Innovative Electronics for a changing World

SOC V2.0

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1. System description / Default IP 192.168.1.2

The ***Mi*** **SOC v2.0 monitor** is used to monitor the percentage state of charge from any Lithium battery remotely over a network and can be monitored via embedded web pages and SNMP protocol.

Lithium batteries does not drop the 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 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.

The SOC V2.0 is compatible with 12V,24V and 48V Lithium batteries.

2. How it works:

The SOC V2.0 monitor measures the current flow in and out the battery to determine the state of charge of the lithium battery with a bi-directional non-contact current sensor.
The SOC V2.0 first needs to be configured with the following information relative to the battery connected.

Battery capacity: Enter the battery capacity in Amp/hr rating
End charge voltage: Maximum end charge voltage as specified on the battery

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 amps 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 V2.0 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 to 100%.

SOC %: enter the current SOC% value if known, otherwise 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 V2.0 will calibrate itself to 100% SOC.

The SOC V2.0 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 V2.0, when powered back on the last SOC% reading could be from 5 minutes before power where disconnected.

3. Input range, other specs and Relay output function

The SOC V2.0 have scaled voltage inputs to increase the voltage reading accuracy of the battery which is very important for Lithium batteries.
The unit have a GND (negative) input and a separate 12V , 24V and 48V input terminal **
Please make sure the battery gets connected to the correct voltage input terminal which corresponds to the battery being used**

12V Battery input: maximum measuring range 9VDC to 16VDC
24V Battery input: maximum measuring range 18VDC to 30VDC
48V Battery input: maximum measuring range 38VDC to 59VDC

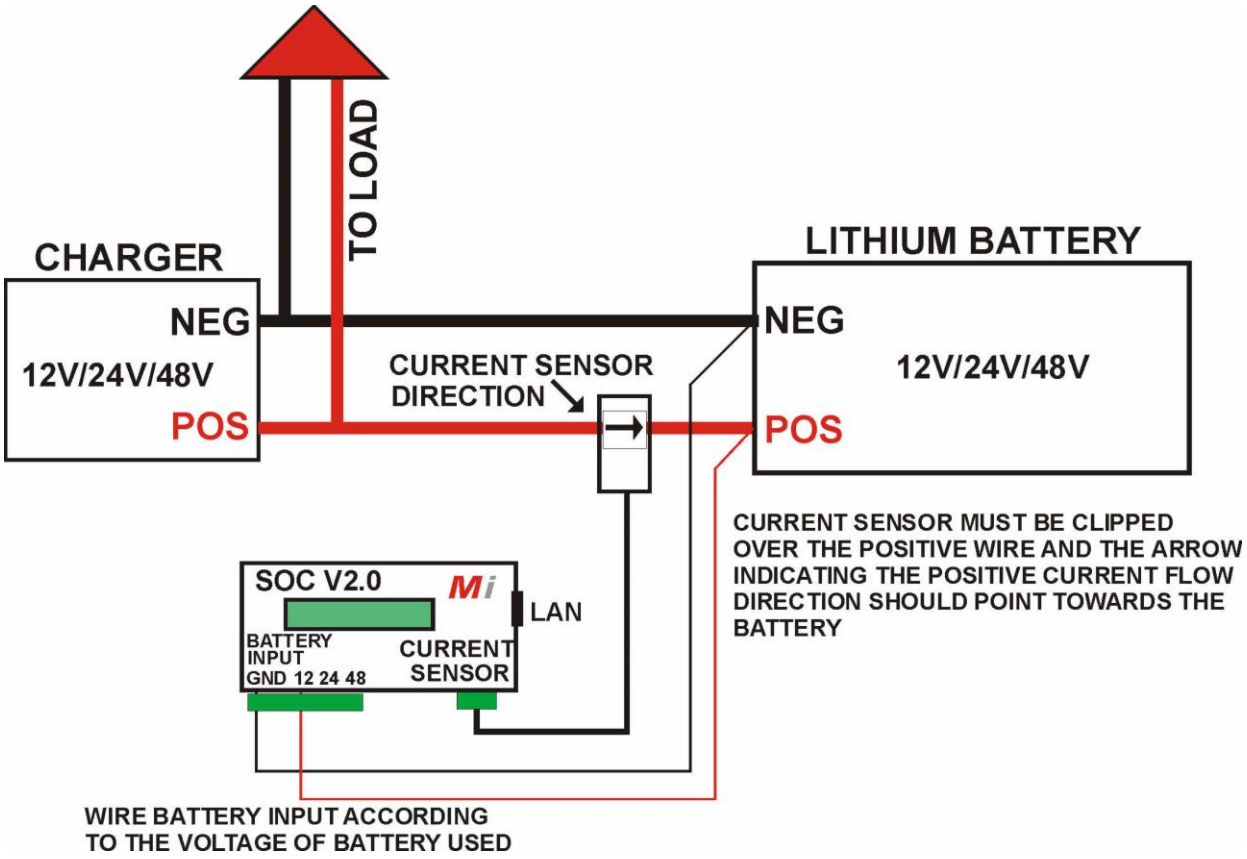
Current sensor: Non-invasive current sensor with a –50 Amp to +50Amp DC range.
Ethernet: 10Mbs LAN port with embedded web pages and SNMP.
LCD Display: Backlit LCD display indicating the *battery voltage*, + *Charge or – Discharge current*, the *Watts* being charged or discharged from the battery and the *SOC %* of the battery.

