Innovative Electronics for a changing World

TCP IP V/A meter –Remote Volt / Amp Meter

Several applications require the use of series connected battery packs for adequate power. These packs often need effective automated equipment to measure the battery voltages from time to time. The voltage is a good indicator of whether any battery is losing charge due to extraneous factors. Some of the factors that contribute towards reduction in life or charge retention of such batteries include the type of battery cell design, ambient temperature, and length of usage/storage. This means that if there are certain subtle differences between the individual batteries, the batteries will not charge/discharge in a uniform manner. The result is that some units will be overcharged, some excessively discharged, and poor performance will result.

All batteries must remain within a high and low voltage operating range to prevent damage. During the discharge cycle, batteries which are less efficient tend to go out of voltage balance before the rest, resulting in an overall limiting of the total battery capacity. Similarly, during the charge cycle, batteries which are more efficient tend to get charged a little higher than the rest, resulting in an overcharge. Batteries that are overcharged are subject to an oxygen recombination cycle at their negative electrodes, and this causes their cycle life to be significantly reduced, **the TCP IP V/A meter now allows you to monitor your battery pack voltage and charge current remotely.**

TCP IP V/A meter +SNMP | Mi

MODELS :

TCP IP V/A meter / 35 Amp / Default IP 192.168.1.2

1. System description

The TCP IP Volt / Amp meter was designed to assist Network specialists with DC Power related information via Ethernet Communication.

The TCP IP V/A meter measures one or more batteries and up to four that is connected in the series configuration and report the Battery voltages individually as well as the total battery pack voltage. Multiple batteries can be connected in parallel and then in series configuration.** **See connection diagrams below****

One **35 Amp contactless** – current port is available to sense the charge current to the battery pack or the lad current to equipment – customer defined.- **see wiring diagrams below**

All information is available from embedded web pages as well as through **SNMP (Simple network management protocol) V1 and V2c**

Battery 1 to 4, Total battery pack Voltage and charge current is available via web pages and SNMP

Current Consumption:

80 milli-amps @ 12Vdc (1 battery connected)

40 milli-amps @ 24Vdc (2 batteries connected)

40 milli-amps @ 36Vdc (3 batteries connected) - only monitored

40 milli-amps @ 48Vdc (4 batteries connected) – only monitored

2. BATTERY CONNECTIONS

Any number of batteries can be connected to the system from 1 to 4 as long as the batteries start from ground at the GND terminal and then follow +12V to B1 and +24V to B2 and +36V to B3 and +48V to B4.
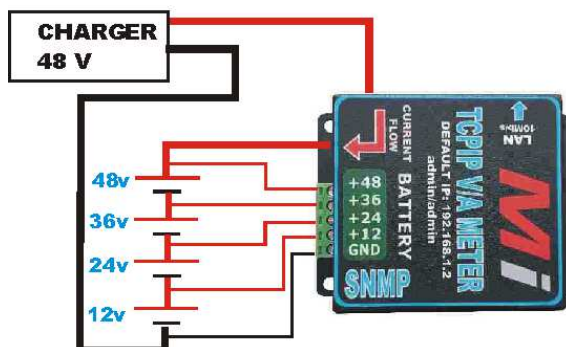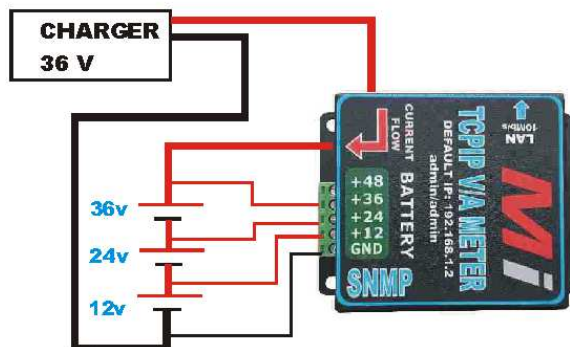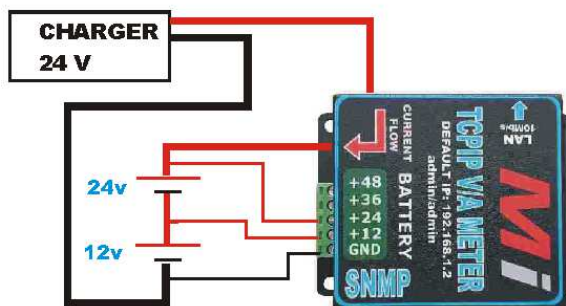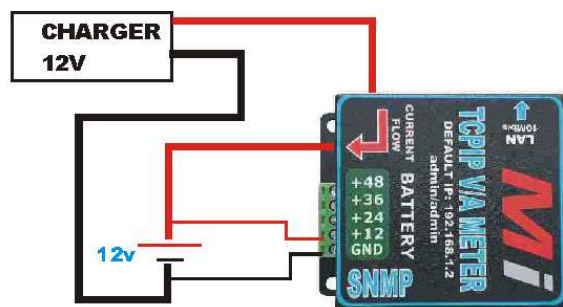
B1 meaning first battery closest to Ground – B2 next battery up to B4.

The unit power from the 12V and 24V rail only, the 36V and 48V rail is only monitored

The unit will not function with only the GND and the 36 or 48V connection

Continue]..

BATTERY CONNECTIONS……

CURRENT PORT CONNECTIONS

TCPIP VA meter use a non-contact DC current sensor

Charge or load current + (positive) wire should be fed through the centre hole of the current sensor

MEASURING CHARGE CURRENT TO BATTERY

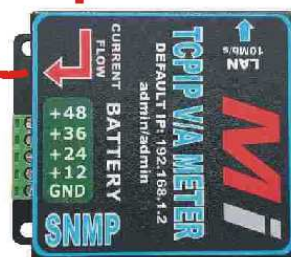FROM CHARGER +

Current flow direction

TO BATTERY +

MEASURING LOAD CURRENT TO EQUIPMENT

FROM BATTERY +

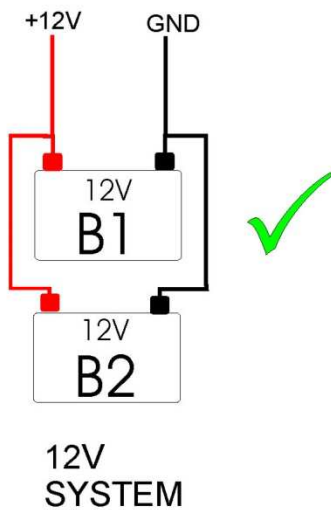Current flow direction

TO EQUIPMENT (LOAD) +

3. BATTERY CONNECTIONS FOR PARALLEL - SERIES CONNECTED BATTERIES

Correct series / parallel connection of Multiple Battery banks
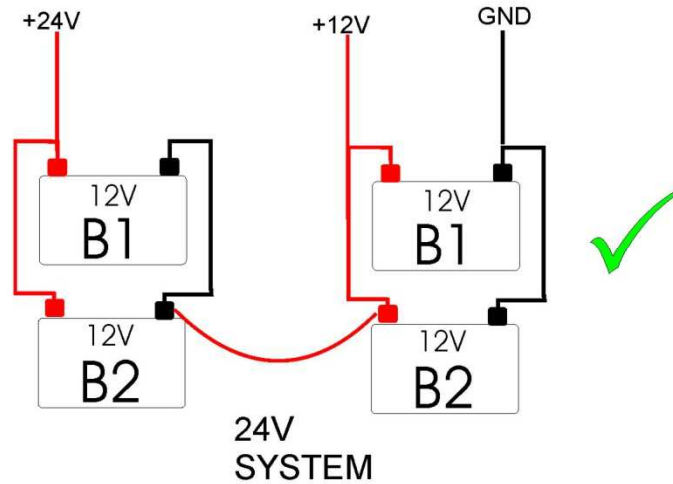to double the A/h capacity but still be able to sense all Batteries

