NETICO

A New Kind of Automation

NTPM 100A / 110A

Smart Energy Sensor

Installation and Operation Manual

UM.005 R02.01, 2019-12

Equipment covered in this manual
NTPM 100A / 110A

Effective date September 2020

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Smart Energy Sensor

NTPM 100A / 110A

Installation and Operation Manual

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About this manual

This document is intended to be used in conjunction with the installation manual that ships in the box with your device and accessories.

This manual is for use by operators of the equipment and engineers and technicians responsible and properly trained for installing NTPM units. It is intended to provide operators, engineers, and technicians with information to install, configure and operate NTPM 100A / 110A device.

This manual assumes you have an understanding of power monitoring and are familiar with the equipment and power system in which your device is installed.

The information in this document is valid for the latest version of the NTPM 100A / 110A device at the time document was published.

For more information and updates, see www.netico-group.com.

Related documents

Document	Reference number
NTPM 100A / 110A Installation manual	NTPM_IM_R01.00

Safety information

Read carefully this manual and become familiar with the device before trying to install, operate, service or maintain it. The following symbols and messages may appear throughout this document or on the device to warn of potential hazards.

 **DANGER**	Indicates potentially hazardous situation which, if not avoided, **will result in death or serious injury.** **Failure to follow these instructions will result in death or serious injury.**
 **WARNING**	Indicates potentially hazardous situation which, if not avoided, could result in personal injury or death, property damage, or economic loss.

Table 1 *Symbols found on the NTPM unit*

Symbol	Description
	General warning sign – refer to warnings in this manual.
	Risk of electric shock.

Safety Precautions

To ensure safety of personnel and property, and to avoid hazardous situations, please, read and follow all warnings, cautions and instructions provided with NTPM 100A / 110A product.

Improper installation, mishandling and misuse of NTPM 100A / 110A device can lead to equipment and property damage, personal injury or even death.

This equipment must be installed only by qualified personnel who has skills and knowledge related to electrical installations.

The manufacturer shall not be held responsible for failure to comply with the instructions in this manual.

DANGER

RISK OF ELECTROCUTION, BURNS OR EXPLOSION!

- Use appropriate personal protective equipment (PPE) and follow safe electrical work practices. In the USA and Canada, the equipment installation shall meet ANSI/NFPA 70, NEC, with CSA C22.1, CEC, Part I or with both as appropriate. In other countries, follow all local installation requirements and regulations.
- Prior to any work, isolate the voltage inputs and power supply inputs, and short-circuit the secondary winding of all current transformers.
- Always use properly rated voltage detection device to confirm the absence of voltage.
- Follow instructions in the Wiring section of the related Installation manual.
- Do not exceed the equipment's ratings for maximum limits.
- Never short the secondary of a voltage transformer (VT)
- Never open circuit of a current transformer (CT)
- WARNING: To reduce the risk of electric shock, always open of disconnect circuit from power distribution system of building before installing or servicing current sensing transformer.

Failure to take these precautions could cause serious injuries.

WARNING

Risk of damaging the device!

- Before starting any maintenance, change in connections, repair, etc. The equipment must be disconnected from all power sources.
- When an operating fault or protection fault is suspected, the equipment must be taken out of service.
- Do not open the instrument under any circumstances when it is connected to a power source.
- Only qualified personnel familiar with the instrument and its associated electrical equipment must be perform setup procedures.

NTPM Series

Devices from NTPM series are smart energy sensors for use in three phase voltage systems. All models have integrated WEB server functionality that serves as a modern user interface to the user. Also, all the models have integrated support for Modbus TCP and Modbus RTU communication protocols for integration in a SCADA system.

Features at a Glance

- ✓ Three-phase and Single-phase measurement
- ✓ Measures over 100 different electrical energy parameters
- ✓ Provides power quality analysis
- ✓ Provides embedded rule engine for event-driven control of energy consumption
- ✓ Integrated alarm system
- ✓ Data archiving
- ✓ Integrated web server
- ✓ Maximum demand monitoring and analysis
- ✓ Ethernet
- ✓ Simple Network Time Protocol (SNTP)
- ✓ DIN rail mount
- ✓ Low cost, compact design
- ✓ All-in-one unit solution

Overview of NTPM Ports, Connections, and Controls

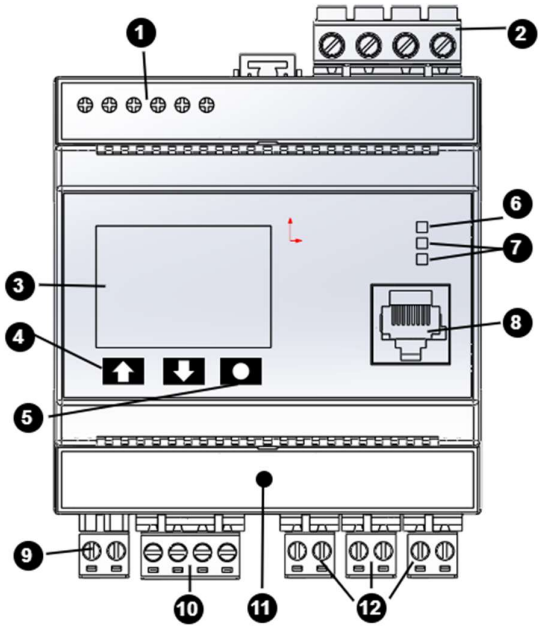


Figure 1 *NTPM components identification*

Table 2 Components of NTPM device

1	Current inputs – Rated input current 5 A. Supported external CTs with ratio up to 1000.
2	V1, V2, V3 voltage inputs VN neutral terminal – optional depending on your power configuration.
3	Display (Only NTPM 110A model)
4	Navigation buttons (Only NTPM 110A model)
5	Backlight button (Only NTPM 110A)
6	Power LED
7	Ethernet LEDs
8	10/100 Ethernet RJ-45 port.
9	Power supply input - 100 – 270 V AC ±10%, 50/60 Hz, max 2W
10	RS-485 communication port
11	Restart button – Reset the device to default settings.
12	Digital outputs – Three Form A digital outputs (DO1, DO2, DO3). Max 30 VAC/60 VDC, 125 mA

Display

Display shows the device readings in real-time or device parameters. Use navigation buttons to go through the real-time data screens or go to the screen showing device parameters.

Navigation buttons

Use navigation buttons to go to the next / previous real-time data screen.

Backlight button

Backlight button turns on the display backlight which goes off after 10 seconds of inactivity.

Power LED

Power LED is on when the device is energized and indicates the presence of power.

Ethernet LEDs

The device has a two LEDs for Ethernet communication.

The Link LED is on when the valid Ethernet connection is established. The Act (active) LED flashes to indicate the device is communicating through the Ethernet port.

Wiring considerations

These devices are not intended for installation within switchboards or panelboards.

These devices need to be installed within a dedicated electrical/fire enclosure.

Voltage inputs

Voltage measurement inputs can be connected directly to the phase voltage lines of the power system if the line-to-line or line-to-neutral voltages of the power system do not exceed direct contact voltage limits of the equipment.

Voltage measurement inputs are rated for up to 400 V L-N / 690 V L-L. In USA and Canada, the maximum voltage on the voltage measurement inputs may not exceed 347 V L-N / 600 V L-L.

If system voltage is greater than rated maximum voltage, you must use **UL Listed isolation transformers** to step down the voltages.

Current inputs

NTPM 100A / 110A records AC current by measuring the secondary circuit of a current transformer (CT).

For use with Listed Energy-Monitoring Current Transformers.

When installing current transformers, it is important to match the phases to the voltage inputs and current input (connect the V1 voltage input and the I1 current sensor to the same conductor).

- To reduce risk of electric shock, always open or disconnect circuit from power distribution system (or service) of building before installing or servicing current-sensing transformers.
- The current transformers may not be installed in equipment where they exceed 75% of the wiring space of any cross-sectional area within the equipment.
- Restrict installation of CT in an area where it would block ventilation openings.
- Restrict installation of CT in an area of breaker arc venting.
- Not suitable for Class 2 wiring methods and not intended for connection to Class 2 equipment.
- Secure CT and route conductors so that they do not directly contact live terminals or bus.

Communications connections

RS-485

Connect the devices on the RS-485 bus in a point-to-point configuration, with the A (Tx-/Rx-) and B (Tx+/Rx+) terminals from one device connected to corresponding A (Tx-/Rx-) and B (Tx+/Rx+) terminals on the next device.

Use a shielded 2 twisted pair or 1.5 twisted pair RS-485 cable to wire the devices. Use one twisted pair to connect A (Tx-/Rx-) and B (Tx+/Rx+) terminals and use the other insulated wire to connect the COM terminals.

The total distance for devices connected on the RS-485 bus should not exceed 1200 m (4000 ft).

RS-485 terminals

A	Data minus. This transmits/receives the inverting data signals.
B	Data plus. This transmits/receives the non-inverting data signals.
COM	Common. This provides the voltage reference (zero volts) for the data plus and data minus signals.

Ethernet

Use a Cat 3 cable to connect device's Ethernet port.

Your Ethernet connection source should be installed in location that minimizes the overall Ethernet cable routing length.

Digital outputs

The device has three form A digital outputs (D0, D1, D2).

You can use digital outputs for switching applications, for example, to provide on/off control signals for switching capacitor banks, generators, and other external devices end equipment.

The digital outputs are designed for limited power sources. These outputs must be connected to the specified power supply (max 30 VAC / 60 VDC) with a current limiter (max 0.125 mA) to function.

Refer to Technical data, page 61, for the voltage limits of the digital outputs. For higher voltage applications, use an external relay as the switching circuit.

As Figure 2 shows you can connect digital output to a relay that switches on a generator.

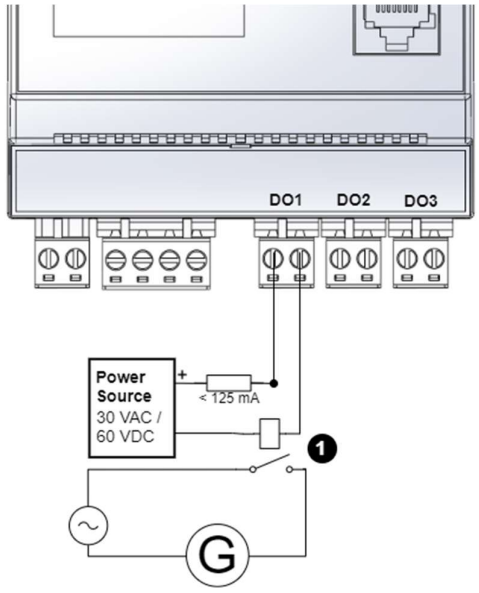


Figure 2 *Digital output application example*

❶ Relay

G Generator

Configuration

The device has an embedded Web server that is used to host configuration pages. These web pages can be accessed from a Web Browser such as Microsoft Internet Explorer or Mozilla Firefox. HTML5 compliant browser must be used to get full functionality.

NOTE	Depending on the Ethernet infrastructure, the device TCP/IP settings may need to be reconfigured for the working environment. To obtain required parameters such as IP address, Gateway address etc., please contact local network administrator.

If the device has never been configured, follow the procedure described in First Time Configuration section. If the device has been previously configured and there already exists IP connectivity to the device, First Time Configuration step can be skipped, and configuration pages can be accessed with current device settings. Details on configuration options can be found in Configuration Pages section of this document.

First Time Configuration

For the first time configuration it is advised for both the device and configuration PC to be in an Ethernet LAN. Reset device settings to default and set the PC IP configuration to correct LAN settings. To reset device settings to default, hold **Reset** button for 5 seconds and then release it. The device will reboot with default settings. Information about the default IP settings and user authentication data can be found on the device marking label.

Default configuration:

- The device IP Address: 192.168.1.100
- The device Network mask: 255.255.255.0
- The device Web access username: admin
- The device Web access password: admin

To connect to the NTPM via Ethernet port, you will need the following items:

1. Appropriate supply for the NTPM device.
2. One Ethernet cable (crossover, Cat 5 or 6)
3. A PC computer with working Ethernet interface.

To connect to the NTPM device follow these steps:

1. Connect one end of the Ethernet cable to the Ethernet interface of the NTPM device, and the other end of the cable to the PC Ethernet interface (Figure 3).
2. Configure the PC Ethernet interface IP address and network mask:
    - PC IP address: 192.168.1.1
    - PC network mask: 255.255.255.0

3. Reset NTPM device settings to the default.
4. Test IP connectivity from the PC. This can be done by using the PING tool:
    - On Windows OS start CMD.EXE from Start menu, on Linux start terminal software.
    - Type “ping 192.168.1.100” in the terminal.
    - If IP connectivity exists, PING utility will report how much time it takes for a message to go to the NTPM device and to return to the PC (Figure 4).
    - If there is no connectivity check cables and that correct Ethernet interface of the PC is used and go to step 1 to repeat the procedure.

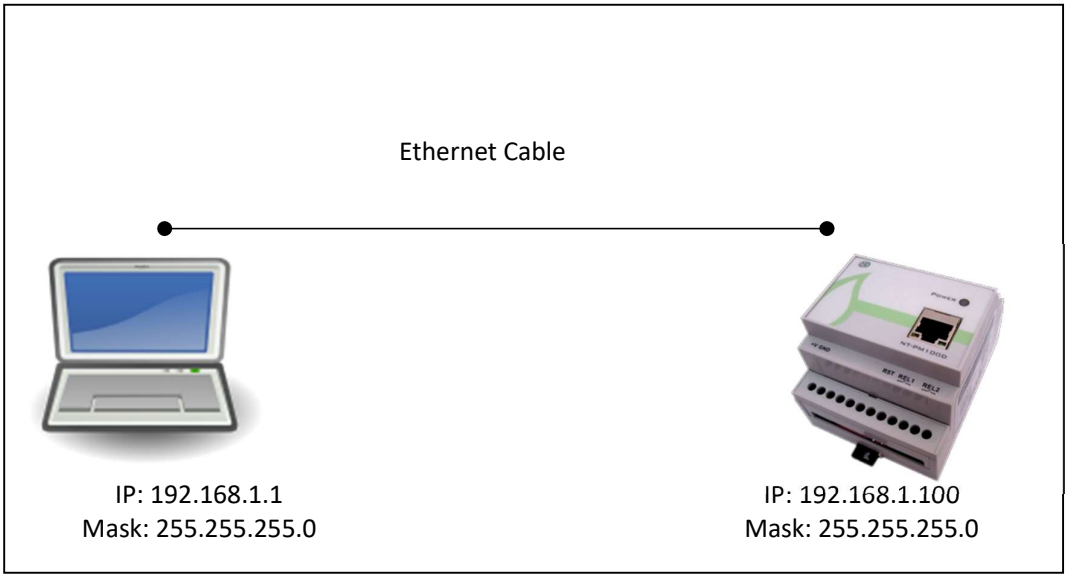


Figure 3 *Default Ethernet network configuration*

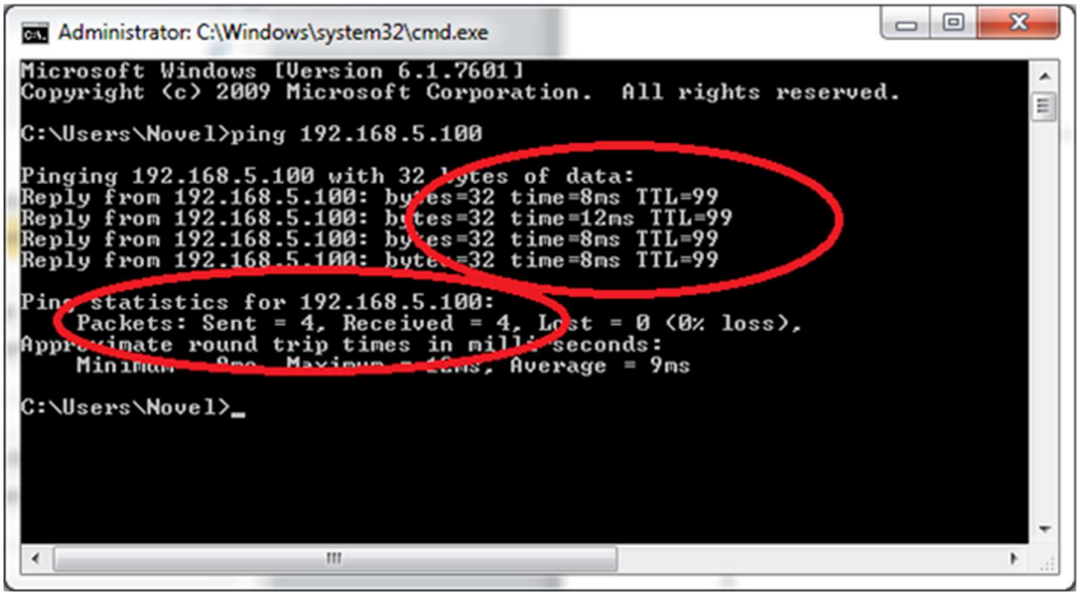


Figure 4 *Successful Ping IP connectivity*

Web Configuration

Before accessing the configuration pages, make sure that:

- The device power supply is connected properly.
- The device is physically connected to Ethernet network.
- IP connectivity exists between the device and PC that is running the web browser.

NOTE	IP connectivity can be tested with “ping” tool from the host PC.

To access web configuration pages, start a Web browser on the host PC and type the IP address of the device in the URL box of the Web browser. The pages require user authentication (username and password) to be entered before they can be accessed (Figure 5). When a dialogue requesting user, information appears in the browser, enter current username and password.

