are purely indicative and absolutely not binding. The conditions of the connected batteries can also change them very significantly.

REGENERATOR CONSOLE SOFTWARE INSTALLATION

The DOWNLOAD DATA and REPORT CREATION operations described below are supported EXCLUSIVELY by the following application:

Regenerator Console

It is therefore necessary to install the Regenerator Console application on your device, available for PC (S.O. Windows 10 Rev.2019 and later) and soon for Smart Phone (S.O. Android 8.0 and later).
The application can be downloaded from the dedicated section of the manufacturer's website.

Go to website: ***www.unionbatteryservice.it***

Select and click on BATTERY REGENERATION section:

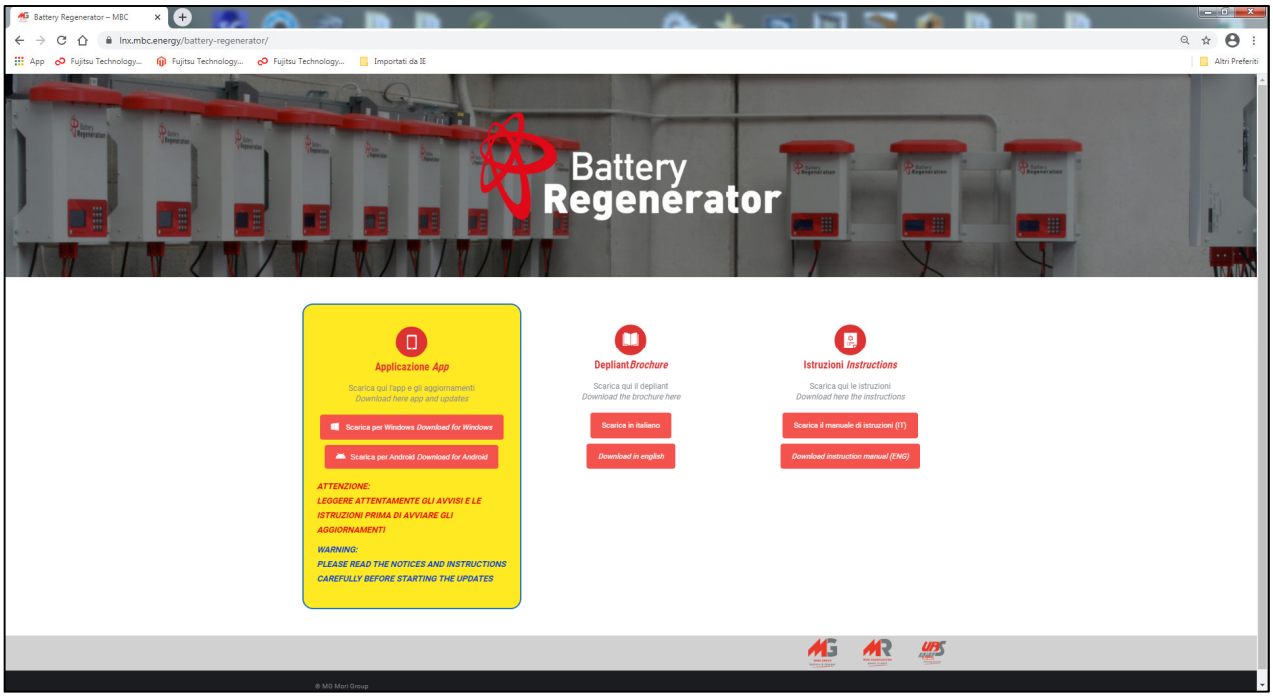
Click on the button: "**REGEN-01 – INSTRUCTION MANUAL AND APP DOWNLOAD**"

Or click on following link (Ctrl+click): ***Link to: REGEN01 - INSTRUCTION MANUAL AND APP DOWNLOAD***

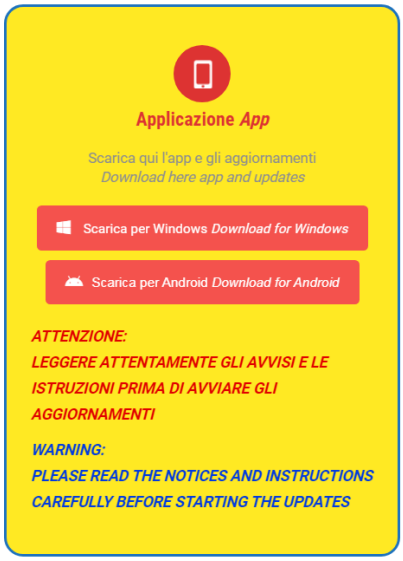
Or (for Smartphone or Tablet) use the QR Code present on the Regenerator:

REGEN

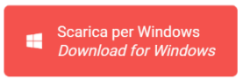
In all cases, you can access to the ***BATTERY REGENERATOR*** Home Page:



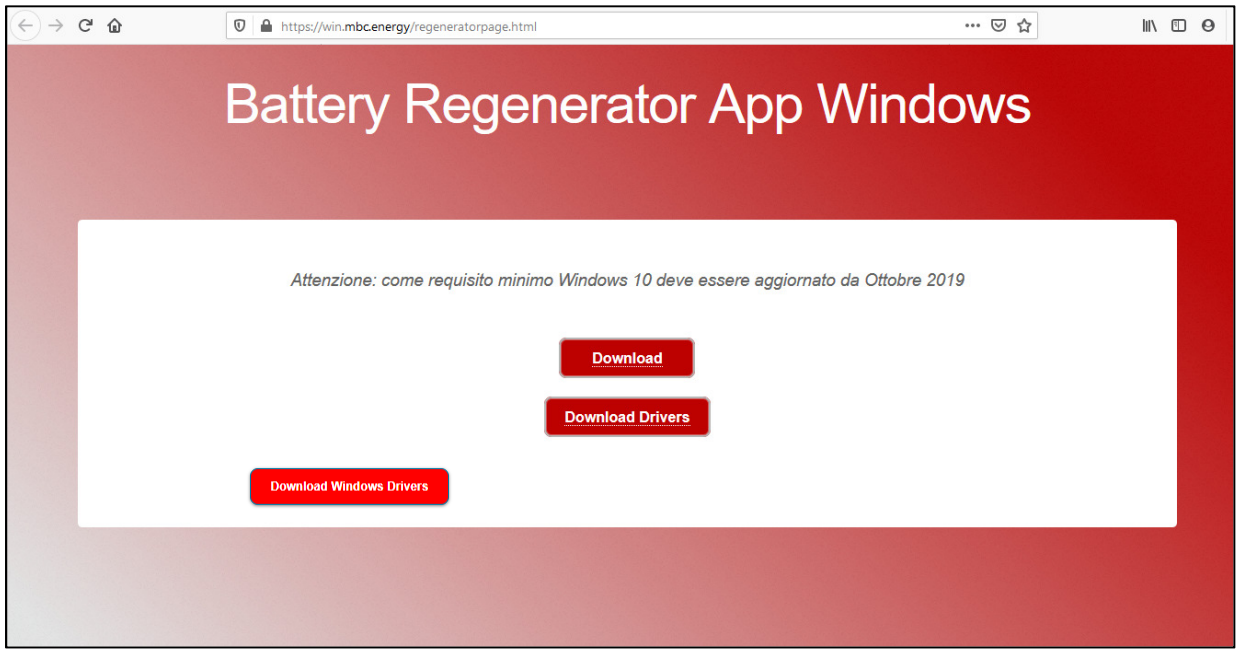
From the Home Page it is possible to download the application and all documents such as Brochures and Instructions in the various languages available using the dedicated keys:



APPLICATION INSTALLATION on PC (S.O. Windows 10 Rev.2019 and later):

Selecting the button 

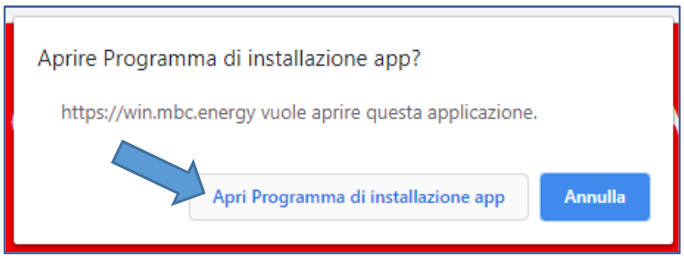
of the "**Applicazione App**" section it opens the following page:



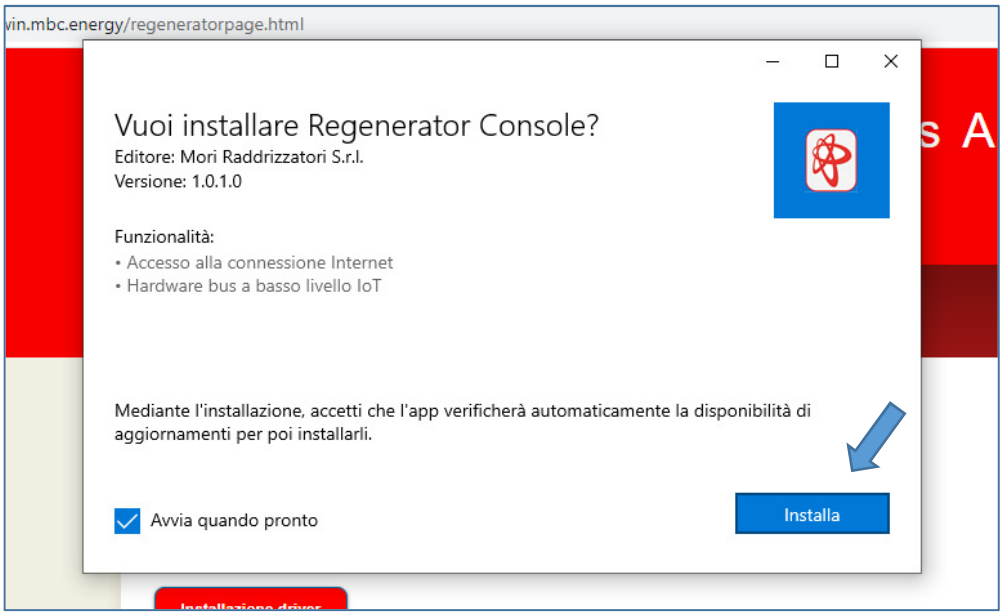
Click on 

to start the installation.

click to allow the run of the installation program:

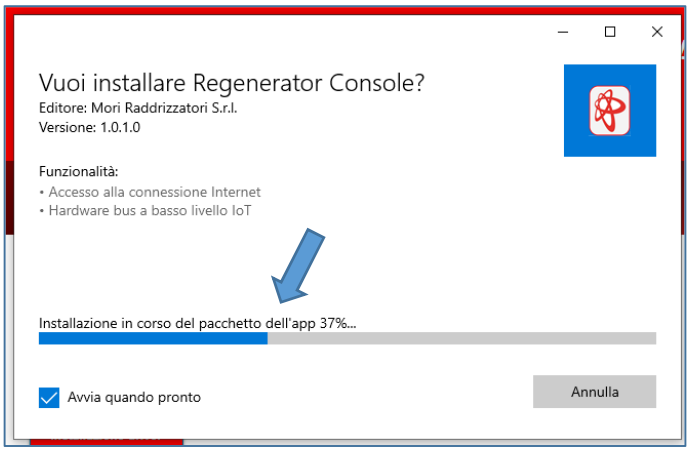


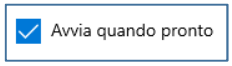
the ***Regenerator Console*** installation window opens:



Click on the button "***Install***".

