



MICRO INSTRUMENTS

Innovative Electronics for a changing World

SOC V2.1

Lithium Battery state of charge monitor with Ethernet



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1.System description

The **Mi** SOC v2.1 monitor is used to calculate and monitor the percentage state of charge from any Lithium battery remotely over an Ethernet network and can be monitored via embedded web pages and SNMP protocol.

Lithium batteries does not drop in output voltage like Lead acid /Gel/AGM batteries but rather keep the voltage stable until the cells are drained completely which results in the internal battery management system (BMS) to shut the battery down for

protection hence making it difficult to monitor the state of charge from these batteries by just relying on the voltage reading.

The SOC monitor comes with a contactless non – invasive bi-directional current sensor which needs to be clipped around the positive battery wire. This type of sensor ease installation and prevent **hot** connections but is less accurate than wired shunt sensors, the % error is so small and in the region of 3 to 5% that we have opted for the non-invasive sensor for safety.

The SOC V2.1 is compatible with 12V,24V and 48V Lithium batteries.

2. System specifications and physical specifications

100Mb/s Ethernet port

Embedded web pages

SNMP V2 over Ethernet protocol

Battery voltage input range: 9VDC to 60VDC max

Current measuring range: 0 to +- 50 Amps nominal (+-75 Amp max range)

Oled display

System status Led

Non invasive current sensor

Size: (L) 105mm x (W) 61mm x (H) 24mm

3. Reset system to factory defaults and current zero calibration

RESET

To reset the SOC V2.1 press the reset button at any time and **keep** the button pressed – the status led will flash yellow 5 times, the Oled screen will indicate Mi logo and the led will turn blue.

System will be available at **192.168.1.2** / password **admin**

ZERO CALIBRATION

If the current (amps) reading on the unit indicates current flow without any current flowing through the current sensor in rare occasions due to sensor drift - press the reset button 3 times very fast within 1 sec - the status led will flash purple and the current reading will become 0.00 (**this should be done with absolutely NO current flowing through the sensor**)

4. System settings

Open the settings page in the web pages

Enter the password

Enter the **amp hour rating** from the connected battery

Enter the **end charge voltage** (max charge voltage) as per battery specifications

Current SOC and tail current.

Tail current: The battery is considered fully charged once the charge current has dropped below the “Tail current” setting. The “Tail current” value is set in an amp value and usually around 2.8% of the battery total capacity – so 2.8 Amps for a 100A/h lithium. Some Lithium battery chargers stop charging when the charge current drops below a certain value, some lithium batteries will reach the end charge voltage level and will still continuously draw a certain amount of current.

As soon as the SOC V2.1 detects that the voltage of the battery has reached the set “End charge voltage” parameter and the current has dropped below the “Tail current” parameter the battery monitor will set the state of charge automatically to 100%.

SOC: If the soc % is unknown set this to 50% and the first time the battery reach the end charge voltage level and the tail current drops below the Tail current setting the SOC V2.1 will auto calibrate itself to 100% SOC.

The SOC V2.1 will save the current SOC% value continuously in run time to memory every 5 minutes to not overstress the endurance of the Eeprom memory, so in the event where the power is disconnected totally from the SOC V2.1, when powered back on the last SOC% reading could be from 5 minutes before power where disconnected.

Enter the Network settings

TAG settings:

Location tag: Enter a name for the site where the unit is installed as a quick identifier

Relay tag: set a identifier for the relay and what its used for - eg: start generator when the relay is configured to automatically switch according to SOC levels or eg: Reboot equipment if the relay is used to reboot remote equipment

Auto Relay control:

Specify the % SOC where the relay should auto energise and de-energise

SNMP community name:

Change this name according to the SNMP management software community name

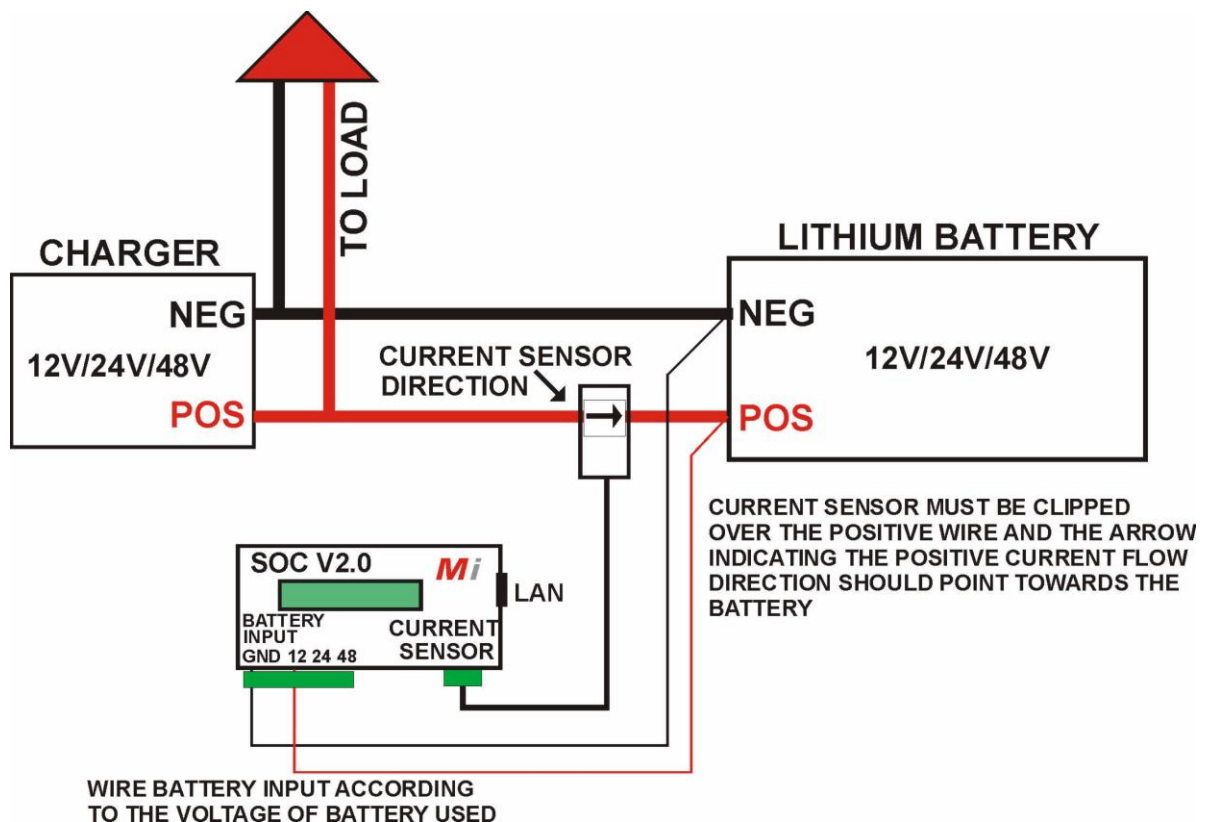
Password:

Setup a user specific password – no back door – if password is forgotten the unit will have to be hard reset.

5. Wiring example



It is of utmost importance that all connected equipment is connected on the DC power line **before** the current sensor ! The current sensor should only see the current flowing towards the battery and from the battery.