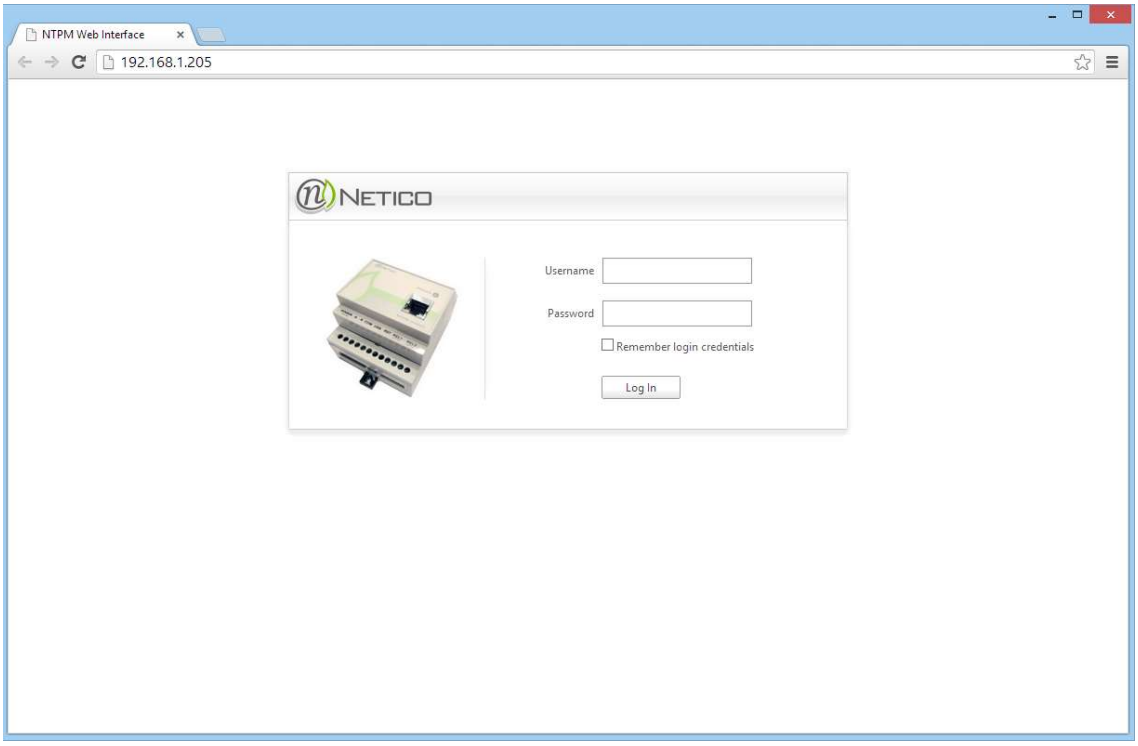


Figure 5 *Login page*

Once correct username and password are entered, a homepage with a dashboard will be displayed (Figure 6).

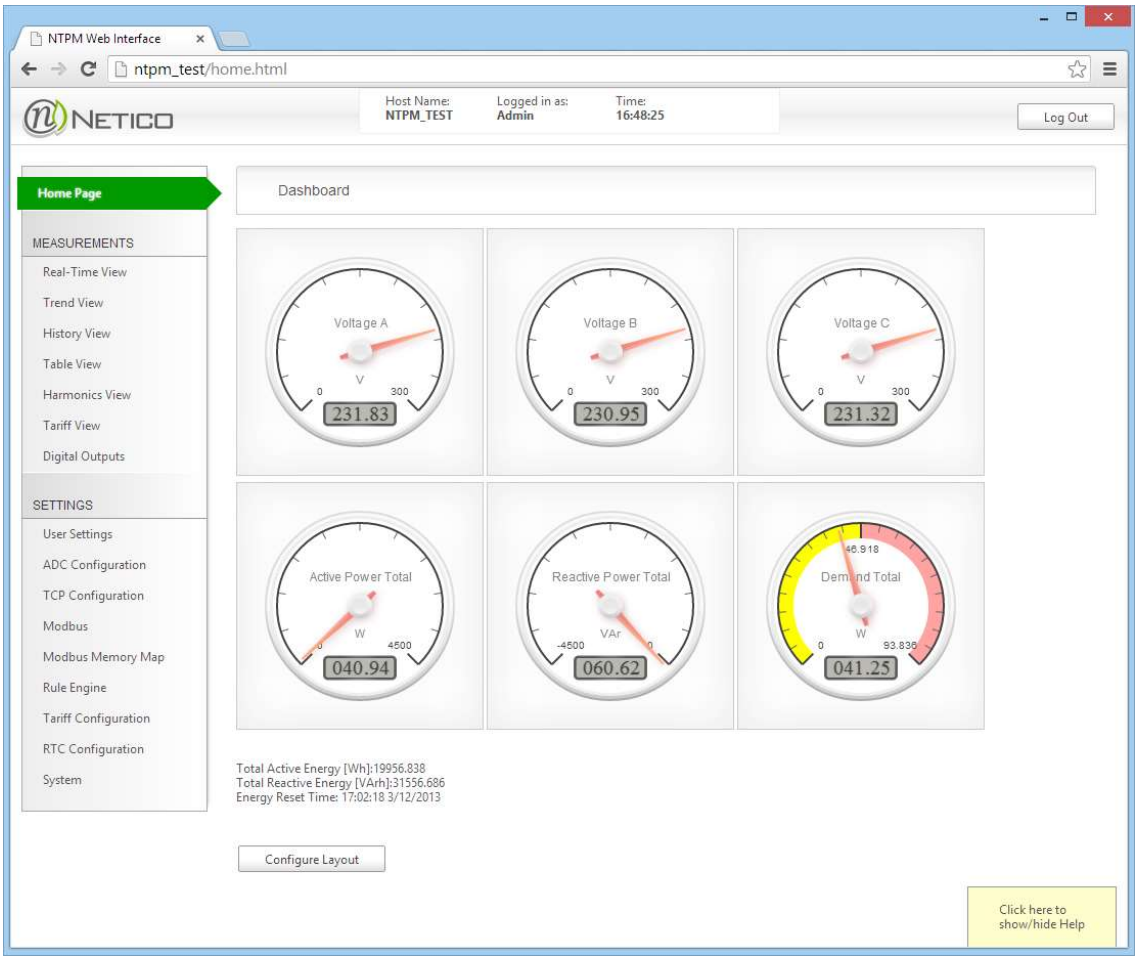


Figure 6 *Home page*

From here on, various device settings can be changed, and measured electrical parameters can be monitored from the web pages. For details on Web Interface see Configuration Pages chapter of this document.

Webpages

Measured Electrical and Environmental parameters

Current measured data parameters can be accessed in one of three ways:

- by Web interface (section Web Interface);
- by Web service (section Web service),
- or by Modbus communication protocol (section Modbus Protocol Support).

Trend Data

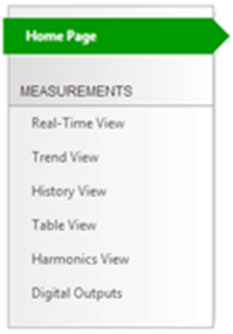
The device records these parameters with one second resolution. The data recorded in this way is available for maximum of 31 days in the past. These parameters are stored in the internal memory and can be accessed by Web interface or by Web service.

History Data

The device also records historical data of the measured parameters. This historical data is stored on the device in the internal memory with a capacity to record 5 years history. The data can be retrieved by Web interface or Web service. History Data consists of minimum, maximum and average values recorded at: 5 minute, 15 minute, 1 hour, 1 day and 1 month periods.

Web Interface

Netico Power Meter web interface is used for: device configuration and measurement analysis. To use full potential of the device web client application, you need to have a HTML5 compliant browser (IE9 and above supported) installed on your PC/Tablet and enable JavaScript functionality. Some specific features like Hostname will only work under specific operating systems that support NetBIOS name resolution method. If you experience problems when using Internet Explorer, try disabling Compatibility mode.



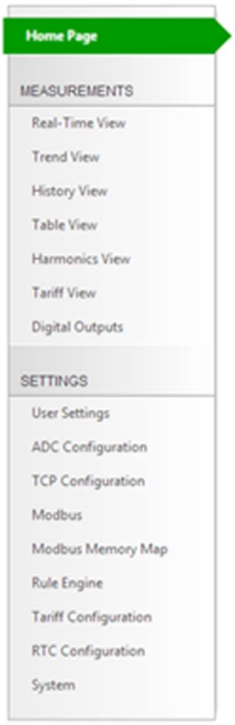


Figure 8 *Regular user menu*

Depending on the user level access (regular or admin) main menu will have different options available. Also, some of the same items from the menu will have different features displayed.

Measurement pages

Home page

This page displays real-time measurements using gauges and numeric fields.

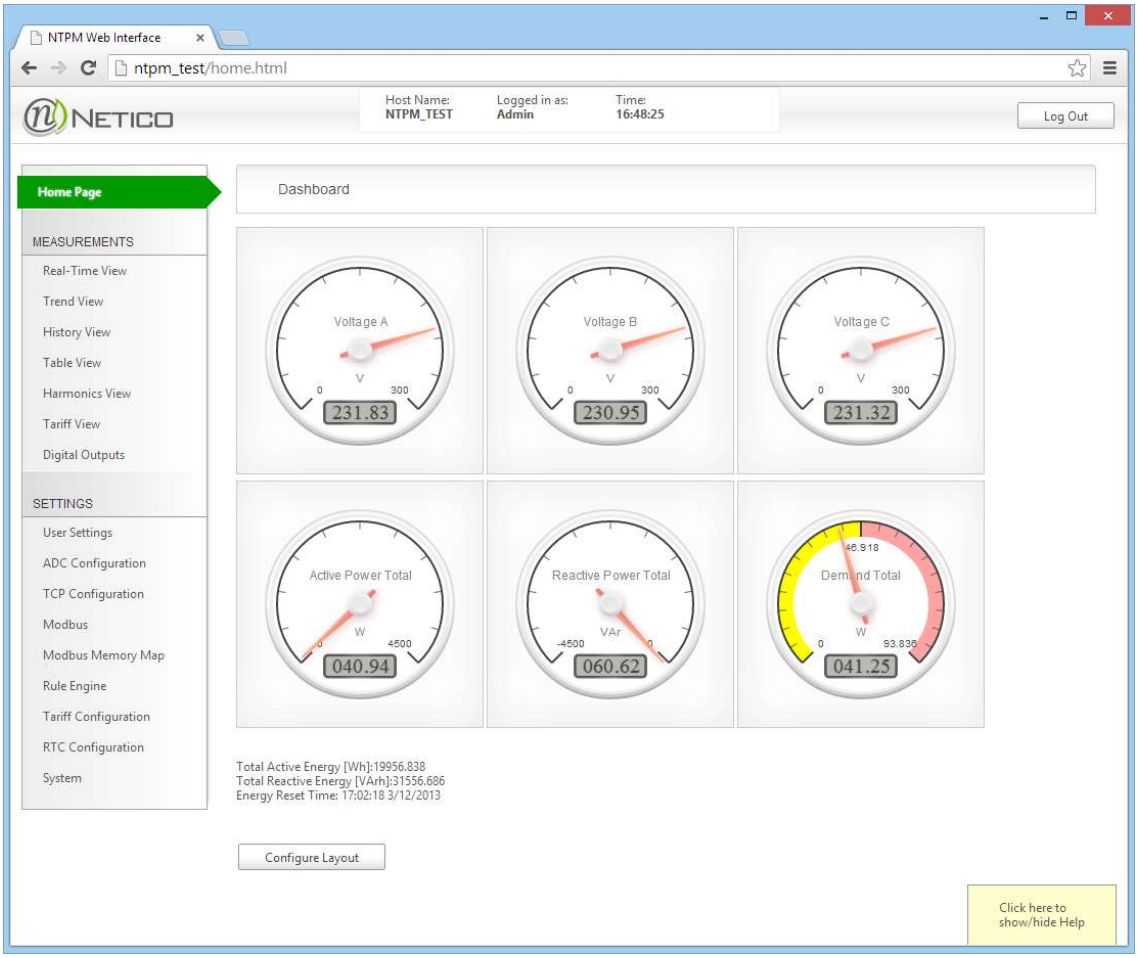


Figure 9 *Home page*

By clicking on "Configure Layout" button you are presented with screen where you can configure which measurements will be displayed. These settings are saved into browser's local storage.

NOTE	In order to use home page configuration functionality, you need to address the device from a browser either by using NetBIOS hostname (suitable if device uses dynamic IP address) or set a fixed IP address to the device. Local configuration is tied to the NetBIOS hostname or the IP address of the device and will be lost if these change (for example if the device uses dynamic IP address).

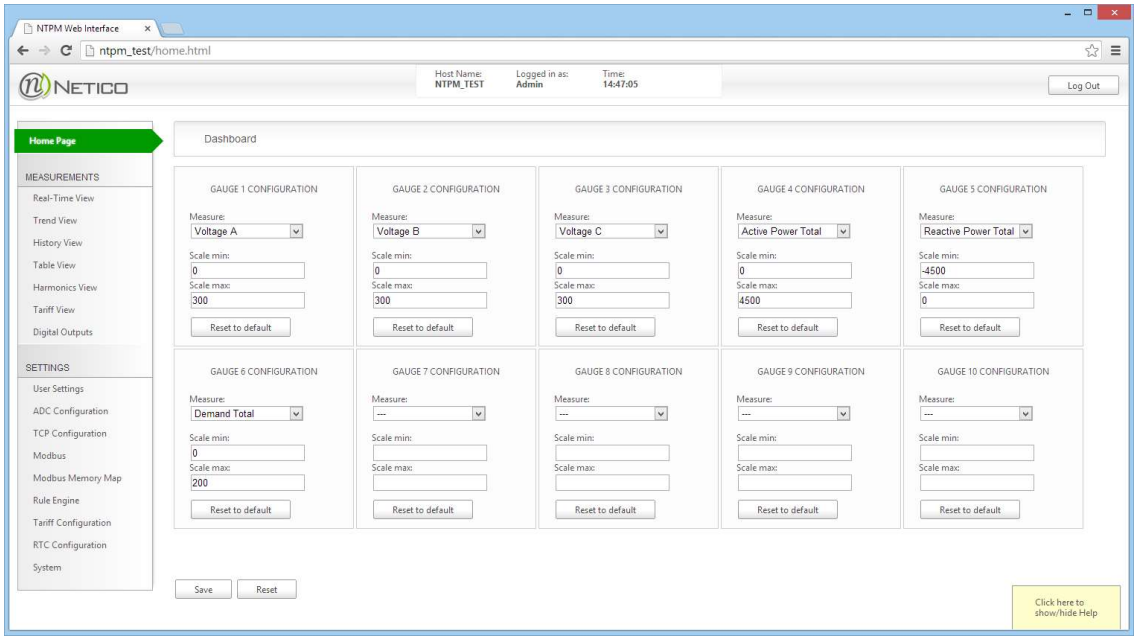


Figure 10 *Configuration of the home page*

For each gauge you can configure:

- displayed measurement
- scale minimum value
- scale maximum value

” Reset to default” button resets scale ranges to recommended ones, using set values for voltage transformer and current transformer ratios (ADC Configuration page). If you leave blank dropdown for measure (---) that gauge will not be displayed. “Reset” button on the bottom will reset gauge configuration to recommended default layout. “Save” button saves configuration into browsers local storage and returns to gauge display.

Real-Time View

Measurements refreshed in one second interval can be monitored on this page. The page shows selected measured (or calculated) values in real-time as soon as the device records them.

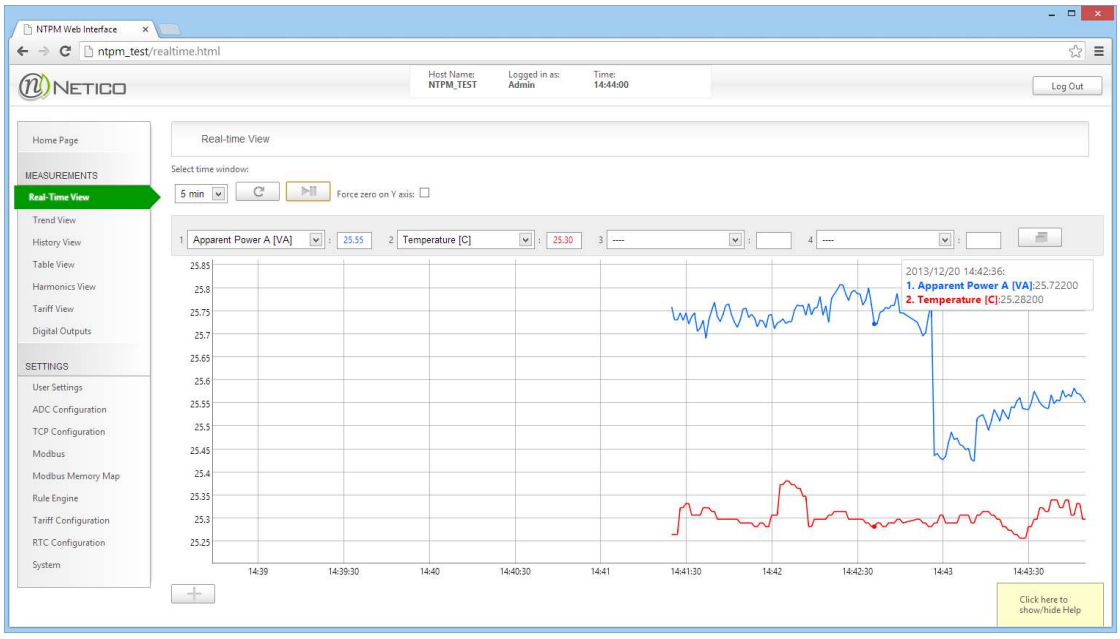


Figure 11 *Real-time view*

There is only one graph displayed by default, more (up to three total) are added by clicking on the plus button . Up to 4 measurements can be displayed on one graph. Each graph can be stretched over the entire screen for better viewing experience by clicking on double window icon . You can select between 1, 5, 15- or 60-minutes time window. By clicking on "Refresh" button you are applying new settings (graph is then being reset – starts to draw new values from scratch). Graph can be zoomed by dragging mouse while holding left mouse button pressed. By double clicking on a graph you can reset the graph zoom to the initial setting.

Trend View

This page displays any 5-minute interval from last 31 days of recorded measurements, with one second resolution. Interface options are like Real-Time View with addition of date and time picker.

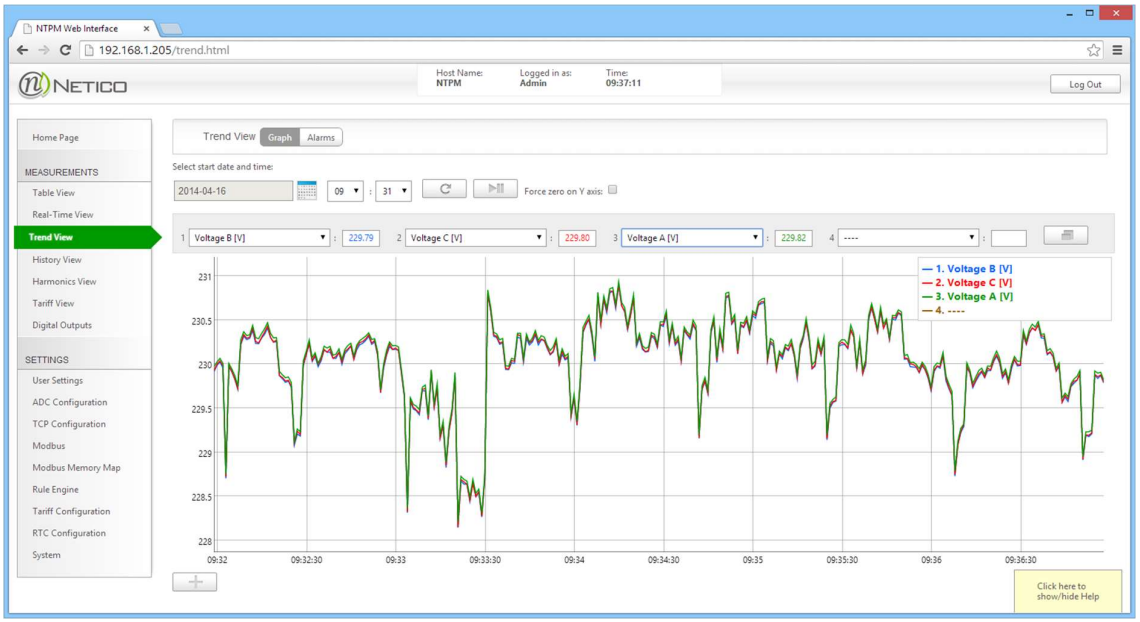


Figure 12 *Trend view*

Events can also be viewed on the Trend View page. You select a date from which you would like to load events. Events are loaded and displayed from newest to the oldest. You can also click on any listed event, and you will be taken to the trend graph, which will automatically load data from the time when the clicked event was triggered.