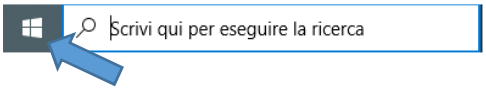
The progress bar indicates the installation in progress.



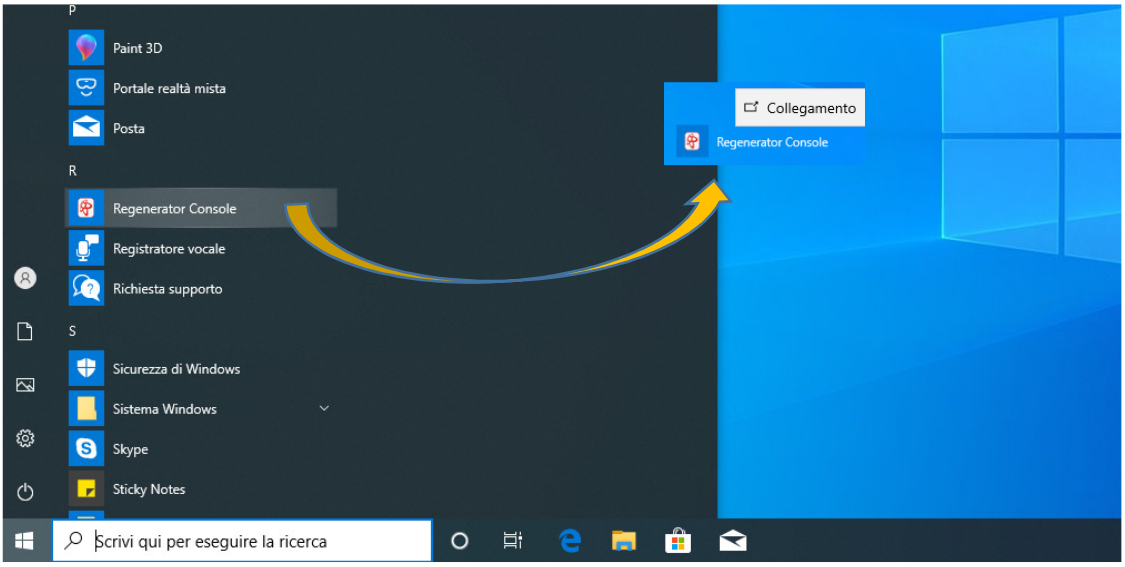
NOTE: At the end of the installation, if the selection 

has been activated, the Regenerator Console application opens automatically.

Otherwise the Application will be inserted in the list of Windows Apps accessible by button lower left.



Selecting and dragging the icon from the App bar to the Desktop automatically creates the link to **Regenerator Console** on Desktop.



DRIVER REGENERATOR INSTALLATION

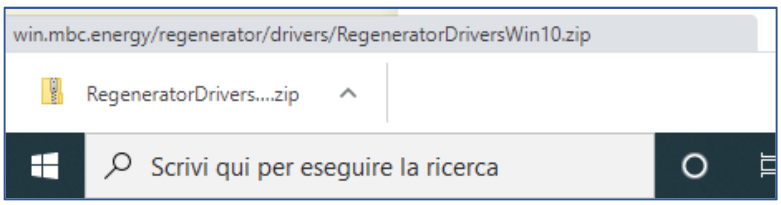
To communicate with the device it is necessary to install the USB communication port drivers.

<u>Warning:</u> To install the Drivers it is necessary to have the PC Administrator credentials.

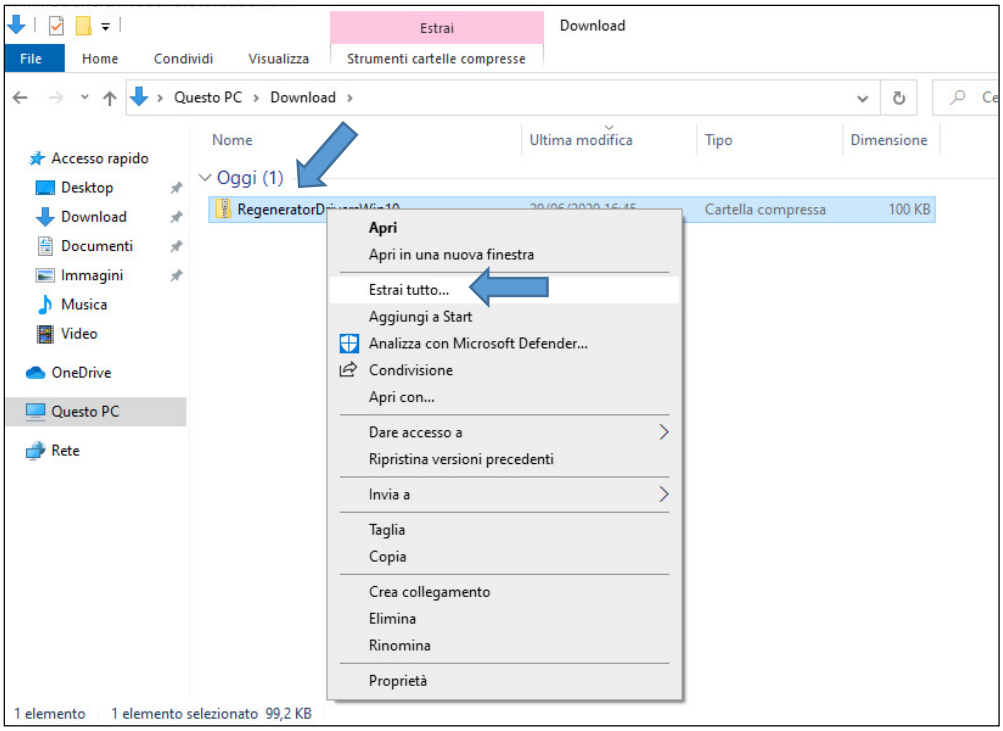
From Home Page select 

to start the automatic download of Driver files:

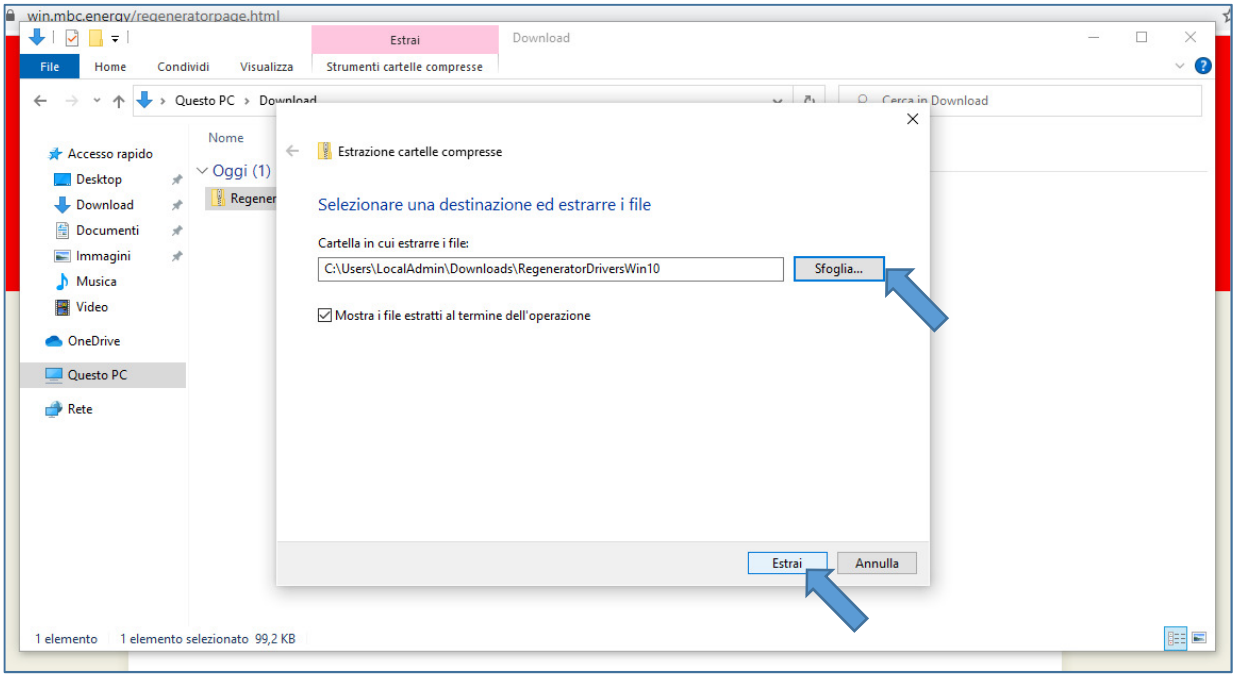
The compressed folder of installation files will appear at the bottom left:



Once the download of the compressed package is finished, it is necessary to extract the files: select the ***RegeneratorDriversWin10*** folder, open the files menu with the right mouse button and activate the ***Extract All*** item.



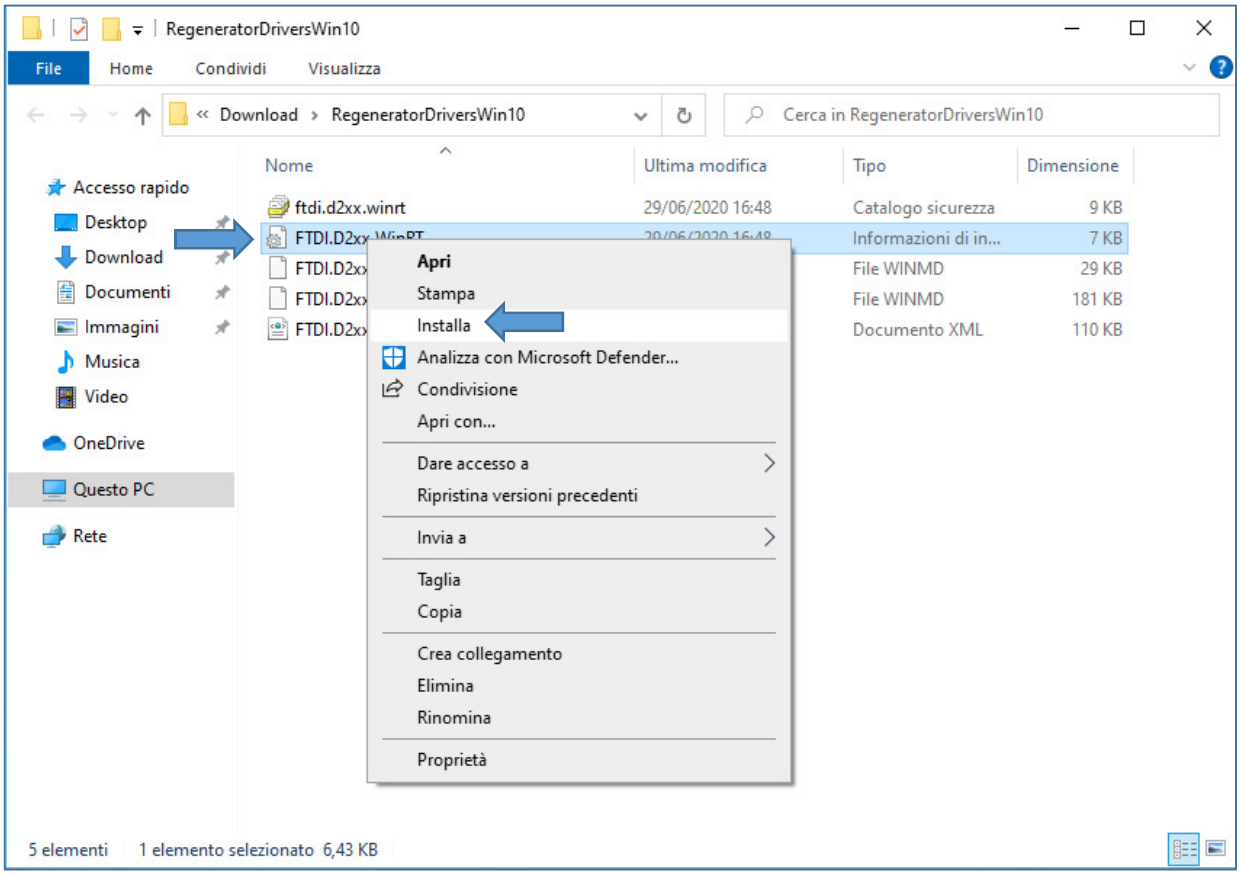
Select the desired path with the ***Browse*** button and extract the Files by activating the ***Extract*** button.