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

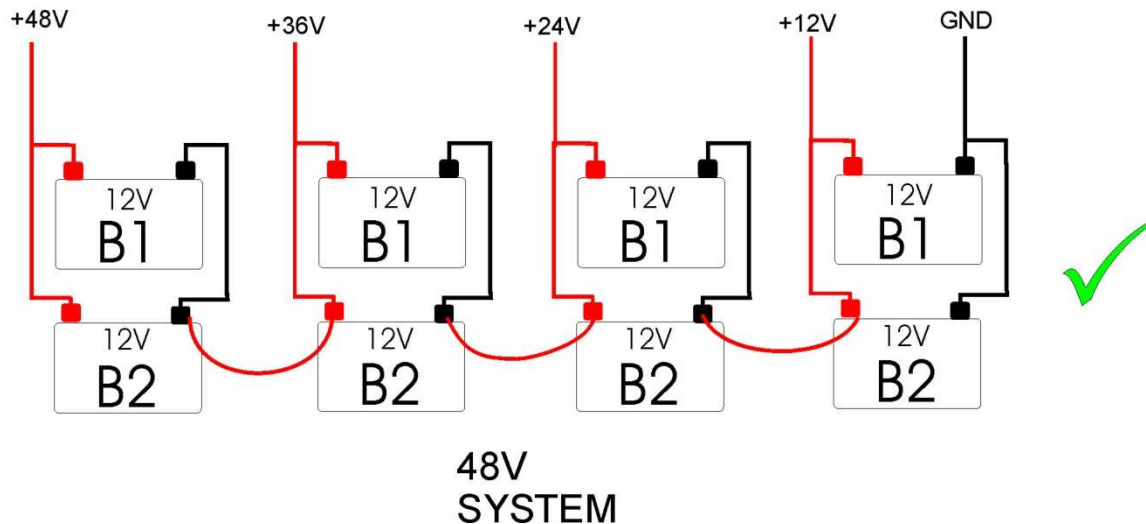+24V   +12V   GND

12V
B1

12V
B2

12V
B1

12V
B2

24V
SYSTEM

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

+48V   +36V   +24V   +12V   GND

12V
B1

12V
B2

12V
B1

12V
B2

12V
B1

12V
B2

12V
B1

12V
B2

48V
SYSTEM

4. User Name and Password

Open a web browser and direct to 192.168.1.2 (Default address)

The Network configuration and SNMP configuration pages is password protected

Default:

Username **: admin**

Password **: admin**

Reset to Defaults : Push and hold reset button next to the LAN port , apply power , keep the button pressed until the run led flashes once , the unit will reboot and will be available on the factory IP again : **192.168.1.2**

5. Home page

Home page displays the serial number, model number and the total battery pack voltage

6. Status Page

Total Battery pack volts, charge current and values for Batteries 1 to 4 is displayed.

If only battery 1 is connected Battery 2,3,4 will indicate 00.0V

Micro Instruments

TCP IP V/A meter SNMP

- **Home Page**
- **Status**
- **Network Configuration**
- **SNMP Configuration**

STATUS

Battery pack Total Volts:.

14.29 V

Charge Current:.

+00.0A

Battery 1 (12V):.

14.29 V

Battery 2 (24V):.

00.00 V

Battery 3 (36V):.
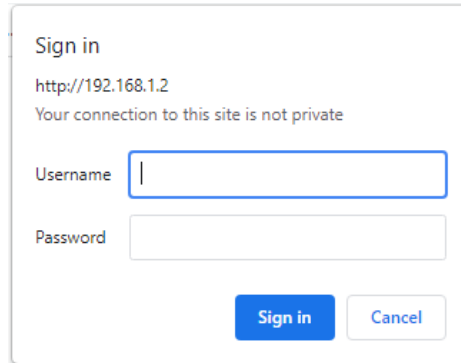
00.00 V

Battery 4 (48V):.

00.00 V

7. Network Configuration page

User will have to enter password

Enter: admin , admin (Default) / or admin and user defined password

IP address , Gateway and subnet Mask can be changed here

The user can specify a **user defined Password** here

Login will then always be **admin and the user defined password**

8.SNMP Configuration page

SNMP Configuration – normally can be left unaltered

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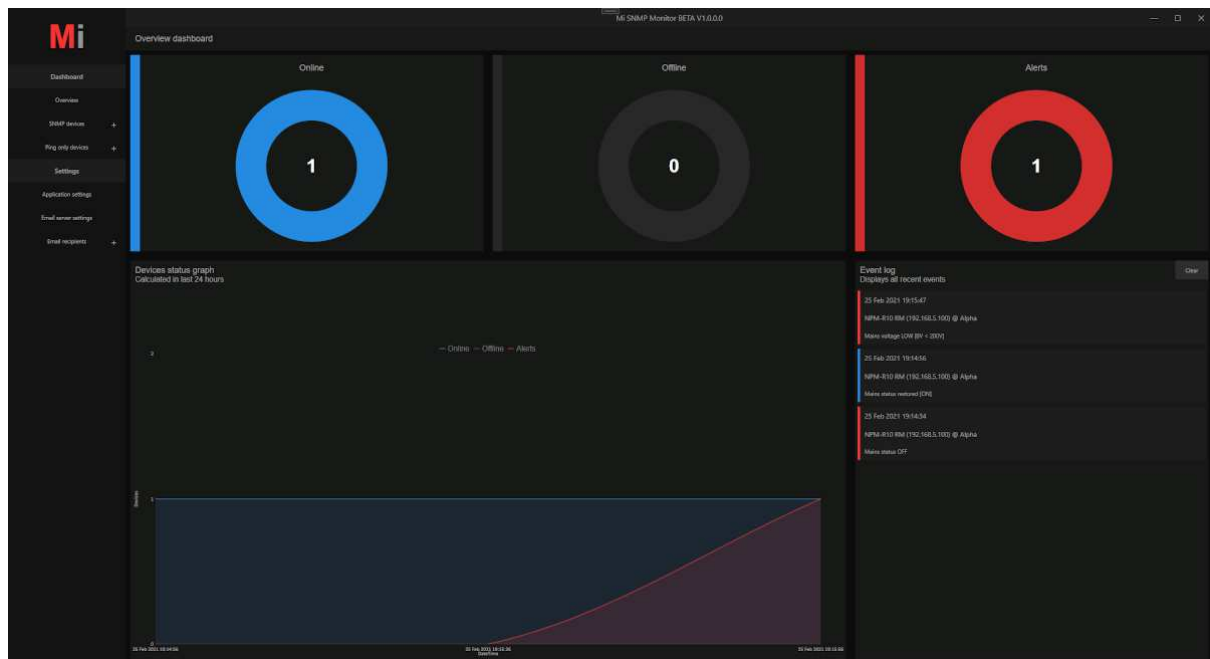
Mi SNMP Manager is a standalone Microsoft Windows SNMP (simple Network Management Protocol) software application to monitor all Remote power monitoring products manufactured by Micro Instruments. It will also be future compatible with all new products supporting SNMP.

