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Front view



Rear View



NPM-R10-U -ISO Remote Network Power Monitor- Stand-alone or 19"Rack mount modular system with 2 x Clip on non-invasive – non contact DC current sensors

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Ethernet Network Based Remote Battery Power Monitor for communication sites.

NPM-R10-U * Default IP: 192.168.1.2 Default Password: admin / admin**

1. SYSTEM DESCRIPTION

Main module **NPM-R10-U-MAIN**

Front



Rear



Relay output module **NPM-R10-U-RELAY (optional)**

Front



Rear



DB9 Cable



GSM module **NPM-R10-U-GSM (optional)**

Front



Rear



GSM Antenna



DB9 Cable



19" Base plate **NPM-R10-U-BASE (optional)**



Current sensors – NON invasive – clip on DC current sensors

Arrows indicates the direction of current flow – install correct

System Description:

The **NPM-R10-U-ISO** Network power monitor was designed to assist Network specialists with Power and battery power related information via **Ethernet, SNMP** and **GSM** Communication.

Modular system design gives the user options to use the NPM-R10-U-ISO as a 19" rack mount product or as a stand-alone module that can be fitted into any other type of enclosure.

The NPM-R10-U-ISO Main module, GSM module, Relay module and 19" Rack mount base plate is ordered separately to give multiple options to the user.

What makes the NPM-R10-U-ISO unique is the battery input voltage range from 8 VDC up to 70 VDC, making the NPM-R10_U Lithium battery ready and the Clip on non-contact current sensors to measure high currents without physical connections

Total battery pack voltage (from 8 to 70VDC) as well as **individual** battery voltages for series connected batteries can be measured if connected, **0-75 Amp Charging** Current to battery pack, **0-75 Amp Load current to equipment with non contact clip on current sensors**, Current sensors available on request up to **200Amp DC** however we supply by default **with 75Amp current sensors**, **Mains AC** voltage level, **Alarm** input and **temperature** information is available via web pages, SMS and SNMP.

Embedded Web pages for monitoring and configuration of the system.

The unit supports the **SNMP V1** and **SNMP V2C** communication platform to be compatible with any SNMP monitoring software platforms as well with Mi-SNMP Manager software for Windows.

2x16 Local LCD display on for quick access and indication of power related information on site

(B:) Total Battery pack voltage

(AC :) 232V (voltage level of mains supply)

(I:) Charge current: 0 to 75 Amp

(i:) Load current: 0 to 75 Amp - in case of alarm active (i:) will be replaced with (AL) for Alarm

The NPM-R10-U-ISO have external connected isolated 75 Amp current sensors for both charge current and load current measurements, **no connection to the unit is necessary** , **simply clip them around the cables- note the arrow on the sensor indicates the direction of current flow – please install correctly – reverse installation will result in zero current readings**

The NPM-R10-U-ISO can measure battery voltages from 8V up to 70VDC

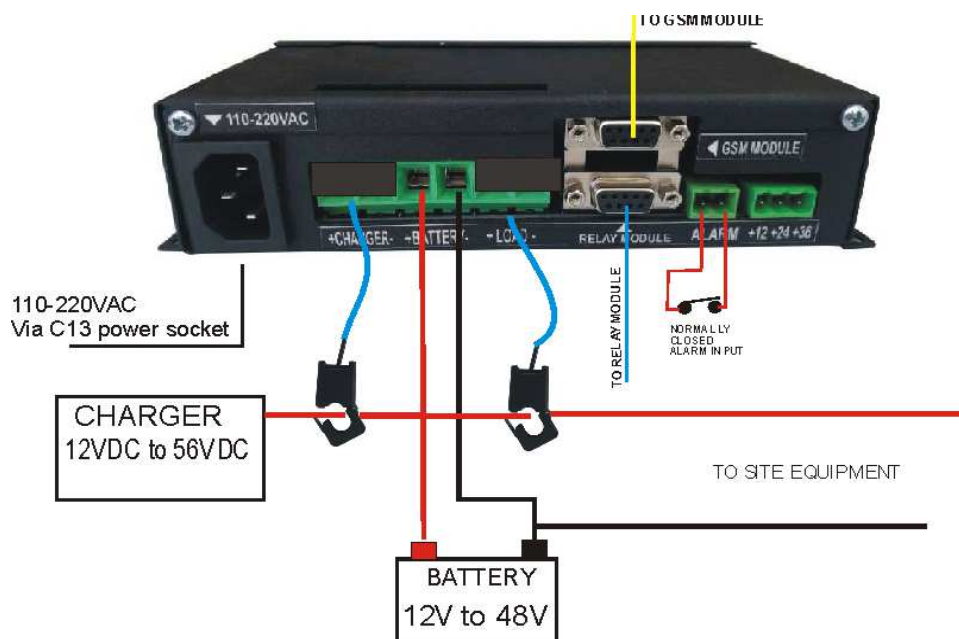
2 wire battery systems like Lithium batteries can be connected directly to the system