Relay Output: (optional relay unit)

The SOC V2.0 have a output port (2.5mm pin spacing JST 3 way connector) next to the LAN port to drive an external Relay module which can be ordered as a optional extra unit. (SOC V2.0 Relay) – GND and +5VDC output is needed for the external relay and the trigger pin switch output voltage is 3.3VDC – Dry contact Relay output is rated 10Amps max.

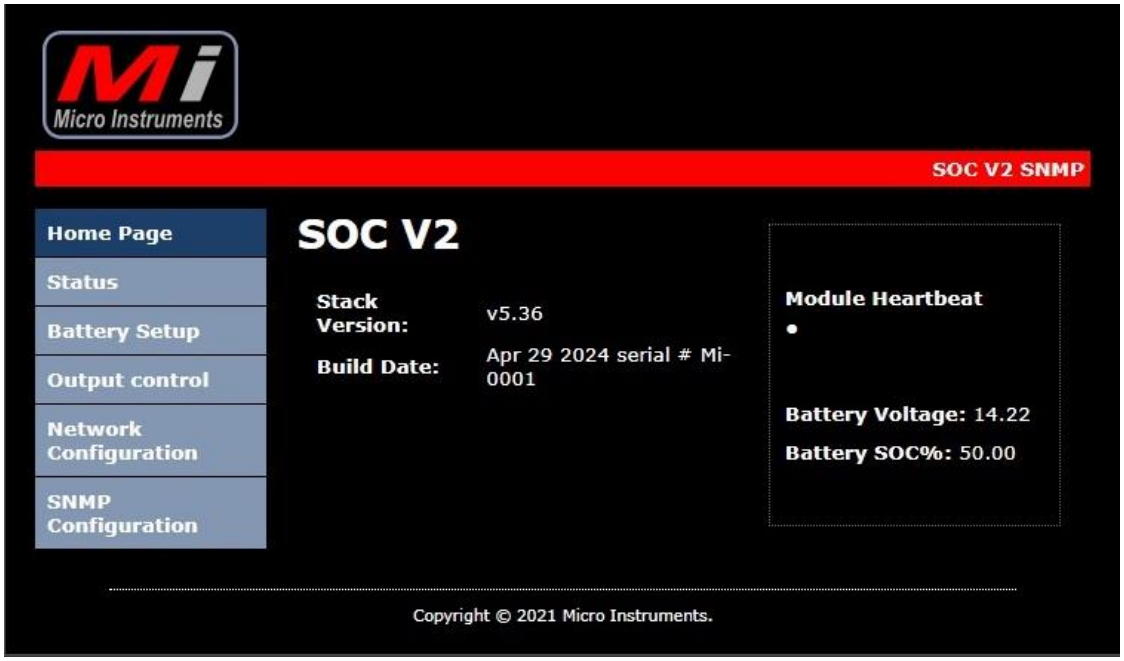
In the Relay control page from the main menu , the user can set a **SOC% value** of the battery where the **relay should activate** and also specify the **SOC% value** where the **relay should de-activate**. This can be used to start and stop generators or signal other equipment about the SOC % state of the connected battery.

