Installation Instructions

- Download the setup executable installer to any directory with permissions. http://www.interflexo.com//kp184//setup_kp184_10240.exe
- Double click it to execute the setup installer.
- Follow all the prompts that appear.
- It is suggested that you follow all the defaults, but you can select an alternate directory for the install.
- You are good to go.
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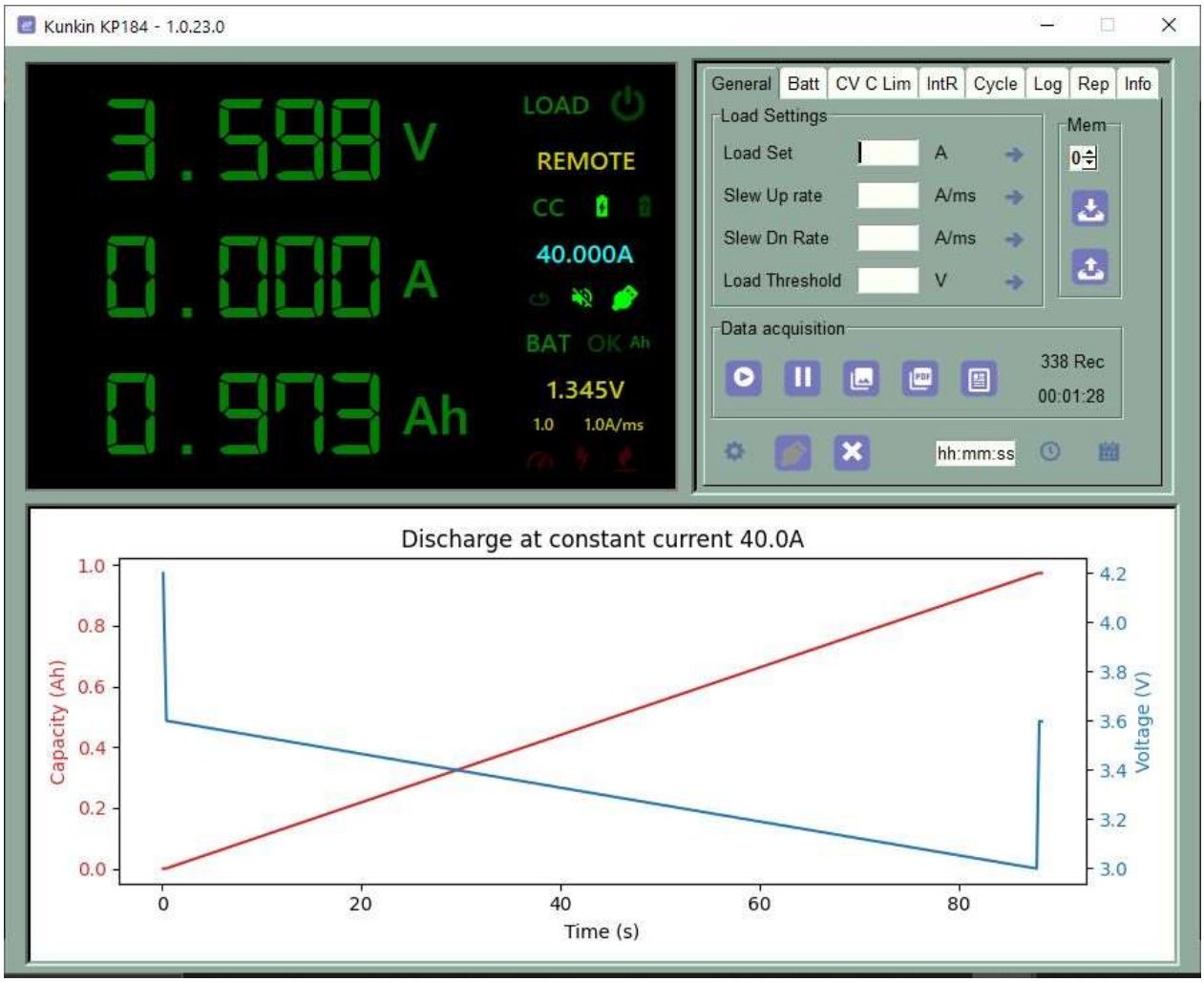
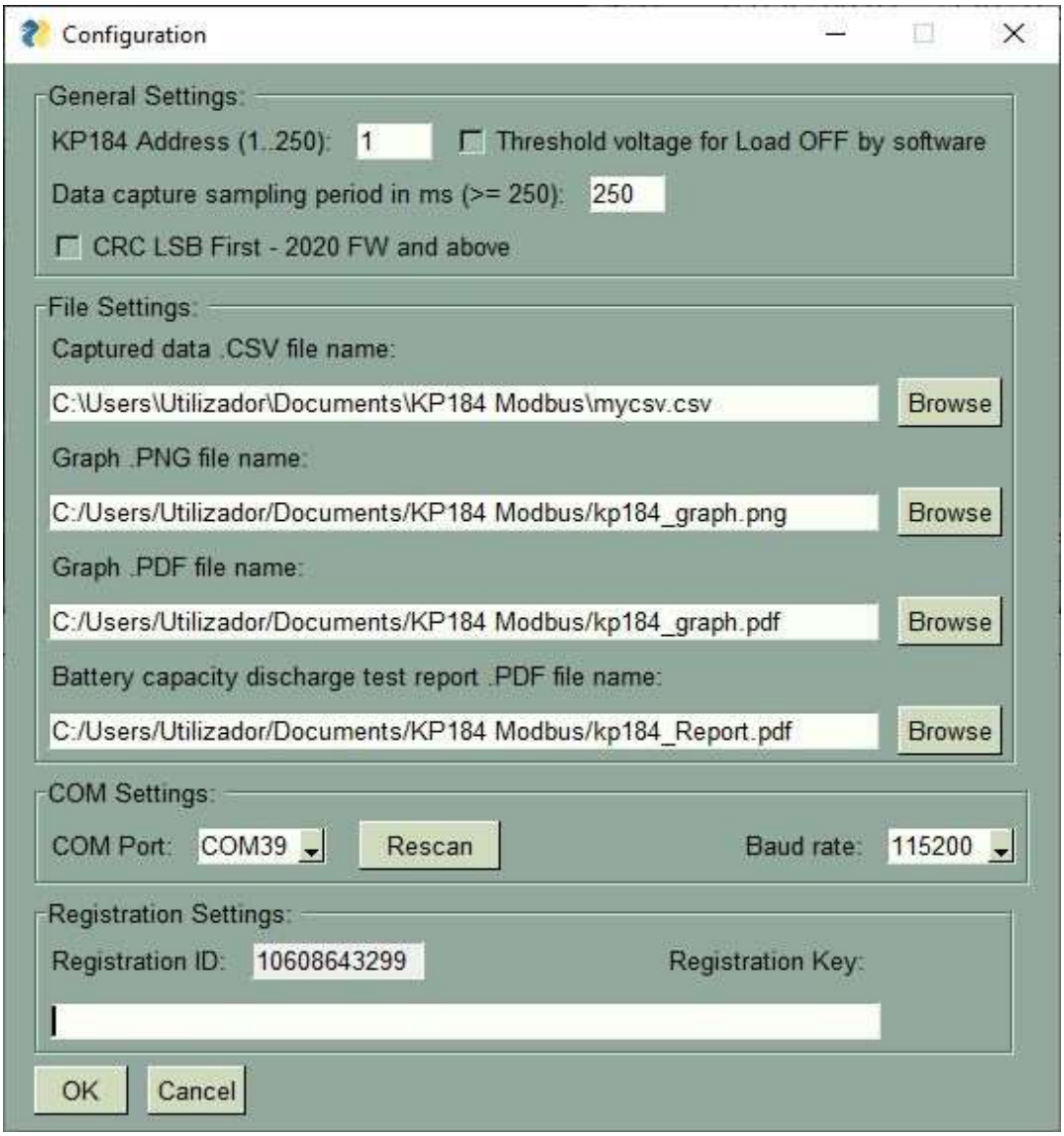
Main Screen