Features:

Plug and Play setup – Quick setup of our remote monitoring devices – No need to add OID's.

Can ping other 3ʳᵈ part devices to indicate the online and offline status of a device

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

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 Manager can be downloaded **free** from www.microinstruments.co.za as a fully functional application. Download Mi SNMP monitor from the **SOFTWARE** tab

8 . SNMP screenshots and OID table
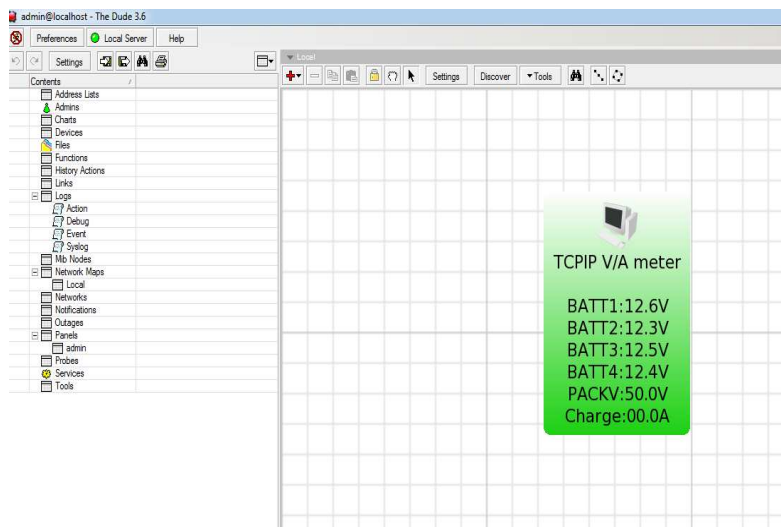
OID table

1.3.6.1.4.1.45501.1.3.1.0 – Battery 1 (12V)

1.3.6.1.4.1.45501.1.3.2.0 – Battery 2 (24V)

1.3.6.1.4.1.45501.1.3.3.0 – Battery 3 (36V)

1.3.6.1.4.1.45501.1.3.4.0 – Battery 4 (48V)

1.3.6.1.4.1.45501.1.3.5.0 – Total battery pack volts

1.3.6.1.4.1.45501.1.3.6.0 – Charge Amps

Snmp Walk 192.168.1.2

From: server

To: 192.168.1.2

Profile: v2-public

Oid:

Timeout: 3000 ms

Tries: 3

Start • Stop • Close

List | Tree | Table

Module: all

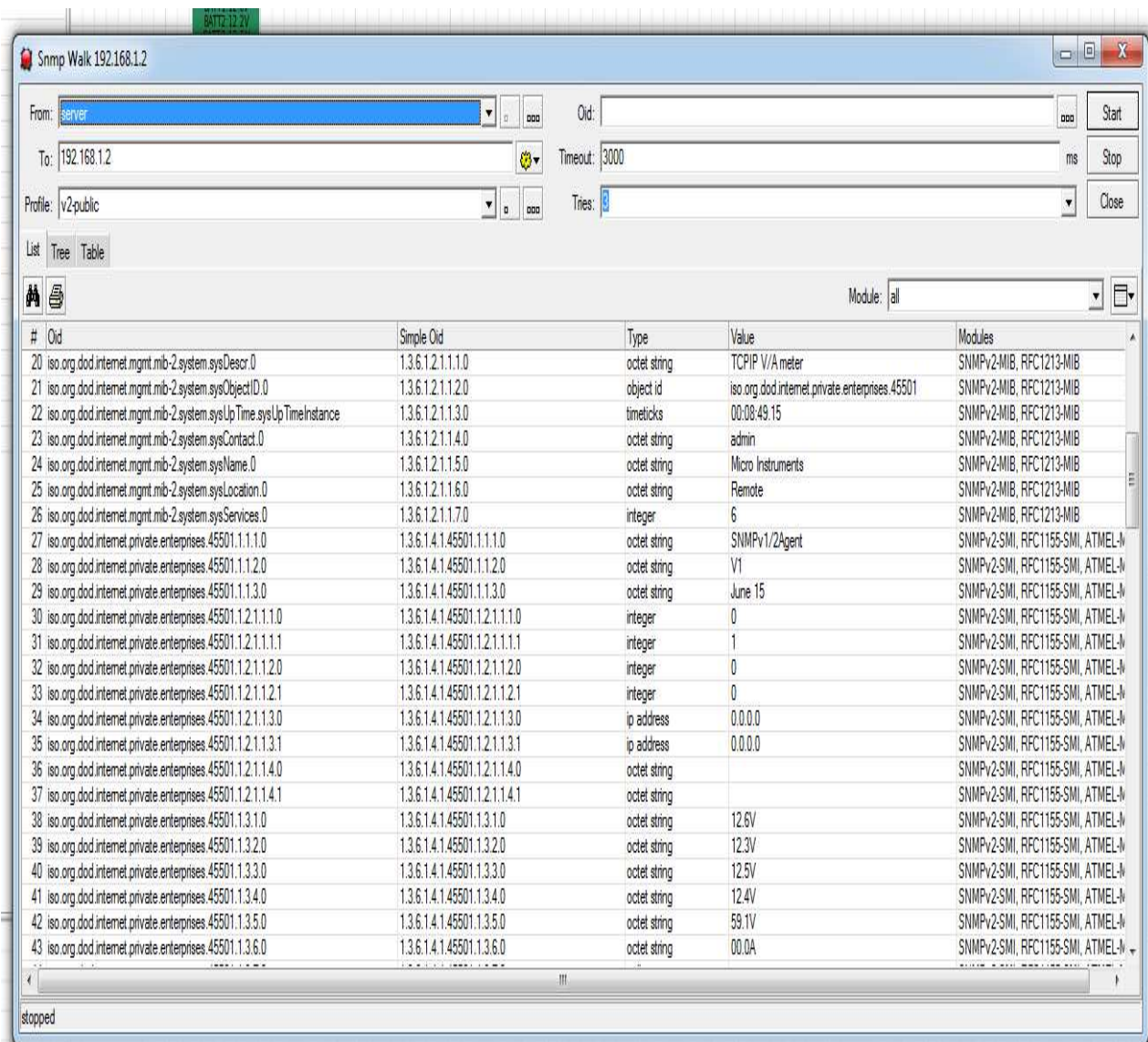| #	Oid	Simple Oid	Type	Value	Modules
20	iso.org.dod.internet.mgmt.mib-2.system.sysDescr.0	1.3.6.1.2.1.1.1.0	octet string	TCPIP V/A meter	SNMPv2-MIB, RFC1213-MIB
21	iso.org.dod.internet.mgmt.mib-2.system.sysObjectID.0	1.3.6.1.2.1.1.2.0	object id	iso.org.dod.internet.private.enterprises.45501	SNMPv2-MIB, RFC1213-MIB
22	iso.org.dod.internet.mgmt.mib-2.system.sysUpTime.sysUpTimeInstance	1.3.6.1.2.1.1.3.0	timeticks	00:08:49.15	SNMPv2-MIB, RFC1213-MIB
23	iso.org.dod.internet.mgmt.mib-2.system.sysContact.0	1.3.6.1.2.1.1.4.0	octet string	admin	SNMPv2-MIB, RFC1213-MIB
24	iso.org.dod.internet.mgmt.mib-2.system.sysName.0	1.3.6.1.2.1.1.5.0	octet string	Micro Instruments	SNMPv2-MIB, RFC1213-MIB
25	iso.org.dod.internet.mgmt.mib-2.system.sysLocation.0	1.3.6.1.2.1.1.6.0	octet string	Remote	SNMPv2-MIB, RFC1213-MIB
26	iso.org.dod.internet.mgmt.mib-2.system.sysServices.0	1.3.6.1.2.1.1.7.0	integer	6	SNMPv2-MIB, RFC1213-MIB
27	iso.org.dod.internet.private.enterprises.45501.1.1.1.0	1.3.6.1.4.1.45501.1.1.1.0	octet string	SNMPv1/2Agent	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
28	iso.org.dod.internet.private.enterprises.45501.1.1.2.0	1.3.6.1.4.1.45501.1.1.2.0	octet string	V1	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
29	iso.org.dod.internet.private.enterprises.45501.1.1.3.0	1.3.6.1.4.1.45501.1.1.3.0	octet string	June 15	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
30	iso.org.dod.internet.private.enterprises.45501.1.2.1.1.1.0	1.3.6.1.4.1.45501.1.2.1.1.1.0	integer	0	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
31	iso.org.dod.internet.private.enterprises.45501.1.2.1.1.1.1	1.3.6.1.4.1.45501.1.2.1.1.1.1	integer	1	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
32	iso.org.dod.internet.private.enterprises.45501.1.2.1.1.2.0	1.3.6.1.4.1.45501.1.2.1.1.2.0	integer	0	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
33	iso.org.dod.internet.private.enterprises.45501.1.2.1.1.2.1	1.3.6.1.4.1.45501.1.2.1.1.2.1	integer	0	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
34	iso.org.dod.internet.private.enterprises.45501.1.2.1.1.3.0	1.3.6.1.4.1.45501.1.2.1.1.3.0	ip address	0.0.0.0	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
35	iso.org.dod.internet.private.enterprises.45501.1.2.1.1.3.1	1.3.6.1.4.1.45501.1.2.1.1.3.1	ip address	0.0.0.0	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
36	iso.org.dod.internet.private.enterprises.45501.1.2.1.1.4.0	1.3.6.1.4.1.45501.1.2.1.1.4.0	octet string		SNMPv2-SMI, RFC1155-SMI, ATMEL-N
37	iso.org.dod.internet.private.enterprises.45501.1.2.1.1.4.1	1.3.6.1.4.1.45501.1.2.1.1.4.1	octet string		SNMPv2-SMI, RFC1155-SMI, ATMEL-N
38	iso.org.dod.internet.private.enterprises.45501.1.3.1.0	1.3.6.1.4.1.45501.1.3.1.0	octet string	12.6V	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
39	iso.org.dod.internet.private.enterprises.45501.1.3.2.0	1.3.6.1.4.1.45501.1.3.2.0	octet string	12.3V	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
40	iso.org.dod.internet.private.enterprises.45501.1.3.3.0	1.3.6.1.4.1.45501.1.3.3.0	octet string	12.5V	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
41	iso.org.dod.internet.private.enterprises.45501.1.3.4.0	1.3.6.1.4.1.45501.1.3.4.0	octet string	12.4V	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
42	iso.org.dod.internet.private.enterprises.45501.1.3.5.0	1.3.6.1.4.1.45501.1.3.5.0	octet string	59.1V	SNMPv2-SMI, RFC1155-SMI, ATMEL-N
43	iso.org.dod.internet.private.enterprises.45501.1.3.6.0	1.3.6.1.4.1.45501.1.3.6.0	octet string	00.0A	SNMPv2-SMI, RFC1155-SMI, ATMEL-N

