Mi

Innovative Electronics for a Changing World

Solar Monitor – ISO - Remote Solar Regulator Monitor

3 x Clip on non-invasive- non-contact DC current sensors for high current installations.

With Optional external relay board

INDEX

Solar Monitor – ISO - SNMP

Reset to factory defaults pins– on the left side of the temperature sensor is an opening with the 2 pins visible – carefully insert a thin metal object –short circuit only the two reset pins – power the unit and wait for the internal led to flash – or wait 10 seconds then remove short".

Default IP address: 192.168.1.2

1. SYSTEM DESCRIPTION

Main Unit

Relay Board (optional)

1. SYSTEM DESCRIPTION.

The **Solar monitor** was designed to assist network specialist with power related information from **solar sites** through Ethernet and SNMP protocol.

The system changes any existing solar regulator into a smart monitoring device.

Solar Panel input current, Battery charge current and battery voltage, Load current on the system and temperature data is available via embedded web pages and SNMP V1/2C.

The Solar monitor features **3 x 75Amp** isolated hall-effect current sensors for current monitoring. Easy installation, no need to cut and connect charge and load and battery wires by using clip on current sensors– intended for high current sites.

The unit supports SNMP V1 and SNMP V2C communication platform to be compatible with SNMP monitoring software platforms and the **free** Mi-SNMP Monitor software for Microsoft Windows.(download from https://microinstruments.co.za/software.html)

The Solar Monitor system functions on 12V and 24V battery bank systems only

The Solar Monitor can also be easily connected to the external optional 5 way relay board to reset or control equipment at the remote site through the Relay I/o port.

The unit also have a potential free normally closed alarm contact input, this can assist with attempted solar panel theft by connecting an Alarm magnetic reed switch to the alarm input.

The system can also report both battery voltages separately as well as the total voltage for a 24V system if the 12V centre tap wire is connected-**see system connections page.

### Why not monitoring the Solar Panel voltage ?

Some Solar Regulators are **common negative** regulators where the positive line from the PV input is being controlled to the charge output, other regulators are **common positive** regulators where the negative line is being controlled from the PV input to the charge output.

The problem comes in with **Common positive** regulators that controls the negative input line of the solar panel, the moment the negative from the solar panel is connected to the system ground in order to measure the solar panel input voltage, a direct path between negative coming from the solar panel and the battery negative is established resulting in a direct connection between the solar panel and the battery and is actually "**Bridging out**" the control regulator resulting in **over charging** of the batteries.

To stop confusion about what type of regulator the user connects, and if the Solar monitor is maybe moved from one site to another with a different solar regulator and the user forgets about this issue we have decided to discard the solar panel voltage reading on the unit for safety.

Solar panels output power in Watts is the product of the output voltage multiplied with the output current of the solar panel, so whenever the solar panels output voltage change the output current will change. The solar Monitor only measure current flowing from the panels to the regulator and **not the voltage**- This still indicates the performance of the solar panels to the user if the solar panels is in good shape or if the panels is maybe dirty (dusty) or shaded and loosing performance.