Configuration dialog button. Disabled when connected to COM port.



The standard Kunkin KP184 operating parameters are omitted from this manual, please refer to the equipment manual for reference.

KP184 Address (1..250): Device communication address, must match the value configured on Kunkin operating panel.

Threshold voltage for Load OFF by software: The hardware threshold voltage for Load OFF on the Kunkin KP184 is implemented with some weird ramp that throttles down the current in an unstable way. This software option lowers the KP184 hardware programmed value by 500mV to get it out of the way and just cuts the load automatically when the programmed threshold value is reached.

The screen values are always refreshed 3 times per second. The **Data capture sampling period** refers to the .csv and plot graph data creation.
The captured data includes elapsed time in seconds, voltage, current, capacity (Ah) and energy (Wh). I probably should add Power in Watts.

Check the **CRC LSB First** option if you experience difficulties establishing the serial communication with KP184 later models (Firmware 2020 and up – can be check at the Kunkin screen at startup)

File settings group: Default file names and folders for captured data, graph images and battery capacity discharge test reports.

A verification is made to check if the folder and path are valid. In error case it will default to “My Documents\KP184 Modbus\”.

All the data file names (.csv; .png; .pdf) are used as base file names, numbers are automatically added in subsequent files to avoid overwriting files.

Please use a decent USB serial adapter in the absence of a legacy COM port. A FTDI or Silabs processor chips are far better than a low the cost

Prolific or WCH. A Digitus DA-70156 USB 2.0 to Serial (FTDI/FT232RL) from ASSMANN Electronic GmbH costs 8,67 EUR + Shipping on Amazon. Don't need to break the bank.