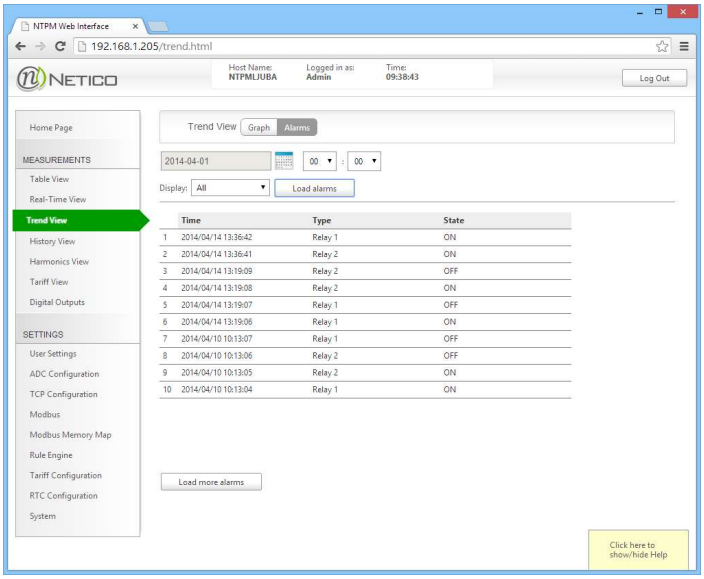


Figure 13 *Display of events*

History View

History data can be viewed from this page. There are two preview options available: “single” and “compare” mode. In the “single” mode, you can only view one, selected, time period, while in the “compare” mode you can preload two periods and display them both on one graph, thus allowing comparison of measured values from these two periods.

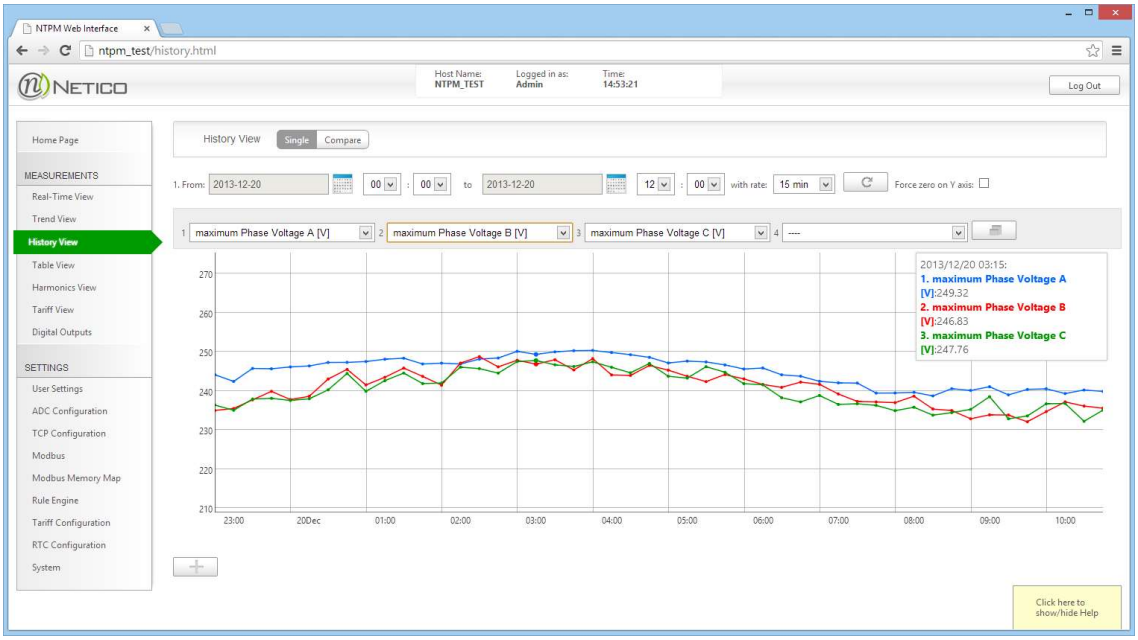


Figure 14 *History view - single mode*

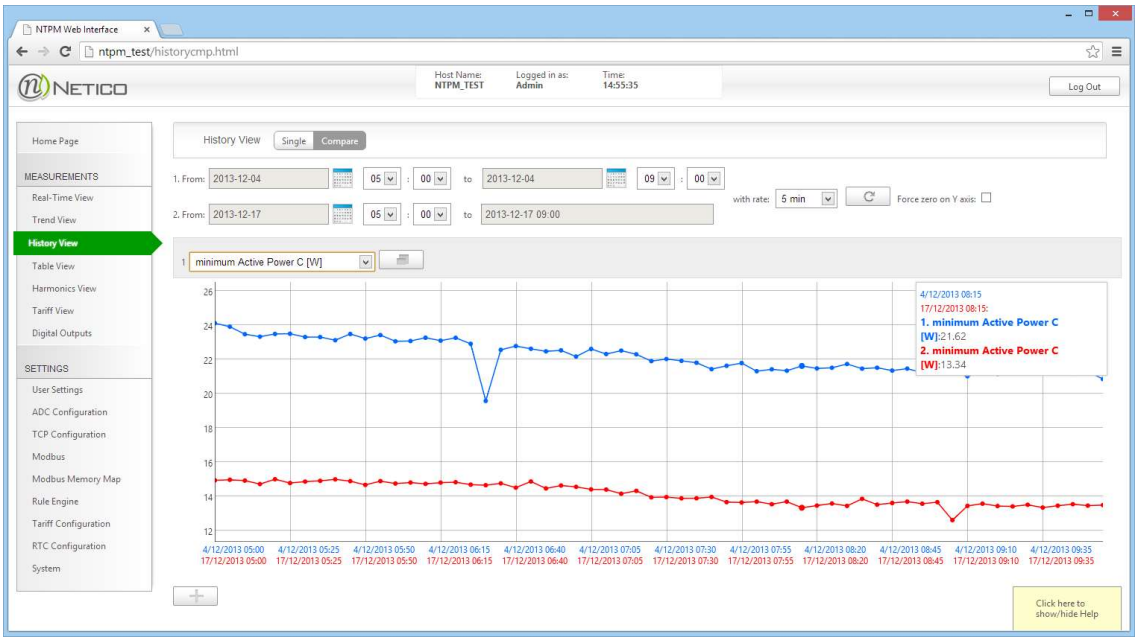
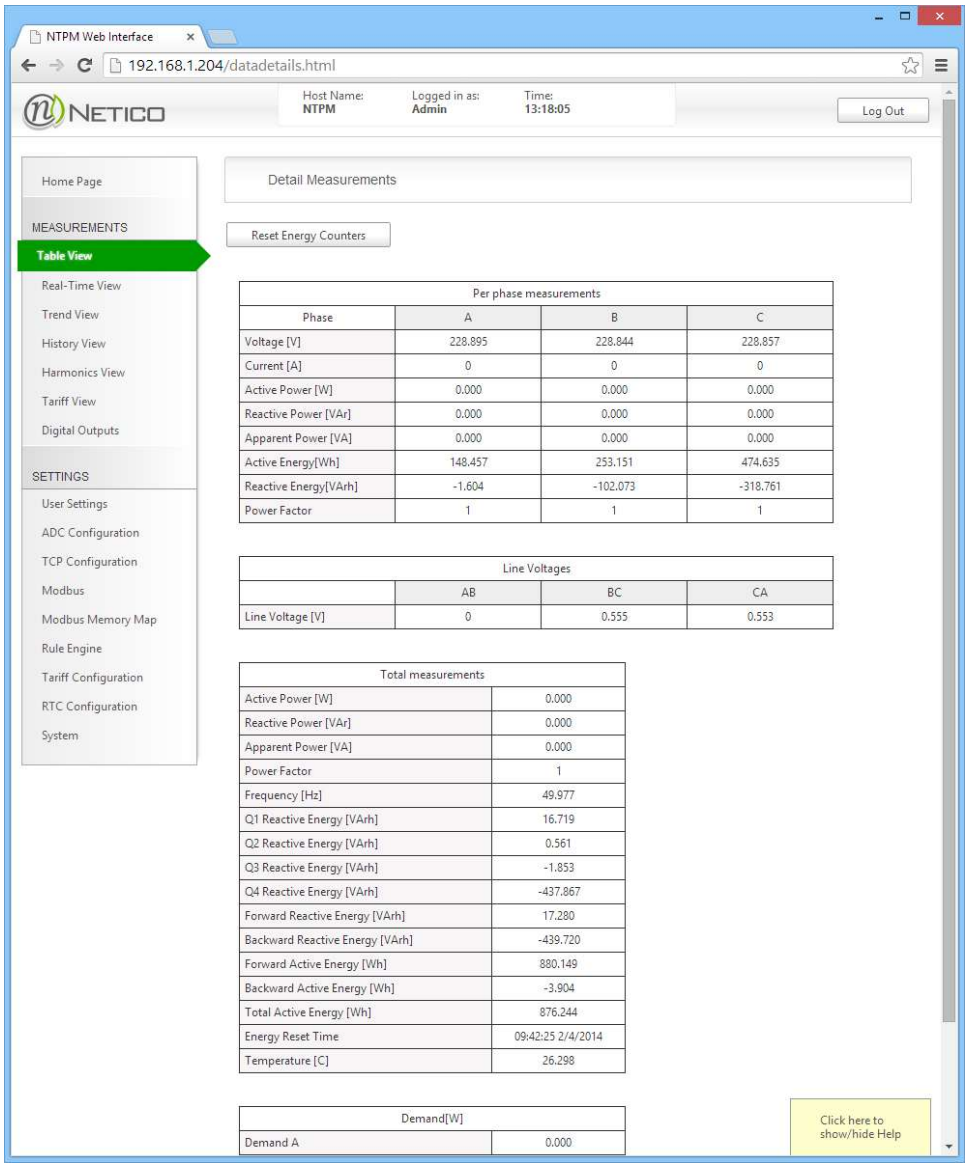


Figure 15 *History view - compare mode*

History measurements are recorded at 5 minute, 15 minute, 1 hour, 1 day and 1 month resolutions. You can choose to display average, minimum, or maximum values of measured parameters for the selected resolution. By clicking on any point displayed on the graph, you can jump to a finer resolution around that point timeframe (from 1 hour to 15 minutes, from 15 minute to 5 minute… etc.). When you click on the 5-minute points, you will be transferred to the Trend view if the clicked point is within the last 31 days of the trend history. In this way, you can analyse instantaneous measurement values (with one second resolution) around the clicked 5-minute point.

Table View

This page displays real-time measurements (per-phase, total, line and demand) as numerical data. Displayed data is being automatically refreshed every 5 seconds.



Per phase measurements			
Phase	A	B	C
Voltage [V]	228.895	228.844	228.857
Current [A]	0	0	0
Active Power [W]	0.000	0.000	0.000
Reactive Power [VAr]	0.000	0.000	0.000
Apparent Power [VA]	0.000	0.000	0.000
Active Energy[Wh]	148.457	253.151	474.635
Reactive Energy[VArh]	-1.604	-102.073	-318.761
Power Factor	1	1	1

Line Voltages			
	AB	BC	CA
Line Voltage [V]	0	0.555	0.553

Total measurements	
Active Power [W]	0.000
Reactive Power [VAr]	0.000
Apparent Power [VA]	0.000
Power Factor	1
Frequency [Hz]	49.977
Q1 Reactive Energy [VArh]	16.719
Q2 Reactive Energy [VArh]	0.561
Q3 Reactive Energy [VArh]	-1.853
Q4 Reactive Energy [VArh]	-437.867
Forward Reactive Energy [VArh]	17.280
Backward Reactive Energy [VArh]	-439.720
Forward Active Energy [Wh]	880.149
Backward Active Energy [Wh]	-3.904
Total Active Energy [Wh]	876.244
Energy Reset Time	09:42:25 2/4/2014
Temperature [C]	26.298

Demand[W]	
Demand A	0.000

Figure 16 *Table view*

Harmonic view

Netico Power Meter measures up to 31-st Voltage and Current harmonic. Both numerical and graphic representations are available on this page. Values here are displayed in real-time, along with the calculated total harmonic distortion (THD) for voltages and currents.

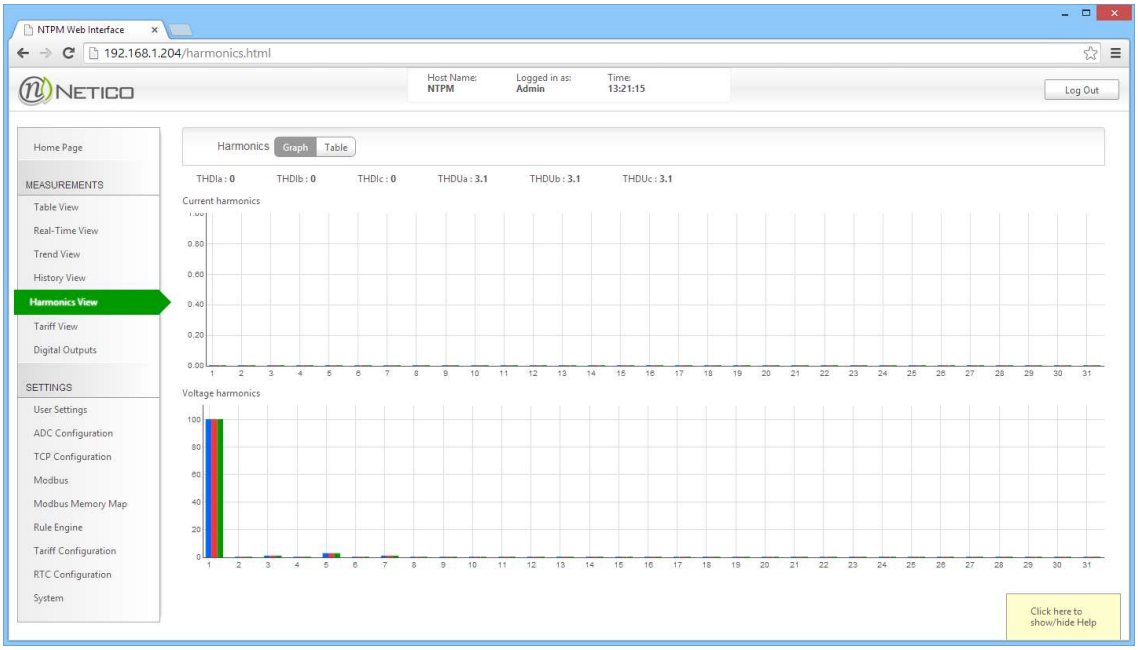


Figure 17 *Harmonics view – graph*

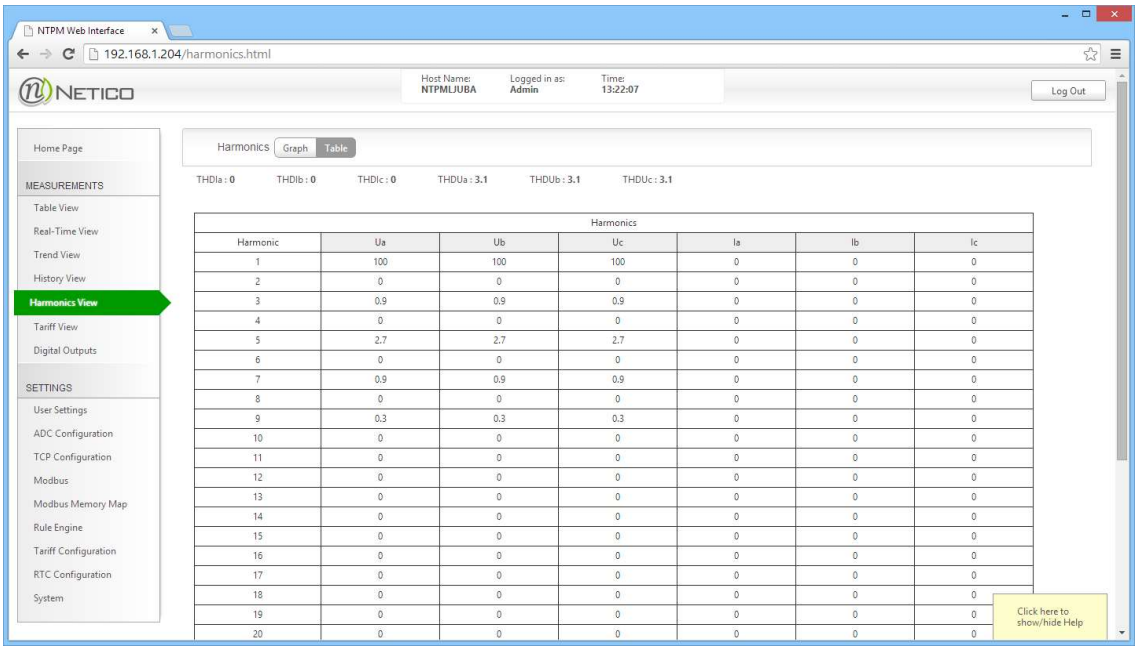


Figure 18 *Harmonics view - table*

Tariff view

On this page you can view tariffs (active energies, reactive energies and demand) for the chosen month. Netico power sensor can be configured to record energy consumption for four separate tariffs, which are configured based on different times of day (see tariff configuration below).