2. SYSTEM CONNECTIONS – (12V SYSTEM)
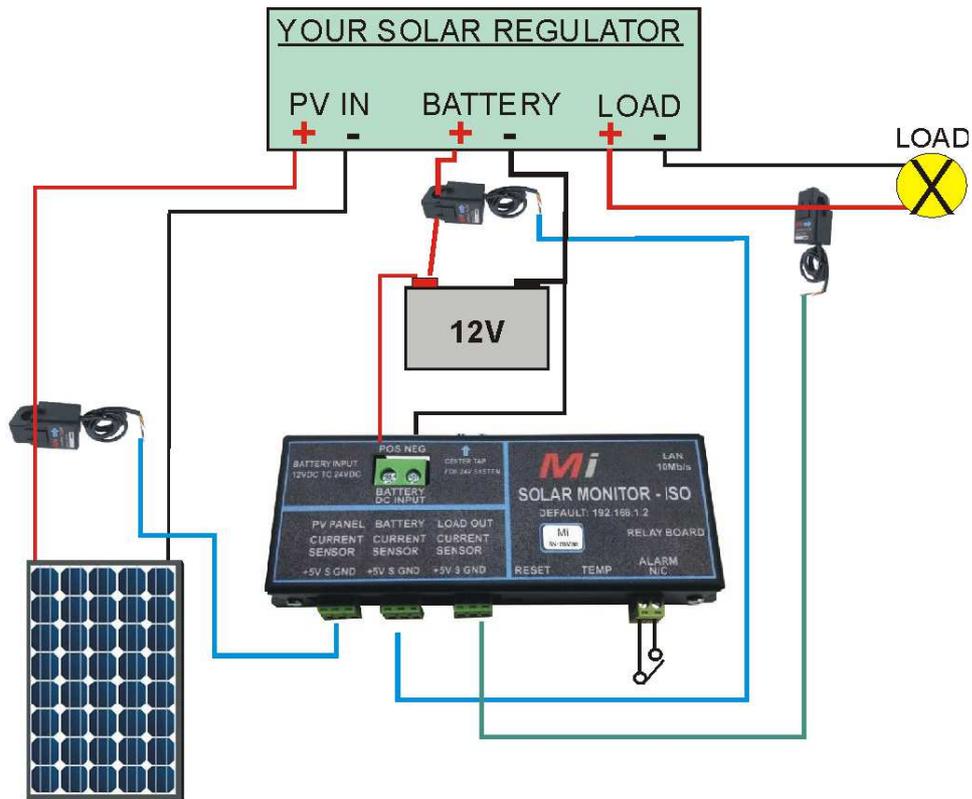
SYSTEM CONNECTIONS – (24V SYSTEM)
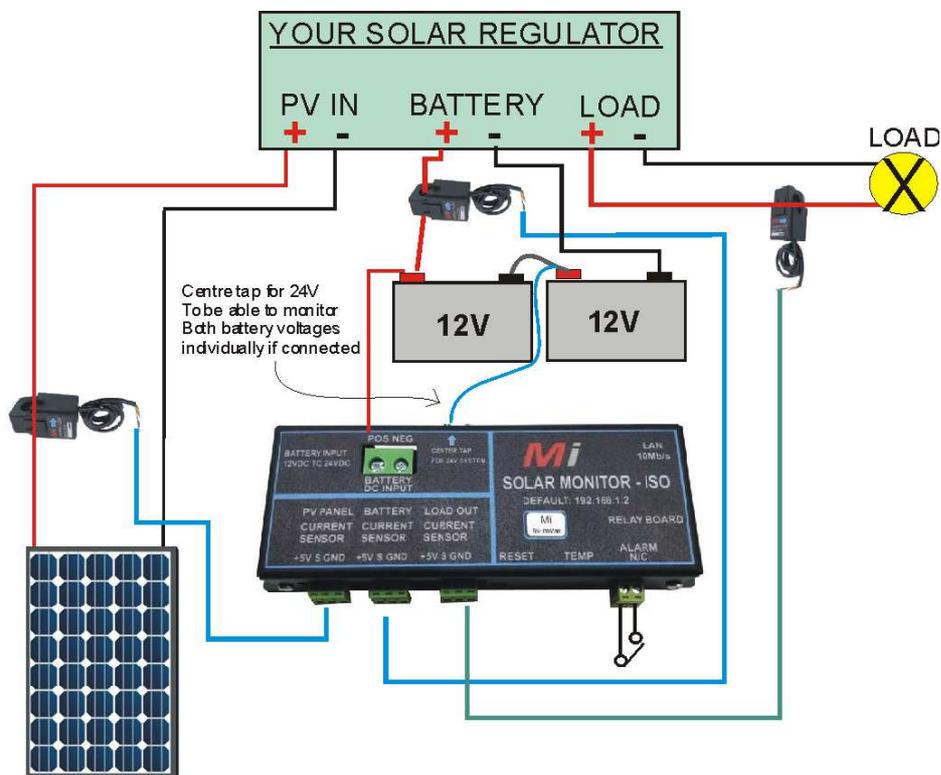
The 12V centre tap wire can be a thin wire as the device only monitors the one 12V battery from this line in order to indicate the 2 different battery voltages to the user if connected to a 24V battery system.