stopped

OID table

1.3.6.1.4.1.45501.1.3.1.0 – Battery 1 (12V)

1.3.6.1.4.1.45501.1.3.2.0 – Battery 2 (24V)

1.3.6.1.4.1.45501.1.3.3.0 – Battery 3 (36V)

1.3.6.1.4.1.45501.1.3.4.0 – Battery 4 (48V)

1.3.6.1.4.1.45501.1.3.5.0 – Total battery pack volts

1.3.6.1.4.1.45501.1.3.6.0 – Charge Amps

Dude " appearance settings "

To add a device to the Dude

Top of screen Click on **+** to add a device, enter the device IP address and click next and then click finish. Right click on the device icon, select appearance in the drop down menu, click in the Label window and copy the code below to the label window.

[Device.Name]

[device_performance()][Device.ServicesDown]

copy this into the window below the above automatic inserted text

BATT1:[oid("1.3.6.1.4.1.45501.1.3.1.0")]

BATT2:[oid("1.3.6.1.4.1.45501.1.3.2.0")]

BATT3:[oid("1.3.6.1.4.1.45501.1.3.3.0")]

BATT4:[oid("1.3.6.1.4.1.45501.1.3.4.0")]

PACKV:[oid("1.3.6.1.4.1.45501.1.3.5.0")]

Charge:[oid("1.3.6.1.4.1.45501.1.3.6.0")]

Click on arrow at unknown, Up, Down Partial, Down complete to select the colours for them.

Click apply and ok

Right click on device icon and select " Settings" – go to services – at Probe: select ping – select enable and set probe interval , probe time out and down count to 1
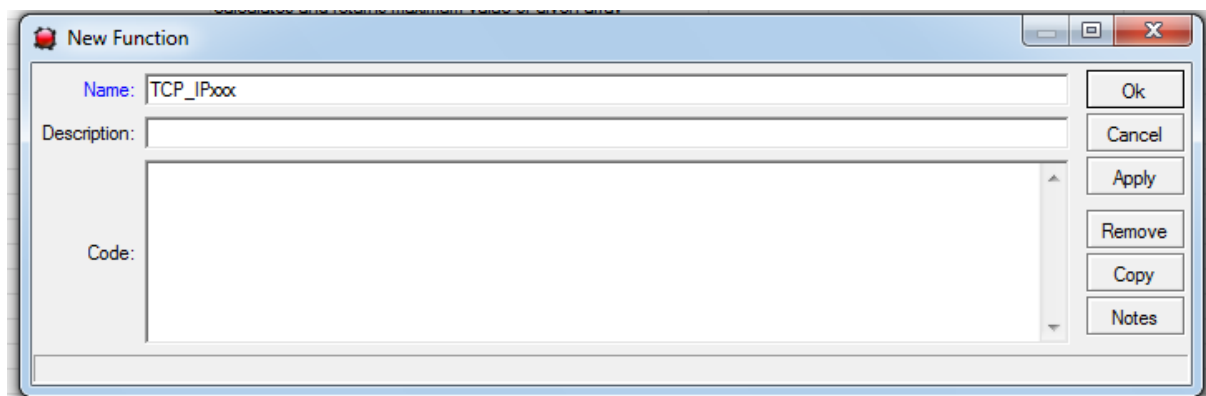
Apply and ok