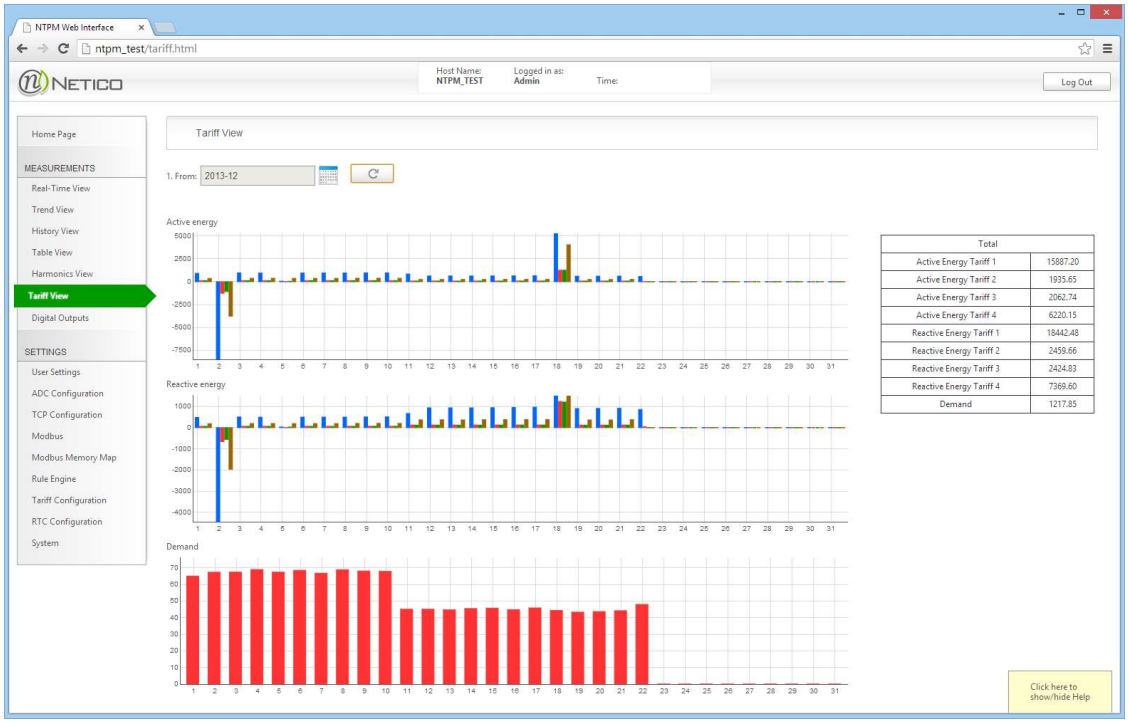


Figure 19 *Tariff view*

Digital Outputs

Digital outputs of the device can be manually controlled through this page. Status of the outputs is shown and can be changed by clicking on appropriate buttons corresponding to each output (only admin can change states). Soft alarms status is also displayed below.

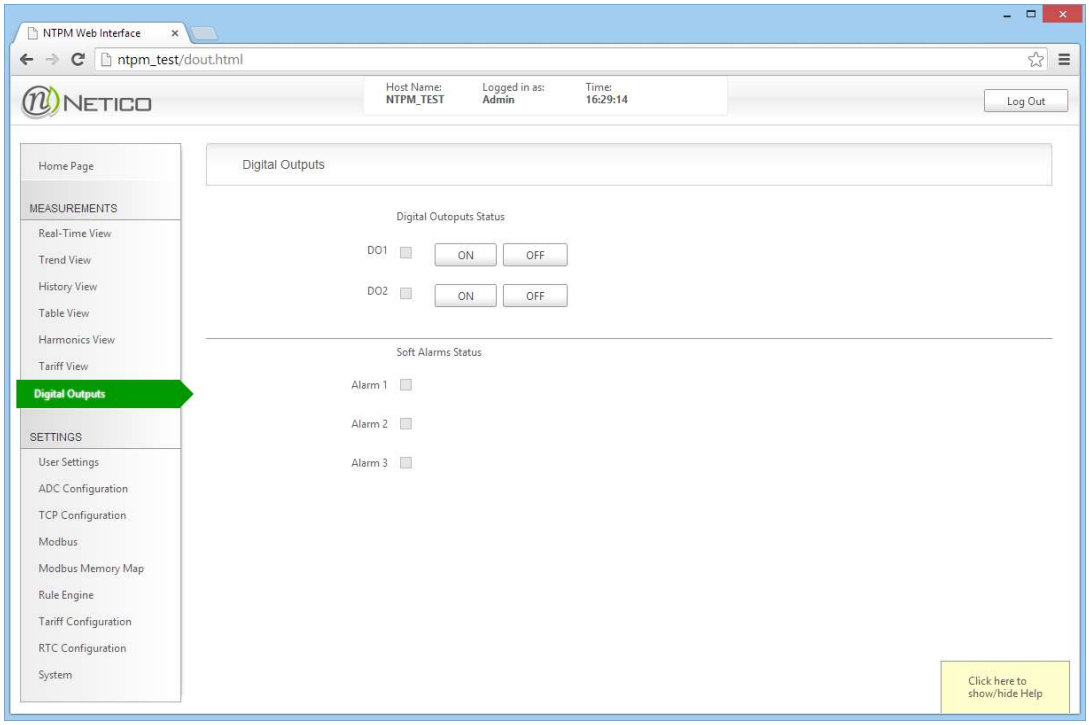


Figure 20 *Digital Outputs*

Configuration Pages

User Settings

Username and password for access to the Web Pages can be changed within the User Settings page. The default values are:

For administrator:

Username: **admin**

Password: **admin**

For regular user:

Username: **reader**

Password: **reader**

Changes to the user settings can be saved by clicking on the appropriate “Submit” button. New configuration will be stored in the device and the device will reboot after few seconds.

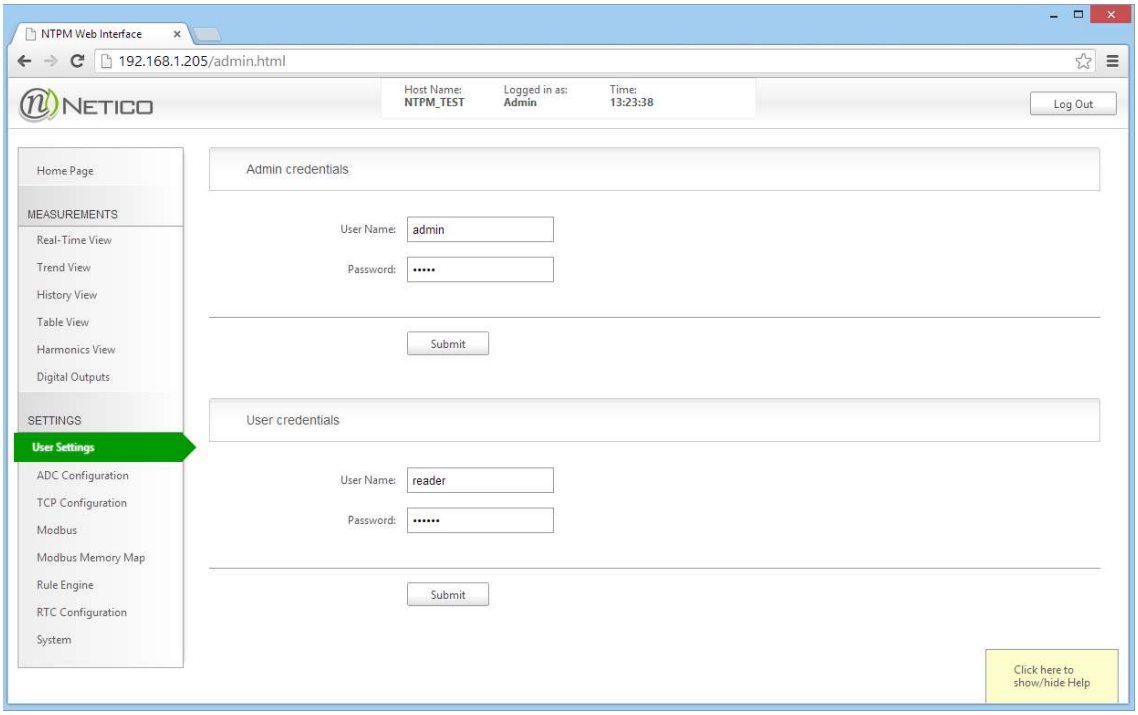


Figure 21 *User Settings*

ADC Configuration

This page allows setting transformer ratios for the external voltage and current transformers. When the voltage or current levels of the monitored system exceed the device nominal values, external transformers can be used to lower the values to acceptable ranges. The device needs to be configured with the correct transformer ratios in order to show correct values for the measured electrical parameters. Nominal frequency of the electrical line and Maximum Demand period are also set on this page.

Power and energy display metric option allows to change display format of all measurements (Power, Apparent Power, Reactive Power, Energy). It is possible to select if the device will display measured parameters in native units or in kilo or mega amounts.

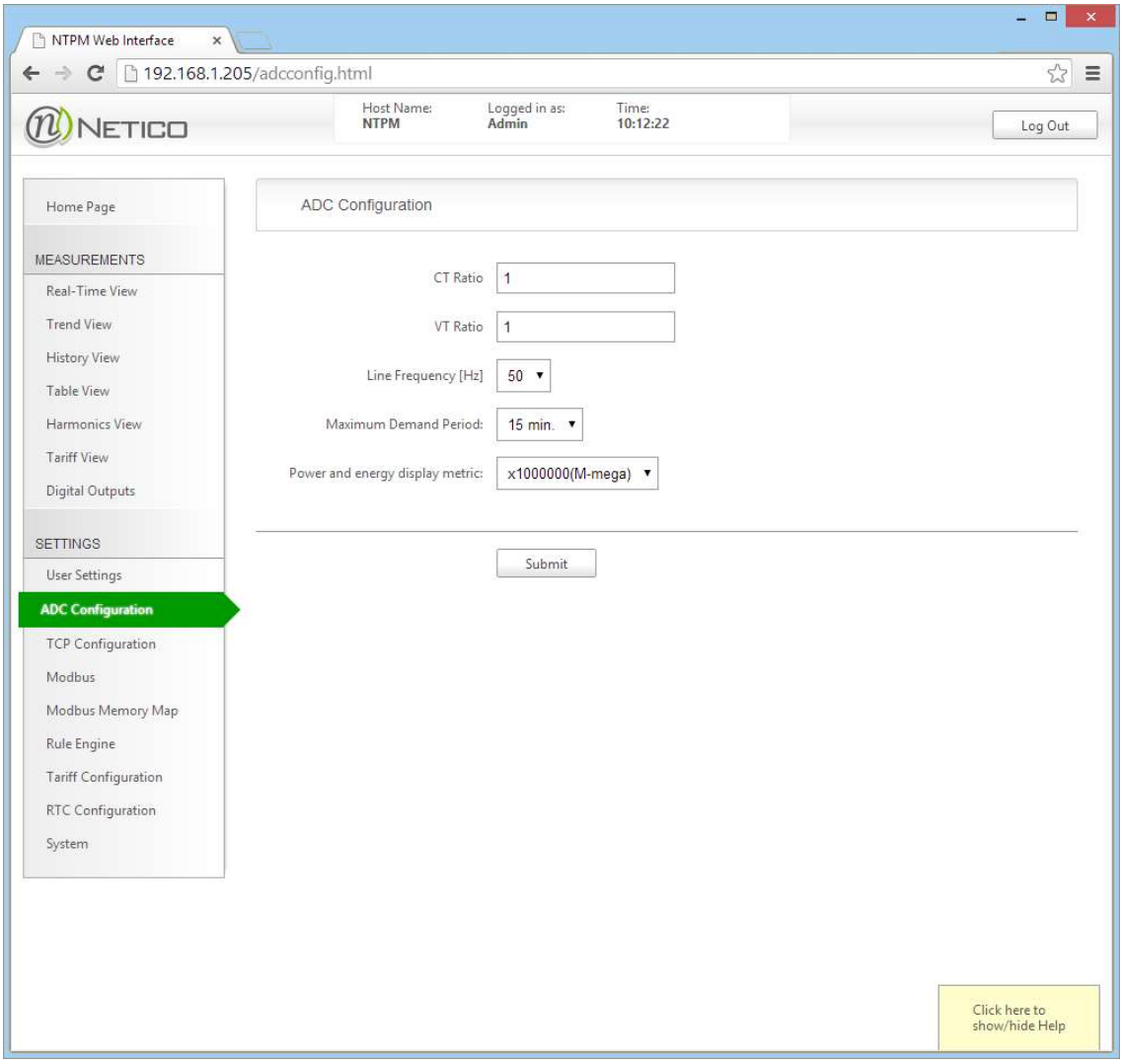


Figure 22 *ADC Configuration*

Changes to the ADC configuration settings can be saved by clicking on the “Save” button on the bottom of the page. New configuration will be sorted in the device and the device will reboot after few seconds.

TCP Configuration

TCP Configuration depends on the Ethernet network settings to which the device will be connected. For help on configuring TCP settings contact local network administrator. Figure 2 shows the TCP configuration page. Parameters that are supplied in the TCP configuration page are standard parameters necessary for configuring TCP end points.

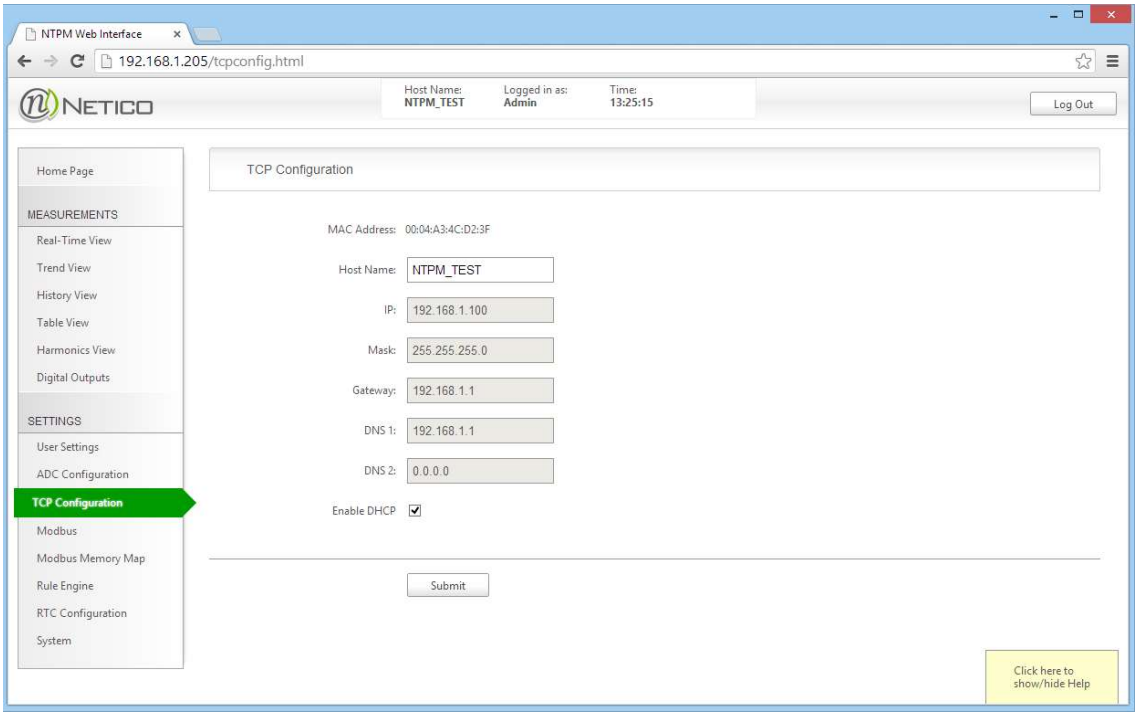


Figure 23 *TCP configuration page*

Option	Default value	Description
MAC Address	Varies	Read-only, set during device assembly.
Host Name	NTPOWERMETER	Host name for the device.
IP	192.168.1.100	The device IP address.
Mask	255.255.255.0	IP subnet mask.
Gateway	192.168.164.1	Gateway address.
DNS 1	192.168.164.1	DNS Server address
DNS 2	192.168.164.1	DNS Server address
Enable DHCP	Not checked	Check to enable DHCP client on the device.

Changes to the TCP settings can be saved by clicking on the “Save” button on the bottom of the page. New configuration will be stored in the device and the device will reboot after few seconds.

NOTE	Depending on the new TCP settings, web interface may no longer be accessible from the same LAN

Modbus

Modbus communication settings (both TCP and RS485) can be configured from this page.

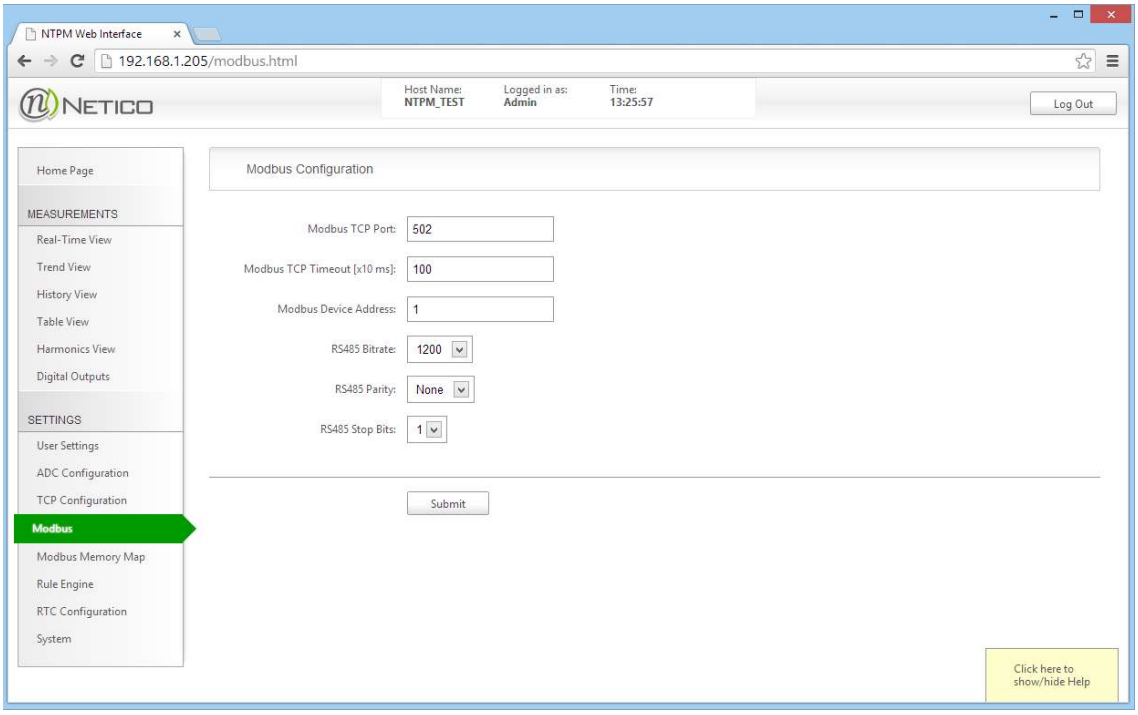


Figure 24 *Modbus*

Modbus Memory Map

The device supports Modbus communication protocol, and functions as a Modbus Slave device. To be able to use this feature, one must know the Modbus memory map of the Modbus slave device. The page shows layout of the device Modbus memory map.