After the complete extraction of the files, the list of the Drivers files is opened:

Select the file with the wheel on the icon 

Open the right-click options menu and select ***Install:***

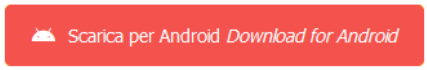


Confirm any requests for installation consent that the system may request.

The driver will be automatically installed on your PC.

APPLICATION INSTALLATION ON ANDROID DEVICE (O.S. VER. 8.0 and later):

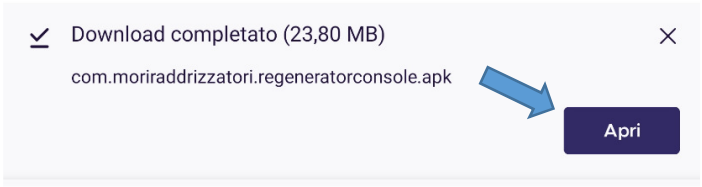
Pressing the key



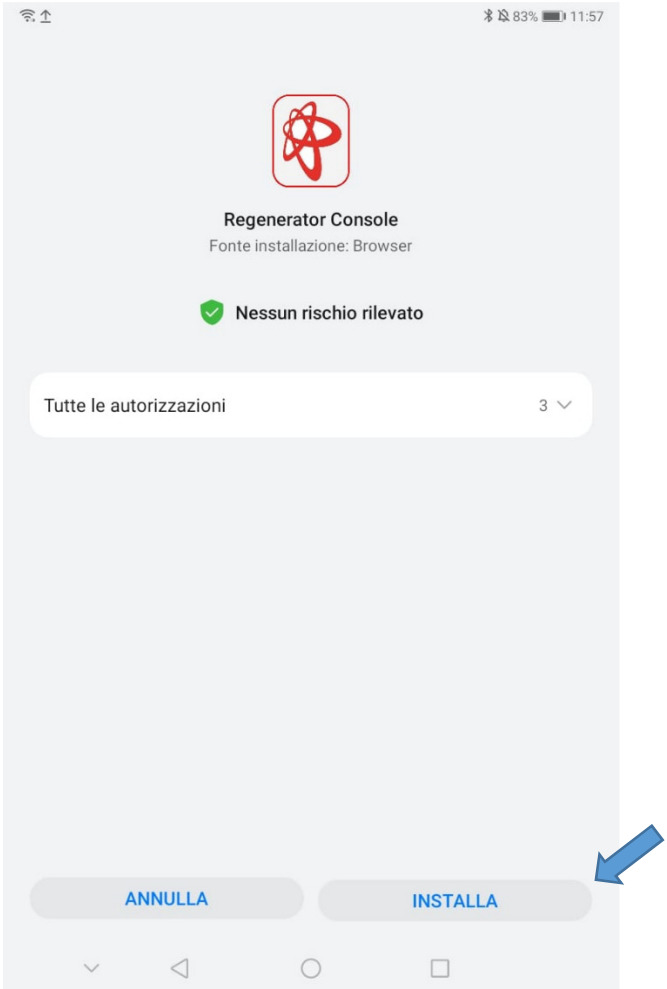
in the "Application" section, the app download and installation procedure is activated. Depending on the Android version and file management app on the device, the screens may be different.

The operation steps are the follows:

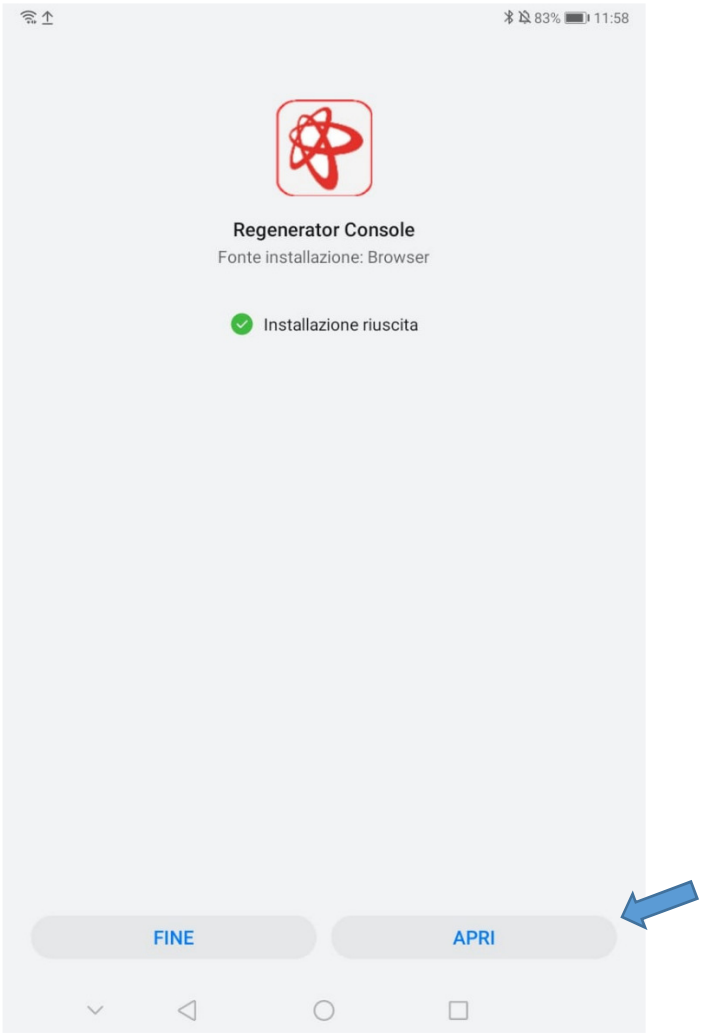
- File download



- Authorization and launch of the installation



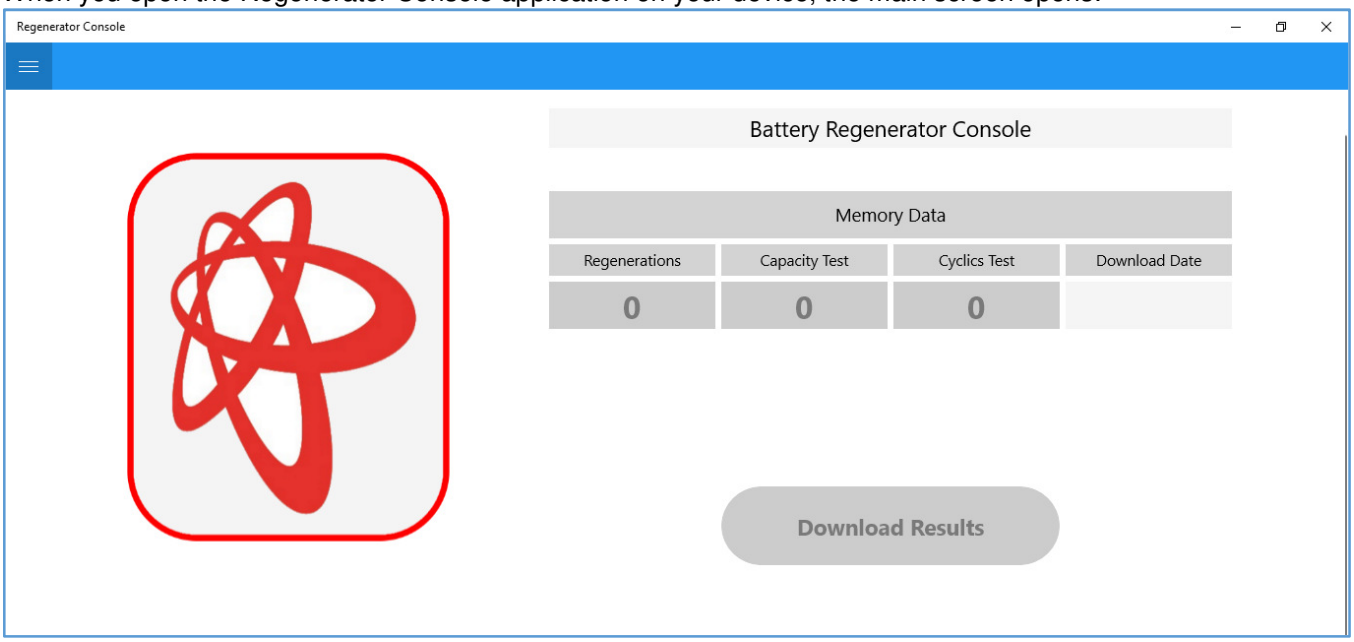
- App launch



As already mentioned, the screens proposed could be different as well as the actual number of steps required, but the sequence of operations will still be the one indicated.