The serial COM is a high latency communication. The protocol used is a Modbus RTU with CRC checks. COM Port configuration: 8,N,1 No hardware/software flow control. It will work reliably across the KP184 limits from 2400 to 115200. Please favor the higher speeds to keep the application responsive depending on your adapter, cable and distances.

This unregistered product works in trial mode for 15 minutes, after the expired period the data capture features are disabled. If you find out that this software product is useful, you can register sending your registration ID from this configuration dialog to interflexo@sapo.pt along with $30 USD by PayPal. Interflexo will then email you back an unlocking registration KEY after payment clearance.

 Connects to the configured COM serial port

 When connect the corresponding icon lights up on the LCD area. When there is an adapter/cable/baudrate problem the icon first flashes during five seconds trying to find the Kunkin KP184 then stays dimmed.

 Exits the application

All controls have tool tips (hints) when you carefully hover the cursor over the controls.

Main LCD screen

Switches the electronic load ON/OFF. The dimmed image signals the OFF state.

Remote/Local Toggles the voltage sense mode. Local uses the power connectors and is affected by the voltage drop (proportional to the electronic load current) on the cables, connectors, etc. Remote uses the independent front BNC connector for voltage sense and is not affected by the voltage drop because it does not carry any meaningful current. You may connect the alligators directly to the battery (being tested) terminals, please respect the polarity. The assembly bellow costs about 7 Eur.

CV/CC/CW/CR Signals and Cycles through the four load modes. Constant Voltage, Constant Current, Constant Power and Constant Resistance.

 Toggles battery capacity test mode ON/OFF. Mode ON unlocks Battery tab.

 Toggles Internal resistance test mode ON/OFF. Mode ON unlocks In Resist tab.

0.000V/0.000A/0.000W/0.000Ω Shows the programmed load value

 Toggles the Power up load state. OFF (dimmed) the electronic load is always OFF at power up. ON the electronic load remembers the last state when was power down and uses it at power up.

 Toggles Kunkin KP184 key beep sound ON/OFF.

GEN/BAT/RES/CVL/DYN/COP/OCT Shows the Kunkin active test mode. Toggles to CVL test mode.

0.000V Threshold voltage for load OFF programmed value. Please notice the tool tip (hint) to check for hardware or software handling type. When using the software type the indicator flashes red when stopping the load.

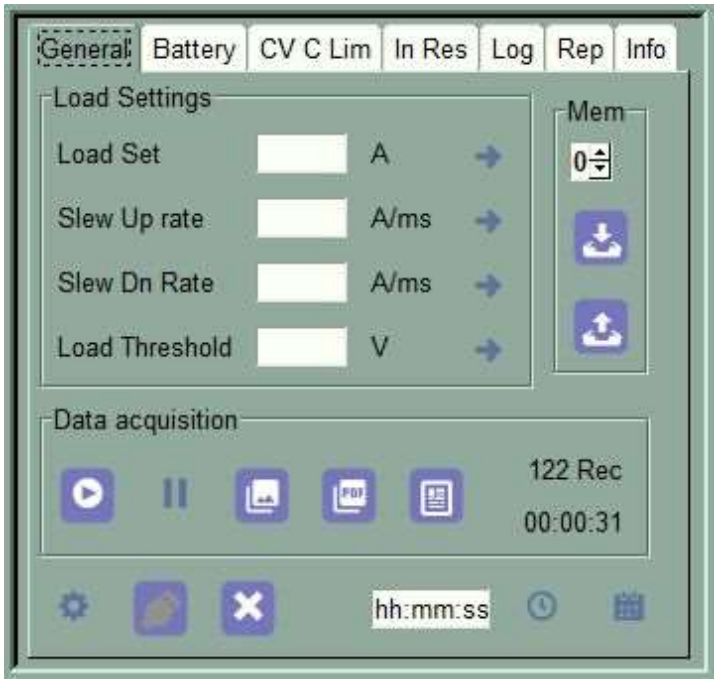
0.0 0.0 A/ms Current slew down rate and current slew up rate when switching ON/OFF.

Overpower indicator. Power > 410W.

Over voltage indicator. Voltage > 152V.

Over temperature indicator.

General Tab:



Load Settings Frame:

Set the:

Load Set Value: 0..150V; 0..40A; 0..400W; 0..8000Ω

Slew Up rate: 0..100A/ms

Slew Dn rate: 0..100A/ms

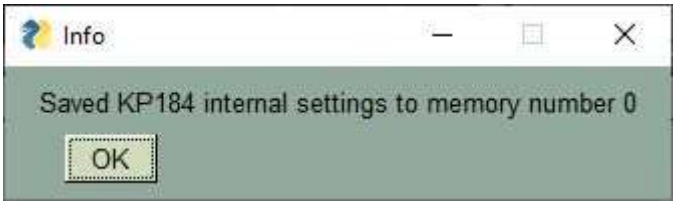
Threshold Voltage: 0..150V

and use the corresponding send button. The new setting is sent to Kunkin KP184. This button can appear enabled or disabled according to the setting entered string syntax validation and COM port communication status.