Memory map consists of separate tables depending on the object type (**Input Registers, Holding Registers** and **Coils)**. More details on the Modbus protocol are available on http://www.modbus.org.

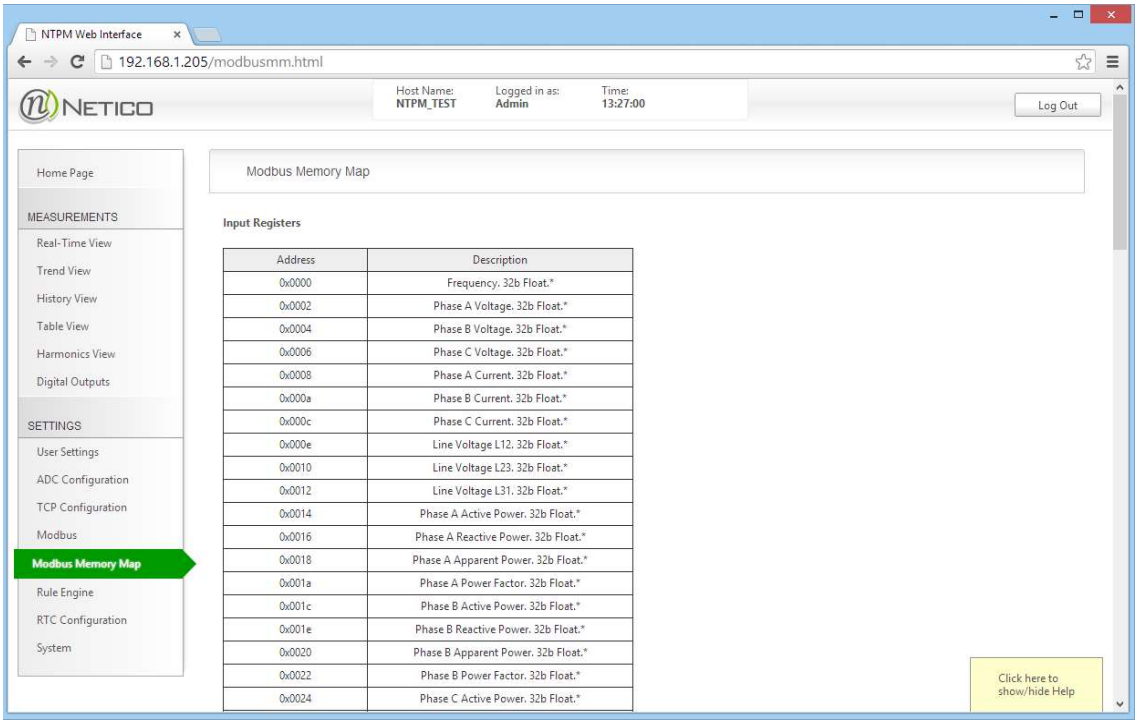


Figure 25 *Modbus memory map*

Rule engine

NTPM built in “Rule Engine” functionality allows for setting actions, which are triggered when set condition is met. Every rule can be enabled or disabled. Two actions can be set for every rule, based on weather condition of the rule is true or false.

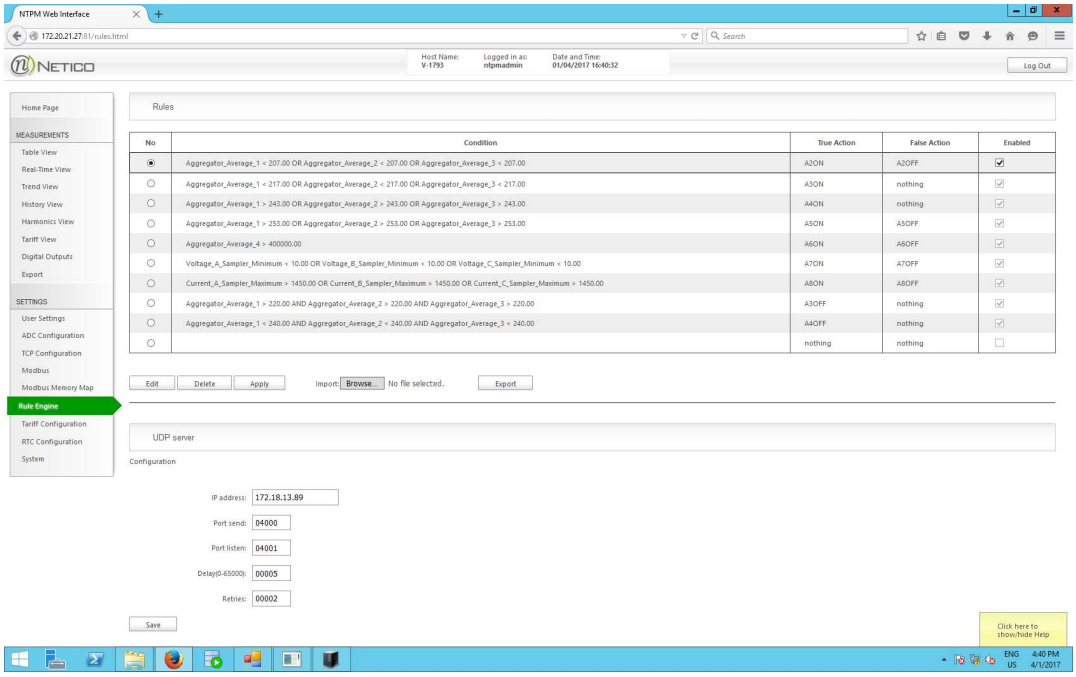


Figure 26 *Rule engine - rules list*

“***Edit***” button takes you to Condition editor, where you can set rule condition and action. Once you set expression in the editor, you can check validity by clicking on “Check” button.

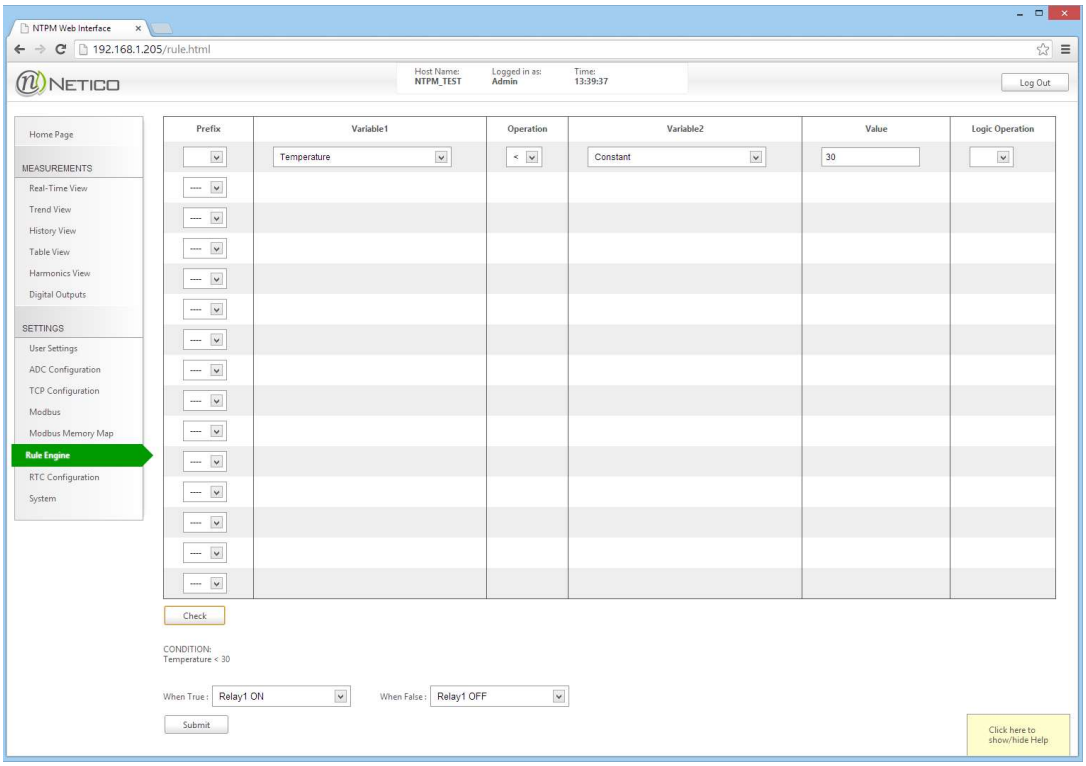


Figure 27 *Rule engine - condition editor*

"***Delete***" button deletes the selected rule.

"***Apply***" button saves and activates/updates all the rules. For example: if the user enables/disables a rule or imports new rules from file, by clicking on "Apply" new rule setup will be saved and rule engine reinitialized and restarted.

"***Import***" and "***Export***" buttons can be used to import/load or export/save rule setup from/to a file.

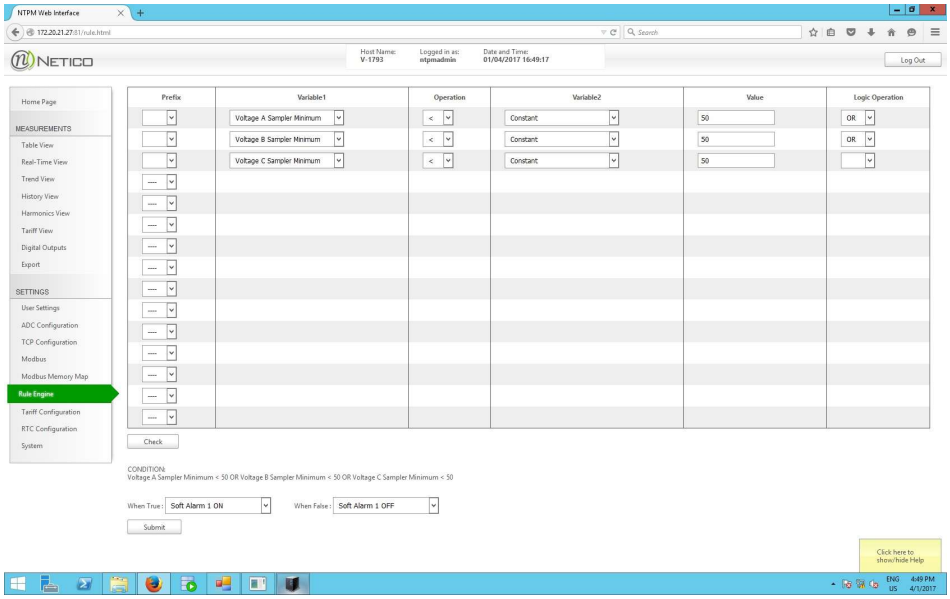
"***UDP Server***" configuration area is used to setup a connection toward a Netico Event Server application used to receive the alarms from the NTPM units in "real" time. NTPM uses UDP and XML formatted messages for alarms/events sending.

- ***IP Address*** : This is the IP address of the PC server on which Netico Event Server application is running
- ***Port Send*** : This is the port of the PC server on which Netico Event Server application is listening
- ***Port Listen*** : This is the port of the NTPM device on which it receives
- ***Delay*** : This is a delay in seconds between message retries in case there are communication problems
- ***Retries*** : This is number of retries after which NTPM stops sending messages

Rule Engine Examples

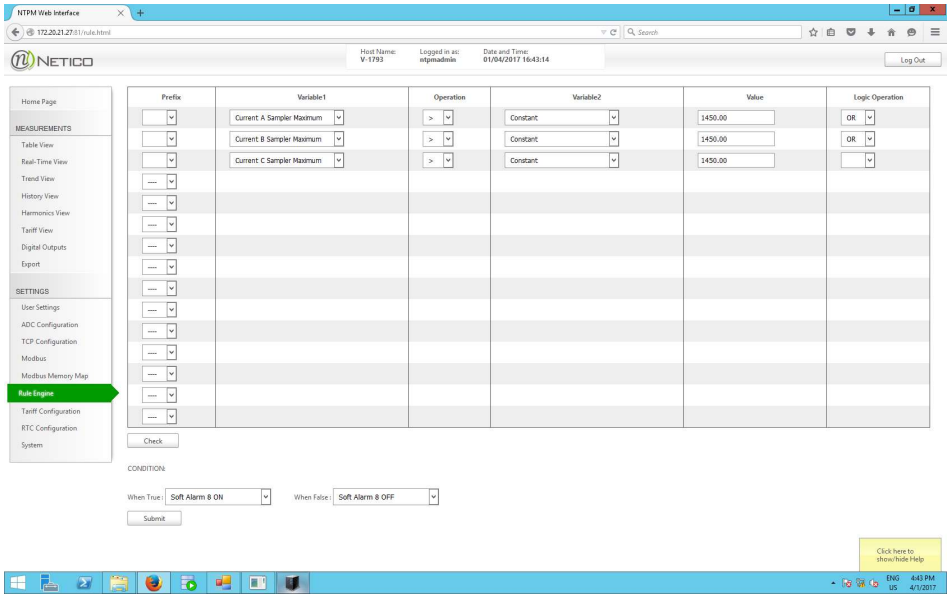
Catch Voltage Dips

This is an example how to configure a rule that will generate a software alarm if a voltage dip in one or more phases is detected. As Variable1 we will use the voltage sampler components for each phase. We will use the sampler minimum since we want to catch the minimum one cycle effective values of voltages. We compare if at least one of those minimums is less than 50 Volts. If so Software Alarm 1 will be generated.



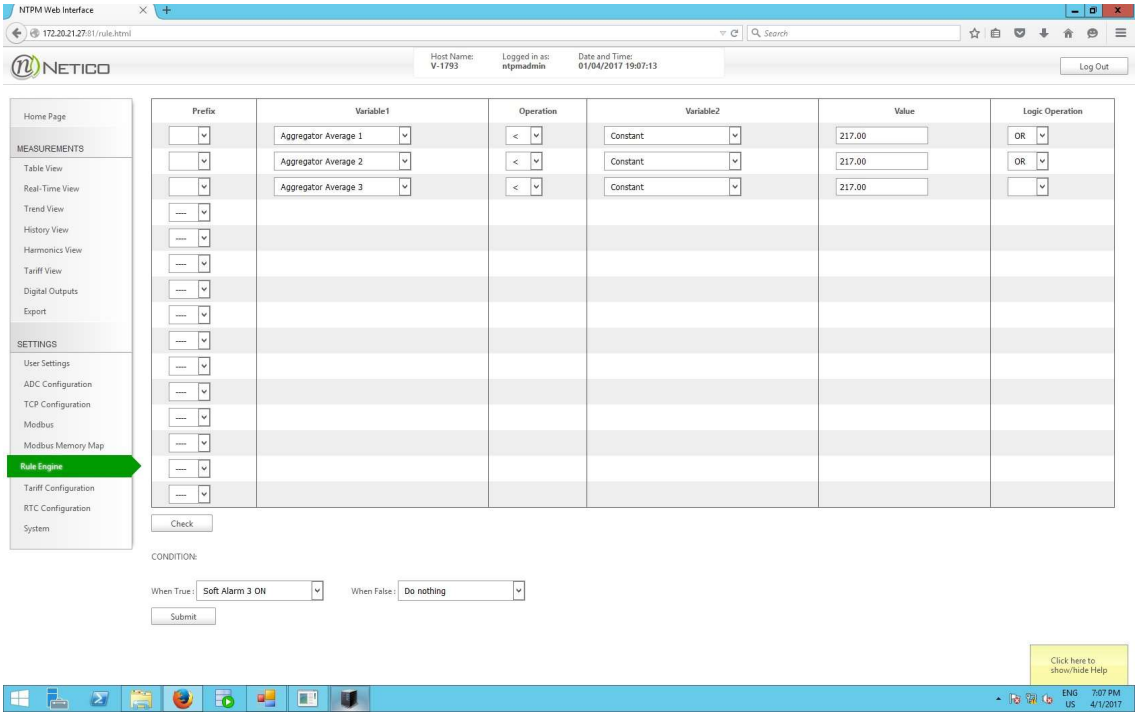
Catch Short Circuits

This is an example how to configure a rule that will generate a software alarm if a short circuit in one or more phases is detected. As Variable1 we will use the current sampler components for each phase. We will use the sampler maximum since we want to catch the maximum one cycle effective value of currents. We compare if at least one of those maximums is greater than 1450 amps. If so, Software Alarm 8 will be generated.

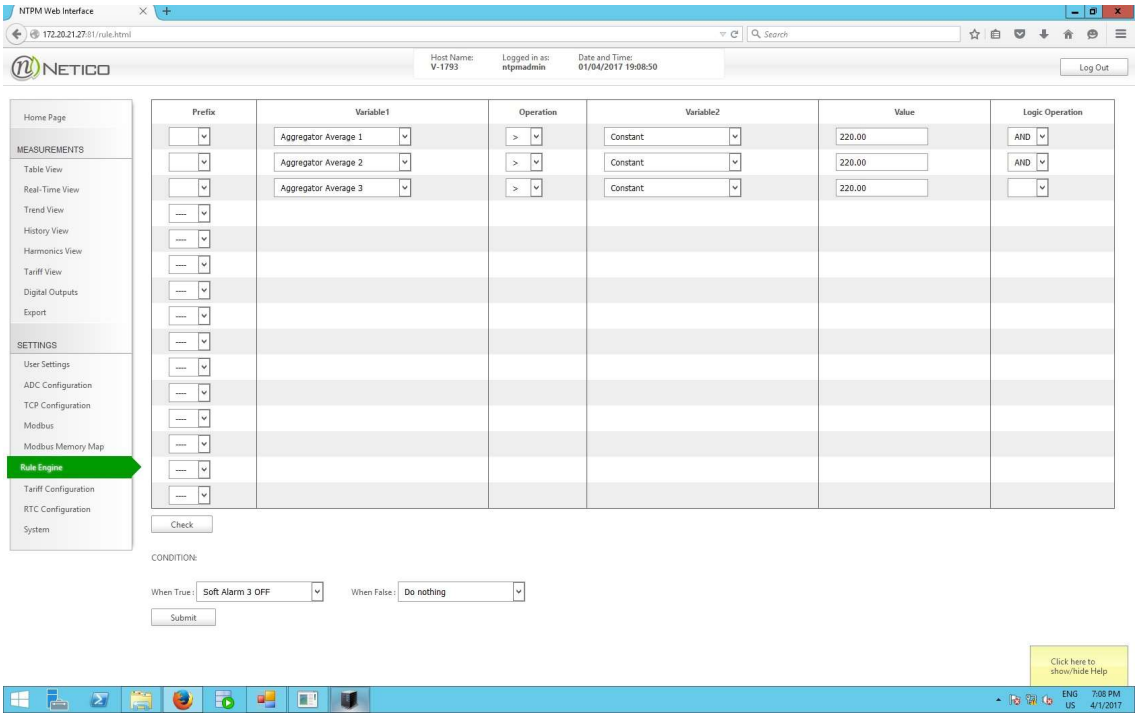


Set up low voltage alarms with hysteresis

This is an example how to configure a rule that will generate a software alarm if a low voltage is detected in one or more phases. It will also use 2 rules for 1 alarm to achieve a hysteresis like behaviour, so we do not have rapid alarm ON/OFF behaviour in case voltage constantly varies around alarm limit. As Variable1 we will use the voltage aggregator components for each phase (Voltage phase 1 is assigned to aggregator 1, Voltage phase 2 is assigned to aggregator 2 and Voltage phase 3 is assigned to aggregator 3, all aggregators are set to 10-minute time windows). We will use the aggregator average since we want to catch the average of voltages in the last 10 minutes. We compare if at least one of those averages is below 217 volts. If so, Software Alarm 3 will be generated/turned ON.