Add a probe and function to the dude for low Battery Voltage notification of Battery 1

To be notified by the Dude for a change in low Battery1 status add a function and a probe

In the right hand side navigation window of the Dude double click Functions

Click the + sign to add a function

Type the Name as **TCP_IPB1**

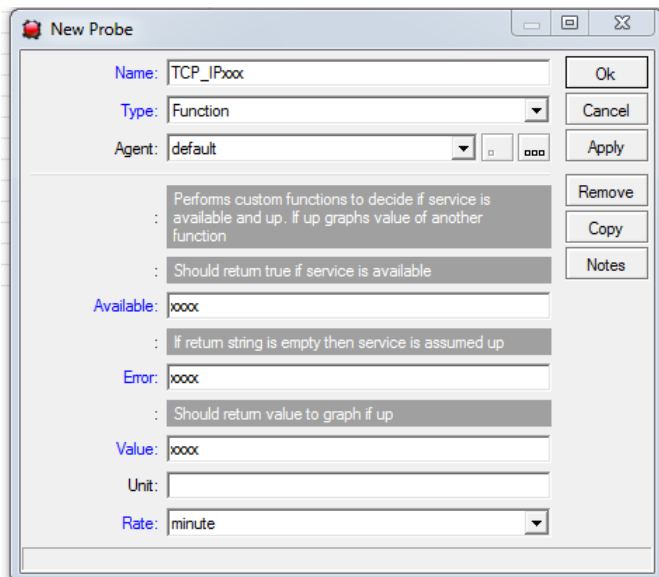**Copy and paste the text below as above (note the OID is the Batt 1 OID)**

oid("1.3.6.1.4.1.45501.1.3.1.0")

Click apply and ok

In the right hand side navigation window of the Dude double click Probes

Click the + sign to add a Probe

Under Probes create a new probe:

Type the name exactly as the function created earlier - : **TCP_IPB1**

Change Type to **: Function**

Agent: **default**

Copy and paste the text below one by one and insert

Available: TCP_IPB1()

Error: if(TCP_IPB1() > 11.5, "", "BATT1 LOW")

YOU can change your battery low level in decimal , currently at 11.5V

Value: TCP_IPB1()

Leave **Unit** blank

Rate: **minute**

Click Apply and ok

Right click the device icon on the monitoring screen and select **" Settings"**

Go To **services**

Click the + sign to add a service

Under Probe: select -   TCP_IPB1

Select the probe interval and probe timeout time and set the Probe down count to 1Click apply and ok to exit / At this time if Battery 1 input voltage drops below 11.5v the result in the monitoring Icon in the Dude to turn Orange and indicate at the top of the icon that it is a low Batter 1 condition.

TCP IP V/A meter +SNMP — Mi

Add a probe and function to the dude for low Battery Voltage notification of Battery 2

To be notified by the Dude for a change in low Battery2 status add a function and a probe

In the right hand side navigation window of the Dude double click Functions

Click the + sign to add a function

Type the Name as **TCP_IPB2**
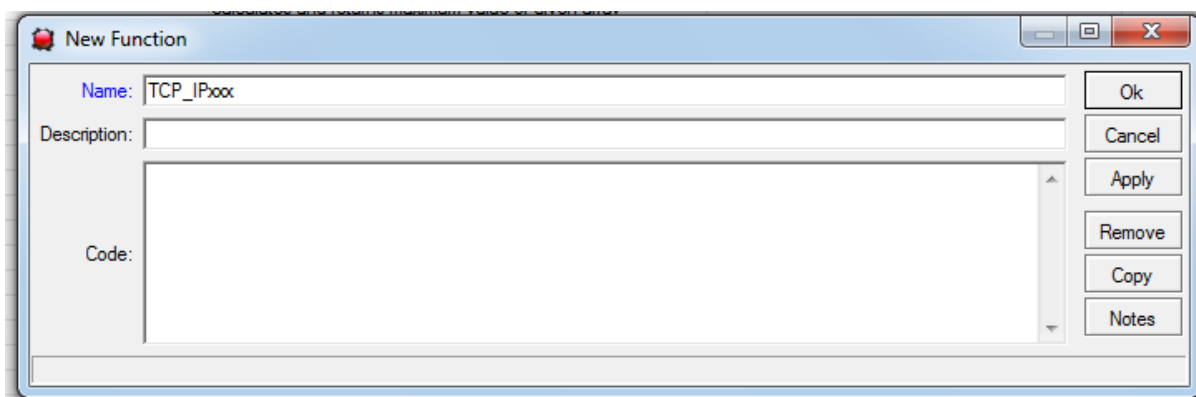
Copy and paste the text below as above (note the OID is the Batt 2 OID)

oid("1.3.6.1.4.1.45501.1.3.2.0")

Click apply and ok

In the right hand side navigation window of the Dude double click Probes

Click the + sign to add a Probe

Under Probes create a new probe:
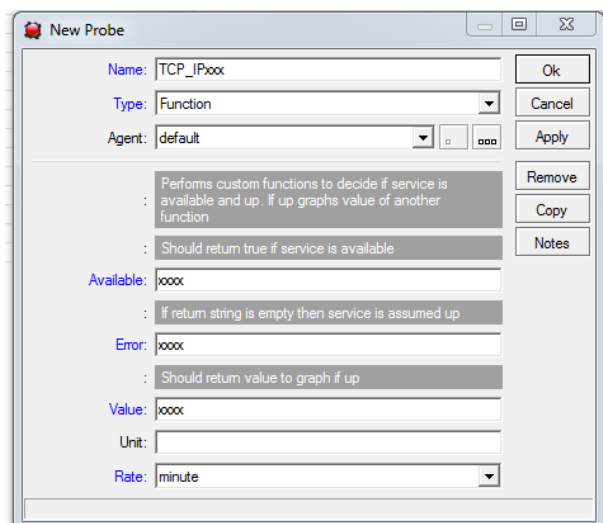
Type the name exactly as the function created earlier - : **TCP_IPB2**

Change Type to **: Function**

Agent: **default**

Copy and paste the text below one by one and insert

Available: TCP_IPB2()

Error: if(TCP_IPB2() > 11.5, "", "BATT2 LOW")

YOU can change your battery low level in decimal , currently at 11.5V

Value: TCP_IPB2()

Leave **Unit** blank

Rate: **minute**

Click Apply and ok

Right click the device icon on the monitoring screen and select **" Settings"**

Go To **services**

Click the + sign to add a service

Under Probe: select -   TCP_IPB2

Select the probe interval and probe timeout time and set the Probe down count to 1