Preset Memories frame:

 Preset memory load button. Loads settings from preset memory number (0..9) defined on the spin box and sends them to Kunkin KP184.

 Preset memory save button. Saves settings from Kunkin KP184 to preset memory number (0..9) defined on the spin box.



A non blocking pop up window confirms the selected operation.

Settings involved on preset memories:

key_sound
power_up_state
voltage_sense
load_mode
cv_setting
cc_setting
cr_setting
cw_setting
threshold_volt
slew_up_rate
slew_dn_rate
dynamic_mode_1
level_1_cur

level_1_tim
level_2_cur
level_2_tim
dynamic_mode_2
battery_mode
bat_end_volt
bat_go_half_cur
bat_cap_units
bat_test_over_signal

Data Acquisition frame:

Erases previous memory data. Start collecting new data.

Pauses/Resumes collecting data.

Saves collected data on a previously configured .csv file name and folder. The file name is used as a base file name, numbers are automatically added in subsequent files to avoid overwriting files. It can be used during data acquisition to follow up during long processes. A progress window is shown during the file creation process. The system can save more than 14.000 records per hour. Adjust the data sampling period (> 250ms) on the config dialog according to your needs.

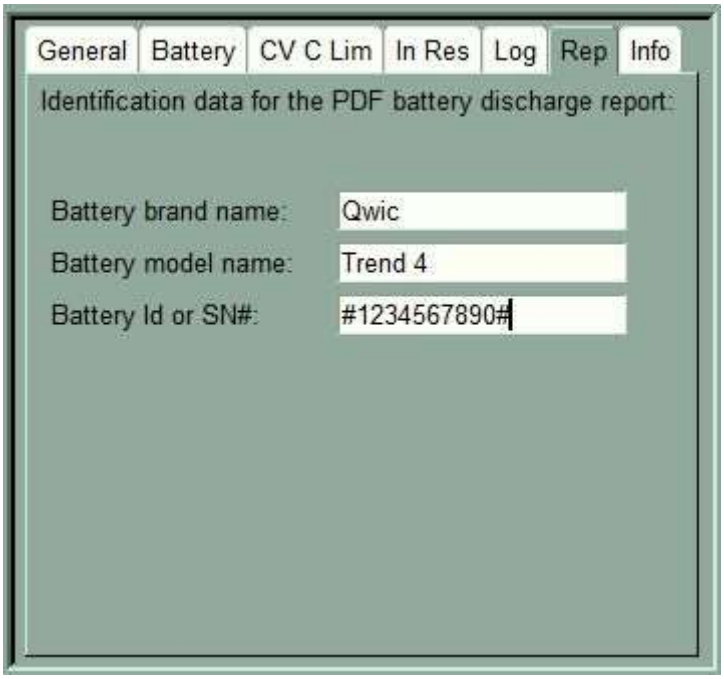
Saves the plot graph on a previously configured PDF file name and folder. The file name is used as a base file name, numbers are automatically added in subsequent files to avoid overwriting files. It can be used during data

acquisition. A matching ".png" image file is also added for easier document insertion. After file creation the PDF file is automatically opened on Adobe Acrobat Reader or configured web browser.

Battery capacity discharge test PDF report. When using battery capacity test mode this option also creates a detailed report page.

This PDF report is built based on a supplied html template file named "Report.html" that must exist on the program directory. You can make minor and careful changes to this template file to fit your particular needs. No support will be given to accommodate these changes. This html template file is used by the xhtml2pdf Python module. Please refer to the module documentation here:

https://xhtml2pdf.readthedocs.io/en/latest/



The battery identification details that will be used on the test report can be filled on the Rep tab.

These are simple text fields, you can type anything you want or leave them blank.

The report creation is a silent operation. However a line is added to the application log when the report is created.

The PDF battery test report is created if:

- Test mode is Battery capacity test mode.
- Operating mode is CC (constant current) mode.
- Load is OFF.
- Data recording is OFF.
- Discharge test capacity value in Ah is not null.
- Discharge test elapsed time is not null.
- The test result graph PNG file was successfully created.

The battery capacity discharge test may have ended automatically when the end test voltage was reached, time limit was reached or test was user terminated or temporary suspended by a load OFF command.

The report is saved on a previously configured PDF file name and folder. The file name is used as a base file name, numbers are automatically added in subsequent files to avoid overwriting files. After file creation the PDF file is automatically opened on Adobe Acrobat Reader or configured web browser.