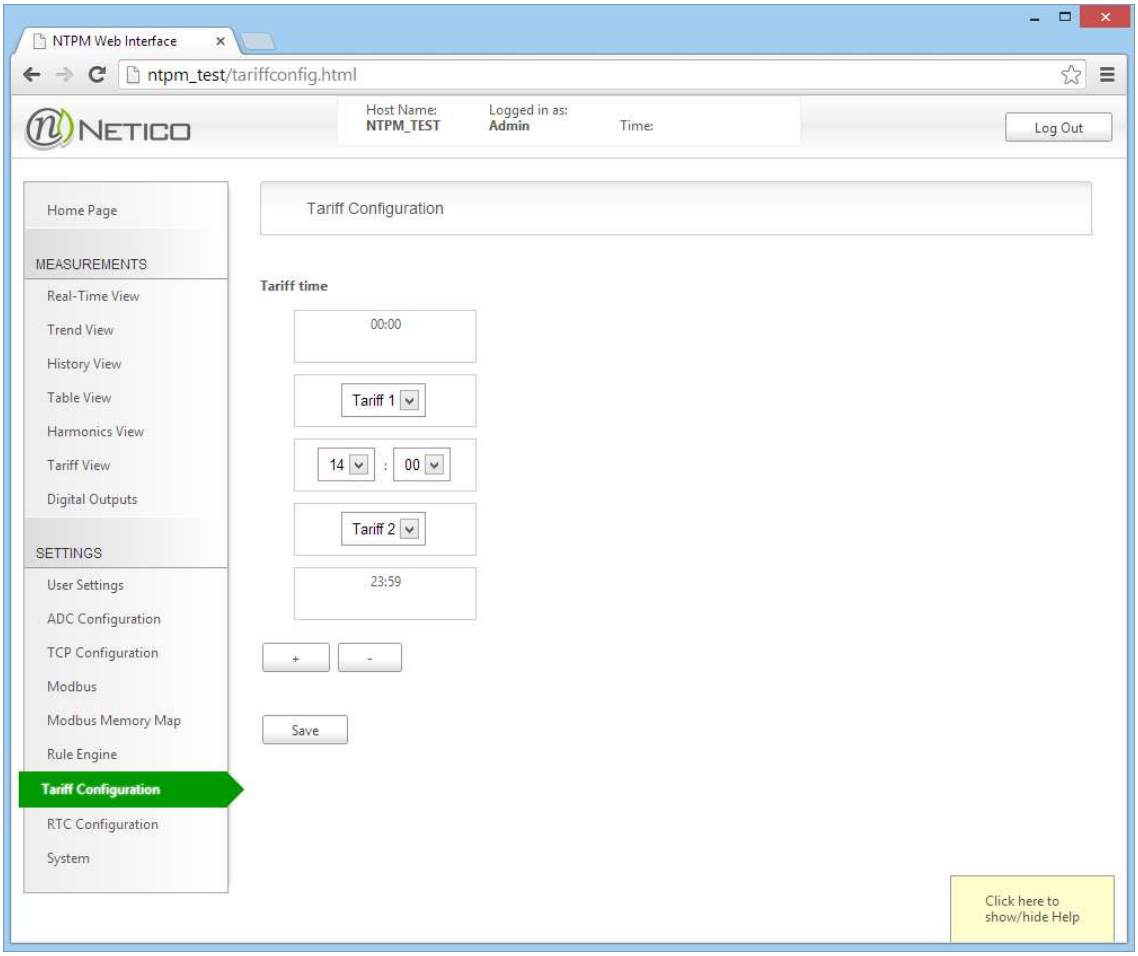


For the second rule As Variable1 we will use the voltage aggregator components for each phase (Voltage phase 1 is assigned to aggregator 1, Voltage phase 2 is assigned to aggregator 2 and Voltage phase 3 is assigned to aggregator 3, all aggregators are set to 10-minute time windows). We will use the aggregator average since we want to catch the average of voltages in the last 10 minutes. We compare if all those averages are above 220 volts. If so, Software Alarm 3 will be turned OFF.


NTPM Web Interface
172.20.21.27:81/rule.html
Search
NETICO
Host Name: V-1793
Logged in as: ntpmadmin
Date and Time: 01/04/2017 19:08:50
Log Out
Home Page
MEASUREMENTS
Table View
Real-Time View
Trend View
History View
Harmonics View
Tariff View
Digital Outputs
Export
SETTINGS
User Settings
ADC Configuration
TCP Configuration
Modbus
Modbus Memory Map
Rule Engine
Tariff Configuration
RTC Configuration
System
Prefix
Variable1
Operation
Variable2
Value
Logic Operation
Aggregator Average 1
Aggregator Average 2
Aggregator Average 3
Constant
220.00
AND
Check
CONDITION:
When True :
Soft Alarm 3 OFF
When False :
Do nothing
Submit
Click here to show/hide Help
ENG US
7:08 PM 4/1/2017

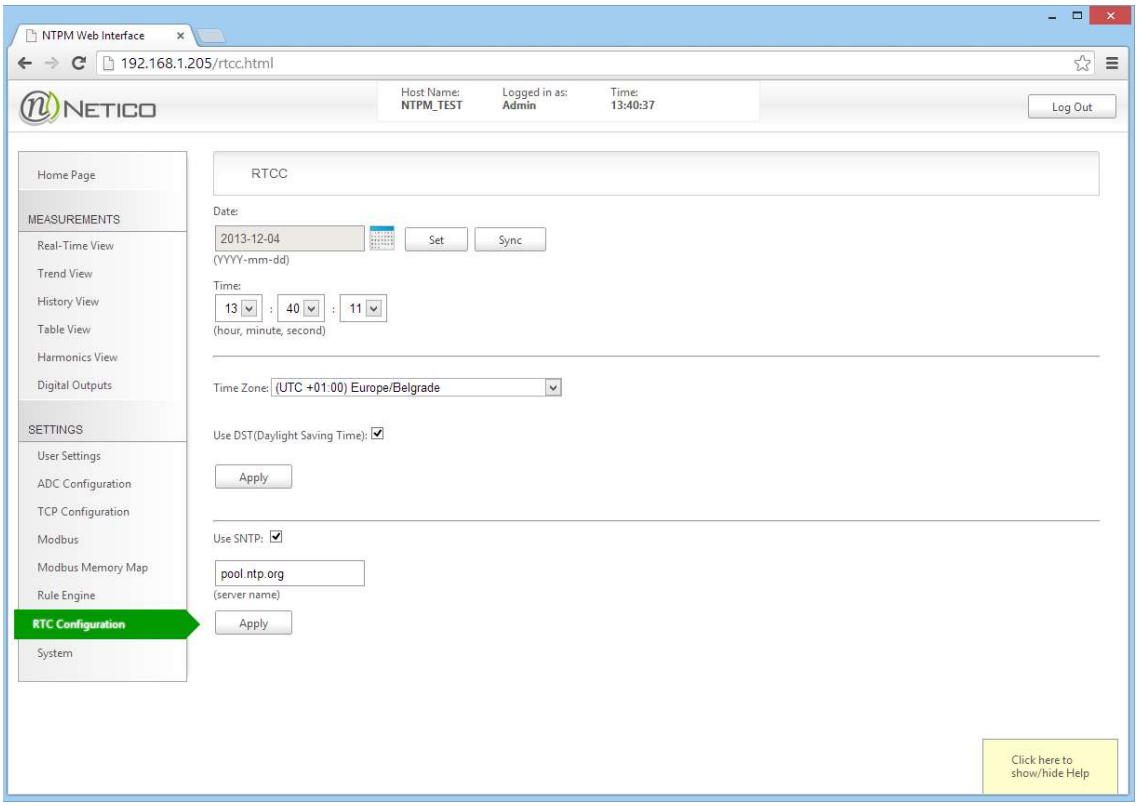
Tariff Configuration

Tariffs can be set on this page. Up to four different tariffs can be configured.



RTC Configuration

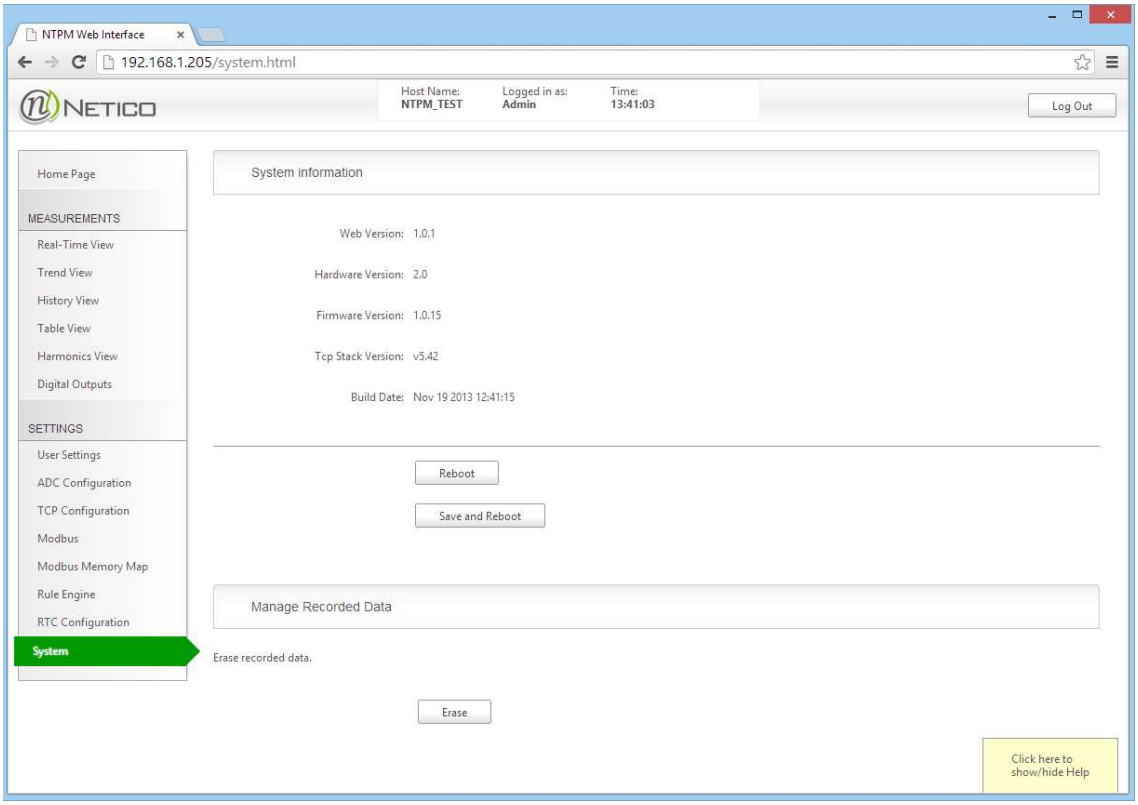
Real Time Clock settings can be configured on this page. “Set” button sets devices clock based on the manual setting of date and time in the calendar and time controls. “Sync” button synchronizes your devices date and time to your client machines date and time (PC/Tablet). Time zone settings are also supported with option to use DST (Daylight Saving Time). NTPM also supports time synchronization over SNTP server.



System Page

The page displays device information like Hardware and Firmware version. The device can also be rebooted from this page by clicking on the “Reboot” or “Save and Reboot” button.

Measurement data recorded on device’s SD card can be erased by clicking on “Erase” button found under “Manage Recorded Data” section on the page. Erasing process takes a while and status is indicated with progress bar at bottom of the screen.



Web Service

NTPM100 offers a robust web service interface for access to measurement data stored in the device. Data can be obtained by sending HTTP POST request to the devices web server.

Host: <device IP address>

Path: custom.xml

Parameters used in request:

type : [current|by_second|by_5min|by_15min|by_hour|by_day|by_month]

- **current** – currently measured data
- **by_second** – data measured and saved every second
- **by_5min** – history data calculated every 5 minutes
- **by_15min** – history data calculated every 15 minutes
- **by_hour** – history data calculated every hour
- **by_day** – history data calculated every day
- **by_month** – history data calculated every month

start : [DD-MM-YYYY-hh-mm-ss] - beginning time

stop : [DD-MM-YYYY-hh-mm-ss] - ending time

When using this format for start and stop parameters [DD-MM-YYYY-hh-mm-ss] do not omit leading zeroes. Format fields are:

- DD : day (01-31)
- MM : month (01-12)
- YYYY : year (2000-2100)
- hh : hour (00-23)
- mm : minutes (00-59)
- ss : seconds (00-59).

user : username for authentication

pass : password for authentication

tags : [tag1-tag2-tag3-….] measurement tags separated by dash

Following tags are available:

Full Name	**Tag Name**							
time stamp	Time							
time slice	TimS	**current (0)**	**1 second (1)**	**5 minutes (2)**	**15 minutes (3)**	**1 hour (4)**	**1 day (5)**	**1 month (6)**
Frequency minimum	FreL		**X**	**X**	**X**	**X**	**X**	**X**
Frequency average	FreA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Frequency maximum	FreH		**X**	**X**	**X**	**X**	**X**	**X**
Power Factor A minimum	PFaL		**X**	**X**	**X**	**X**	**X**	**X**
Power Factor A average	PFaA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Power Factor A maximum	PFaH		**X**	**X**	**X**	**X**	**X**	**X**
Power Factor B minimum	PFbL		**X**	**X**	**X**	**X**	**X**	**X**
Power Factor B average	PFbA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Power Factor B maximum	PFbH		**X**	**X**	**X**	**X**	**X**	**X**
Power Factor C minimum	PFcL		**X**	**X**	**X**	**X**	**X**	**X**
Power Factor C average	PFcA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Power Factor C maximum	PFcH		**X**	**X**	**X**	**X**	**X**	**X**
Power Factor Total minimum	PFtL		**X**	**X**	**X**	**X**	**X**	**X**
Power Factor Total average	PFtA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Power Factor Total maximum	PFtH		**X**	**X**	**X**	**X**	**X**	**X**
Phase Voltage A minimum	VPaL		**X**	**X**	**X**	**X**	**X**	**X**
Phase Voltage A average	VPaA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Phase Voltage A maximum	VPaH		**X**	**X**	**X**	**X**	**X**	**X**
Phase Voltage B minimum	VPbL		**X**	**X**	**X**	**X**	**X**	**X**
Phase Voltage B average	VPbA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Phase Voltage B maximum	VPbH		**X**	**X**	**X**	**X**	**X**	**X**
Phase Voltage C minimum	VPcL		**X**	**X**	**X**	**X**	**X**	**X**
Phase Voltage C average	VPcA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Phase Voltage C maximum	VPcH		**X**	**X**	**X**	**X**	**X**	**X**
Line Voltage AB minimum	VabL		**X**	**X**	**X**	**X**	**X**	**X**
Line Voltage AB average	VabA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Line Voltage AB maximum	VabH		**X**	**X**	**X**	**X**	**X**	**X**
Line Voltage BC minimum	VbcL		**X**	**X**	**X**	**X**	**X**	**X**
Line Voltage BC average	VbcA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Line Voltage BC maximum	VbcH		**X**	**X**	**X**	**X**	**X**	**X**
Line Voltage CA minimum	VcaL		**X**	**X**	**X**	**X**	**X**	**X**
Line Voltage CA average	VcaA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Line Voltage CA maximum	VcaH		**X**	**X**	**X**	**X**	**X**	**X**
Phase Current A minimum	IPaL		**X**	**X**	**X**	**X**	**X**	**X**
Phase Current A average	IPaA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Phase Current A maximum	IPaH		**X**	**X**	**X**	**X**	**X**	**X**
Phase Current B minimum	IPbL		**X**	**X**	**X**	**X**	**X**	**X**
Phase Current B average	IPbA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Phase Current B maximum	IPbH		**X**	**X**	**X**	**X**	**X**	**X**
Phase Current C minimum	IPcL		**X**	**X**	**X**	**X**	**X**	**X**
Phase Current C average	IPcA	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Phase Current C maximum	IPcH		**X**	**X**	**X**	**X**	**X**	**X**

Phase Current Average minimum	IPtL		X	X	X	X	X	X
Phase Current Average average	IPtA	X	X	X	X	X	X	X
Phase Current Average maximum	IPtH		X	X	X	X	X	X
Power Active A minimum	PPaL		X	X	X	X	X	X
Power Active A average	PPaA	X	X	X	X	X	X	X
Power Active A maximum	PPaH		X	X	X	X	X	X
Power Active B minimum	PPbL		X	X	X	X	X	X
Power Active B average	PPbA	X	X	X	X	X	X	X
Power Active B maximum	PPbH		X	X	X	X	X	X
Power Active C minimum	PPcL		X	X	X	X	X	X
Power Active C average	PPcA	X	X	X	X	X	X	X
Power Active C maximum	PPcH		X	X	X	X	X	X
Power Active Total minimum	PPtL		X	X	X	X	X	X
Power Active Total average	PPtA	X	X	X	X	X	X	X
Power Active Total maximum	PPtH		X	X	X	X	X	X
Power Reactive A minimum	PQaL		X	X	X	X	X	X
Power Reactive A average	PQaA	X	X	X	X	X	X	X
Power Reactive A maximum	PQaH		X	X	X	X	X	X
Power Reactive B minimum	PQbL		X	X	X	X	X	X
Power Reactive B average	PQbA	X	X	X	X	X	X	X
Power Reactive B maximum	PQbH		X	X	X	X	X	X
Power Reactive C minimum	PQcL		X	X	X	X	X	X
Power Reactive C average	PQcA	X	X	X	X	X	X	X
Power Reactive C maximum	PQcH		X	X	X	X	X	X
Power Reactive Total minimum	PQtL		X	X	X	X	X	X
Power Reactive Total average	PQtA	X	X	X	X	X	X	X
Power Reactive Total maximum	PQtH		X	X	X	X	X	X
Power Apparent A minimum	PSaL		X	X	X	X	X	X
Power Apparent A average	PSaA	X	X	X	X	X	X	X
Power Apparent A maximum	PSaH		X	X	X	X	X	X
Power Apparent B minimum	PSbL		X	X	X	X	X	X
Power Apparent B average	PSbA	X	X	X	X	X	X	X
Power Apparent B maximum	PSbH		X	X	X	X	X	X
Power Apparent C minimum	PScL		X	X	X	X	X	X
Power Apparent C average	PScA	X	X	X	X	X	X	X
Power Apparent C maximum	PScH		X	X	X	X	X	X
Power Apparent Total minimum	PStL		X	X	X	X	X	X
Power Apparent Total average	PStA	X	X	X	X	X	X	X
Power Apparent Total maximum	PStH		X	X	X	X	X	X
Energy Active A Period	EPaP		X	X	X	X	X	X
Energy Active B Period	EPbP		X	X	X	X	X	X
Energy Active C Period	EPcP		X	X	X	X	X	X
Energy Active Total Period	EPtP		X	X	X	X	X	X