Series connected lead acid or similar batteries can be connected by 2 wires only for the total battery voltage of the pack or the links between the batteries can also be connected to obtain individual battery voltages in the stack and the total voltage.

2. System wiring example A - 2 wire Lithium battery connection

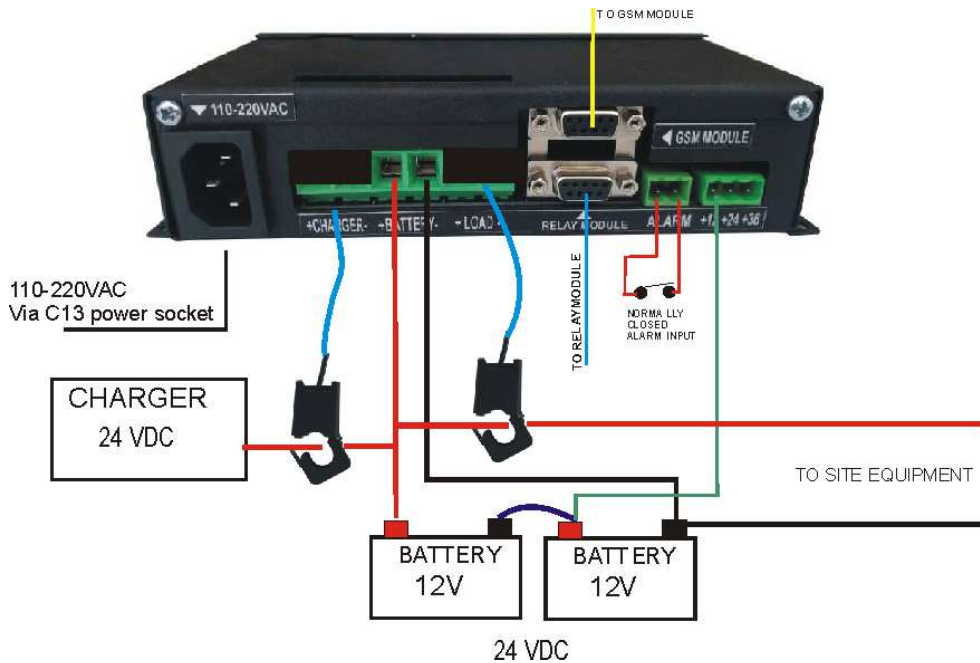
Connecting a single Lithium battery with only 2 wires (+ and -) 12V to 48V batteries.

Connecting lead acid or gel batteries from 12V to 48V in the same way



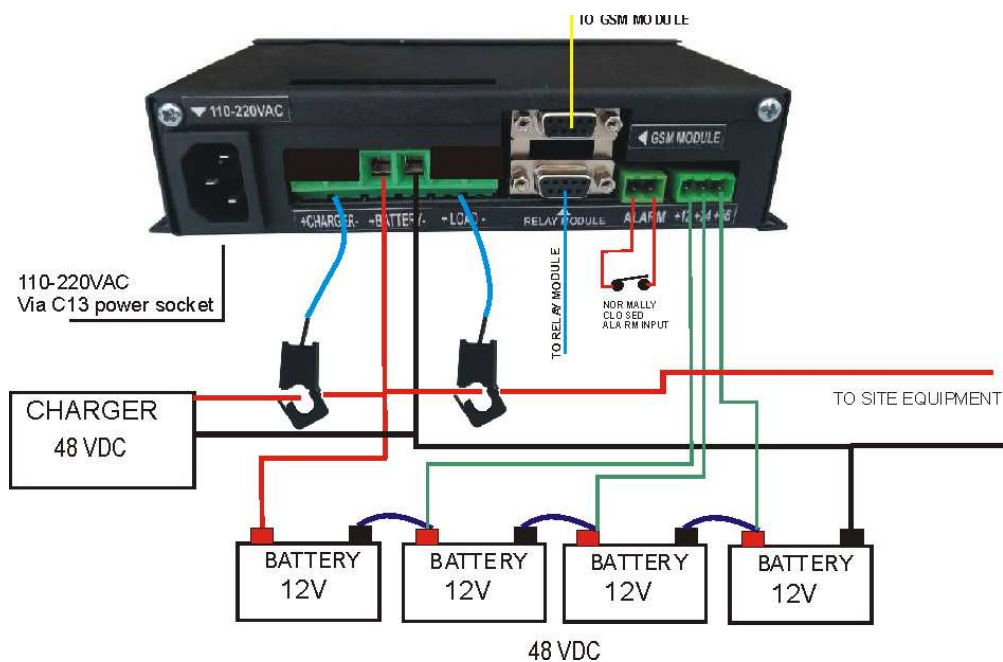
System wiring example B – 24V Lead acid or Gel or similar battery connection