Current consumption in total with LAN port connected 110mA @ 12Vcdc / 55mA @ 24Vdc

**** IMPORTANT NOTE****

The Alarm input is a **potential free contact input only** and **NO** voltages should be injected here- Permanent Damage to the unit will occur.

The **5 Way Relay board** connects via 10Way IDC cable supplied with the -Relay board

Internal Temperature sensor

10Mb/s Ethernet port.

The Alarm SNMP (OID) data will change from a 0 to a 1, as soon as the Alarm input is triggered and will stay at data 1 for about 7minutes after the alarm condition was restored.

This is working well with PIR alarm detectors etc so that the alarm condition is not missed by the SNMP manager software polling the unit.
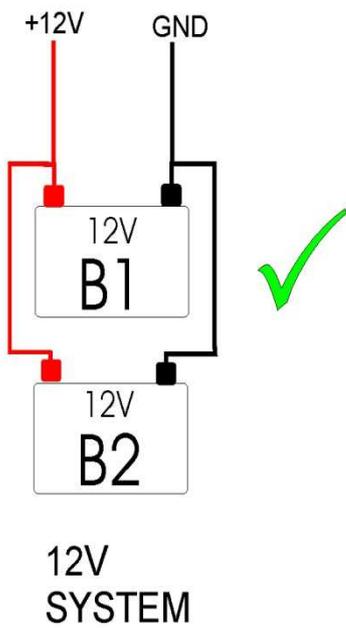
3. SERIES CONNECTED BATTERIES SYSTEMS IN PARALLEL

Correct series / parallel connection of Multiple Battery banks to double the A/h capacity but still be able to sense all Batteries
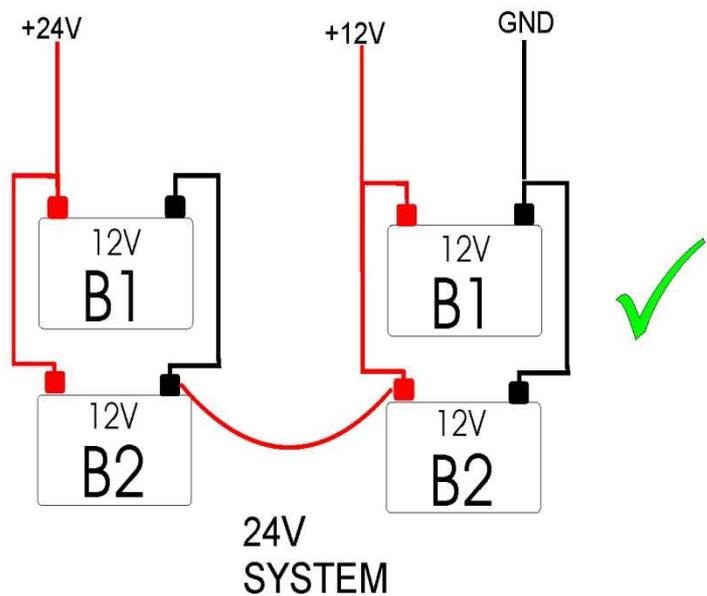
2 x 12V Batteries in parallel to Double the A/h capacity

2 x 12V Batteries inparallel to Double the A/h capacity

2 x 12V Batteries inparallel to Double the A/h capacity

Then connected in series

+12V   GND

12V
B1

12V
B2

12V
SYSTEM

+24V   +12V   GND

12V
B1

12V
B2

12V
B1

12V
B2

24V
SYSTEM

4. OPTIONAL 5 WAY RELAY BOARD

The 5 Relay expansion board connects to the Solar Monitor via a 10way ribbon cable supplied with the relay board, Relay's is rated at 10Amps 220Vac.