Energy Reactive A Period	EQaP		X	X	X	X	X	X
Energy Reactive B Period	EQbP		X	X	X	X	X	X
Energy Reactive C Period	EQcP		X	X	X	X	X	X
Energy Reactive Total Period	EQtP		X	X	X	X	X	X
Energy Active A Counter	EPaC	X	X	X	X	X	X	X
Energy Active B Counter	EPbC	X	X	X	X	X	X	X
Energy Active C Counter	EPcC	X	X	X	X	X	X	X
Energy Active Total Counter	EPtC	X	X	X	X	X	X	X
Energy Reactive A Counter	EQaC	X	X	X	X	X	X	X
Energy Reactive B Counter	EQbC	X	X	X	X	X	X	X
Energy Reactive C Counter	EQcC	X	X	X	X	X	X	X
Energy Reactive Total Counter	EQtC	X	X	X	X	X	X	X
Tariff Active Energy 0	TPE0	X	X	X	X	X	X	X
Tariff Active Energy 1	TPE1	X	X	X	X	X	X	X
Tariff Active Energy 2	TPE2	X	X	X	X	X	X	X
Tariff Active Energy 3	TPE3	X	X	X	X	X	X	X
Tariff Reactive Energy 0	TQE0	X	X	X	X	X	X	X
Tariff Reactive Energy 1	TQE1	X	X	X	X	X	X	X
Tariff Reactive Energy 2	TQE2	X	X	X	X	X	X	X
Tariff Reactive Energy 3	TQE3	X	X	X	X	X	X	X
Energy Reactive Q1	EQQ1	X	X	X	X	X	X	X
Energy Reactive Q2	EQQ2	X	X	X	X	X	X	X
Energy Reactive Q3	EQQ3	X	X	X	X	X	X	X
Energy Reactive Q4	EQQ4	X	X	X	X	X	X	X
Energy Active Forward	EPFw	X	X	X	X	X	X	X
Energy Active Reverse	EPRw	X	X	X	X	X	X	X
Energy Reactive Forward	EQFw	X	X	X	X	X	X	X
Energy Reactive Reverse	EQRw	X	X	X	X	X	X	X
Energy Reset Time	ERTm	X	X	X	X	X	X	X
Demand A	DemA	X	X	X	X	X	X	X
Demand B	DemB	X	X	X	X	X	X	X
Demand C	DemC	X	X	X	X	X	X	X
Demand	DemT	X	X	X	X	X	X	X
Demant ResetTime	DemR	X	X	X	X	X	X	X
Demand Time (Procentage)	DemP	X						
Valid Flag	Flag	X	X	X	X	X	X	X
THDI A minimum	HIaL		X	X	X	X	X	X
THDI A average	HIaA	X	X	X	X	X	X	X
THDI A maximum	HIaH		X	X	X	X	X	X
THDI B minimum	HIbL		X	X	X	X	X	X
THDI B average	HIbA	X	X	X	X	X	X	X
THDI B maximum	HIbH		X	X	X	X	X	X
THDI C minimum	HIcL		X	X	X	X	X	X
THDI C average	HIcA	X	X	X	X	X	X	X
THDI A maximum	HIcH		X	X	X	X	X	X
THDU A minimum	HUaL		X	X	X	X	X	X
THDU A average	HUaA	X	X	X	X	X	X	X
THDU A maximum	HUaH		X	X	X	X	X	X
THDU B minimum	HUbL		X	X	X	X	X	X

THDU B average	HUbA	X	X	X	X	X	X	X
THDU B maximum	HUbH		X	X	X	X	X	X
THDU C minimum	HUcL		X	X	X	X	X	X
THDU C average	HUcA	X	X	X	X	X	X	X
THDU A maximum	HUcH		X	X	X	X	X	X
Temperature minimum	TemL		X	X	X	X	X	X
Temperature average	TemA	X	X	X	X	X	X	X
Temperature maximum	TemH		X	X	X	X	X	X
Harmonic Current Phase A 1-31	Ia01 - Ia31	X						
Harmonic Current Phase B 1-31	Ib01 - Ib31	X						
Harmonic Current Phase C 1-31	Ic01 - Ic31	X						
Harmonic Voltage Phase A 1-31	Ua01 - Ua31	X						
Harmonic Voltage Phase B 1-31	Ub01 - Ub31	X						
Harmonic Voltage Phase C 1-31	Uc01 - Uc31	X						
Alarms	Alar	X	X					

Below is the example of the received custom.xml for the following request parameters:

start=2014-04-15-13-27-00
stop=2014-04-15-16-00-00
type=by_5min
tags=TemA
user=admin
pass=admin

```
<?xml version="1.0"?>
<!-- Netico -->
<custom>
  <data error="none" type="by_5min" count="31">
    <point seq="0" time="2014-04-15-13-27-00" valid="true">
      <TemA>25.848</TemA>
    </point>
    <point seq="1" time="2014-04-15-13-32-00" valid="true">
      <TemA>25.848</TemA>
    </point>
    <point seq="2" time="2014-04-15-13-37-00" valid="true">
      <TemA>25.878</TemA>
```

```
</point>
<point seq="3" time="2014-04-15-13-42-00" valid="true">
  <TemA>25.893</TemA>
</point>
<point seq="4" time="2014-04-15-13-47-00" valid="true">
  <TemA>25.919</TemA>
</point>
<point seq="5" time="2014-04-15-13-52-00" valid="true">
  <TemA>25.932</TemA>
</point>
<point seq="6" time="2014-04-15-13-57-00" valid="true">
  <TemA>25.944</TemA>
</point>
<point seq="7" time="2014-04-15-14-02-00" valid="true">
  <TemA>25.955</TemA>
</point>
<point seq="8" time="2014-04-15-14-07-00" valid="true">
  <TemA>25.963</TemA>
</point>
<point seq="9" time="2014-04-15-14-12-00" valid="true">
  <TemA>25.963</TemA>
</point>
<point seq="10" time="2014-04-15-14-17-00" valid="true">
  <TemA>25.960</TemA>
</point>
<point seq="11" time="2014-04-15-14-22-00" valid="true">
  <TemA>25.966</TemA>
</point>
<point seq="12" time="2014-04-15-14-27-00" valid="true">
  <TemA>25.982</TemA>
</point>
<point seq="13" time="2014-04-15-14-32-00" valid="true">
  <TemA>26.000</TemA>
</point>
<point seq="14" time="2014-04-15-14-37-00" valid="true">
  <TemA>26.022</TemA>
</point>
<point seq="15" time="2014-04-15-14-42-00" valid="true">
  <TemA>26.032</TemA>
</point>
<point seq="16" time="2014-04-15-14-47-00" valid="false"></point>
<point seq="17" time="2014-04-15-14-52-00" valid="false"></point>
<point seq="18" time="2014-04-15-14-57-00" valid="false"></point>
```

```
      <point seq="19" time="2014-04-15-15-02-00" valid="false"></point>
      <point seq="20" time="2014-04-15-15-07-00" valid="false"></point>
      <point seq="21" time="2014-04-15-15-12-00" valid="false"></point>
      <point seq="22" time="2014-04-15-15-17-00" valid="false"></point>
      <point seq="23" time="2014-04-15-15-22-00" valid="false"></point>
      <point seq="24" time="2014-04-15-15-27-00" valid="false"></point>
      <point seq="25" time="2014-04-15-15-32-00" valid="false"></point>
      <point seq="26" time="2014-04-15-15-37-00" valid="false"></point>
      <point seq="27" time="2014-04-15-15-42-00" valid="false"></point>
      <point seq="28" time="2014-04-15-15-47-00" valid="false"></point>
      <point seq="29" time="2014-04-15-15-52-00" valid="false"></point>
      <point seq="30" time="2014-04-15-15-57-00" valid="false"></point>
   </data>
</custom>
<!-- Netico -->
```

Modbus protocol support

This chapter describes Modbus communication protocol support on the device.

The device operates as a Modbus slave and supports Modbus TCP and Modbus RTU protocols. Details about memory map for the device can be found in Modbus Memory Map section. Modbus TCP is available on the Ethernet interface, and Modbus RTU on the RS485 interface.

Following Modbus function codes are supported:

- 0x01 (Read Coils)
- 0x02 (Read Discrete Inputs)
- 0x03 (Read Holding Registers)
- 0x04 (Read Input Registers)
- 0x05 (Write Single Coil)
- 0x0F (Write Multiple Coils)
- 0x11 (Report Slave ID)

Modbus RTU Slave

Modbus RTU slave is available on the RS485 interface on the device. To configure the interface, following configuration parameters must be set:

- Device Address: unique numerical ID that identifies the device. As more than one Modbus slave device may be listening on the same RS485 line, Modbus RTU masters use this ID to identify the slave when communicating in unicast mode. The slave accepts broadcast messages too.
- Baud rate: defines rate at which data is transferred over the asynchronous RS485 serial port.
- Parity: Parity information used on serial line. Used for error detection on serial lines.
- Stop bits: number of stop bits used to terminate a symbol on the asynchronous serial line.

Device Address	Baud Rate	Parity	Stop Bits
1 – 247	1200	NONE	1
	2400	EVEN	2
	4800	ODD	
	9600	MARK	
	19200	SPACE	
	28800		
	38400		
	57600		

Modbus TCP Slave

Modbus TCP slave is available on the Ethernet interface. Following configuration parameters must be set:

- IP address/mask/gateway address: these parameters are set in the Ethernet interface web page (see Network parameters);
- TCP port: TCP port on which Modbus TCP server listens. Default value is 502.
- Timeout: message reception timeout. This timeout is used as a safety feature. The server accepts only one connection at the time. If a connection is idle for time specified in the parameter, TCP connection will be closed from the server side, and will be ready to accept new requests. When a connection is closed, received data is discarded from the internal buffer.

Modbus Memory Map

Input registers (modbus type 04)				
Measurment	address	Type	additional conversion	Comment
Temperature	0	float 4 bytes (2 registers)	none	
Frequency	2	float 4 bytes (2 registers)	none	
Phase A Voltage	4	float 4 bytes (2 registers)	none	
Phase B Voltage	6	float 4 bytes (2 registers)	none	
Phase C Voltage	8	float 4 bytes (2 registers)	none	
Phase A Current	10	float 4 bytes (2 registers)	none	
Phase B Current	12	float 4 bytes (2 registers)	none	
Phase C Current	14	float 4 bytes (2 registers)	none	
Line Voltage L12	16	float 4 bytes (2 registers)	none	
Line Voltage L23	18	float 4 bytes (2 registers)	none	
Line Voltage L31	20	float 4 bytes (2 registers)	none	
Current total	22	float 4 bytes (2 registers)	none	
Phase A Active Power	24	float 4 bytes (2 registers)	none	
Phase A Reactive Power	26	float 4 bytes (2 registers)	none	
Phase A Apparent Power	28	float 4 bytes (2 registers)	none	
Phase A Power Factor	30	float 4 bytes (2 registers)	none	
Phase B Active Power	32	float 4 bytes (2 registers)	none	
Phase B Reactive Power	34	float 4 bytes (2 registers)	none	
Phase B Apparent Power	36	float 4 bytes (2 registers)	none	
Phase B Power Factor	38	float 4 bytes (2 registers)	none	
Phase C Active Power	40	float 4 bytes (2 registers)	none	
Phase C Reactive Power	42	float 4 bytes (2 registers)	none	
Phase C Apparent Power	44	float 4 bytes (2 registers)	none	
Phase C Power Factor	46	float 4 bytes (2 registers)	none	
Total Active Power	48	float 4 bytes (2 registers)	none	
Total Reactive Power	50	float 4 bytes (2 registers)	none	
Total Apparent Power	52	float 4 bytes (2 registers)	none	
Total Power Factor	54	float 4 bytes (2 registers)	none	
Phase A fundamental active power	56	float 4 bytes (2 registers)	none	
Phase B fundamental active power	58	float 4 bytes (2 registers)	none	
Phase C fundamental active power	60	float 4 bytes (2 registers)	none	
Phase A fundamental reactive power	62	float 4 bytes (2 registers)	none	
Phase B fundamental reactive power	64	float 4 bytes (2 registers)	none	
Phase C fundamental reactive power	66	float 4 bytes (2 registers)	none	

Phase A harmonic active power	68	float 4 bytes (2 registers)	none	
Phase B harmonic active power	70	float 4 bytes (2 registers)	none	
Phase C harmonic active power	72	float 4 bytes (2 registers)	none	
Phase A harmonic reactive power	74	float 4 bytes (2 registers)	none	
Phase B harmonic reactive power	76	float 4 bytes (2 registers)	none	
Phase C harmonic reactive power	78	float 4 bytes (2 registers)	none	
THD Voltage A	80	float 4 bytes (2 registers)	none	
THD Voltage B	82	float 4 bytes (2 registers)	none	
THD Voltage C	84	float 4 bytes (2 registers)	none	
THD Current A	86	float 4 bytes (2 registers)	none	
THD Current B	88	float 4 bytes (2 registers)	none	
THD Current C	90	float 4 bytes (2 registers)	none	
Accumulated Q1 Energy	92	float 4 bytes (2 registers)	none	
Accumulated Q2 Energy	94	float 4 bytes (2 registers)	none	
Accumulated Q3 Energy	96	float 4 bytes (2 registers)	none	
Accumulated Q4 Energy	98	float 4 bytes (2 registers)	none	
Accumulated Forward Reactive Energy	100	float 4 bytes (2 registers)	none	
Accumulated Reverse Reactive Energy	102	float 4 bytes (2 registers)	none	
Accumulated Forward Active Energy	104	float 4 bytes (2 registers)	none	
Accumulated Reverse Active Energy	106	float 4 bytes (2 registers)	none	
Accumulated Active Energy A	108	float 4 bytes (2 registers)	none	
Accumulated Active Energy B	110	float 4 bytes (2 registers)	none	
Accumulated Active Energy C	112	float 4 bytes (2 registers)	none	
Accumulated Total Active Energy	114	float 4 bytes (2 registers)	none	
Accumulated Reactive Energy A	116	float 4 bytes (2 registers)	none	
Accumulated Reactive Energy B	118	float 4 bytes (2 registers)	none	
Accumulated Reactive Energy C	120	float 4 bytes (2 registers)	none	
Accumulated Total Reactive Energy	122	float 4 bytes (2 registers)	none	
Demand A	124	float 4 bytes (2 registers)	none	
Demand B	126	float 4 bytes (2 registers)	none	
Demand C	128	float 4 bytes (2 registers)	none	
Demand Total	130	float 4 bytes (2 registers)	none	
Peak Demand in Month	132	float 4 bytes (2 registers)	none	
Demand Time (s)	134	float 4 bytes (2 registers)	none	
RESERVED FOR 1 SECOND AND HISTORY BUFFER TRANSFER	135-349			
Harmonics Voltage A 1-31	350-380	unsigned integer 2 bytes (1 register)	/10.0	
THD Voltage A	381	unsigned integer 2 bytes (1 register)	/10.0	
Harmonics Current A 1-31	382-412	unsigned integer 2 bytes (1 register)	/10.0	
THD Current A	413	unsigned integer 2 bytes (1 register)	/10.0	
Harmonics Voltage B 1-31	414-444	unsigned integer 2 bytes (1 register)	/10.0	
THD Voltage B	445	unsigned integer 2 bytes (1 register)	/10.0	
Harmonics Current B 1-31	446-476	unsigned integer 2 bytes (1 register)	/10.0	
THD Current B	477	unsigned integer 2 bytes (1 register)	/10.0	
Harmonics Voltage C 1-31	478-508	unsigned integer 2 bytes (1 register)	/10.0	

THD Voltage B	509	unsigned integer 2 bytes (1 register)	/10.0	
Harmonics Current C 1-31	510-540	unsigned integer 2 bytes (1 register)	/10.0	
THD Current C	541	unsigned integer 2 bytes (1 register)	/10.0	
FPI_EVENT_TYPE	542	unsigned integer 2 bytes (1 register)	none	The type of the event: 0 - invalid, 1 - warning, 2 - alarm
FPI_EVENT_START_YEAR	543	unsigned integer 2 bytes (1 register)	none	The time when the overcurrent fault happened
FPI_EVENT_START_MONTH	544	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_START_DAY	545	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_START_HOUR	546	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_START_MIN	547	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_START_SEC	548	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_START_MS	549	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_TRIP_YEAR	550	unsigned integer 2 bytes (1 register)	none	The time when the overcurrent protection powered down the line
FPI_EVENT_TRIP_MONTH	551	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_TRIP_DAY	552	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_TRIP_HOUR	553	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_TRIP_MIN	554	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_TRIP_SEC	555	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_TRIP_MS	556	unsigned integer 2 bytes (1 register)	none	
FPI_EVENT_IA_RMS	557	float 4 bytes (2 registers)	none	
FPI_EVENT_IB_RMS	559	float 4 bytes (2 registers)	none	
FPI_EVENT_IC_RMS	561	float 4 bytes (2 registers)	none	
FPI_EVENT_IA_PEAK	563	float 4 bytes (2 registers)	none	
FPI_EVENT_IB_PEAK	565	float 4 bytes (2 registers)	none	
FPI_EVENT_IC_PEAK	567	float 4 bytes (2 registers)	none	
FPI_CONFIG_IS_ENABLED	569	unsigned integer 2 bytes (1 register)	none	0 - disabled, 1 – enabled
FPI_CONFIG_METHOD	570	unsigned integer 2 bytes (1 register)	none	Method: 0 - invalid, 1 - RMS, 2 - PEAK, 3 - both
FPI_CONFIG_TRIG_ALARM	571	unsigned integer 2 bytes (1 register)	none	Trigger: 0 - line voltage, 1 - phase voltage, 2 - current, 3 - protection mode
FPI_CONFIG_ZERO_DEADBAND	572	float 4 bytes (2 registers)	none	Zero dead band value for seletected trigger alarm, When TRIG_ALARM == 3, this value is ignored.
FPI_CONFIG_FAULT_CURRENT	574	float 4 bytes (2 registers)	none	
FPI_CONFIG_FPR_TIME	576	unsigned integer 2 bytes (1 register)	none	
FPI_MEAS_UAB	577	float 4 bytes (2 registers)	none	
FPI_MEAS_UBC	579	float 4 bytes (2 registers)	none	
FPI_MEAS_UCB	581	float 4 bytes (2 registers)	none	
FPI_MEAS_UA	583	float 4 bytes (2 registers)	none	
FPI_MEAS_UB	585	float 4 bytes (2 registers)	none	
FPI_MEAS_UC	587	float 4 bytes (2 registers)	none	
FPI_MEAS_RMS_IA	589	float 4 bytes (2 registers)	none	
FPI_MEAS_RMS_IB	591	float 4 bytes (2 registers)	none	