Connect **green** wire to monitor individual battery voltages and the total pack voltage



System wiring example C – 48V Lead acid or Gel or similar battery connection

Connect **green** wires to monitor individual battery voltages and the total pack voltage



To monitor individual battery voltages in a series connected pack of batteries , connect **thin** wires between the batteries and the NPM as indicated in the connection sample above – No current is drawn on these uinputs.

Without these sensing wires connected the user will only see the Total voltage of the battery

Current consumption with LAN port connected 110mA @ 12Vdc / 55mA @ 24Vdc / 25mA @ 48Vdc

****** 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.

After the Alarm is triggered the (i:) indication of the Load current in the bottom right corner of the LCD will change to AL: to indicate the Alarm condition.

The Alarm SNMP (OID) data will change from a **0 to a 1** , as soon as the Alarm input is restored the screen will be cleared from AL: for alarm and return to i: for Load current indication but the Alarm SNMP OID will stay at data **1** for about 8 minutes after the alarm was cleared.

This is working well with PIR alarm detectors etc. so that the alarm condition is not missed by the SNMP manager software when polled.

To monitor multiple batteries making up a battery pack for increased capacity – Please follow the connection examples below

In this battery connection configuration multiple batteries in parallel to increase the capacity of a battery is then still seen by the system as one larger 12V battery ..



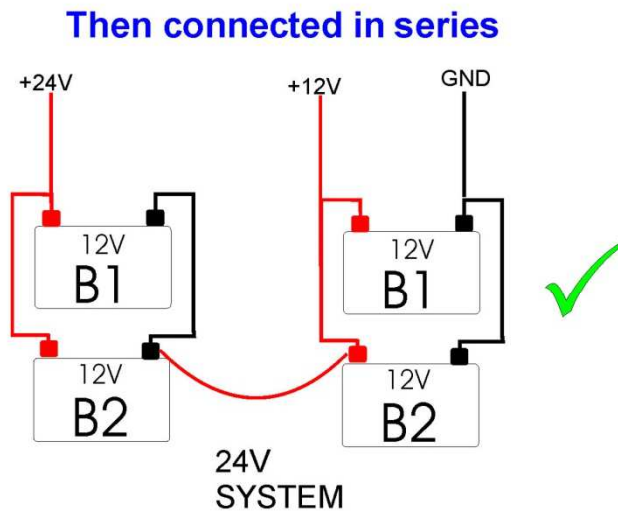
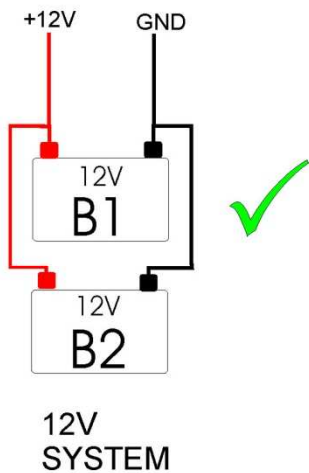
SERIES CONNECTED BATTERY SYSTEMS IN PARALLEL

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 in parallel to Double the A/h capacity