Relay 1,2,3 can only be toggled to activate for 10sec then return to the off position again and is used to reset devices.

Relay 4 and 5 can be controlled to the ON or OFF position by the user and will keep the selected position until changed by the user.

The status of all 5 relays is displayed on the home page of the unit by means of green dots

In the "Relay" control page the user can assign names to the relays to help remember what is connected to the relays at the remote site.

5. START UP

By default the unit is shipped with a default IP address of

192.168.1.2

Default : username = admin

Default Password = admin

Login to the Network Configuration page : Password(max 10 characters) User defined Password can be configured and click save

Username : admin

Password : xxxxx (user configured Password)

Please note the there is no backdoor for a forgotten Password and the board will have to be reset to factory defaults

6. HOME PAGE

The Stack version is displayed, the build date of the firmware programmed on to the device, the units serial number as well as the model number.

A visual indication of the status of Relays 5 to 1 is given and indicated by a green dot if the relay is active (powered)

A "module heartbeat" indication by a green dot flashes once per second as the software runs through the TCPIP applications.

Alarm – ON/OFF is displayed

Left hand menu will navigate to different applications on the unit.

7. STATUS PAGE

Manufacturing date and serial number is displayed.

Temperature sensor is displayed in degrees Celsius.

Solar panel input current

Battery 1 to 2 Voltages is given separately from each other - if all connected

Total Battery voltage, Charge Amps, Load amps and Alarm status On/Off is displayed in the bottom window

8. RELAY CONTROL PAGE

Mi

| | ar Monitor-SNMP |

Home Page

Status

Relay Control

Network Configuration

SNMP Configuration

Sign in

http://192.168.1.2

Your connection to this site is not private

Username [   ]

Password [   ]

Sign in   Cancel

Temperature sensor in Degrees Celcius:.

+18.8 D

Solar Panel input current:.

00.0A

Battery 1 Volts(12V):.

00.00 V

Battery 2 Volts(24V):.

14.32 V

B: = Battery Voltage

I: = Charge Current to Battery

ALARM: ON/OFF status

i: = Load Current to Equipment

B:14.3 V I:00.0A
ALARM:OF i:00.0A

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Admin and admin or admin and user defined password to access

NPM-R10-Lite-SNMP

- Home Page
- Status
- Relay Control
- Network Configuration
- SNMP Configuration

Relay Control Page

This Page application controls the external relay board if present

Relay 1 to 3 / Selecting "Toggle" will activate the specified relay for 10 seconds and then return the relay to the off position "

Relay 4 to 5 / Control Relay via on/off command / or SNMP SET command"

You can go back to the Home Page to view the Relay status indicated by the Green dot"

Relay1 Name(max5): [ ]
Relay2 Name(max5): [ ]
Relay3 Name(max5): [ ]
Relay4 Name(max5): [ ]
Relay5 Name(max5): [ ]

[Save]

Relay 4 and 5 can be controlled via (on/off) commands and will keep its position

4: [Off ▼] 5: [Off ▼]

[Save]

Relay 1,2,3 can only be toggled and will return to its off position after 10 sec

1: [Off ▼] 2: [Off ▼] 3: [Off ▼]

[Save]

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Relay 4 and 5 can be controlled to the on/off status and will keep their positions, Relay 1 to 3 can only be toggled for 10 second periods and is typically used to reset radios or routers without logging yourself out completely from the remote site after a relay was accidently switched , relay 1 to 3 will return automatically after 10 seconds to the off position. Names can be assigned to relays to help the user remember what is connected to the relays in the field.

Relays can also be activated via SNMP SET Commands over Ethernet.

9. SNMP CONFIG PAGE

admin and **admin or admin and user defined Password** gains access.