Click apply and ok to exit / At this time if Battery 2 input voltage drops below 11.5v the result in the monitoring Icon in the Dude to turn Orange and indicate at the top of the icon that it is a low Batter 1 condition.
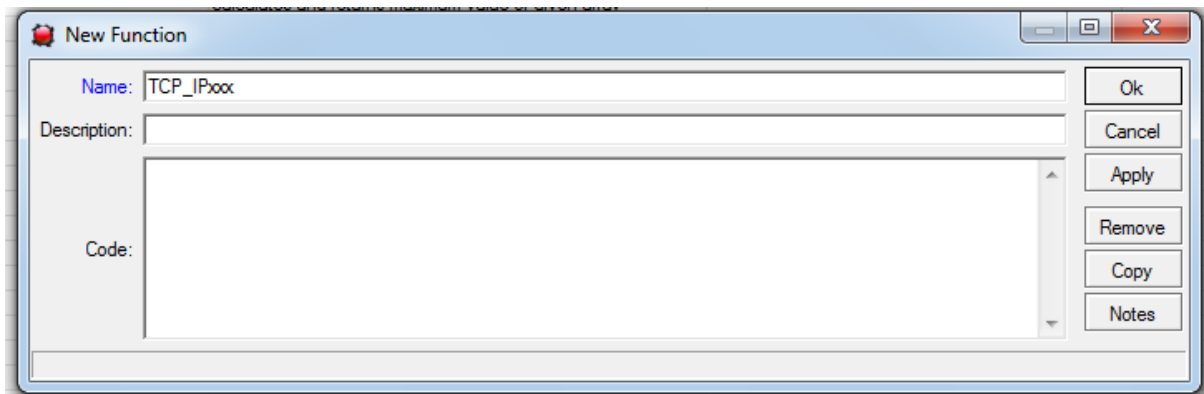
Add a probe and function to the dude for low Battery Voltage notification of Battery 3

To be notified by the Dude for a change in low Battery2 status add a function and a probe

In the right hand side navigation window of the Dude double click Functions

Click the + sign to add a function

Type the Name as **TCP_IPB3**

Copy and paste the text below as above (note the OID is the Batt 3 OID)

oid("1.3.6.1.4.1.45501.1.3.3.0")

Click apply and ok

In the right hand side navigation window of the Dude double click Probes

Click the **+** sign to add a Probe

Under Probes create a new probe:

Type the name exactly as the function created earlier - : **TCP_IPB3**

Change Type to **: Function**

Agent: **default**

Copy and paste the text below one by one and insert

Available: TCP_IPB3()

Error: if(TCP_IPB3() > 11.5, "", "BATT3 LOW")

YOU can change your battery low level in decimal , currently at 11.5V

Value: TCP_IPB3()

Leave **Unit** blank

Rate: **minute**

Click Apply and ok

Right click the device icon on the monitoring screen and select **" Settings"**

Go To **services**

Click the + sign to add a service

Under Probe: select -   TCP_IPB3

Select the probe interval and probe timeout time and set the Probe down count to 1

Click apply and ok to exit / At this time if Battery 3 input voltage drops below 11.5v the result in the monitoring Icon in the Dude to turn Orange and indicate at the top of the icon that it is a low Batter 1 condition.

Add a probe and function to the dude for low Battery Voltage notification of Battery 4

To be notified by the Dude for a change in low Battery2 status add a function and a probe

In the right hand side navigation window of the Dude double click Functions

Click the + sign to add a function

Type the Name as **TCP_IPB4**
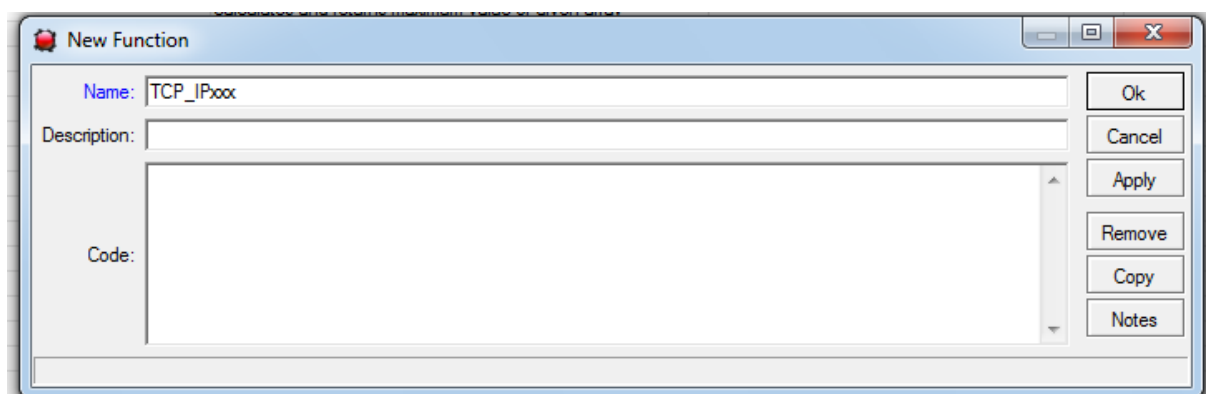
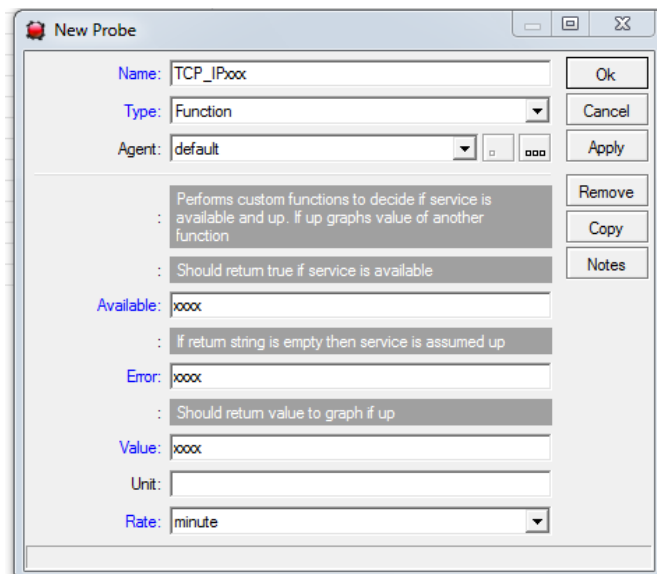**Copy and paste the text below as above (note the OID is the Batt 4 OID)**

oid("1.3.6.1.4.1.45501.1.3.4.0")

Click apply and ok

In the right hand side navigation window of the Dude double click Probes

Click the **+** sign to add a Probe

Under Probes create a new probe:
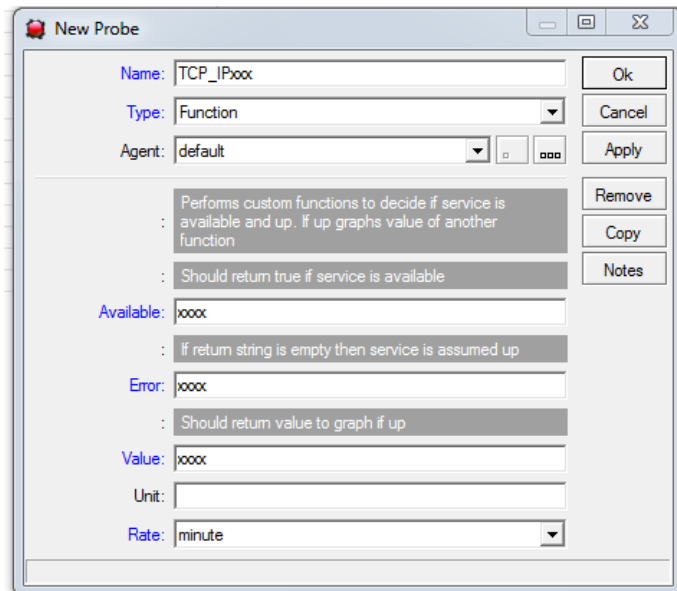
Type the name exactly as the function created earlier - : **TCP_IPB4**