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



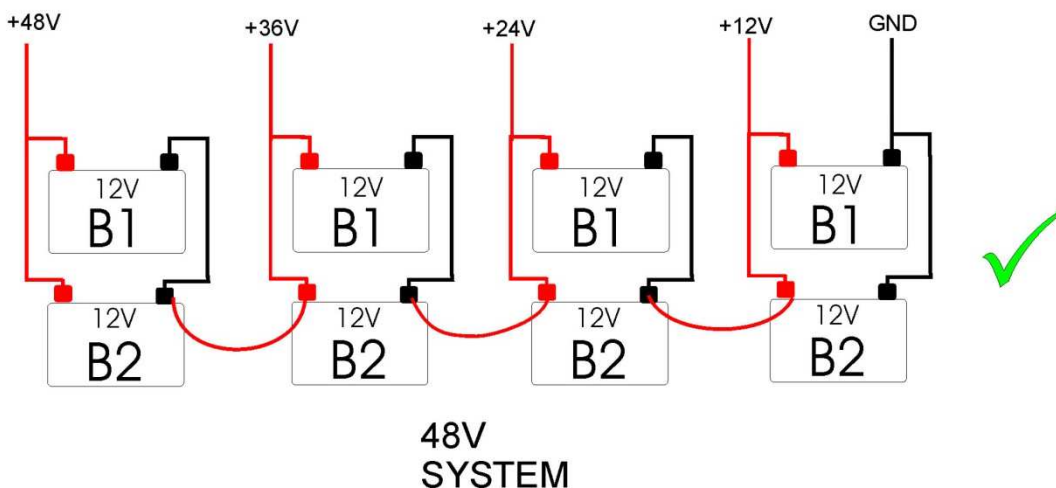
2 x 12V Batteries in parallel

2 x 12V Batteries in parallel

2 x 12V Batteries in parallel

2 x 12V Batteries in parallel

Then connected in series



3. Relay Control module (optional)



The Relay output module connect to the NPM-R10-U via a supplied DB9 serial cable

The Relay module includes a build in “**DEAD Time**” timer for 3 sec to ensure no false switching of relays the moment power is connected to the NPM system.

Relay **1,2,3** can only be toggled to activate for the **web page user specified seconds** then return to the off position again and is used to reset devices. (Time adjustable from 1 to 99 seconds)

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 yellow 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.

Relays are rated at 10 Amp current @ 125VAC



GSM ...

4. GSM module (optional)



The **GSM** module interfaces to the main unit via a supplied DB9 serial cable.

Setup of GSM module

Open the GSM enclosure and Insert a SIM card with no pin code request , close the unit and connect the GSM module to the NPM-RM with the serial cable supplied.

Notice the STATUS led will glow and the NETWORK led will flash at a fast rate

After about 8 sec if the unit finds a Network connection the NETWORK led will start to blink Slowly to indicate connection to a service provider tower, wait about 10 sec before sending an SMS

2 x Cell numbers can be added to the NPM-R10-U via the Network and GSM setting web page and the cell numbers is stored in the NPM-R10-U and not in the GSM module, this makes administration of the cell numbers easy to change in future.

Any alarm from the system will be send via SMS to these configured numbers, when the alarm input goes open circuit and when the mains supply fails and restores.*****Only if "Enable SMS send from NPM-RM" is marked*****

The system will send a **Battery low SMS** if the battery voltage threshold level is reached as configured by the user.

Relays can be controlled via the GSM module with SMS messages

A Status message can be requested from the unit – indicating voltages and currents etc.

Mains failure will be send to configured numbers.