Configure read and write communities

This can usually be left unaltered.
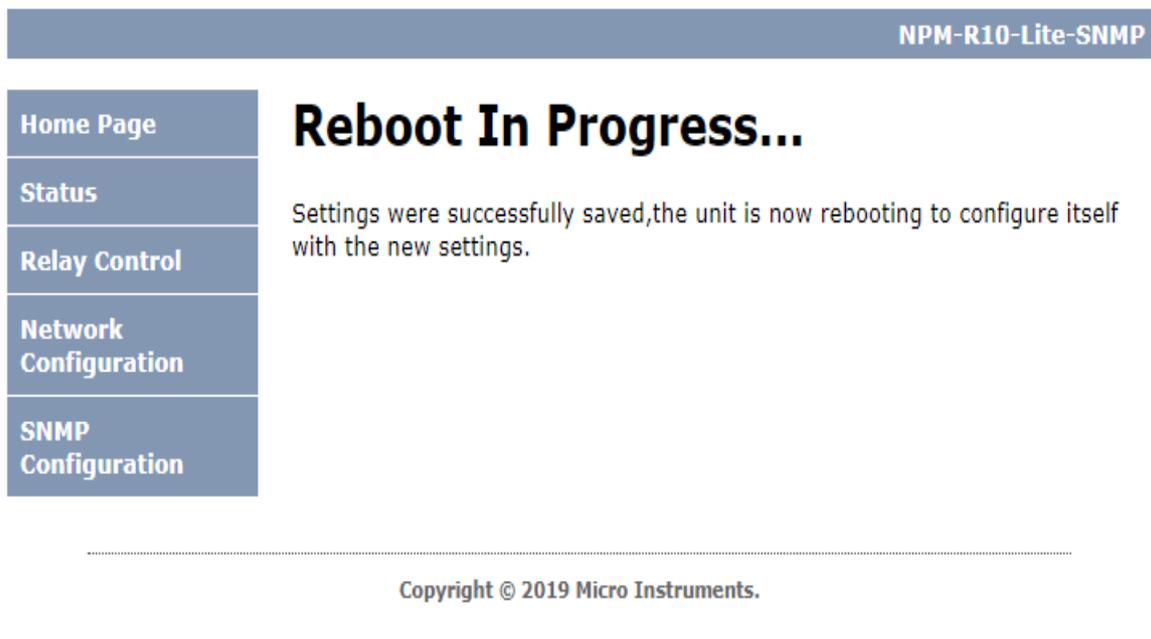
10. NETWORK CONFIGURATION PAGE

Admin and **admin or admin and user defines Password** gains access

MAC address is displayed and cannot be changed / Setup IP address, Gateway and Subnet Mask and user password

Save Configuration – unit will reboot

After the configuration was saved the " Reboot in Progress" page will load

The unit will reboot and configure and should be live in about 5 seconds

11.TFTP Boot-loader

The Solar Monitor supports remote software upgrade over the network via **TFTP** (Trivial file transfer protocol)

Should there be a firmware update or the user wants to make specific changes to the units and we have changed the software accordingly to the customer needs the software can be remotely upgraded over the network.