Change Type to **: Function**

Agent: **default**

Copy and paste the text below one by one and insert

Available: TCP_IPB4()

Error: if(TCP_IPB4() > 11.5, "", "BATT4 LOW")

YOU can change your battery low level in decimal , currently at 11.5V

Value: TCP_IPB4()

Leave **Unit** blank

Rate: **minute**

Click Apply and ok

Right click the device icon on the monitoring screen and select **" Settings"**

Go To **services**

Click the + sign to add a service

Under Probe: select -   TCP_IPB4

Select the probe interval and probe timeout time and set the Probe down count to 1

Click apply and ok to exit / At this time if Battery 4 input voltage drops below 11.5v the result in the monitoring Icon in the Dude to turn Orange and indicate at the top of the icon that it is a low Batter 1 condition.
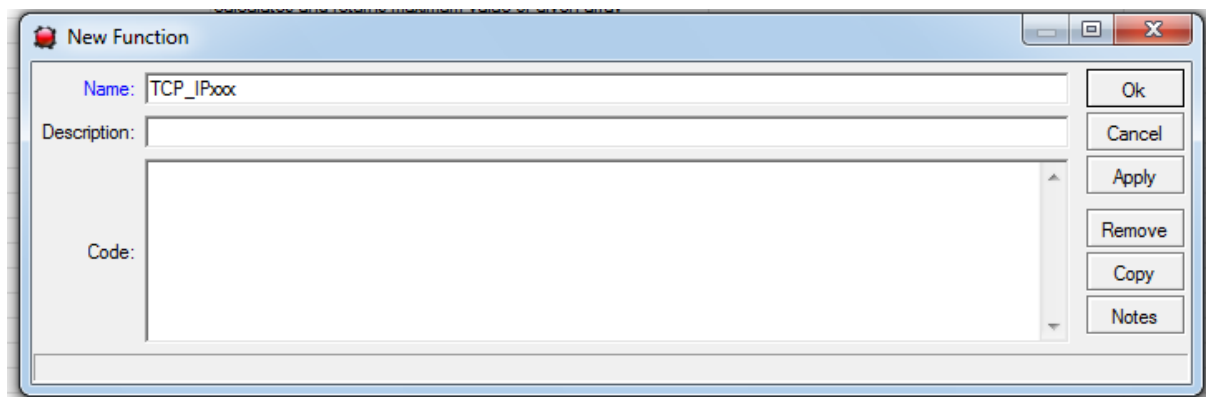
Add a probe and function to the dude for low TOTAL BATTERY PACK notification

To be notified by the Dude for a change in a total low Battery pack status add a function and a probe

In the right hand side navigation window of the Dude double click Functions

Click the **+** sign to add a function

Type the Name as **TCP_IPTOT**

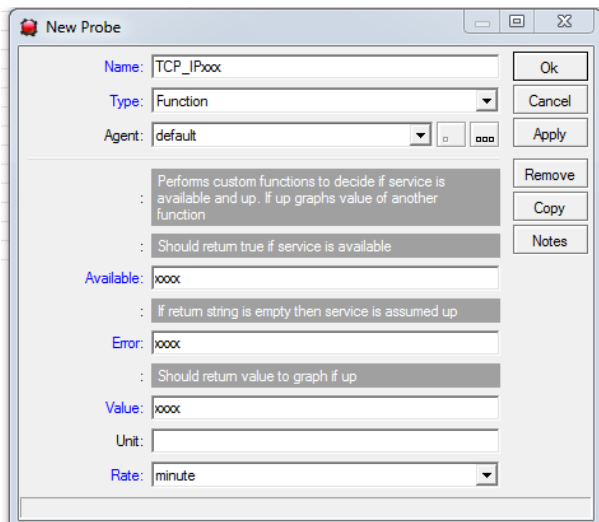**Copy and paste the text below as above (note the OID is the Total pack volts OID)**

oid("1.3.6.1.4.1.45501.1.3.5.0")

Click apply and ok

In the right hand side navigation window of the Dude double click Probes

Click the **+** sign to add a Probe

Under Probes create a new probe:

Type the name exactly as the function created earlier - : **TCP_IPTOT**

Change Type to **: Function**

Agent: **default**

Copy and paste the text below one by one and insert

Available: TCP_IPTOT()

Error: if(TCP_IPTOT() > 46.0, "", "PACK LOW")

YOU can change your battery low level in decimal , currently at 46.0V (if only 1 x 12V battery is connected to the system change to 11.5 for instance – 2 x 12v Batteries on the system change to 23.0 for instance

Value: TCP_IPTOT()

Leave **Unit** blank

Rate: **minute**

Click Apply and ok

Right click the device icon on the monitoring screen and select **" Settings"**

Go To **services**

Click the + sign to add a service

Under Probe: select -   TCP_IPTOT

Select the probe interval and probe timeout time and set the Probe down count to 1 Click apply and ok to exit / At this time if Battery] Pack input voltage drops below the decimal setting added the result in the monitoring Icon in the Dude to turn Orange and indicate at the top of the icon that it is a low Battery pack condition.
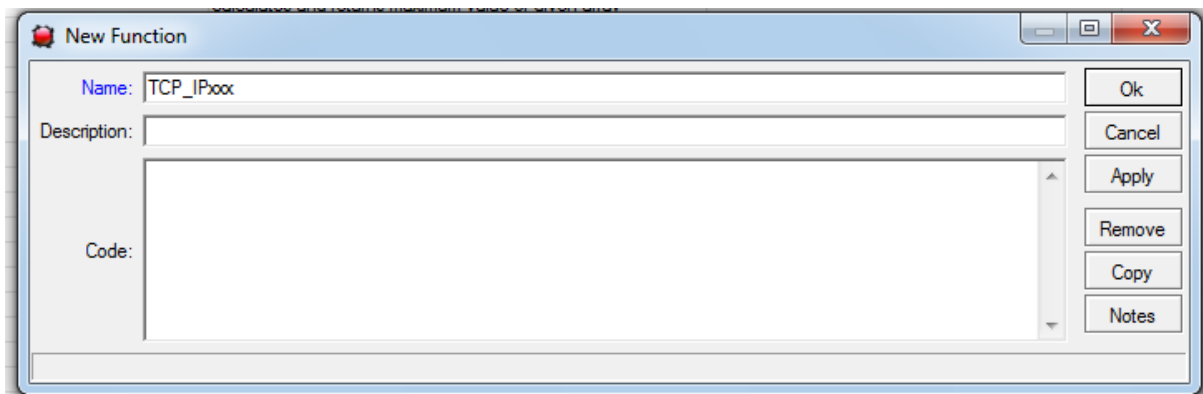
Create a Probe and Function for Graphing for Charge current