REGENERATOR CONSOLE APPLICATION

When you open the Regenerator Console application on your device, the main screen opens:

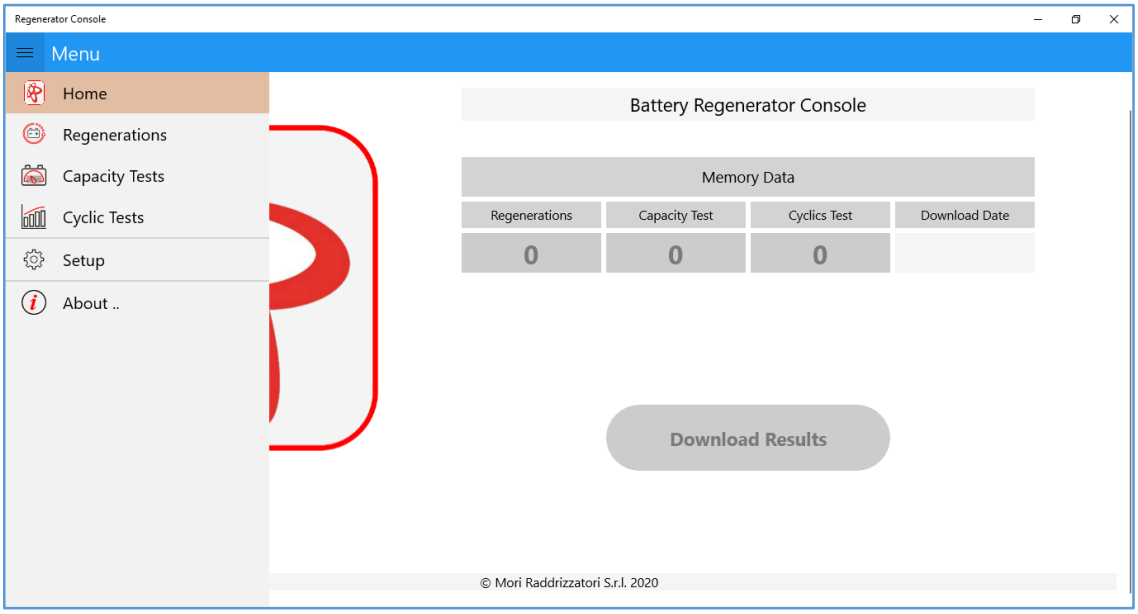


NOTE: The data presented in the "Data in Memory" table at the time the application is opened are those relating to the previous data download (the last performed in order of time). At the first installation they will all be zero.

The table will be updated at the next download of the data from Regenerator, the old data will be lost because replaced by the new ones.

MAIN MENU

Select **Menu** button on the top left to open the drop-down menu of the main functions.



The ***Home*** button takes you back to the main screen

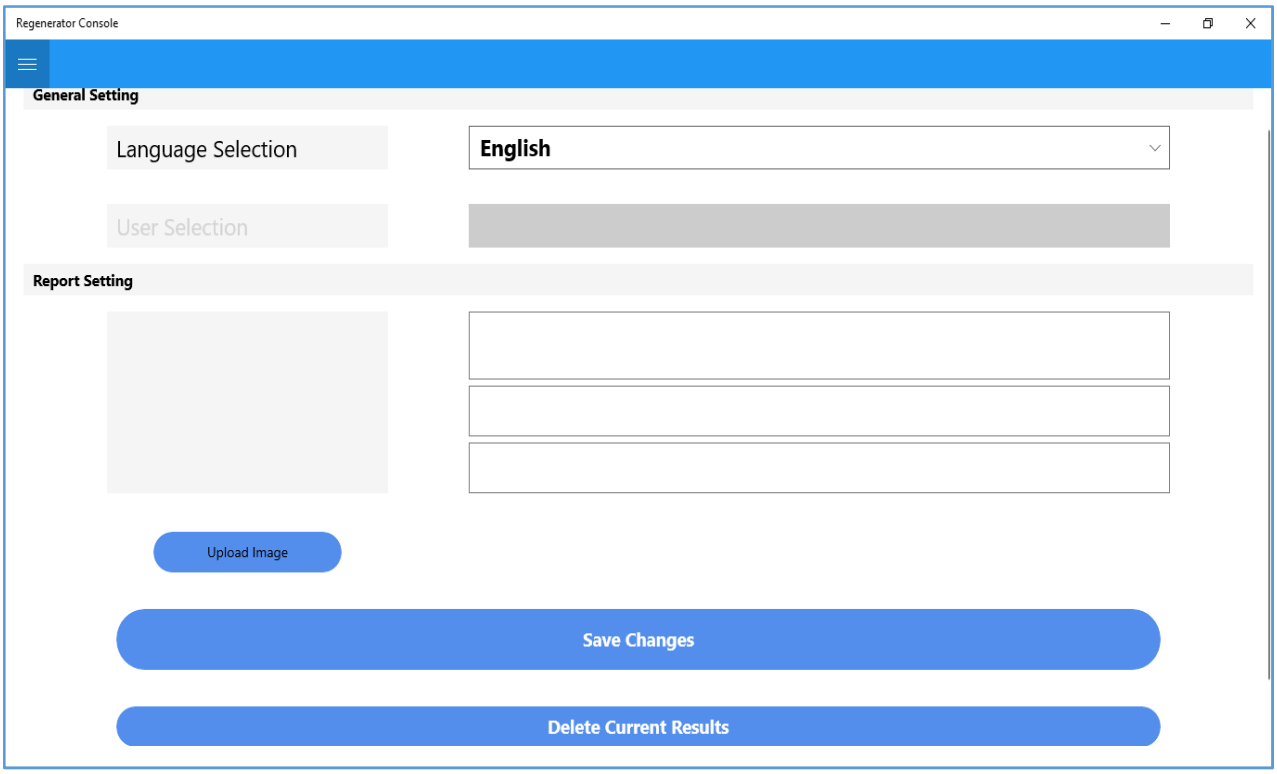
The ***Regenerations*** button allows you to access the list of Regenerations present in memory

The ***Capacity Test*** button allows you to access the list of Capacity Tests present in memory

The ***Cyclic Test*** button allows access to the list of Cyclic Tests present in memory

SETUP

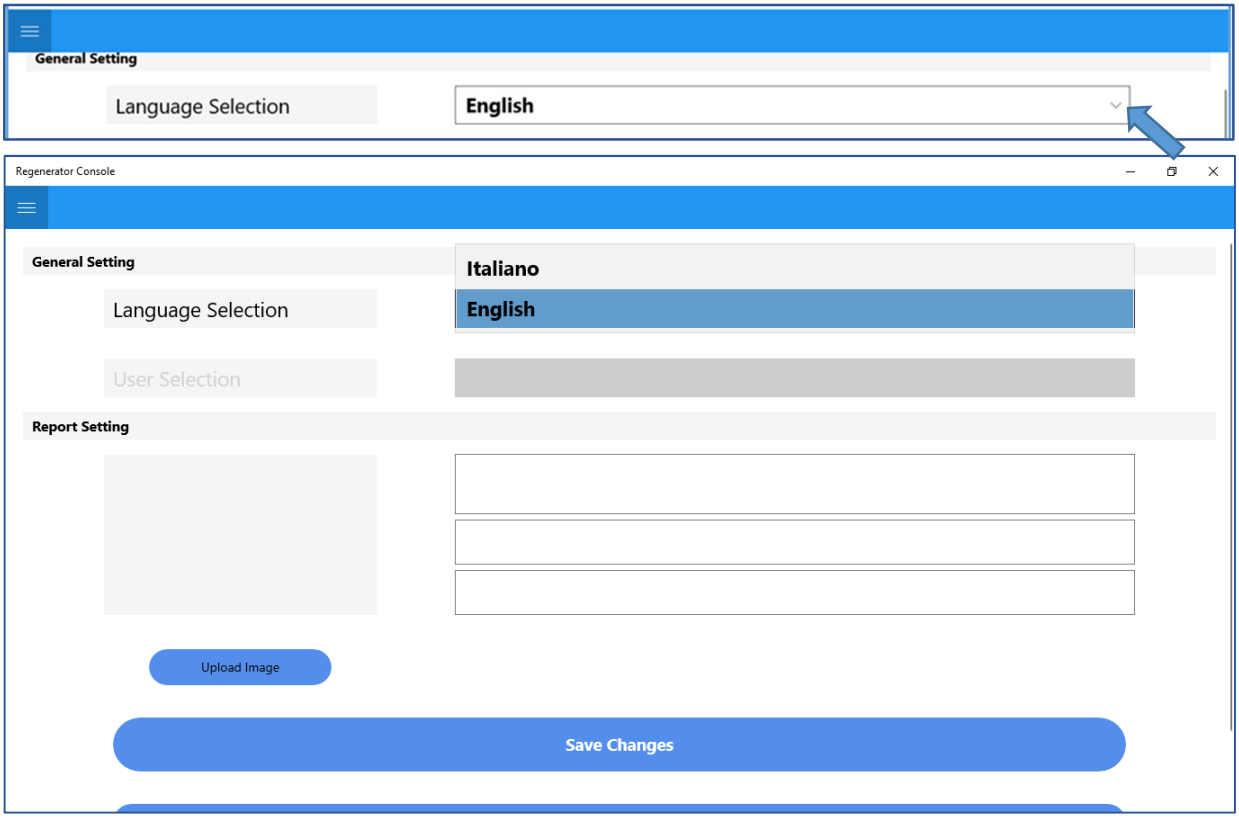
Selecting **SETUP** you can access the following screen:



In which there are the following options:

Language selection

Click the arrow to the right of the Language box to view and select one of the available options.

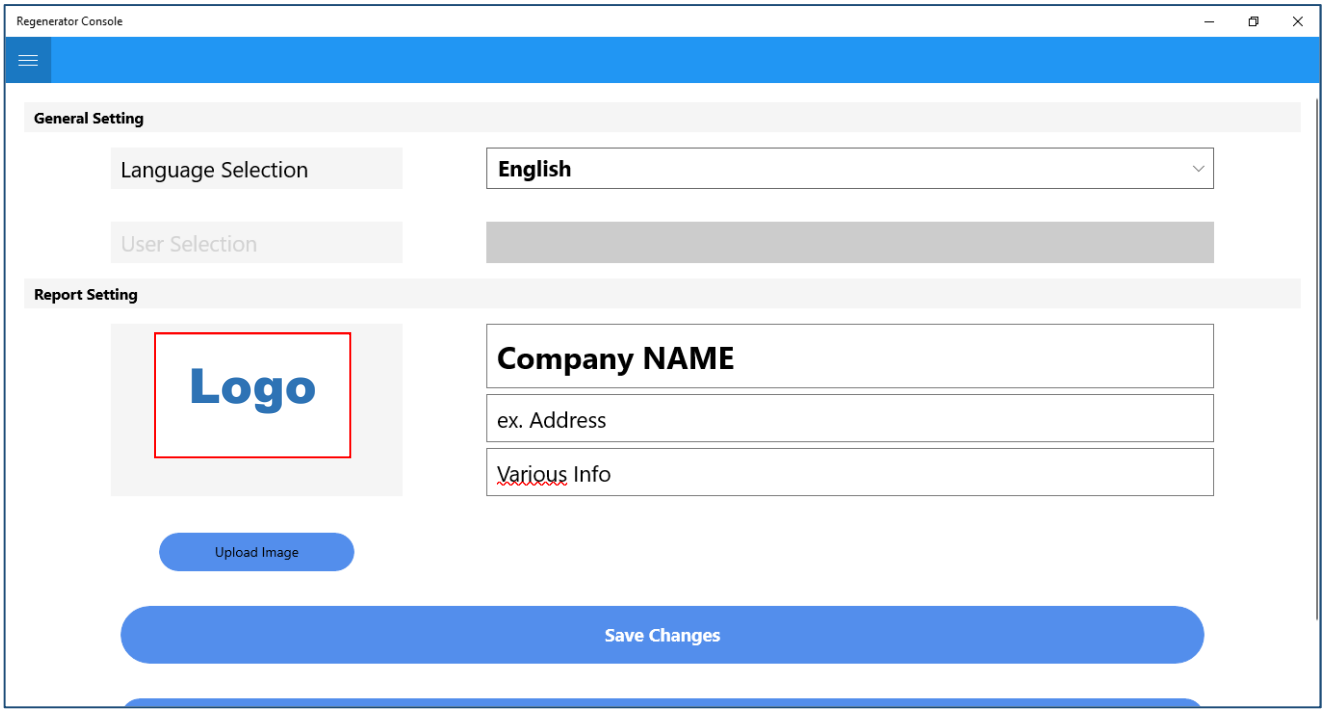


*NOTE: The "**User Selection**" field is pre-set to USER and cannot be changed.*

Report Setting:

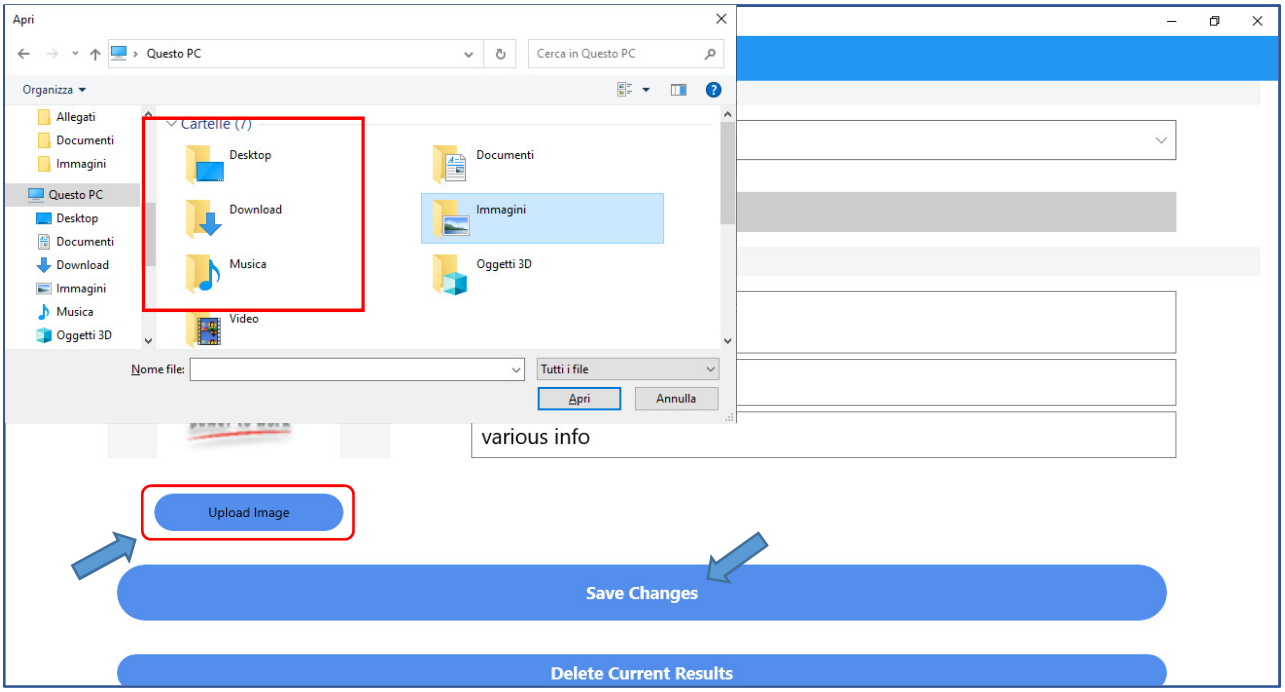
In the section **"Report Setting"**, it is possible to fill in the fields available to create a personalized header of ALL the reports that will be generated.

You can introduce the header and references of your company.



You can insert also your picture of Company logo.

Selecting the "***Upload Image***" button opens the dialog box that allows you to select the path for the image to be uploaded.



Once the fields have been filled in, press the "***Save Changes***" button to save the General Header data that will appear in the header of ALL Reports created since then.

It will always be possible to modify this data at any time.

Delete current Results

If you press this button **ALL the data saved in the program memory will be DELETED**.

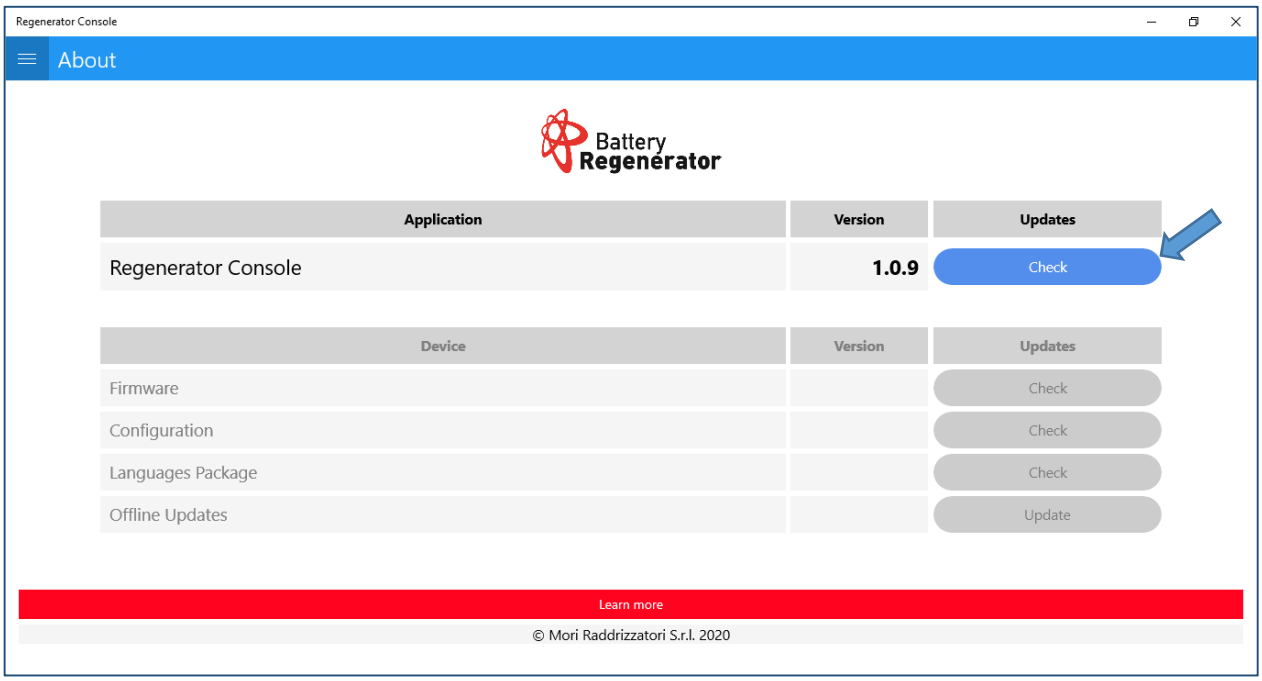
This operation **don't delete** the data stored in **Regenerator.**

It will not be possible to view data until the next download from Regenerator.

ABOUT...

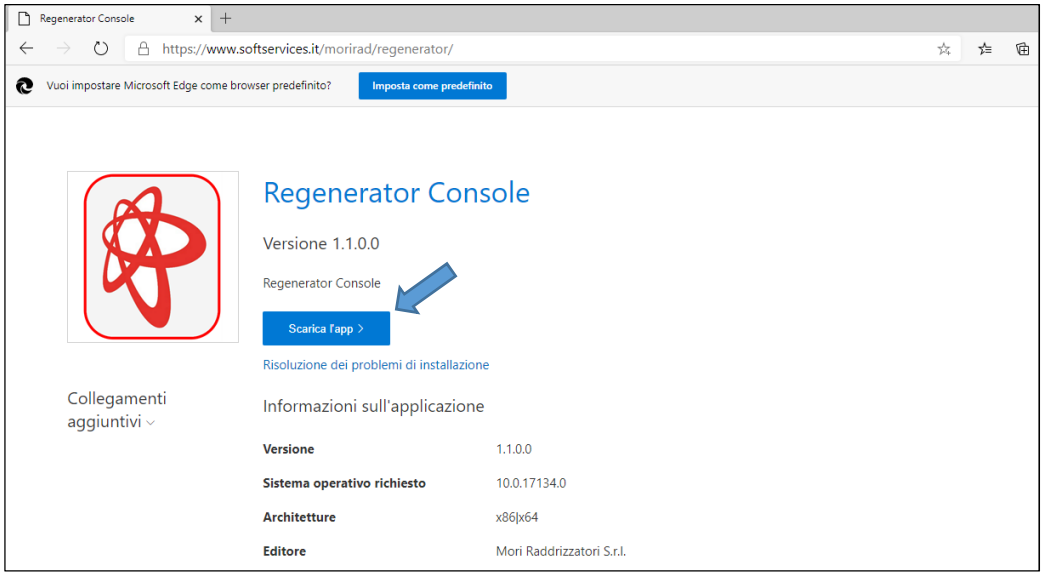
The **"About..."** button opens the window where A**pplication** and **Device** connected version are indicated.

<u>These operations are only possible by an Internet connection.</u>

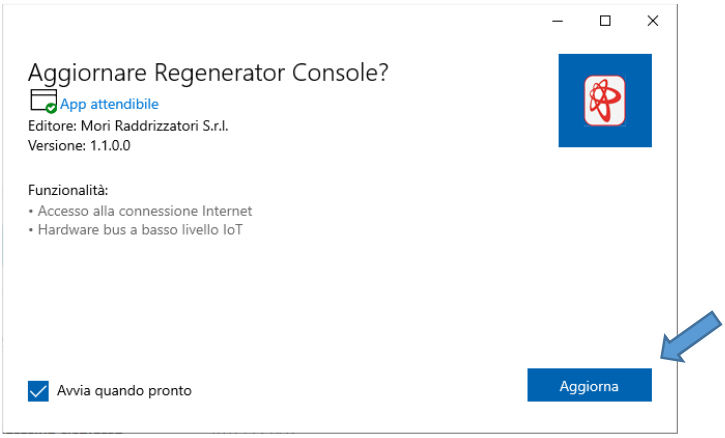


In the **Application** section, you can check the availability of app updates by activating the **Check** button.