On the next page you can find an example of a dummy report test page.

Kunkin KP184 Battery Analyzer

Date: 21-01-2021

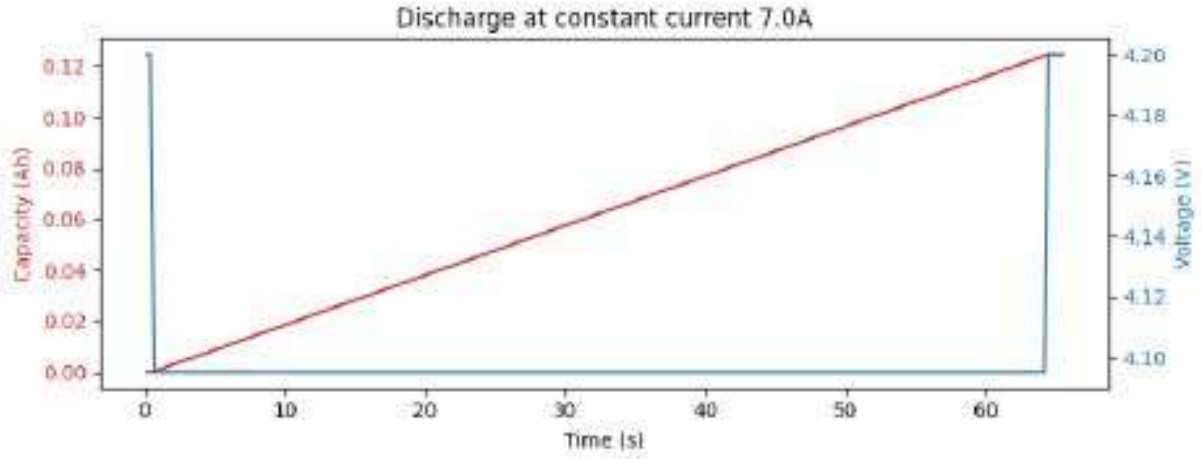
Brand: Qwic

Model: Trend 4

ID: #123456789#

Load Set: 7.00A

End Voltage: 4.1V



Test Results:

Battery Energy: 0.51Wh

Battery Capacity: 0.12Ah

Discharge Time: 00:01:05

Discharge Current: 7.00A

Start Voltage: 4.2V

End Voltage: 4.1V

The number of saved records is constantly updated as well as the elapsed time in the format hh:mm:ss.

Timer to turn Load ON/OFF:

 Calendar date picker for timer to turn Load ON/OFF. Adjust this setting prior to COM port connection. The settings below can be adjusted during serial communications.

 Timer disabled

 Timer enabled to turn Load ON at a specific date and time

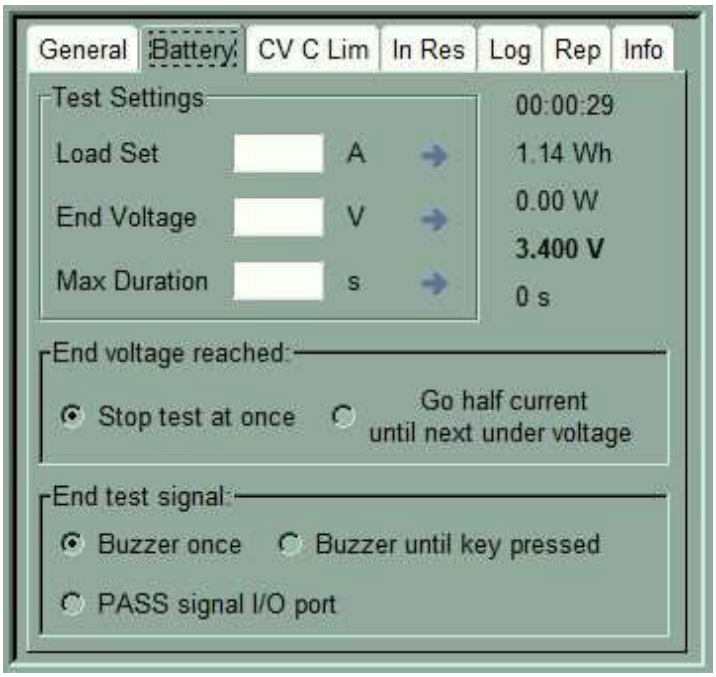
 Timer enabled to turn Load OFF at a specific date and time

These last three buttons cycle through each other when the user clicks the button. The tool tips (hints) are always updated.

The input text box accepts a time in the format hh:mm:ss. Adjust this setting preferably with Timer disabled.

The input text box content is always checked for errors and in case of invalid value the current time is used and the timer is disabled.

Battery Tab:



Toggles battery capacity test mode ON/OFF. Mode ON unlocks Battery tab.

