APOLLO 2.0
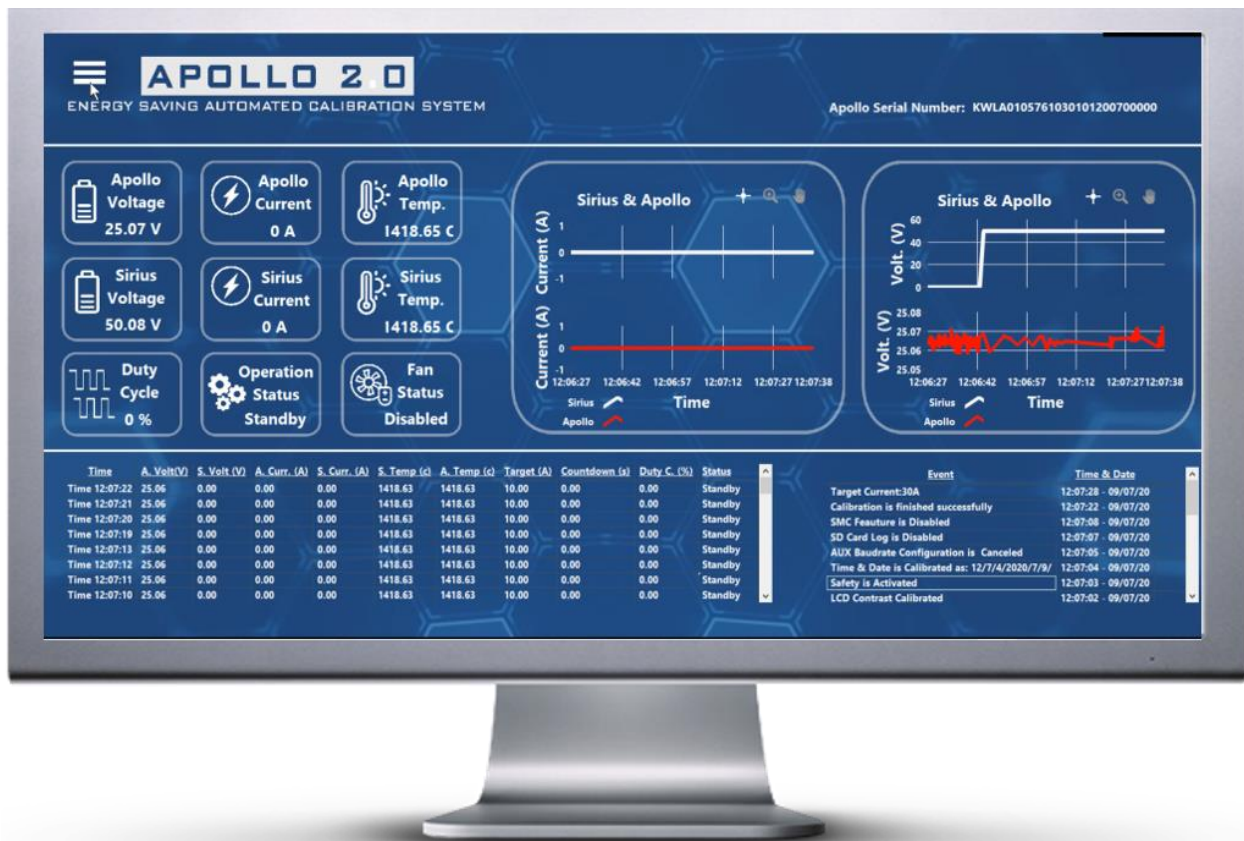## ENERGY SAVING AUTOMATED CALIBRATION SYSTEM

Next Generation Automated Calibration System

User Manual

July 1 2020
KILOWATTLABS

Introduction

Apollo is the next generation of Automated Calibration System for multiple range of energy storage options. Apollo Calibration System is specifically designed for Sirius Energy Storage Modules for testing & calibration and reporting purpose. Apollo Monitoring Software is a great tool for testing, trouble shooting, documenting and calibration of energy storage modules.

ApolloVIEW New Features

- Mobile (without any grid connection) charging and discharging station for 12V,24V, and 48V energy storage modules with safe PID and PWM algorithms.
- Energy saving while testing and calibration by not using any external power.
- Charging & Discharging target current options can be selectable as 10A,20A,30A,40A,50A,60,70,80A
- Charging & Discharging period is defined by user as second.
- User interface with real-time data acquisition and graphs, data logging and events logging.
- Improved reporting options.
- Quick plug and play with simple network configurations.
- Sending E-mail notification by end of session.
- Multiple display resolution support as 1366x768, 1440x900, 1536x864 and 1920x1080.
- Calibrating & testing Sirius Supercapacitor Modules seamlessly in seconds.
- Compatible with Windows 7 and newer OS versions.