See SMS list of commands and functions below

SMS Commands

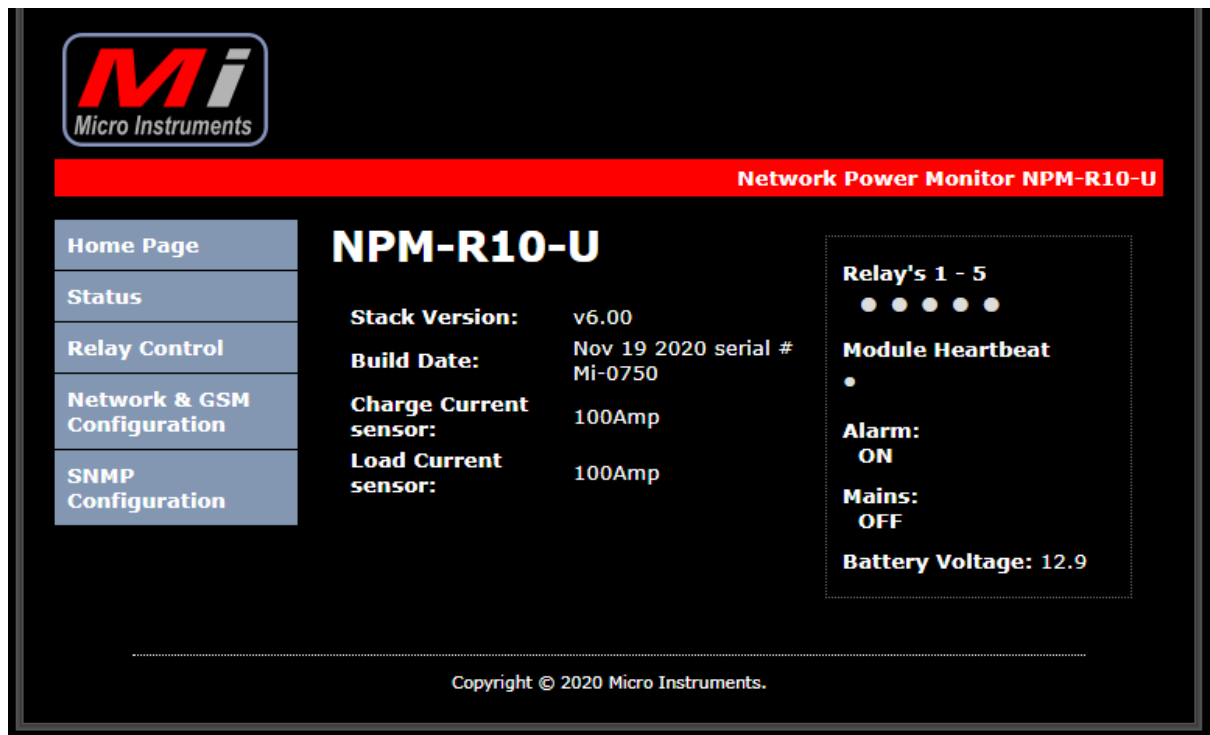
SMS to send	Reply	Action
Help	Returns a list of SMS commands the unit will respond to as below	
Stat or Status	Returns the Status: Mains power status Current battery voltage Charge and load current Relay 4 and 5 status	
Sig	Returns the current GSM signal strength in %	
Balance	Returns the available airtime and SMS available on the SIM card	
Rr1	Reset Relay 1 OK	Toggle relay 1 for time (programmed by user under relay control page)
Rr2	Reset Relay 2 OK	Toggle relay 2 for time (programmed by user under relay control page)
Rr3	Reset Relay 3 OK	Toggle relay 3 for time (programmed by user under relay control page)
R4on	Relay 4 = ON	Switch Relay 4 ON
R4off	Relay 4 = OFF	Switch Relay 4 OFF
R5on	Relay 5 = ON	Switch Relay 5 ON
R5off	Relay 5 = OFF	Switch Relay 5 OFF

The GSM system software will test for a valid GSM connection every 2 minutes and will auto reboot the module in case the connection was lost to try to re connect the module

The GSM module will also reboot if the NPM-R10-U is rebooted via the web page.

5. Web pages.

Home Page



Micro Instruments

Network Power Monitor NPM-R10-U

Home Page

Status

Relay Control

Network & GSM Configuration

SNMP Configuration

NPM-R10-U

Stack Version: v6.00

Build Date: Nov 19 2020 serial # Mi-0750

Charge Current sensor: 100Amp

Load Current sensor: 100Amp

Relay's 1 - 5

● ● ● ● ●

Module Heartbeat

●

Alarm:
ON

Mains:
OFF

Battery Voltage: 12.9

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Relay's 1 – 5 – buttons will turn yellow if active

Module heartbeat button indicates the system is running normal

Alarm: will indicate the status of the alarm input – OFF if alarm input is closed circuit and ON if alarm input is open circuit

Mains : On if mains voltage present and OFF with no Mains voltage present

Battery voltage : Total battery or battery pack volts

Status page

The screenshot shows the status page of a Network Power Monitor (NPM-R10-U). It features a navigation menu on the left with options: Home Page, Status, Relay Control, Network & GSM Configuration, and SNMP Configuration. The main content area is titled 'STATUS' and displays several key metrics:

- Software build date and serial number:** Nov 19 2020 serial # Mi-0750
- Temperature sensor in Degrees Celcius:** +23.0 °
- Mains AC Voltage level:** 241 V
- Total Battery Volts:** 12.8
- Individual battery voltages (From GND to 12V-24V-36V-48V):** 00.0 : 00.0 : 00.0 : 00.0
- Current LCD Display image:**
 - B: = Battery Voltage
 - I: = Charge Current to Battery
 - i: = Load Current to Equipment
 - AC: = 220Vac input level

The LCD display shows: B:12.8 V I:00.0A AC:241 V AL00.0A

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The **build date of the firmware** programmed to the device, the units **serial number** will be displayed.