The load test modes available on battery test mode are limited to CC (Constant Current) and CW (Constant Power).

Use the load mode toggles on the LCD area to set the load mode.

Test Settings Frame:

Fill the Load Set Value and End Test Voltage (LVC) and

use the corresponding send button. This button is enabled based on the entered setting string syntax and COM port communication status.

The software supervises LVC value and finishes the test even if Kunkin KP184 feels like going further.

The Max Duration input text box allows the user to specify a maximum test duration in seconds. Zero disables this feature.

To start the test use the Load Switch button: 

When the test starts:

- The test stops automatically according to the programmed End Voltage and Max Duration parameters.
- The data acquisition is started and terminated automatically.
- The selected capacity units for the plot graph are based on the current choice for the LCD display Ah/Wh at the beginning of the test.

End Voltage Reached Frame:

Kunkin KP184 reports the memory register corresponding to this parameter when changed through the Kunkin KP184 configuration menus but does not change the internal parameter when the software sends the write memory command.

This occurrence happens on several other features. Once again the Kunkin software behaves in the exact same manner. There are no errors reported through the Modbus protocol.

This feature was implemented by software.

“**Stop test at once**” option ends the test when the programmed end voltage condition is reached.

"**Go half current until the next under voltage**" option lowers the discharge current to half the initially configured value at least 10mV prior to the test end voltage reached mark. The next time the test programmed end voltage condition is reached the test is ended. A specific log is added for this event.

In case of high voltage instability due to bad connections or other reasons the 10mV step may not be enough to avoid tripping prematurely the test end voltage condition. Please check your electric connections.

End Test Signal Frame:

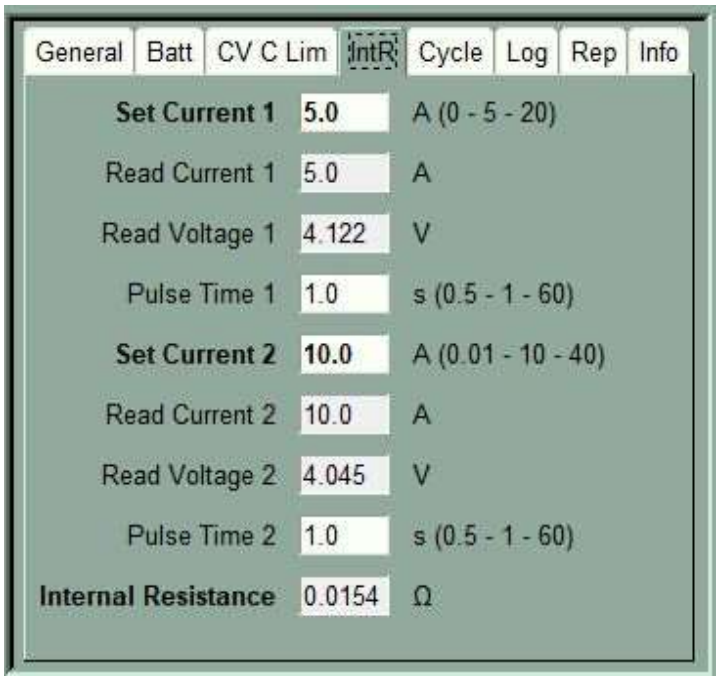
The radio buttons show the parameter value and allow the user to change it. The options are:

- Buzz once
- Buzz until a key is pressed on the Kunkin KP184
- The PASS output electric signal is enabled after the test is finished

Under battery test mode:

- The plot graph displays a line for the voltage and another for the capacity.
- On the LCD area the large Power indicator shows the battery capacity (Ah). Clicking on it resets the capacity value to 0.0Ah.
- On the LCD area the **Ah/Wh** indicator allows the user to switch between Ah/Wh when clicked. The alternate units and Power are always displayed the battery tab.

In Resist Tab:



In the LCD area:

 Toggles Internal resistance test mode ON/OFF. Mode ON unlocks In Resist tab.

Fill the “Set Current 1” and “Set Current 2” step pulse values. Use large and differentiated paired values like 1A and 2A or 5A and 10A depending on the specification of the equipment you are testing. Use remote voltage sense to rule out cable and connectors voltage drops and calculate meaningful results.

The current step pulse times are configurable. These tests can meet IEC 62620 standards for Li-ion batteries and IEC 61951-2 standards for Ni-MH batteries.

As a standard DCIR test please allow 1 second duration for Kunkin KP184 voltage settling.

DCIR is a function of the batery state of charge (SOC). Ideally SOC should not change during the test.

If you know what you are doing you can customize longer pulse times to meet your needs.

The first step may be configured to 0A to measure the battery internal resistance from an open circuit voltage (OCV) state.

The result in ohms (Ω) is displayed on the bottom under “Internal resistance”.