Getting Started to Apollo VIEW

ApolloVIEW let user to communicate with Apollo Calibration System over TCP/IP over ethernet interface, also establish communication with Sirius Modules over serial by USB interface, for proper communication, users should do couple of simple network configuration steps:

Network Configuration of Host PC

Apollo calibration system is kind of network device which static ip as 10.10.10.9. User should have compatible host pc ip address to be in same network with Apollo System. User should change their ethernet network ip address as 10.10.10.x statically. X is anything except 9 to 255. The screenshot below can be good practice to arrange ip address correctly.

Host PC Static IP: 10.10.10.100 (Suggested IP address)

Host PC Subnet Mask: 255.255.255.0 (Suggested Subnet Mask)
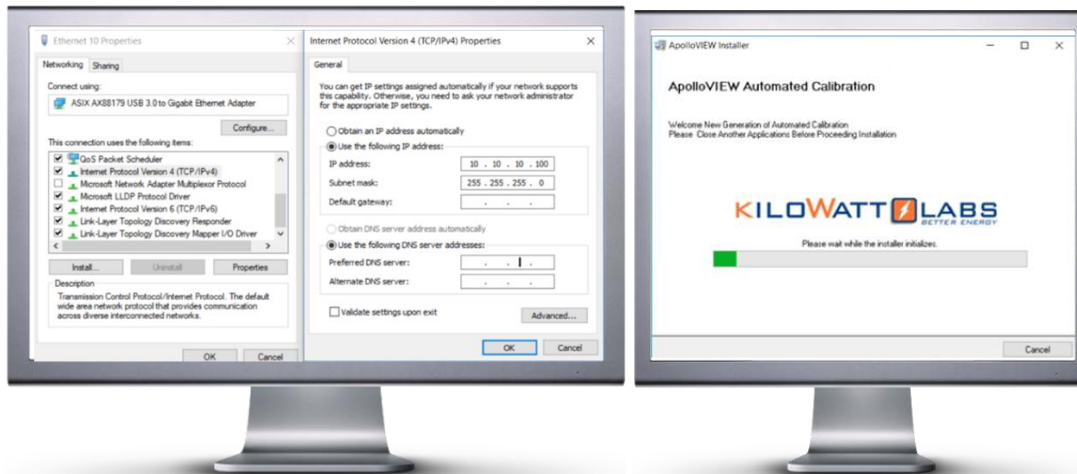
Installing Apollo VIEW Installer and Required Drivers

Apollo Calibration system need host pc to Sirius Module communication over serial, for this purpose required drivers should be installed completely. All the required drviers and ApolloVIEW desktop application can be installed by ApolloVIEW installer which can be downloadable over amberandwaseem.com. Whenever installer is finish installing, ApolloVIEW application will appear onhost pc desktop and ready to run.

Executing Apollo VIEW Application First Time

After installation of ApolloVIEW installer, ApolloVIEW Folder which contains desktop application will be appearred on host pc desktop. User can double click on executable to run it.

Entering User Information to Apollo VIEW Application

While first executaion of ApolloVIEW, application will request some important information about user for report generation and E-mail notifications.

- User name (Tester name)
- Company Name
- E-mail (this e-mail will be used for notifications)

Apollo VIEW System Identification Display

ApolloVIEW will execute system identification routine to understand the status of the Apollo Calibration System. Application will collect information about :

- Apollo System (Communication Status)
- User data
- Host PC Data

Regarding the result of identification, system can suggest different action to user. If there is proper communication between pc and Apollo System, application proceed to main user interface, if there is communication error, application will request action from user to repeat identification routine or termination.
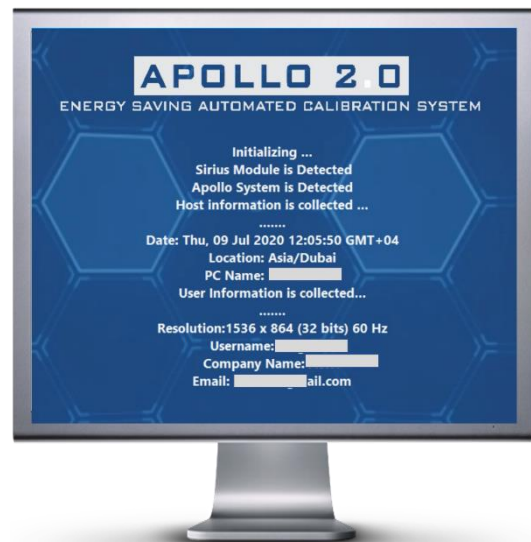
Apollo VIEW Testing & Calibration

ApolloVIEW application provides comprehensive measurements and analyses about both Apollo system and UUT which can be energy storage modules which compatible with Apollo system specs.