The **current temperature** as detected by the internal temperature sensor in degrees Celcius

Mains AC voltage level – will change according to the AC supply connected to unit from the mains supply

Total Battery volts of the battery or battery pack

Individual battery voltages of the batteries connected if more than one battery is used and if the sense wires have been connected

A reflection of the units LCD display – indicating battery volts , charge and load current and AC mains level supply voltage

Relay control page

To gain access to Relay control and Network settings web pages the user should enter the default admin / admin password or the user defined username and password

Relay **4** and **5** can be controlled to the on/off status or SNMP “SET” commands and will keep their positions, Relay **1 to 3** can only be toggled for the **seconds as programmed** and is typically used to reset radios or routers without logging yourself out completely from the remote site after a relay was accidentally switched, relay **1 to 3** will return automatically after the pre-defined 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.

Network & GSM Configuration page

Micro Instruments

Network Power Monitor NPM-R10-U

Network Configuration

This page allows the configuration of the network and GSM settings.

CAUTION: Incorrect settings may cause the unit to lose network connectivity.

Enter Network and GSM settings below:

Cell 1: [08xx]

Cell 2: [08xx]

Low Batt: [Sms@Vdc]

Uncheck box below-user can still send SMS to unit for control with reply SMS, but SMS(Alarm,Mains and Battery low)send from unit will be disabled

Enable SMS send from NPM-R10-U

MAC Address:

Host Name:

Password: [max 9]

IP Address:

Gateway:

Subnet Mask:

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Cell 1 and Cell 2 : Enter cell number/s here if GSM system is in use - numbers must be in the eg: 082.. format and not +27 ect

Low Batt : Low battery voltage level SMS value can be specified here

Enable / disable SMS send from NPM-R10-U by checking or unchecking the tick box

Network settings can be changed here

6. TFTP – Remote Upgrade

NPM-R10-U supports **TFTP** for upgrading device software remotely over a network. The MAC address of the unit is hard coded into software for safety reasons so first obtain a hex file from us for the specific unit with necessary changes before attempting TFTP.

Use TFTP file up-loader downloadable from our website

<https://microinstruments.co.za/downloads>

A TFTP session can be initiated while the unit is in run mode to the current configured IP address of the unit.

7 . SNMP table

OID Table

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 =Mains status (integer) 0 off / 1 on

1.3.6.1.4.1.45501.1.3.4.0 = Total Battery voltage (octet string)

1.3.6.1.4.1.45501.1.3.5.0 = Charge current (octet string)

1.3.6.1.4.1.45501.1.3.6.0 = Load current (octet string)

1.3.6.1.4.1.45501.1.3.7.0 = Mains AC voltage level (octet string)

1.3.6.1.4.1.45501.1.3.8.0 = Temperature (octet string)

1.3.6.1.4.1.45501.1.3.9.0 = Alarm status 0 off / 1 on

1.3.6.1.4.1.45501.1.3.11.0 = Battery 1 (12V) value

1.3.6.1.4.1.45501.1.3.12.0 = Battery 2 (24v) value

1.3.6.1.4.1.45501.1.3.13.0 = Battery 3 (36v) value

1.3.6.1.4.1.45501.1.3.14.0 = Battery 4 (48v) value

8. System Reset



Insert a thin object like a toothpick into the reset hole **next** to the LAN port, press softly until a click is felt , apply power to the system , keep button pressed until the LCD screen indicates **“Reset complete”**

9. Physical dimensions

NPM-R10-U MAIN unit: L 118mm , W 88mm , H 47mm (Weight 0.54Kg / 540 gram)

NPM-R10-U Relay unit: L 115mm , W 54mm , H 47mm (Weight 0.24Kg / 240 gram)

NPM-R10-U GSM unit: L 110mm , W 82mm , H 23mm (Weight 0.16Kg / 160 gram)

NPM-R10-U Base plate: L 480mm , W 120mm , H 46mm (1U) (Weight 0.45Kg / 450 gram)

For any other information please contact us:

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