12. OID TABLE and MI-SNMP Manager software

OID table / number of services = 11

1.3.6.1.4.1.45501.1.3.1.0 = Relay 4 status (integer) 0 off / 1 on

1.3.6.1.4.1.45501.1.3.2.0 = Relay 5 status (integer) 0 off/1 on

1.3.6.1.4.1.45501.1.3.3.0 = Total Battery volts

1.3.6.1.4.1.45501.1.3.4.0 = Battery Charge Amps

1.3.6.1.4.1.45501.1.3.5.0 = Load amps

1.3.6.1.4.1.45501.1.3.6.0 = NOT USED

1.3.6.1.4.1.45501.1.3.7.0 = Temperature

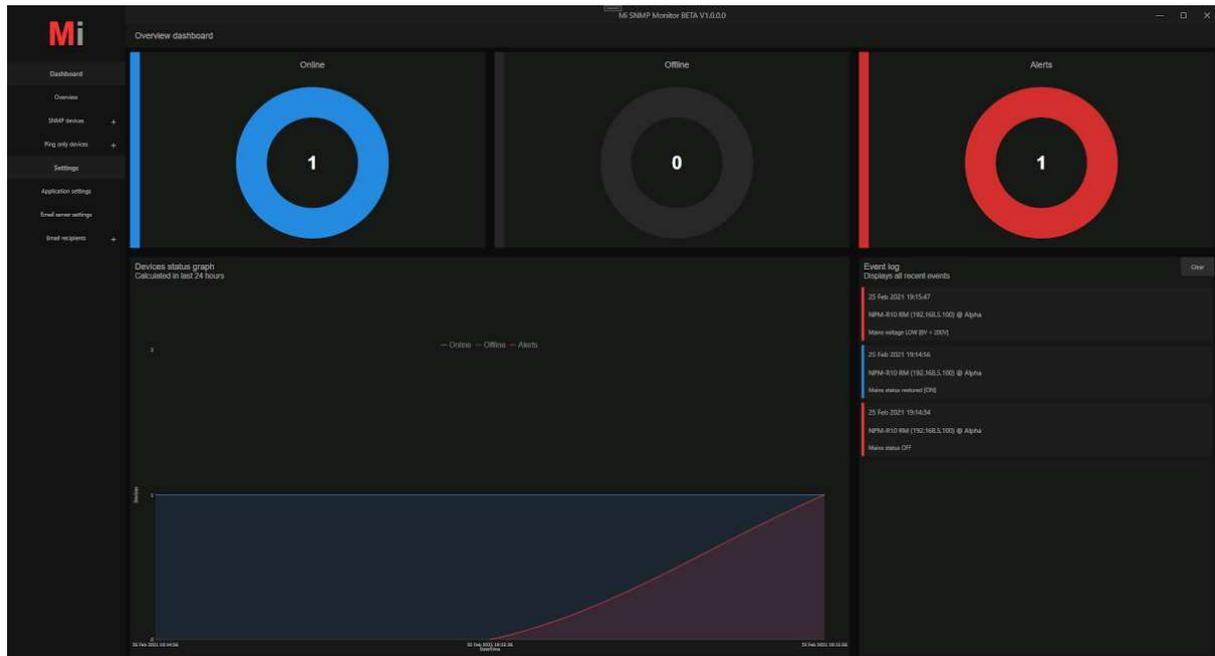1.3.6.1.4.1.45501.1.3.8.0 = Alarm status 0 off / 1 on

1.3.6.1.4.1.45501.1.3.9.0 = **Reserved / not used

1.3.6.1.4.1.45501.1.3.10.0 = Battery 1 (12V) value

1.3.6.1.4.1.45501.1.3.11.0 = Battery 2 (24v) value

1.3.6.1.4.1.45501.1.3.12.0 = Solar panel input Amps

13. MI SNMP Monitor software for Microsoft Windows

Mi SNMP Monitor is a **FREE to download** standalone Microsoft Windows SNMP (simple Network Management Protocol) software application to monitor all Remote power monitoring products manufactured by Micro Instruments. It will also be future compatible with all new products supporting SNMP.

Features:

Plug and Play setup – Quick and easy setup of Mi remote monitoring devices

Can add 3ʳᵈ party devices to ping the equipment to indicate online / offline status

Graphing – each device added will have its own graphical presentation of all measured data and is unit specific.

Email alerts – Multiple email addresses can be added to the system for all alarm notifications, units going offline and online etc. via email

Import and Export – Easily import and export all devices & application settings for easy restore of all information.