In case of available updates you will be automatically directed to the section of the site from where you can download the update:



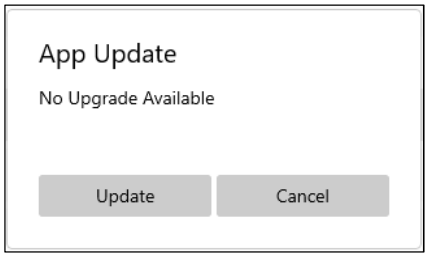
Activating the **"Aggiorna"** button, the application will be updated to the latest version available:



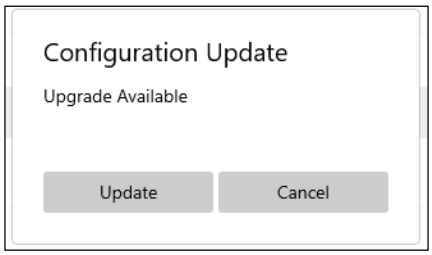
In **"Device"** section of About window, if a **Regenerator** is connected with the USB cable and turned on, the **"Check"** buttons are activated in the following **Device** section:

- *Firmware*
- *Setting*
- *Language package*
- *Offline update (for this function contact the Mori Raddrizzatori service center).*

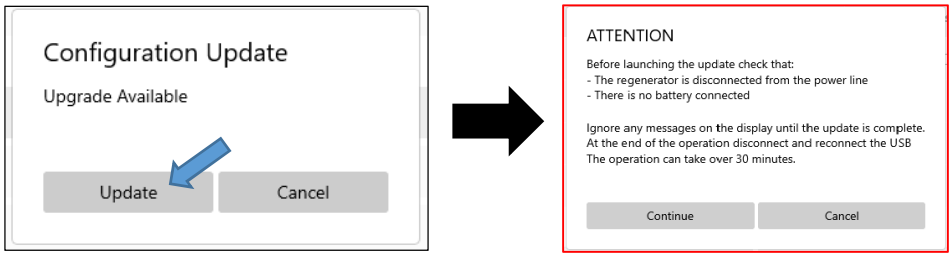
Activating any of the "Check" buttons, if no updates are found, the warning window appears:



If an update is available, the presented window is:



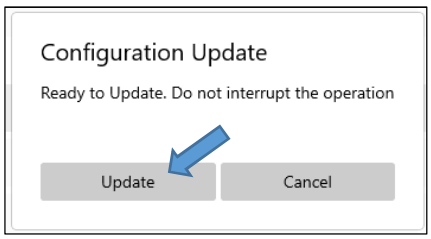
Clicking on the "**Update**" button, the ATTENTION window is presented:



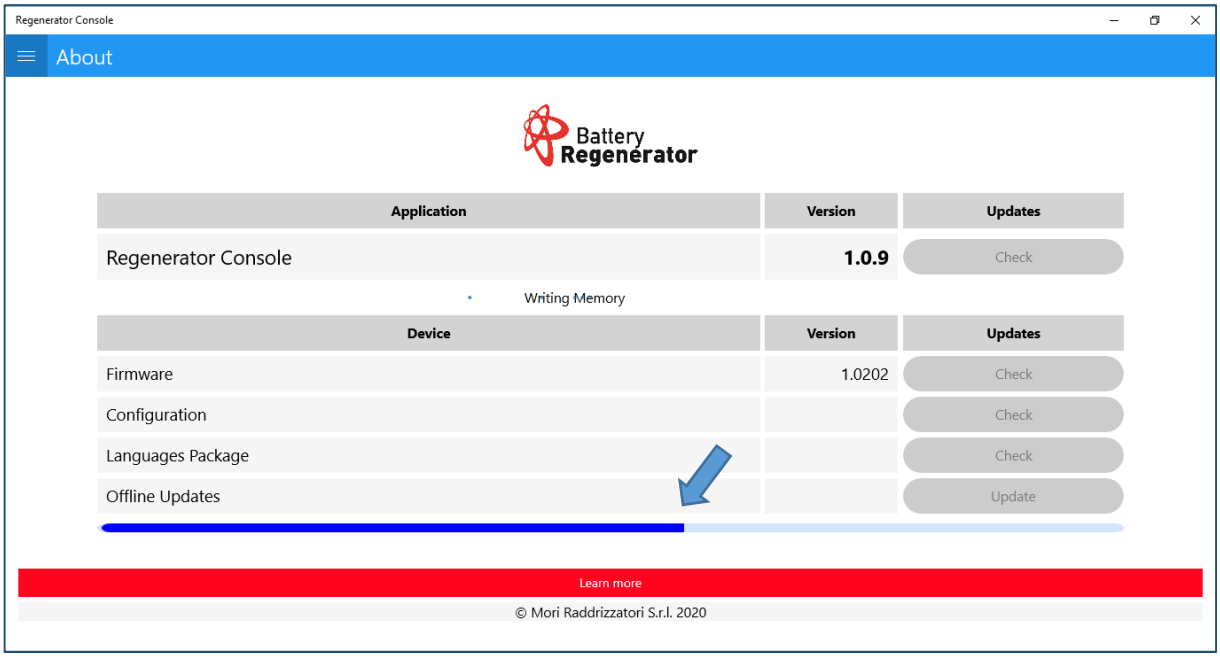
Follow the indicated instructions carefully

If you intend to proceed, select "**Continue**" button

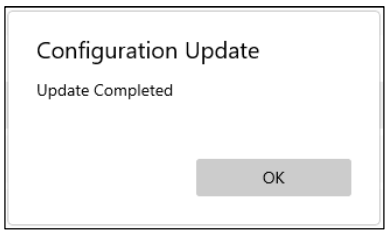
Click "**Update**" to start



During the update the progress bar appears:



Wait for the update to complete which will be indicated with the following notice window:



CAUTION:

During the update it is essential to have a stable internet connection.

Verify that:

- The Regenerator is disconnected from Power Line
- There is NO Battery connected

The process must never be interrupted.

LEARN MORE

By activating the **"Learn more"** bar at the bottom of the screen

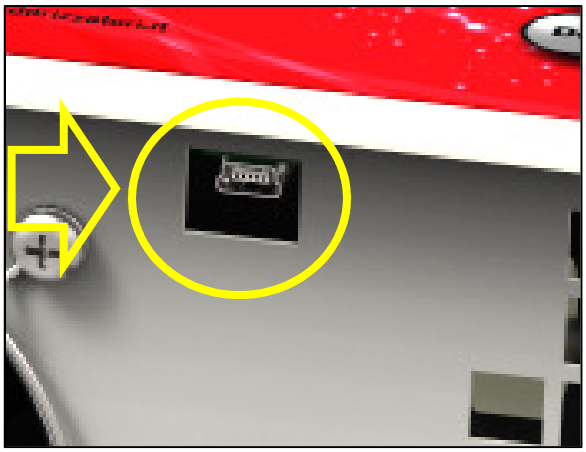
you can go to the manufacturer's website from where it is possible to access the technical documentation of the device (description on page 19).

DATA DOWNLOAD

During data download the **Regenerator** must be connected to the power supply, turned on and it can remain connected to the battery.

Download data only from the MAIN MENU: don't download the data during the procedure execution: the data of the cycle in progress will NOT be available until the end of the cycle in progress.

Connect the **Regenerator** to the PC (or Smart Phone) via USB cable with MINI-USB plug to the socket on the front:

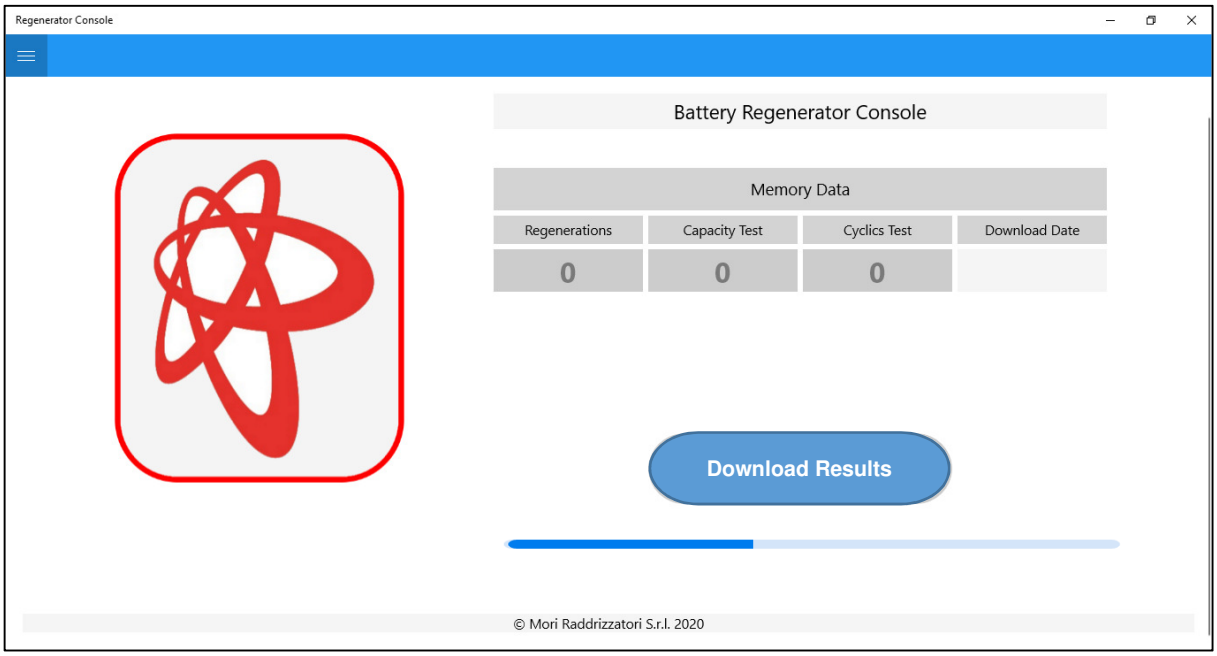


If the device is correctly connected, on the Home page you see the button Download Results (blue coloring) which allows you to download data from the connected device.

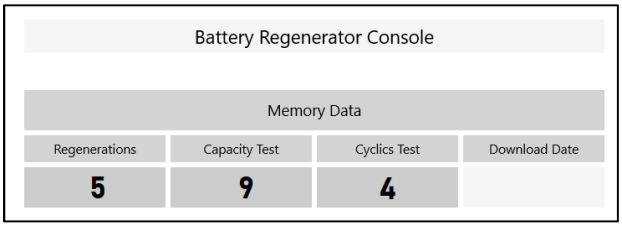
On Android devices at the time of connection the device will apparently remain inert for a few seconds after which the screen will be regenerated and from that moment it will be possible to activate the connection.

Click on Download Results to transfer the data from the ***Regenerator*** to the PC.