To be able to Graph the charge current

In the right hand side navigation window of the Dude double click Functions

Click the + sign to add a function

Type the Name as **TCP_IPAmps**

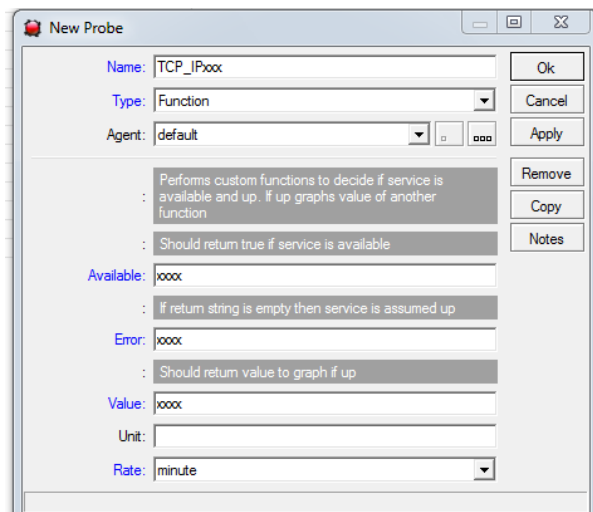**Copy and paste the text below as above (note the OID is the Amps OID)**

oid("1.3.6.1.4.1.45501.1.3.6.0")

Click apply and ok

In the right hand side navigation window of the Dude double click Probes

Click the + sign to add a Probe

Under Probes create a new probe:

Type the name exactly as the function created earlier - : **TCP_IPAmps**

Change Type to **: Function**

Agent: **default**

Copy and paste the text below one by one and insert

Available: TCP_IPAmps()

Error: if(TCP_IPAmps(), "", "")

Value: TCP_IPAmps()

Leave **Unit** blank

Rate: **minute**

Click Apply and ok

Right click the device icon on the monitoring screen and select **" Settings"**

Go To **services**

Click the + sign to add a service

Under Probe: select -   TCP_IPAmps

Select the probe interval and probe timeout time and set the Probe down count to 1

Click apply and ok to exit / At this time we don't have an alarm on charge current but no it will Graph the charge data in your graph – it is possible to add a charge alarm - follow the low battery voltage alarm setup for the Charge amps to do create an alarm.

CREATE the Graphs in the DUDE

Right hand top left menu click on Charts

Click on the + sign to add a chart

Give the Chart a name that make sense to the user

Click on the + sign below to add services to the Dude

Select source in the window that have opened and select for instance the

TCP_IPB1@ TCP_IP as the source

Click on apply and ok

*** If you get a Error message " Unknown type" then please close the window to return to the previous window of Charts and Remove the Chart – you will be prompted with "Remove this Chart . Yes or No" Click yes to remove it , then click on the undo button top left corner of the dude screen to undo the Chart delete , you can now go back to the Chart and add the required data sources for Graphing to it

********** This is a Dude problem with V 3.6 ***********

After all chart data sources was added like TCP_IPB1@TCP_IP and TCP_IPAmps@TCP_IP the graphing of your voltage and charge current etc will start. You can add the Battery 2 , 3 and 4 if present to the graph

SETTING UP EMAIL NOTIFICATIONS IN THE DUDE

Top left on screen click on **SETTINGS**

Add your Primary DNS address

Add your Primary SMTP address

Add your email address of this server

Click Apply and OK

Go to Notifications in the left tree menu

Select email by double click or add email if not present

In the email window add your To: email address and click test

If successful " OK " will appear in the bottom of the email window

Right click on the TCP_IP meter icon on the local map(monitoring screen)

Go to services

Double click on the service you would like to receive an email from

Tick (enable) use notifications and select email in the list

Click apply

Also double check :

Right click TCP_IP meter icon , go to settings , under Polling tab make sure use notifications an email is selected

9.TFTP Boot-loader

TCPIP – V/A meter supports **TFTP** Boot-loader 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.

Send e-mail to support@microinstruments.co.za , state **serial number** of unit (displayed on home page via web browser) and the **type of unit eg: TCPIP V/A meter ,** and the fault detected in software or why you need the software modified.
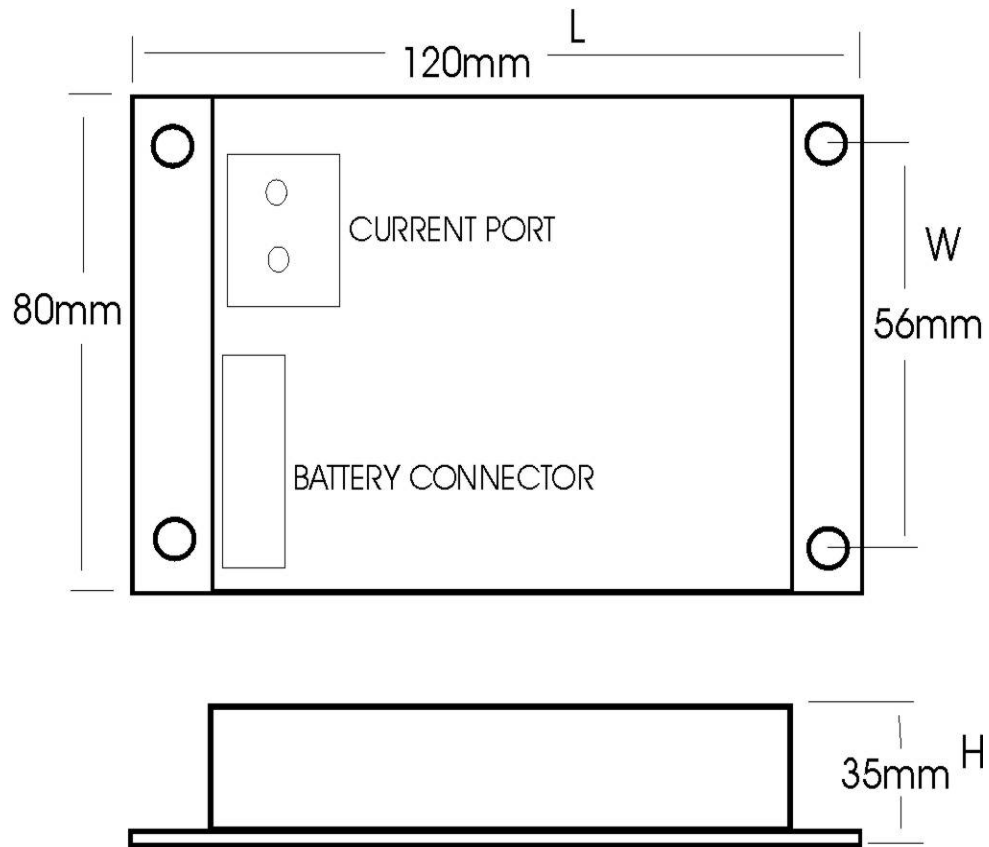
We will then send you a .hex file with the appropriate MAC address to be uploaded.

Simply download the **TFTP2 file up-loader** from our website

Run the program – Enter the device IP address, do not fill in anything for the password field, browse for the .hex file location and click on "UPLOAD" – you will be notified upon successful data transfer. The unit will re-program itself and re-boot with the new software and changes.

Security has been added if the connection is lost while uploading to the unit it will ignore the TFTP session.

10.Physical Dimensions

Weight = 0.3Kg