Mi SNMP Monitor can be downloaded **FREE** from https://microinstruments.co.za/software.html as a fully functional SNMP monitor application for windows. The software package monitors all Mi remote power monitors and also include a ping feature for other devices on the network
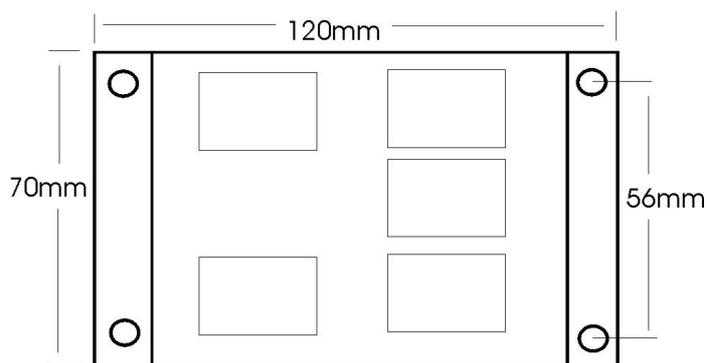
14. Physical Dimensions

Solar Monitor

Weight = 0.800 Kg
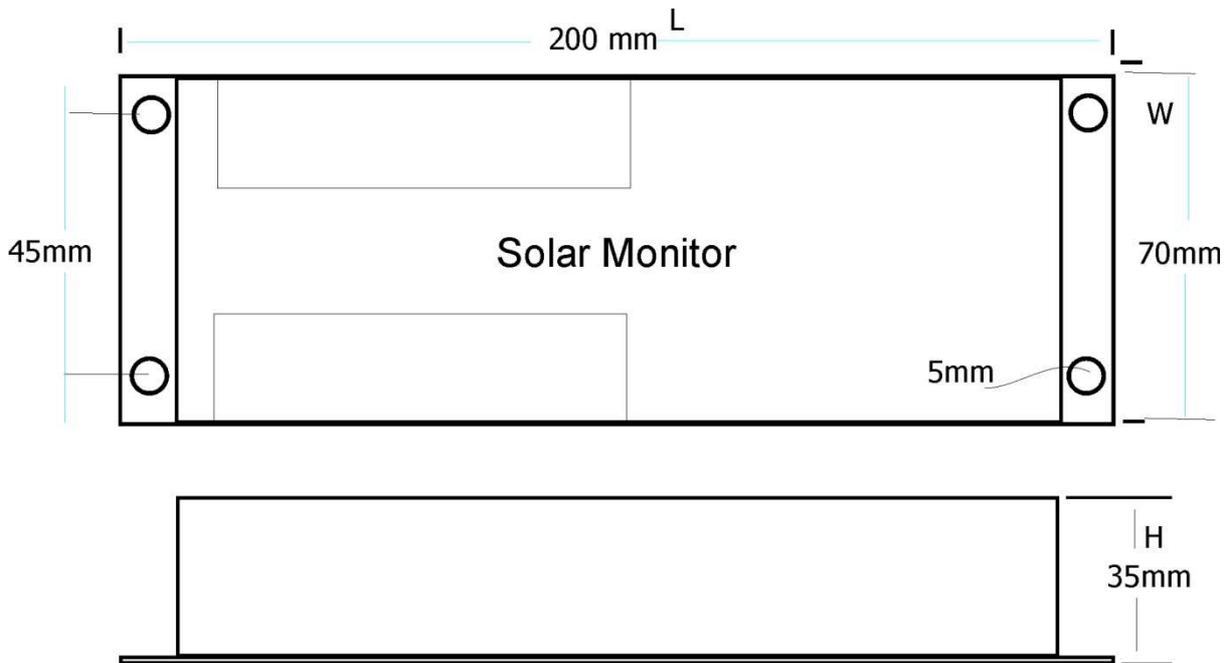
Relay Board:

16. Specifications

Supply Voltage :
12Vdc to 24Vdc battery systems maximum

Current consumption
with LAN port active:
110mA @ 12Vdc / 50mA @ 24Vdc

Current sensors on Charge, Load and Solar panel
75 Amp isolated clip on non-invasive current sensors

Alarm:
Potential free alarm contact input ! – no voltage injection on the terminal

Relay I/o:
10way IDC connector

Temperature sensor:
Internal / -10 to +140deg C

Enclosure:
Non waterproof

LAN Port:
10Mb/s