The progress bar indicates the current procedure:



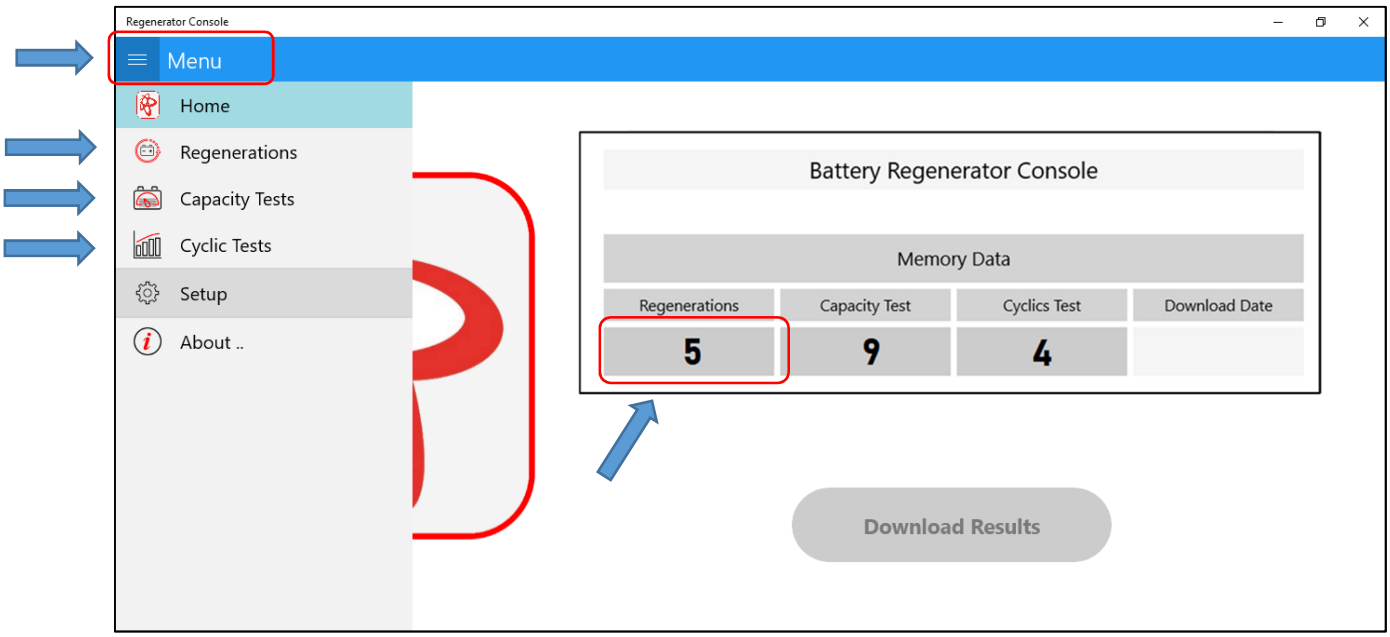
At the end of the data download, the "**Data in Memory**" table is updated with the data of the connected machine where the numbers of the tests performed are indicated, divided by type:



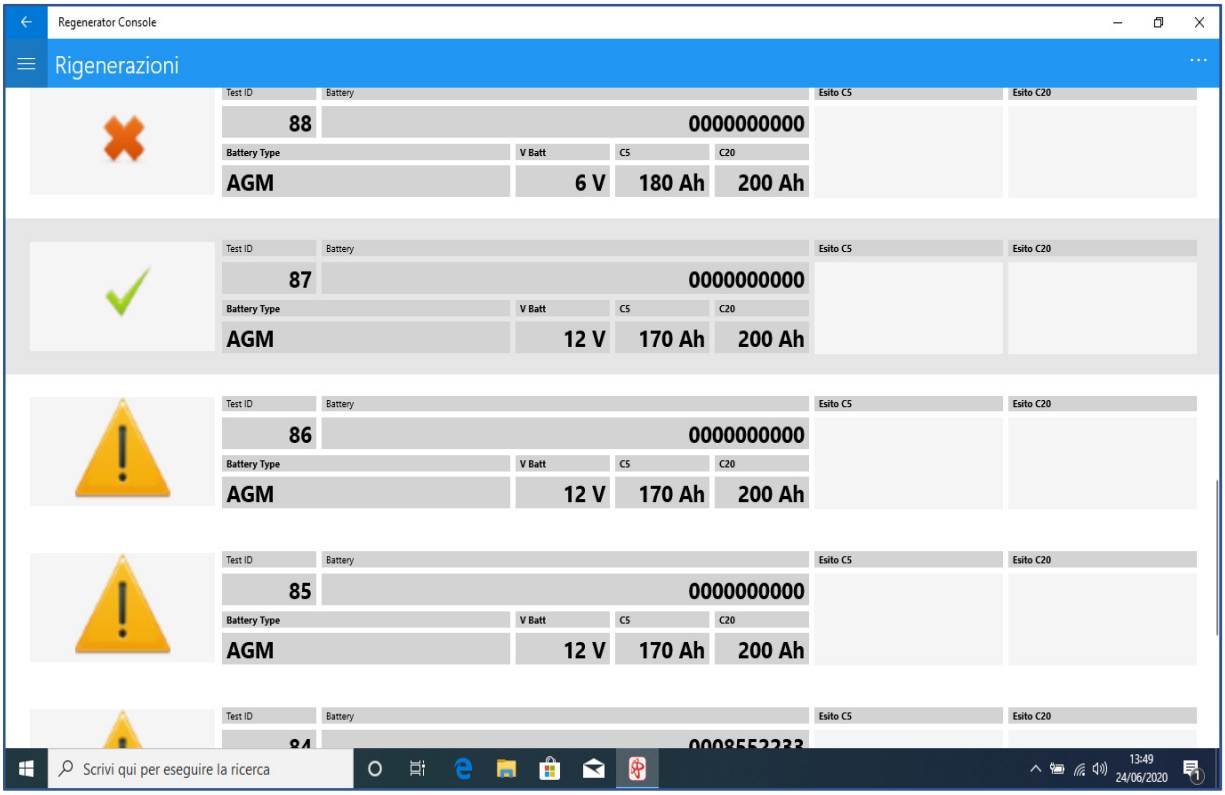
CYCLE CONSULTATION

You can access the display of the specific list of tests in two ways:

1. By opening the drop-down menu at the top left and selecting the type of test you want to consult.
2. Directly from the "Memory Data" table: click on the box indicating the test number.



In both cases, the screen with the list of saved tests opens. Each table indicates the summary values of the relative test:



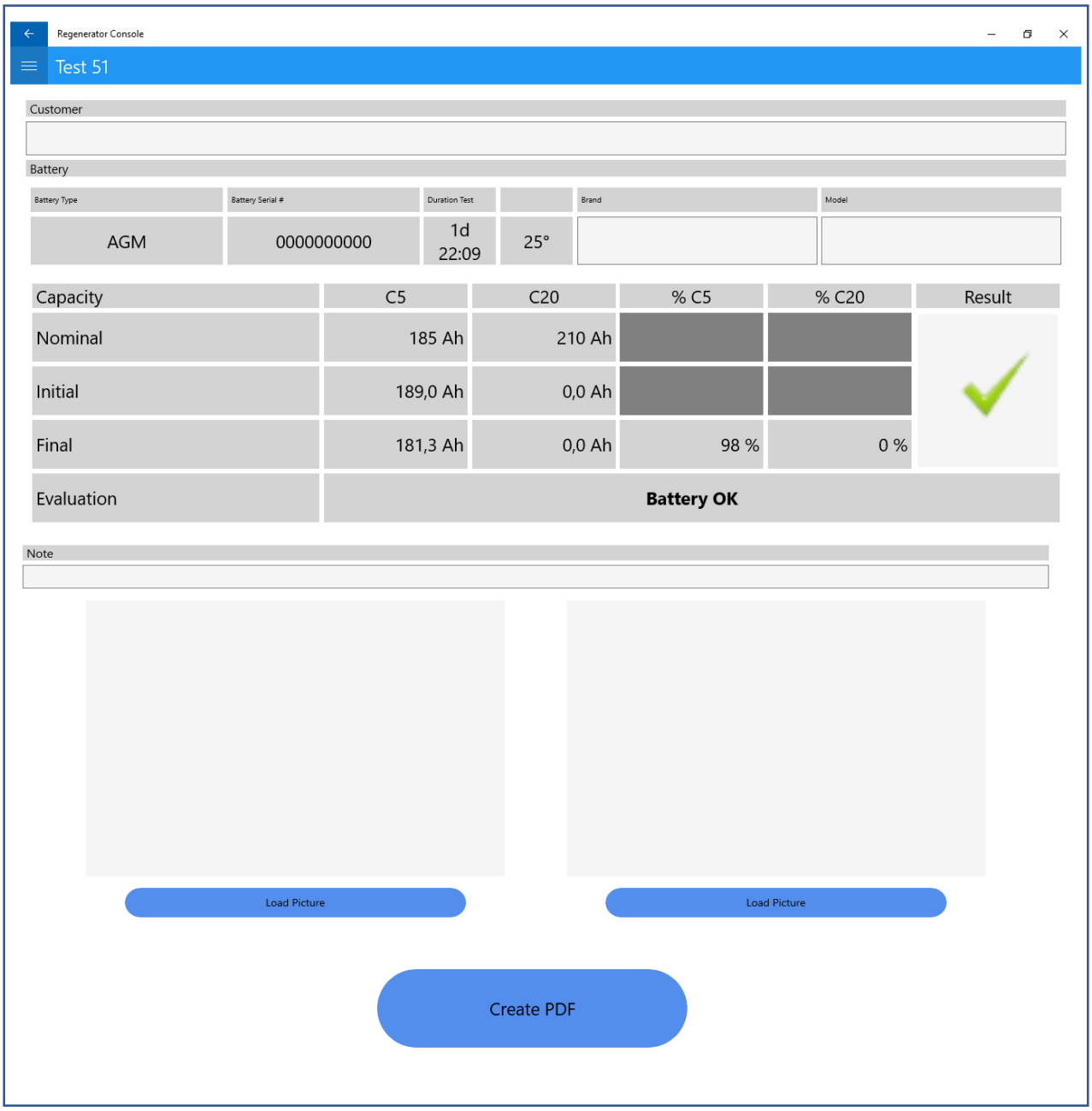
Meaning of the graphic symbols:

TEST COMPLETED WITH POSITIVE RESULT

INCOMPLETE TEST OR OUTCOME TO BE ASSESSED

TEST COMPLETED WITH NEGATIVE RESULT

By selecting one of the tables (in the example, Test ID 51) you enter the display of the relative Report:



REPORT GENERATION

All the present Reports can be saved in PDF format to be printed or consulted at any time.

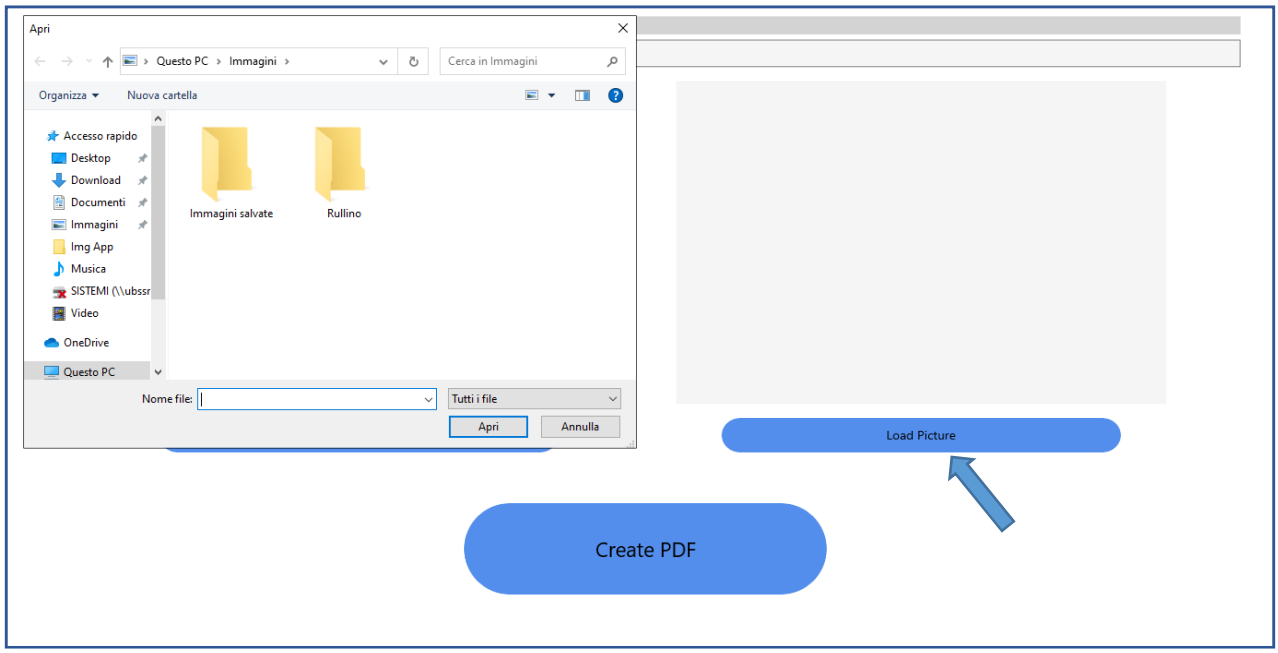
To generate a complete and exhaustive Report it is possible (and recommended) to fill in the fields