ApolloVIEW application run complex and high resolution PWM and PID algorithms to control charge and discharge current regarding users target current decision. While controlling all PWM cycles, also it will calibrate Sirius Energy Storage Modules automatically. At the and of each calibration, ApolloVIEW will create extensive reports and logs to understand system conditions.
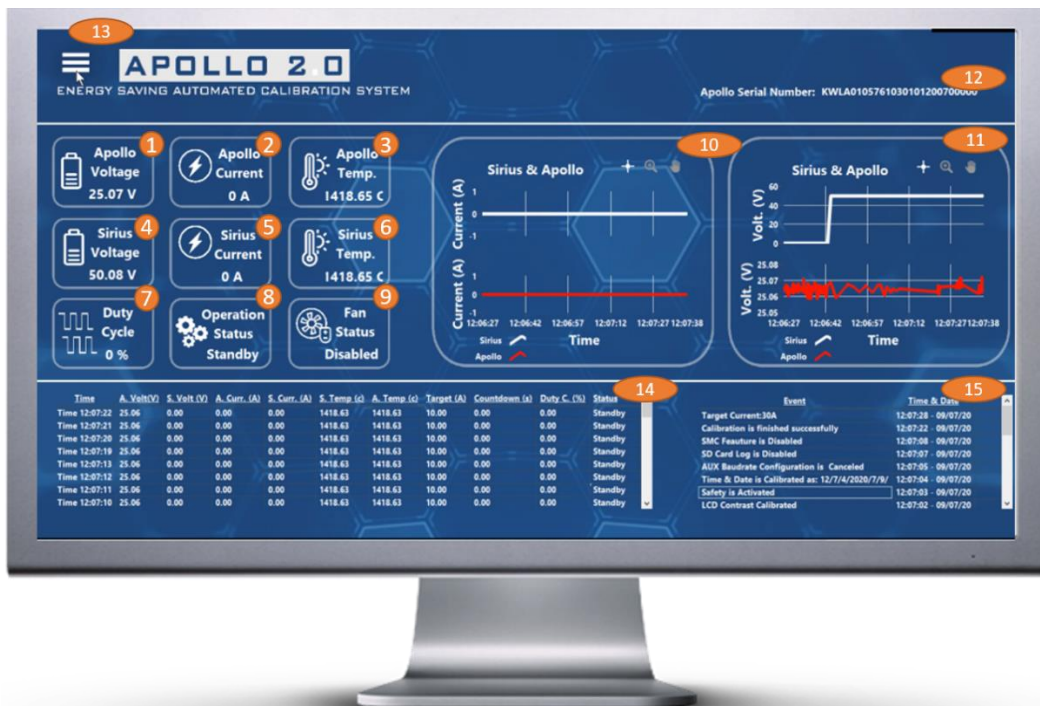
1) Apollo Voltage

Apollo Voltage is the terminal voltage of Apollo System. This voltage level should be much bigger than UUT (Sirius Voltage) to act on charge and discharge safely. Suggested Apollo Voltage should be between 56 and 59.

In case Apollo Voltage is lower than 56V, user should choose continously discharge operation with low current like 10A till voltage level is getting on suggested range.

In case Apollo Voltage is higher that 59V, user should choose continously charge operation with low current like 10A till voltage level is getting on suggested range.

2) Apollo Current

Apollo terminal current will increase or decrease while charging or discharging. This measurent will always behave parallely with Sirius current measurent.

3) Apollo Temp

Apollo System terminal temperature. This value can increase quickly or slowly regarding the target current and environment. In case of high temperature environment or high current operation, users can enable built in fan.

4) Sirius Voltage (UUT)

Sirius Voltage is terminal voltage of UUT or Sirius Energy Storage which can be 48V, 24V and 12V range. If any another module than Sirius Module is used as UUT, users should be carefull regarding their UUT specs.

5) Sirius Current (UUT)

Sirius current will be controlled by PWM and PID algorithm while charge and discharge sessions. This current will be safely increased till measurement reach users target value later it will be stable during timeout period. This value will be safely decreased till Sirius current measurement reaches 0A.

6) Sirius Temp (UUT)

Sirius System terminal temperature. This value can increase quickly or slowly regarding the target current and environment. In case of high temperature environment or high current operation, users can enable built in fan.