4. System connections and wiring



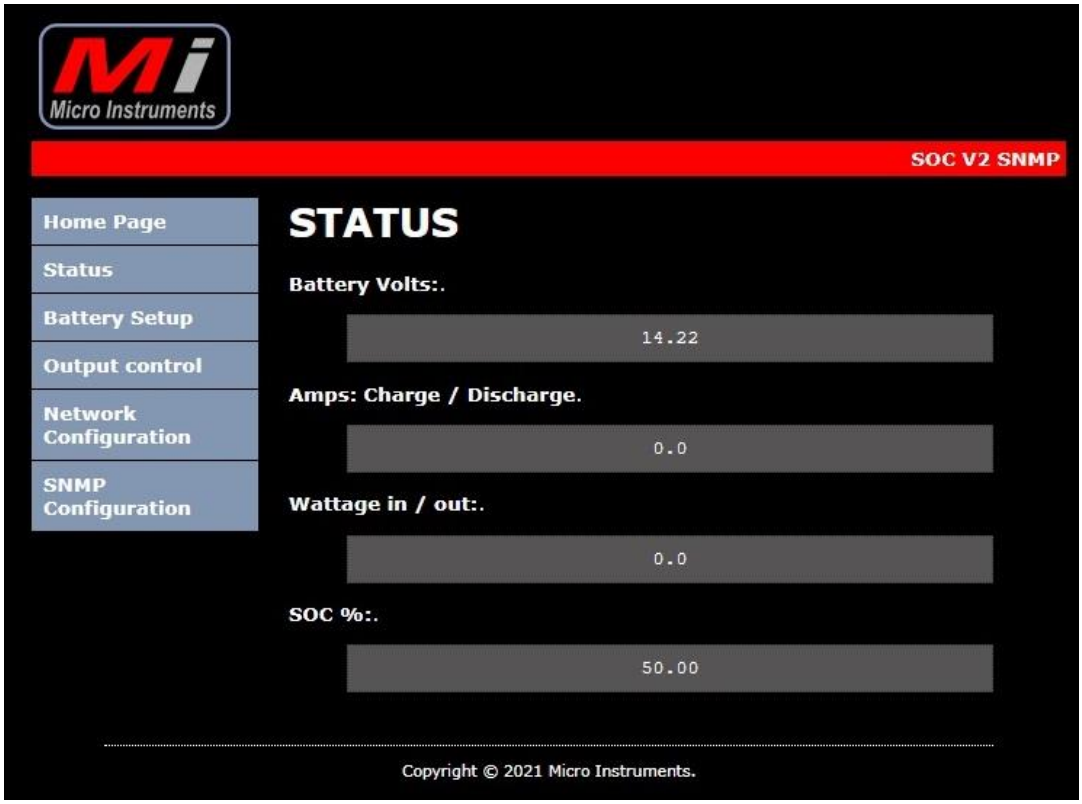
******DO NOT CONNECT ANY EQUIPMENT DIRECTLY TO THE BATTERY TERMINALS EXCEPT THE SOC V2.0 - THIS WILL VOID THE SOC% CALCULATION LOAD SHOULD BE CONNECTED BEFORE THE CURRENT SENSOR ON THE CHARGER SIDE*****

5. Home Page



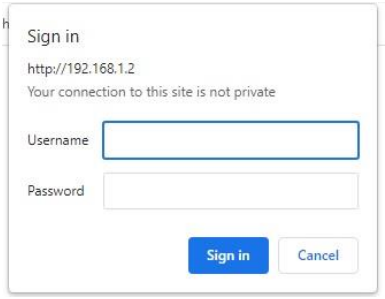
Home page indicate the battery voltage and the SOC %