- **Customer**
- **Battery brand**
- **Battery model**
- **Notes**

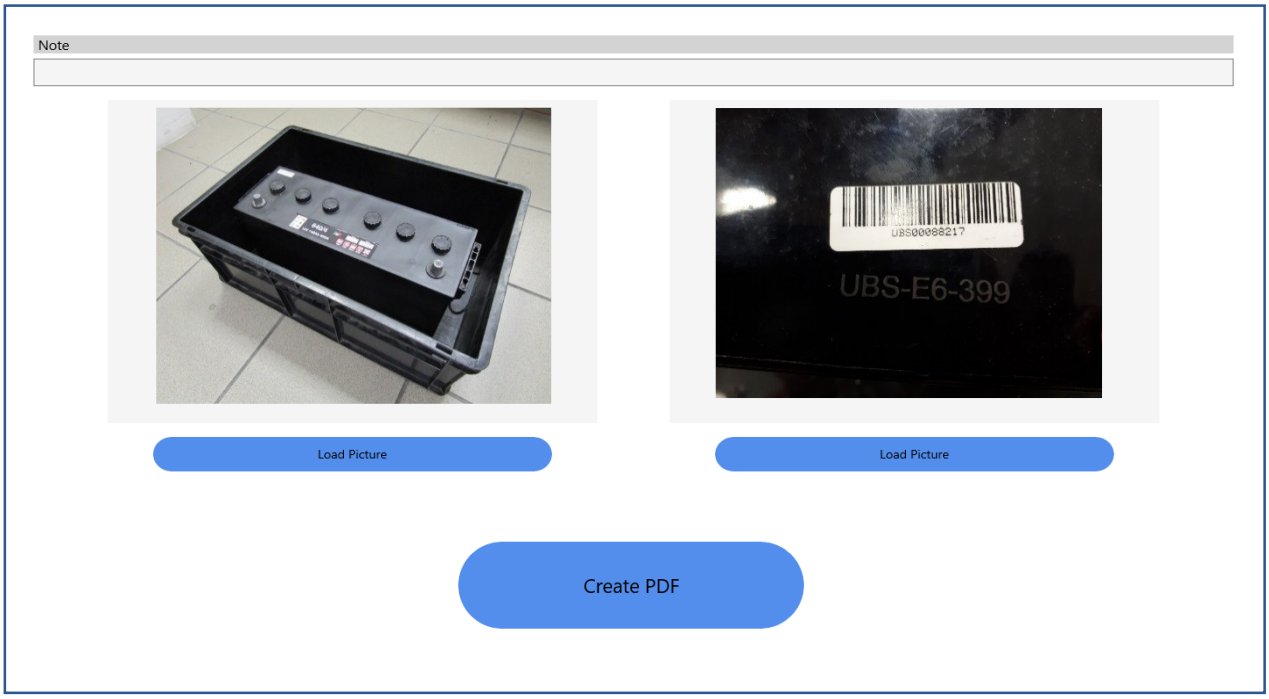
These data will be included in the report at the time of saving.

It is also possible to insert in the Report 2 images of your choice.

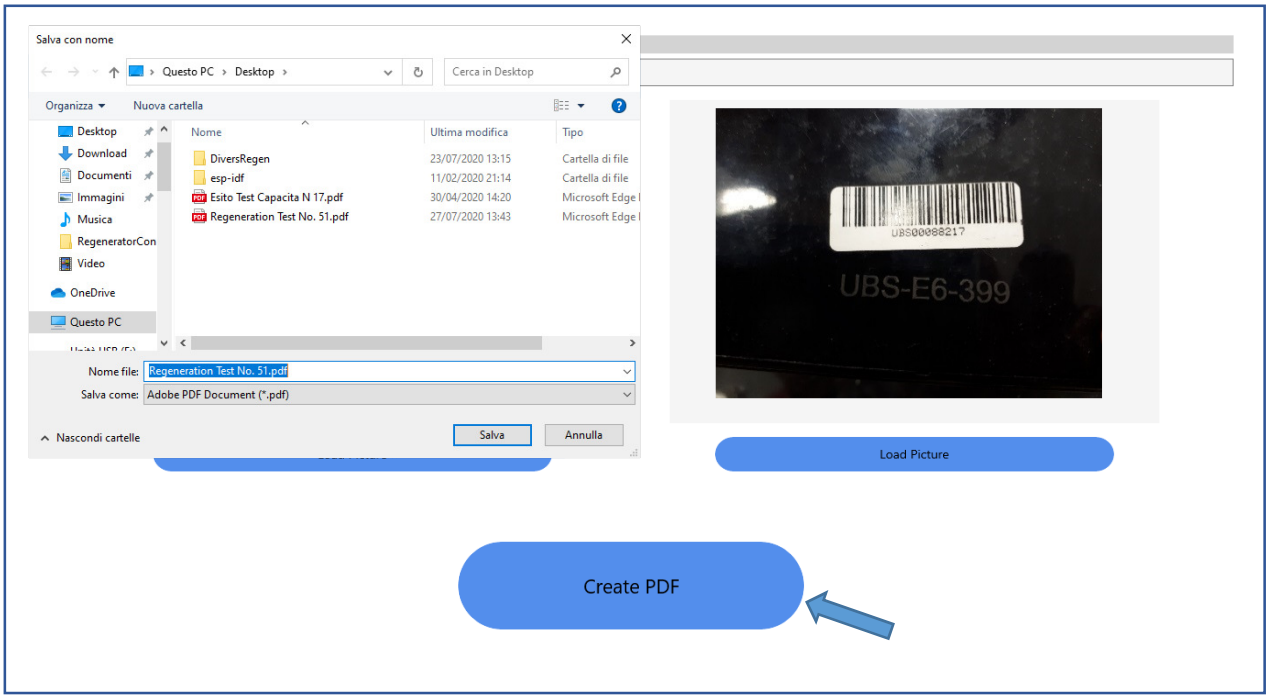
Activating the **"Load Picture"** buttons opens the path selection window from which to upload the desired image:



It is recommended to insert the photos related to the tested battery, for example:



Once the compilation of all the fields has been completed, activating the **Generate PDF** button opens the dialog where you can change the name of the file and select the destination path of the report to be saved:



Through the PDF file management program installed on your PC, you can consult and print the saved reports at any time.

Here is below an example of a Regeneration Report with all the fields filled in:

Logo

Factory Name

Address
Notes

Info from ***Report Setting*** of Menu ***SETUP (pag.26)***

Regeneration Test No. 51

Customer

Customer Name

Battery Type	Voltage	Battery Serial #
AGM	**12 V**	**0000000000**

Brand	Model
Battery brand	Batteriy model

Capacity	C5	C20	% C5	% C20	Result
Nominal	185 Ah	210 Ah			✓
Initial	189,0 Ah	0,0 Ah			
Final	181,3 Ah	0,0 Ah	98 %	0 %	
Evaluation	Battery OK				

Information derived from the data entered in the Regenerator at the start of the tests in the related menu
BATTERY DATA e OPERATING DATA
(e.g. page 6)

and from the data entered in
Report Generation
(page 33)

Note

Various Notes

Execution Date	Duration Test	Temperature
27/07/2020	**1d 22:09**	**25°**

	Technical Documentation no. UT/325E	MODULO N.	48.DCO
MORI RADDRIZZATORI power to work	CE DECLARATION OF CONFORMITY N.: CE / REGEN_000 - 29/06/2020	DATA EMISSIONE:	01/04/2010
		REV. n.2 DEL: 01/10/2016	
	EMESSO DA: **RGQ** / APPROV. DA: **DIR**	PAG.1 DI 2	

The undersigned, as representing of the following manufacturer

Manufacturer identification: **MORI RADDRIZZATORI s.r.l.**

Address: **Via Pietro Nenni, 17/19**
25019 Colombare di Sirmione (BS) - Italy

declares that the following products

BATTERY REGENERATORS

REGEN Series single-phase

result in conformity with the essential requirements as mentioned from the following EU Directives (comprise all applicable amendments)

Reference nr.	title
2014/30/EU	Directive 2014/30/EU (EMC) of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast).
2014/35/EU	Directive 2014/35/EU (LVD) of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits

and that are applied all standards or technical specifications mentioned below.

Last two numbers of the Year in which is affixed the CE label: 20

CE

TCF reference nr. REGEN_rev.000
Place & Date Colombare di Sirmione (BS) – Italy
29/06/2020
Name and position Ing. Antonio Mori
INGEGNERE CAPO dell' UFFICIO TECNICO
Sign.

Reference to standards and/or technical specifications, or part of them, used for this Declaration of Conformity:

– Harmonized standards:

Ref. nr.	*edition*	*title*	*parts*
CEI EN IEC 61000-6-2	2019	**Electromagnetic compatibility (EMC) Part 6-2: Generic standards - Immunity standard for industrial environments**	6-2
CEI EN 61000-6-3/A1	2013	Electromagnetic compatibility (EMC) - - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments	6-3
CEI EN 60335-1/A11	2015	Household and similar electrical appliances – Safety - Part 1: General requirements	1
CEI EN 60335-2-29/A2	2011	Household and similar electrical appliances – Safety - Part 2-29: Particular requirements for battery chargers	2-29

- Other standards and/or technical specifications:

Ref. nr.	edition	title	parts
IEC 61000-6-2:2016	2016 ed. 3.0	Electromagnetic compatibility (EMC) - - Part 6-2: Generic standards - Immunity for industrial environments	6-2
IEC 61000-6-3:2006 + AMD1:2010 CSV	2011 ed.2.1	Electromagnetic compatibility (EMC) - - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments	6-3
IEC 60335-1:2010 + AMD1:2013 + AMD2:2016 CSV	2016 ed. 5.2	Amendment 2 - Household and similar electrical appliances - Safety - Part 1: General requirements	1
IEC 60335-2-29:2016	2016 ed. 5.0	Household and similar electrical appliances – Safety - Part 2-29: Particular requirements for battery chargers	2-29

Other technical solution detailed in the technical documentation or Technical Construction Folder:

..... *(none)*.....

Other reference or information required from the applicable EU Directives:

..... *(none)*.....

---------- INDEX ----------

Regenerator

Regeneration Console App