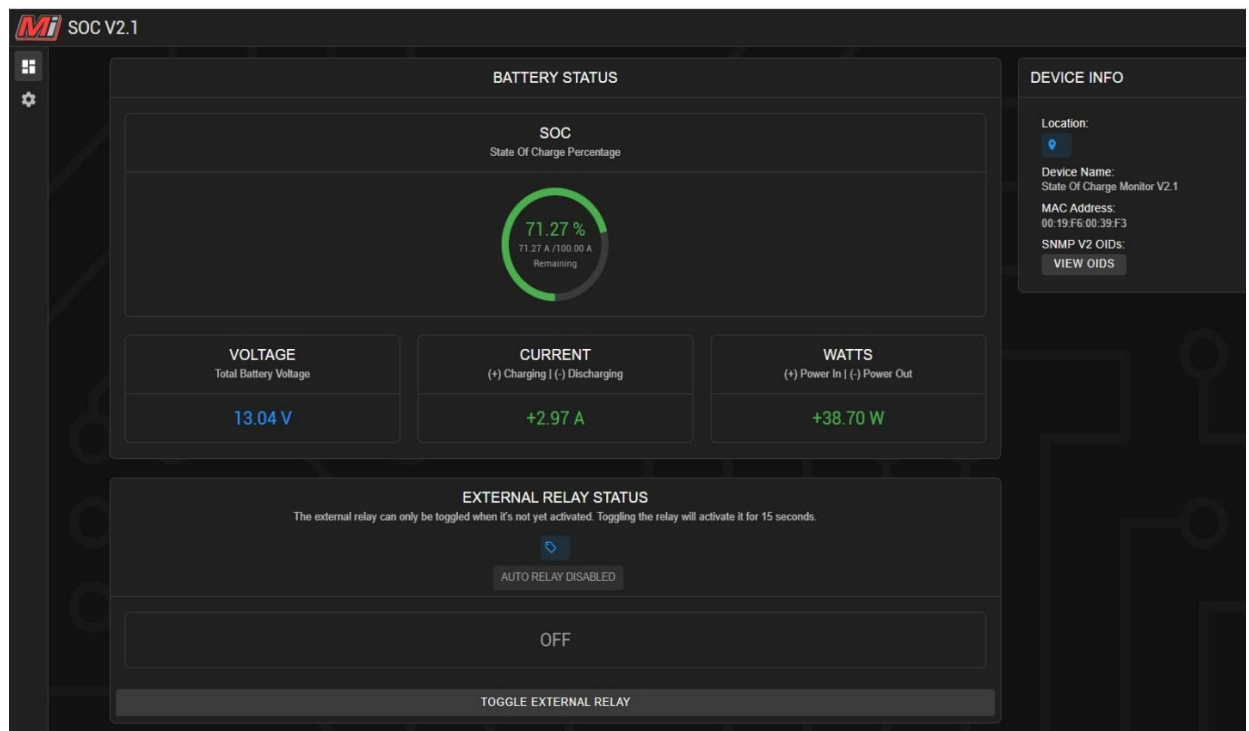
6. Web pages

Home page : Displays all important information – SOC% gauge colours

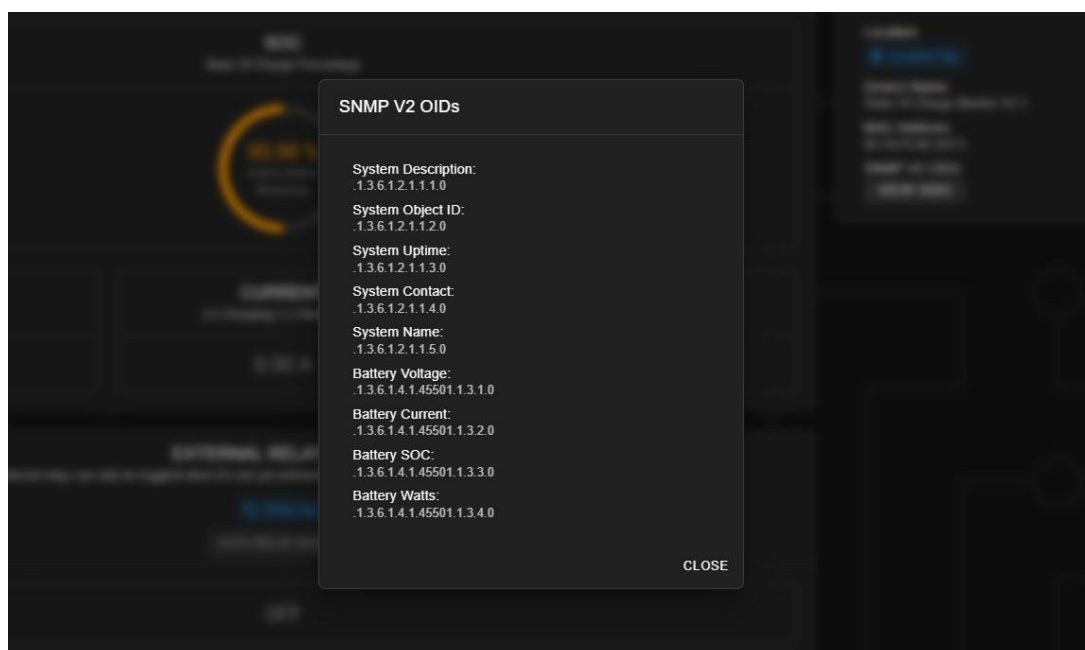
SOC > 50% = Green

SOC < 50% = Amber

SOC < 16% = Red

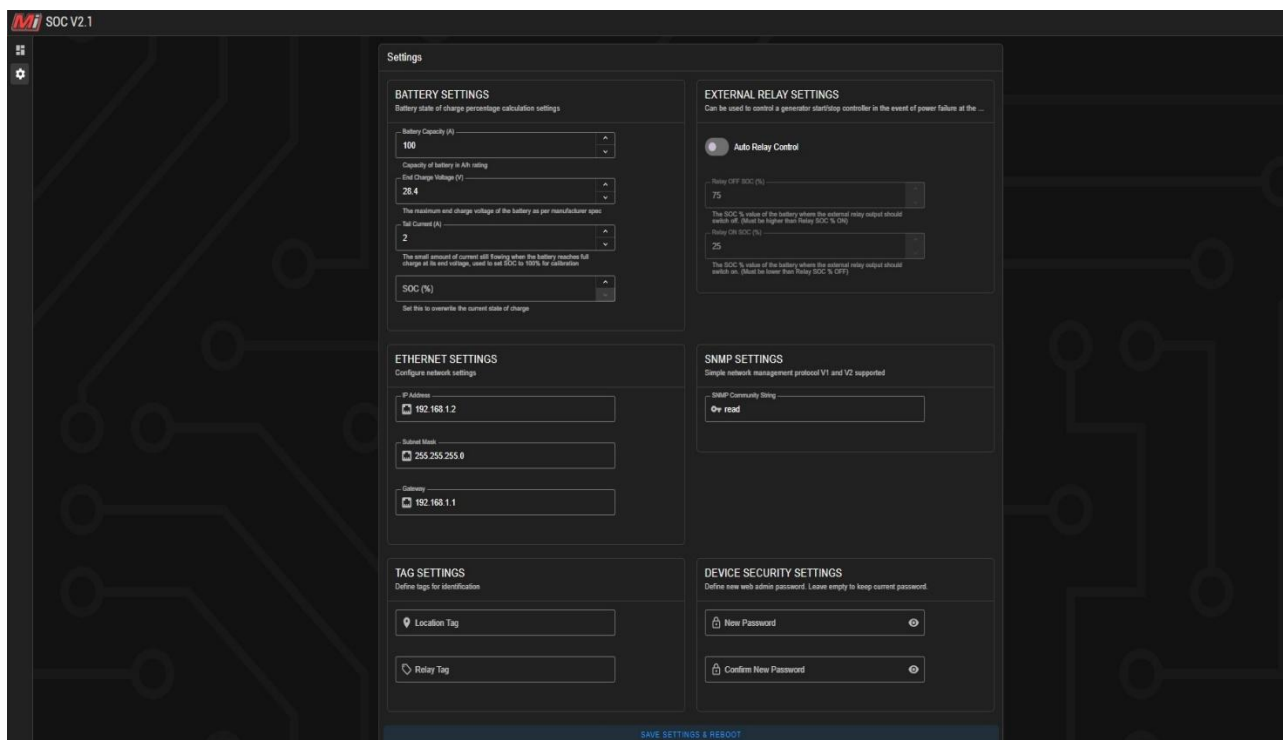
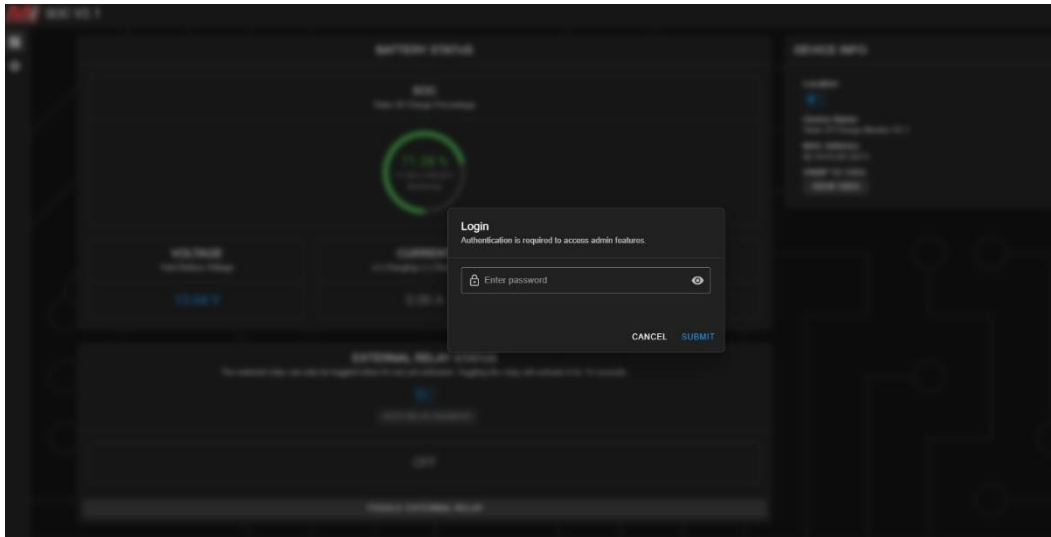


View OID page - quick display of all OID values



Settings page

Password is required to access settings



7. SNMP OID TABLE

OID: .1.3.6.1.4.1.45501.1.3.1.0; Value (OctetString): = Battery Voltage

OID: .1.3.6.1.4.1.45501.1.3.2.0; Value (OctetString): = Charge/Discharge current

OID: .1.3.6.1.4.1.45501.1.3.3.0; Value (OctetString): = Battery SOC %

OID: .1.3.6.1.4.1.45501.1.3.4.0; Value (OctetString): = Wattage in/out

8. OPTIONAL RELAY OUTPUT MODULE:

The relay output module is an optional extra for the SOC V2.1

Relay contacts rated 10Amps



Contact support@microinstruments.co.za or support@microi.co.za for more information

Compatible with all SNMP software managers and Mi SNMP monitor – download from www.microinstruments.co.za