Status Page



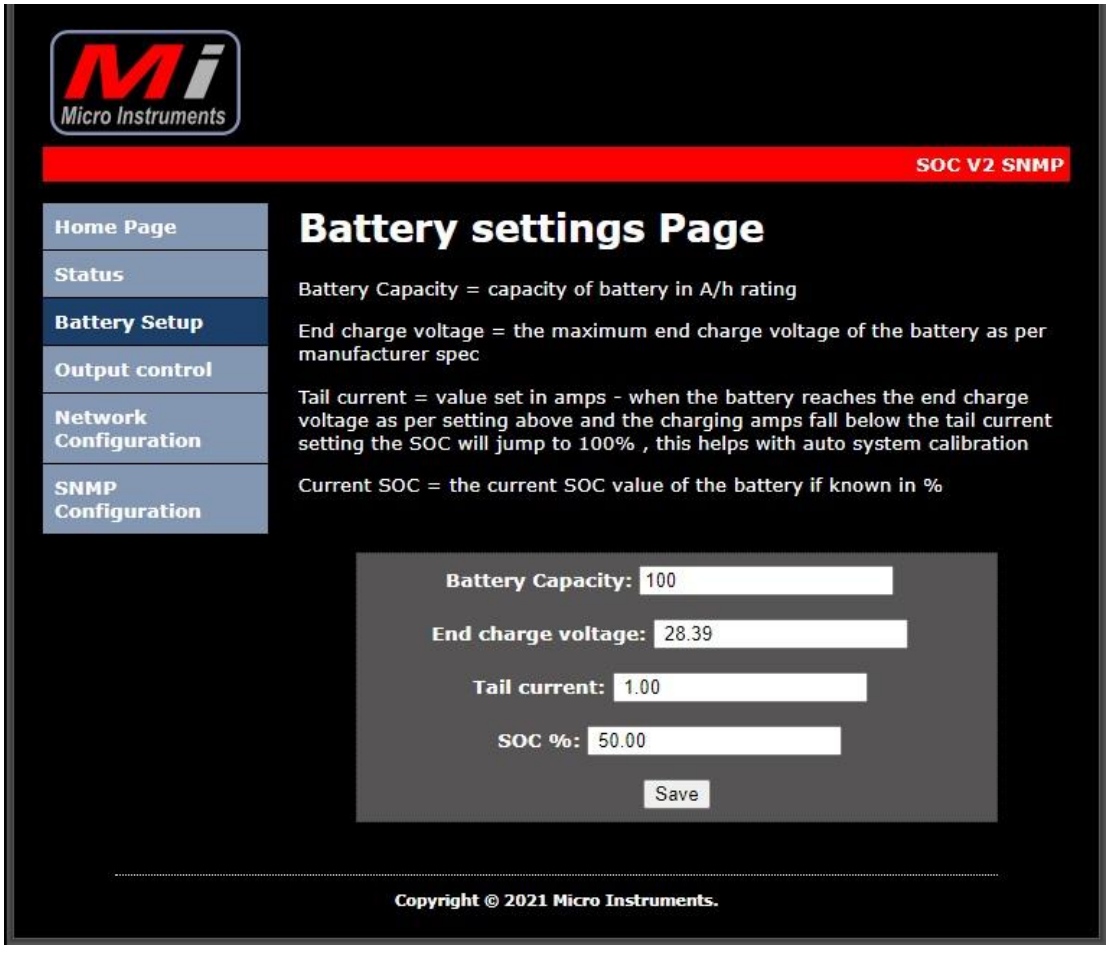
Indicates the battery voltage, Battery charge/discharge current, Wattage in/out and the SOC %

All page access from here requires a username and password



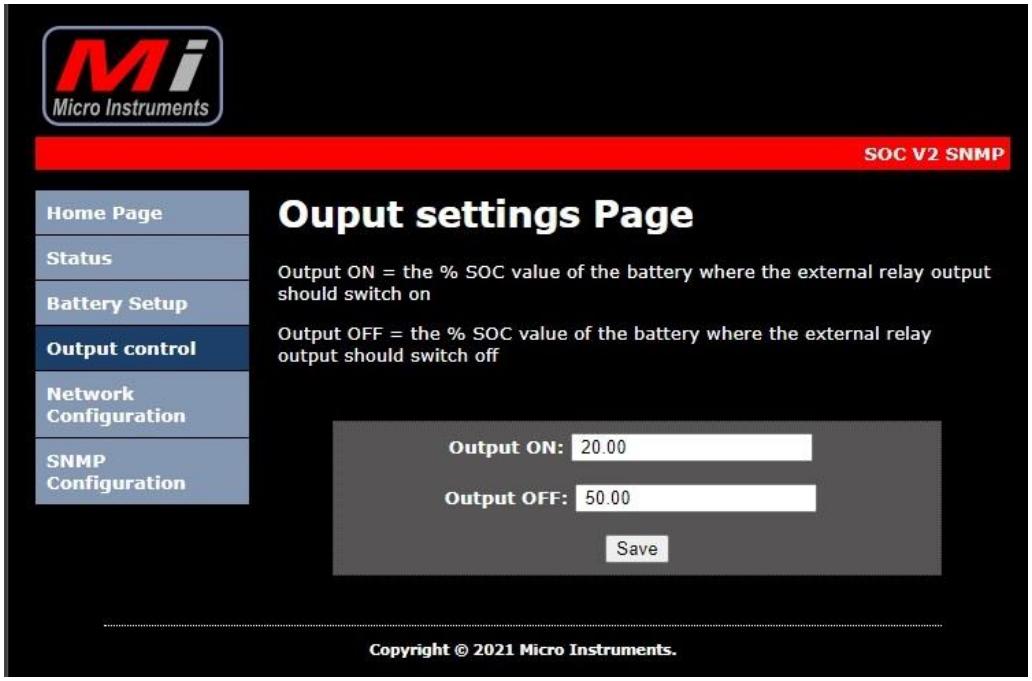
admin/admin allows access if password not yet changed by user.