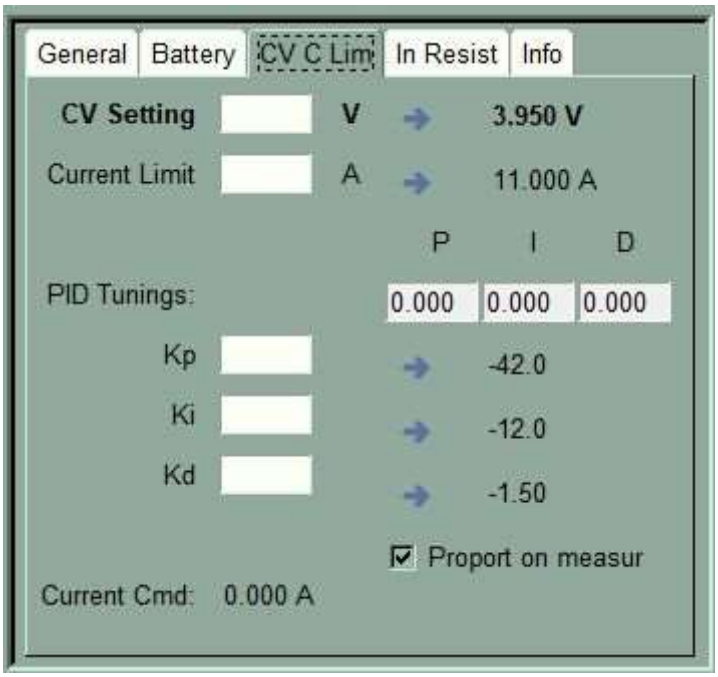
To start the test use the Load Switch button: 

The test stops automatically.

The user can start data acquisition previous to the test start on the General tab and log the process.

This mode is implemented in software. It is impossible to change the Kunkin KP184 parameters by serial port regarding this test. Once again the Kunkin software behaves in the exact same manner.

In CV C Lim Tab:



This is a software current limited CV test.

Kunkin is hardware configured to CC and a PID configurable loop holds the configured CV setting by permanently adjusting the CC load.

Please understand that with an update period of 250ms this process is only viable for fairly stable circuits.

GEN/CVL/... Toggle the test mode indicator to access CVL test. It unlocks In CVL tab.

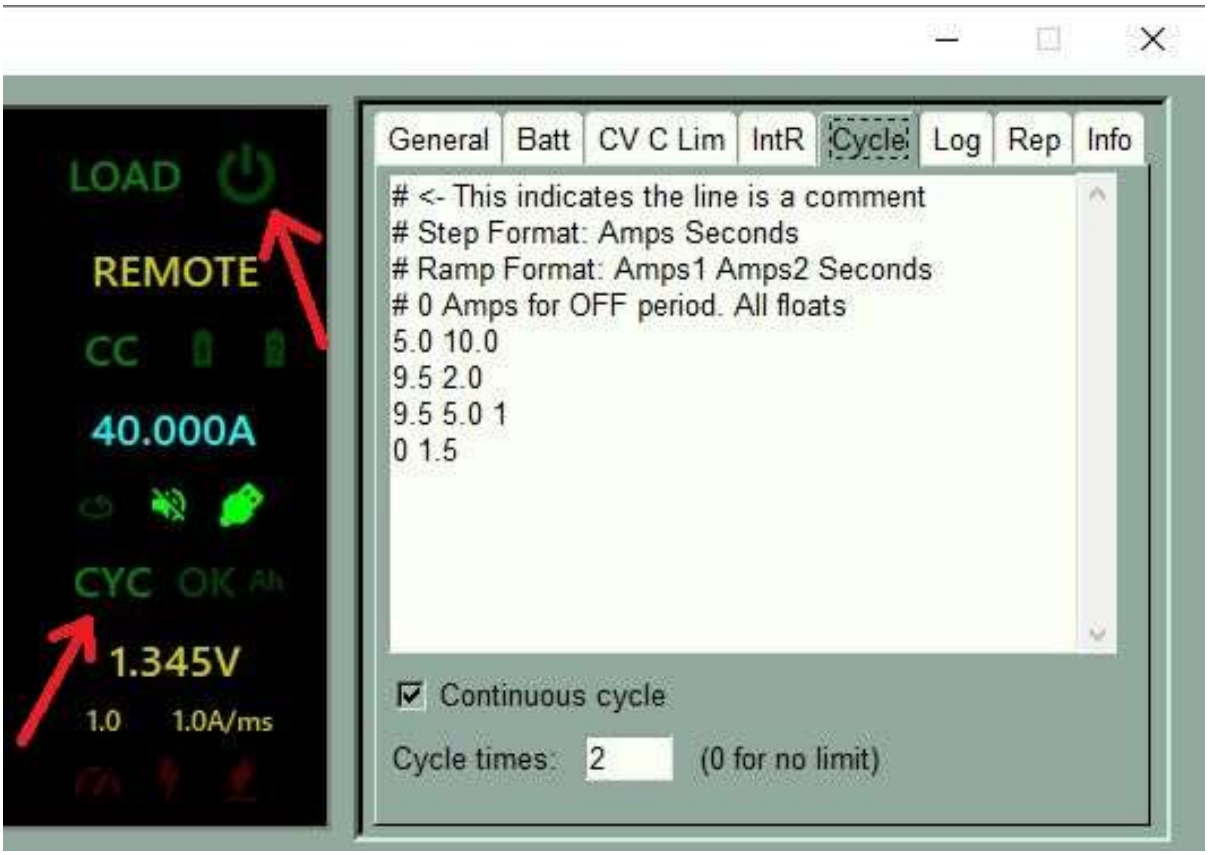
Fill the CV Setting voltage and the current limit.