7) Duty Cycle

ApolloVIEW controls PWM duty cycles by custom PID algorithms to reach users target current while charge or discharge operation. This parameter will increase till system reach target current, later duty cycle will go 0 percent safely.

8) Operation Status

This parameter lets users know the current operation of Apollo System.

- Standby: There is no charge or discharge operation
- Charge: Charging Sirius module by discharging Apollo System
- Discharge: Discharging Sirius module by charging Apollo System

9) Fan Status

Apollo System has built in fan which can be enabled by users in case of need. This parameter will show whether fan is enabled or not.

10) Current Measurement Graph

This graph shows the real-time data of both Sirius Module and Apollo System current measurement at their terminals. Graph will show the trend of current measurements while charging and discharging. At every new operation, graph history will be refreshed.

11) Voltage Measurement Graph

This graph shows the real-time data of both Sirius Module and Apollo System voltage measurement at their terminals. Graph will show the trend of voltage measurements while charging and discharging. At every new operation, graph history will be refreshed.

12) Apollo Serial Number

Each Apollo System has unique serial number which represents:

- Capacity
- Voltage rating
- Voltage range
- Controller type
- Communication type
- Display Type
- Production year, month

13) Multifunctional Operation Button

This button will show all the operational abilities of ApolloVIEW. User needs press that button in case of any operation like :

- Selecting target current
- Selecting timeout duration
- Configuring calibration settings
- Selecting operation (charge or discharge)
- Checking reports…

14) Operation Session Table

This table will show all the vital measurements while any charging and discharging sessions. This table will be logged as excel file at the end of charge or discharge operation for further post processings. Before every new operation, this table will be refreshed automatically.

15) Operation Events Table

This table will show:

- Any event which is triggered by user action.
- Charge & Discharge operation processes and steps.
- Calibration status and results.

Before every new operation, this table will be refreshed automatically. This table will be logged as excel file at the end of charge or discharge operation for further post processings.

Apollo VIEW Multifunctional Button Details

1) Charge Button

By clicking this button, application will start charging operation. Users should be sure they select proper current target and timeout duration. If user did not do any selection:

Default target current: 10A

Default timeout duration 10 seconds

2) Discharge Button

By clicking this button, application will start discharging operation. Users should be sure they already selected proper current target and timeout duration. If user did not do any selection:

Default target current: 10A

Default timeout duration 10 seconds

3) Target Button

By clicking this button, user will have additional display that can select target current for both charge & discharge operation.

4) Time Button

By clicking this button, user will have additional display that can define timeout duration as seconds.

5) Settings Button

By clicking this button, user will have additional display that can configure which calibrations will be enabled while charging or discharging session.

6) Reset Calibration Button

While working with ApolloVIEW and and Apollo System, there can be glitches or mis measurements and calibration can be faulty. In that case users can reset previous calibration by clicking this button.

7) Refresh Button

ApolloVIEW establishes USB communication between host pc and Sirius Module whenever application starts running. If there is any corruption in USB communication, users can check usb cable connection and press that button to refresh USB communication. USB communication is vital for calibrating Sirius Modules

8) Reports Button

By clicking this button, application will show the folder on windows explorer that contains all the reports belongs to charging & discharging session and events.

9) Buzzer Button

By clicking this button, user will ping built-in buzzer which buzzes whenever any operation start and finish. Buzzer can be critial to understand status of Apollo System.

10) Fan ON&OFF Button

By clicking this buttons, user can enable or disable built-in fan to take under control temperature of Apollo System.

11) Update Button

By clicking this buttons, user can modify user data which includes; user name, company name and user e-mail.
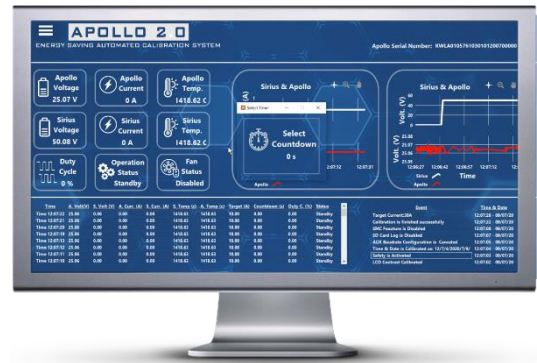
Apollo VIEW Custom Current Offset

Related to environment temperature, vibration during shipping and current sensor tolerances can create some offset at current measurement of Sirius Current parameter. If user realize that there is a offset at Sirius Current measurement by measuring clampmeter, user should positive or negative offset to correct the measurement. For activating custom current offset display, user should click by mouse on Sirius Current parameter on main display. This action will open display beside.