Battery setup page



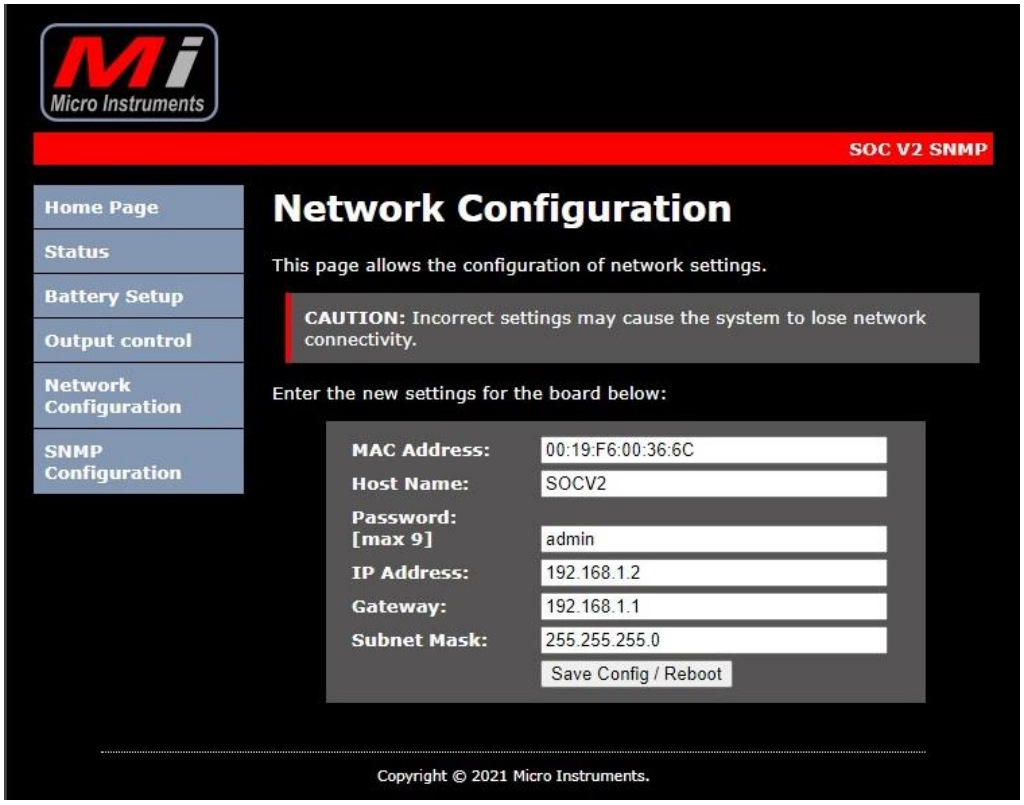
Enter the specifications for the connected battery on this page:

OUTPUT CONTROL



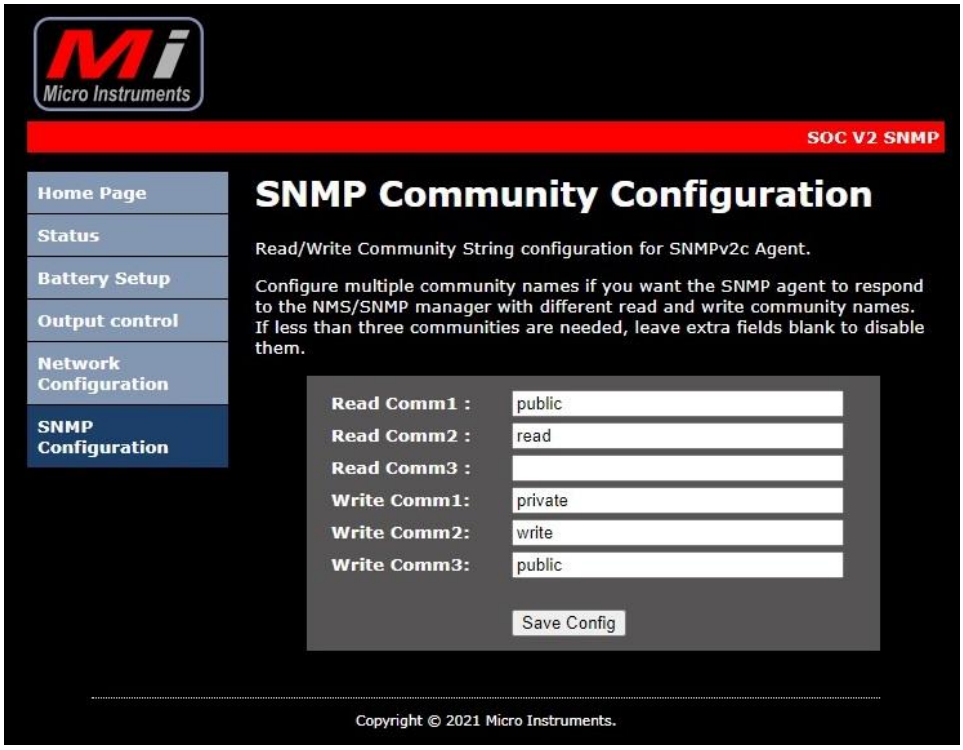
Enter the % SOC value where the relay should activate or de-activate.

NETWORK PAGE



System IP address, Gateway and subnet mask and user defined password can be changed on this page.

SNMP



Community names can be changed on this page for SNMP.

6. OID TABLE for SNMP – Ireasoning screen shot

Result Table

Name/OID	
.1.3.6.1.2.1.1.1.0	SOC V2
.1.3.6.1.2.1.1.2.0	.1.3.6.1.4.1.45501
.1.3.6.1.2.1.1.3.0	10 seconds (1092)
.1.3.6.1.2.1.1.4.0	admin
.1.3.6.1.2.1.1.5.0	Micro Instruments
.1.3.6.1.2.1.1.6.0	Remote
.1.3.6.1.2.1.1.7.0	4
.1.3.6.1.4.1.45501.1.1.1.0	SNMPv1/2Agent
.1.3.6.1.4.1.45501.1.1.2.0	V1
.1.3.6.1.4.1.45501.1.1.3.0	June 15
.1.3.6.1.4.1.45501.1.2.1.1.1.0	0
.1.3.6.1.4.1.45501.1.2.1.1.1.1	1
.1.3.6.1.4.1.45501.1.2.1.1.2.0	0
.1.3.6.1.4.1.45501.1.2.1.1.2.1	0
.1.3.6.1.4.1.45501.1.2.1.1.3.0	0.0.0.0
.1.3.6.1.4.1.45501.1.2.1.1.3.1	0.0.0.0
.1.3.6.1.4.1.45501.1.2.1.1.4.0	
.1.3.6.1.4.1.45501.1.2.1.1.4.1	
.1.3.6.1.4.1.45501.1.3.1.0	14.21
.1.3.6.1.4.1.45501.1.3.2.0	0.0
.1.3.6.1.4.1.45501.1.3.3.0	50.00
.1.3.6.1.4.1.45501.1.3.4.0	0.0

Name/OID: .1.3.6.1.4.1.45501.1.3.1.0; Value (OctetString): 14.21 = Battery Voltage
Name/OID: .1.3.6.1.4.1.45501.1.3.2.0; Value (OctetString): 0.0 = Charge/Discharge current
Name/OID: .1.3.6.1.4.1.45501.1.3.3.0; Value (OctetString): 50.00 = Battery SOC %
Name/OID: .1.3.6.1.4.1.45501.1.3.4.0; Value (OctetString): 0.0 = Wattage in/out

7. Reset to defaults and zero calibration

Reset to defaults: Unplug the battery input connector – push and hold the reset button at the back of the unit – hold until display indicates "Reset Complete !" Release button, system will reboot and will be available at **192.168.1.2**

Zero Calibration: This should be done only in extreme cases where the current sensor offset may have changed resulting in a amp reading of + or – Amps without any current flowing through the sensor – **procedure** – make sure NO current flows through the current sensor – in run mode while the system is powered on and running, press the reset button and hold until the led next to the current sensor input port green connector is **lit steadily and stops flashing** – release reset button – the unit will save the new zero offset from the current sensor to EEPROM memory.

8.Physicall Dimensions

SOC Monitor = (L) 130mm x (W) 65mm x (H) 25mm

**Please contact us for more info : support@microinstruments.co.za