Kp, Ki, Kd adjusts the PID gains on the fly.

Proportional on Measurement: To eliminate overshoot in certain types of systems, the application can calculate the proportional term directly on the measurement instead of the error.

To start/stop the test use the Load Switch button: 

Cycle Tab:



The dynamic Cycle mode allows the user to program a custom variable CC load profile of unlimited steps, ramps and repetitions.
Toggle the test mode indicator to access the special test modes GEN / CVL / CYC. CYC unlocks the Cycle Tab

The format is simple and can be edited on the multiline text box.

Any empty lines are ignored. All lines beginning with '#' are treated as a comment.

A step current is programmed with a current value in A and a pulse time in seconds. Both integer or floats can be used separated by spaces.

A null current of 0A indicates an OFF time.

A current ramp is programmed with two current values in A and a duration time in seconds. Both integer or floats can be used separated by spaces.

The programmed profile can be repeated any number of times and stops automatically or indefinetly and must be stopped with Load Switch button. Use the checkbox to enable the cycle repetitions and the edit box to enter the number of repetitions, use 0 for no limit.

The load commands are sent in real time through the serial interface. Use 115200 baud to reduce the lag as much as possible. The minimum programmable time step is 0.1s

The log tab records all relevant load changes.

To start/stop the test use the Load Switch button: 

In the Cycle tab you can write lines as in a text programming language.

For example:

0 5 3

5 1

0 1

5 1

5 0 3

Will result in the following load programmed profile:

Ramp from 0A to 5A in 3 seconds

Hold 5A during 1 second

Turn Load OFF (0A) during 1 second

Turn Load ON (5A) during 1 second

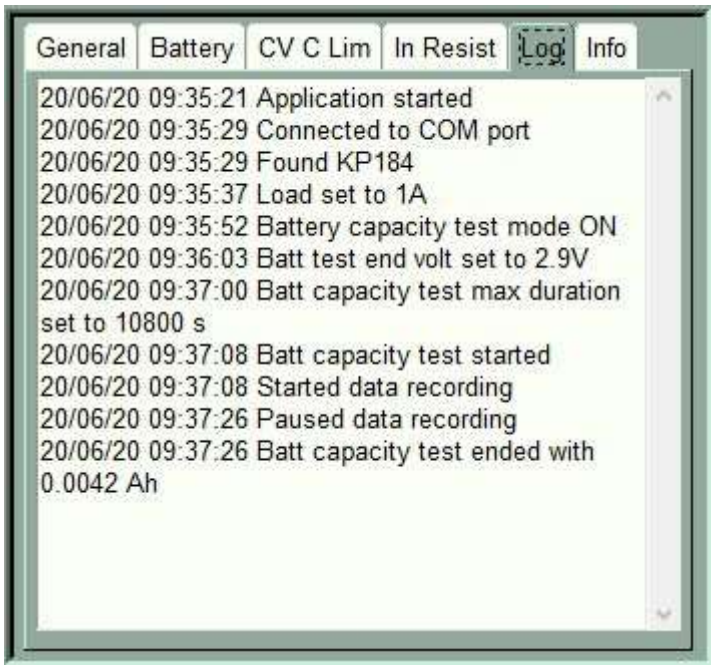
Ramp from 5A to 0A in 3 seconds.

You can repeat the programmed profile any number of times or just indefinitely.

After writing the profile instructions just press the Load Switch icon.

Before pressing the Load Switch icon you switch to the "Log" tab to just watch the log lines in real time an inspect how Kunkin is being commanded.

Log Tab:



The log tab allows the user to keep a track record of the current session activities and results. Events as over temperature, over power and over current are also logged as well as its recoveries.

Right click on the text widget and select "**Copy to clipboard**" to export the complete log in text format or "**Clear Log**" to erase all current session log data.

Download Link: http://www.interflexo.com//kp184//setup_kp184_10240.exe