FPI_MEAS_RMS_IC	593	float 4 bytes (2 registers)	none	
FPI_MEAS_PEAK_IA	595	float 4 bytes (2 registers)	none	
FPI_MEAS_PEAK_IB	597	float 4 bytes (2 registers)	none	
FPI_MEAS_PEAK_IC	599	float 4 bytes (2 registers)	none	
Digital outputs - Coils (modbus type 01)				
Relay output 1	0	binary 0-1	none	
Relay output 2	1	binary 0-1	none	
Reset Energy Counters	2	binary 0-1	none	
Software Alarm 1	3	binary 0-1	none	
Software Alarm 2	4	binary 0-1	none	
Software Alarm 3	5	binary 0-1	none	
Reset FPI	6	binary 0-1	none	
Holding Registers (modbus type 03)				
Alarm 1 Timestamp reg 1	0	unsigned integer 2 bytes (1 register)	year 1B - month 1B	
Alarm 1 Timestamp reg 2	1	unsigned integer 2 bytes (1 register)	day 1B - hour 1B	
Alarm 1 Timestamp reg 3	2	unsigned integer 2 bytes (1 register)	min 1B - sec 1B	
Alarm 1 Trigger source	3	unsigned integer 2 bytes (1 register)	src 1B - alarm state 1B	
Alarm 2 Timestamp reg 1	4	unsigned integer 2 bytes (1 register)	year 1B - month 1B	
Alarm 2 Timestamp reg 2	5	unsigned integer 2 bytes (1 register)	day 1B - hour 1B	
Alarm 2 Timestamp reg 3	6	unsigned integer 2 bytes (1 register)	min 1B - sec 1B	
Alarm 2 Trigger source	7	unsigned integer 2 bytes (1 register)	src 1B - alarm state 1B	
Alarm 3 Timestamp reg 1	8	unsigned integer 2 bytes (1 register)	year 1B - month 1B	
Alarm 3 Timestamp reg 2	9	unsigned integer 2 bytes (1 register)	day 1B - hour 1B	
Alarm 3 Timestamp reg 3	10	unsigned integer 2 bytes (1 register)	min 1B - sec 1B	
Alarm 3 Trigger source	11	unsigned integer 2 bytes (1 register)	src 1B - alarm state 1B	

Maintenance

NTPM 100A/110A does not contain any user-serviceable parts. If the device requires service contact Netico or your local Netico authorized representative for technical support.

WARNING

Risk of damaging the device!

- Do not open device enclosure.
- Do not try to repair the device.

Failure to follow these instructions may lead to equipment damage.

Do not open the device. Opening the device invalidates the warranty.

Firmware Upgrade

The NTPM devices with v1.0.x versions of firmware are using two independent software packages: **firmware** and **webware**. For proper device operation both packages must be compatible with each other and they must be updated as described in this document.

Firmware

The **firmware** is responsible for measurements, data storage and data processing. Firmware must be updated before webware. The device can work using only Firmware, but the data presentation will not be available. Firmware file names are using the following naming convention:

```
first_DD-MM-YYYY.hex
```

where *DD-MM-YYYY* is the date of the firmware release.

Webware

Webware only responsibility is the presentation of measurements and stored data. Webware must be updated only after the firmware. Webware file names are using the following naming convention:

```
second_DD-MM-YYYY.bin
```

where *DD-MM-YYYY* is the date of the webware release.

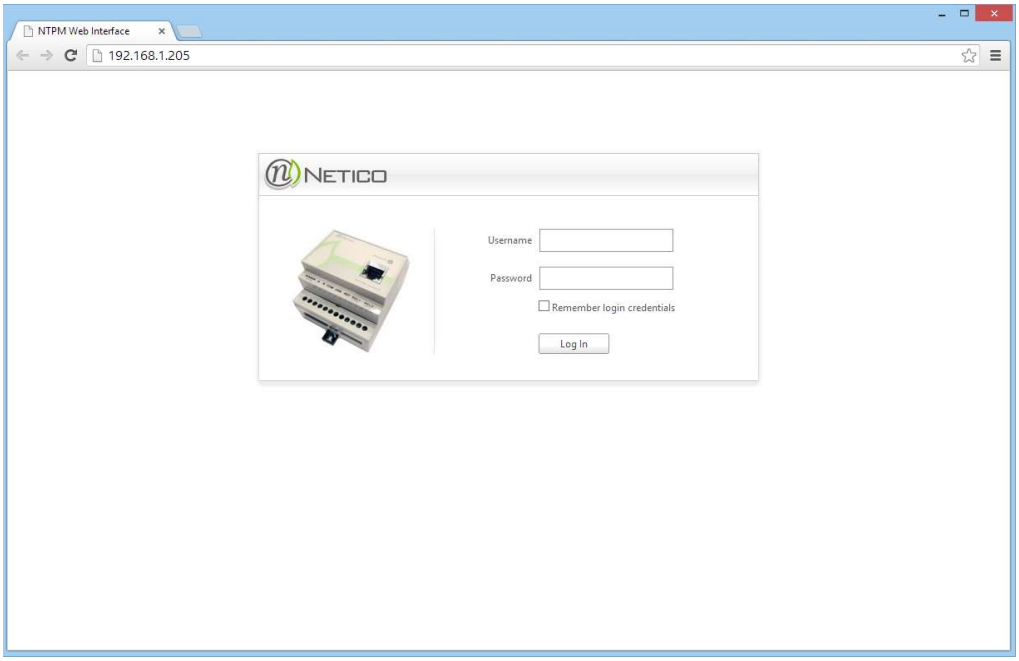
Firmware Update

To properly and successfully update the device firmware the system integrator or Administrator must **follow these steps in strict order**:

1 extract firmware files to a folder
2 login to the device
3 upload the firmware first
4 upload the webware second
5 reboot the device

Step 1 – Prepare firmware files

Netico will supply both firmware and webware in a single ZIP archived file. Decompress (extract) the files into the folder of your choice.



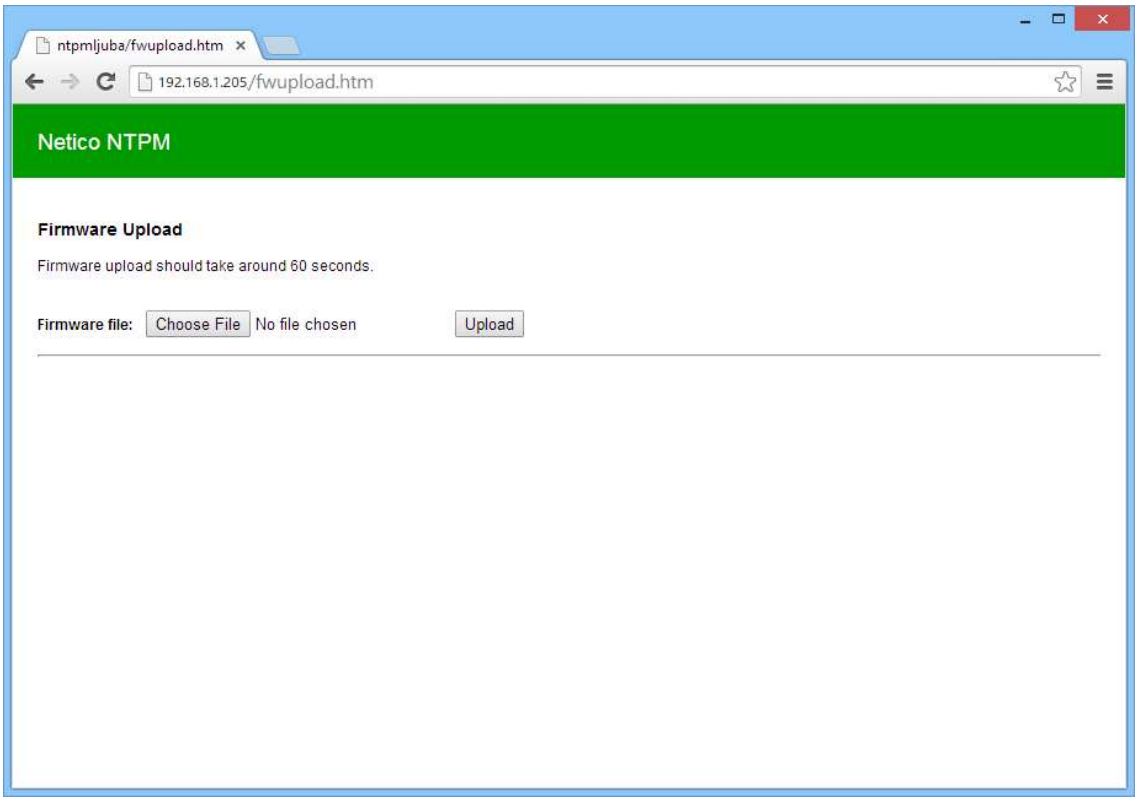
Step 2 – Login to NTPM device

Find the device IP address and access it using the administrator account through a web browser. In this example the device IP address is 192.168.1.205.

NOTE: Default administrator account user name is „admin“ and password „admin“.

Step 3 – Upload firmware

Step 3.1 – Open firmware upload page - Into your browser address bar enter the following web page address (replace the IP address in the example with the correct address of your device): http://192.168.1.205/fwupload.htm



Step 3.2 – Click on the ***Browse/Choose File*** button and select the firmware file from the folder where the files were extracted. Choose the file named `first_DD-MM-YYYY.hex` where *DD-MM-YYYY* is the date of the firmware release.

Step 3.3 – Click the ***Open*** button and the file name should appear on the web page.

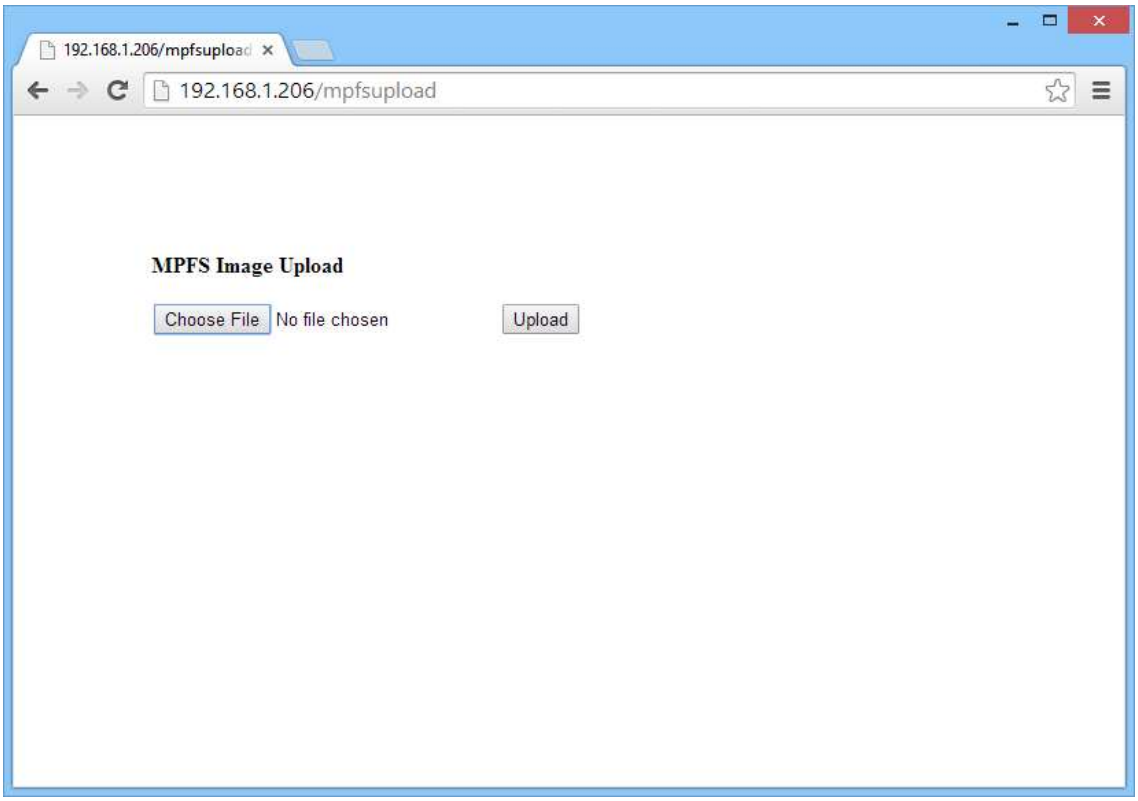
Step 3.4 – Click the ***Upload*** button to begin the firmware file upload process. After clicking the button there will be no activity in the browser window until the whole firmware is uploaded into the device. The upload process can take up to few minutes depending on the state of the network.

When the upload is finished the browser should refresh the screen with new upload status.

NOTE: If the firmware upload is not successful, power cycle the device, and retry this step. This is a known bug which is fixed in new firmware releases.

Step 4 – Upload webware

Step 4.1 – Open webware upload page. Into your browser address bar enter the following web page address: `http://192.168.1.205/mpfsupload`**.** The web page will ask for administrator user name and password once again. Enter username „**`admin`**“ and password „**`admin`**“ and then click OK button.



Step 4.2 – Click on the Browse/Choose File button and select the webware file from the folder where the files were extracted.

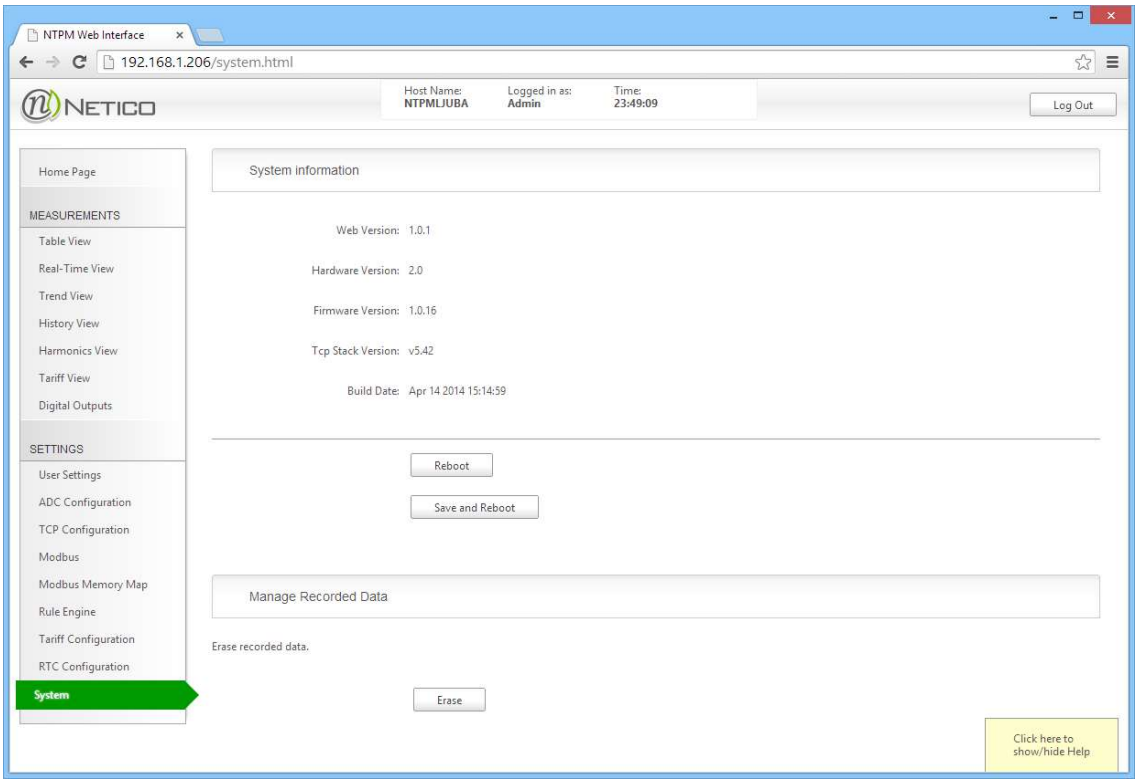
Step 4.3 – Choose the file named `second_DD-MM-YYYY.bin` where *DD-MM-YYYY* is the date of the webware release.

Step 4.4 – Click the ***Upload*** button to begin the webware file upload process. After clicking the button there will be no activity in the browser window until the whole firmware is uploaded into the device. The upload process can take up to few minutes depending on the state of the network.

When the upload is finished the browser should refresh the screen with new upload status.

Step 5 – Reboot the device

You can do this either by turning off and on the device power or remotely through the web interface. To reboot the device through the web interface go directly to `http://192.168.1.205/system.html` web page and click on the ***Reboot*** button. The device needs about a minute to boot with a new firmware. New firmware version and build date can be checked on the *system.html* page after logging in.



Cleaning

If necessary, thoroughly wipe all accessible surfaces of the equipment with a damp cloth and mild cleaning solution. Do not clean the unit with abrasive cleaning compounds, solvents, or other materials that could scratch the panel or damage the unit.

Risk of electrocution!

Do not clean the device while it is powered on. It must be disconnected from all power sources before cleaning.

Technical support

Contact Netico or your local Netico authorized representative for support with technical or other problems with your NTPM 100A / 110A device.

Make sure you include device model, serial number and firmware version in your email or have it available if calling.

Technical Data

Power supply

Voltage	100-270 V AC ±10% Overvoltage category II per IEC 61010-1:2010
Frequency	50/60 Hz ±10%
Power consumption	Max 2 W

Voltage inputs

Measured voltage (Un)	Up to 400 V L-N / 690 V L-L (Wye) or 600 V L-L (Delta) UL listed up to 347 V L-N / 600 V L-L
Measurement by voltage transformer	Supported external VT with ratio up to 350
Measurement category	CAT III 600 V per IEC 61010-2-030
Frequency range(configurable)	47 – 53 Hz (50 Hz nominal)
	57 – 63 Hz (60 Hz nominal)
Network type	Single-phase / Two-phase / Two-phase with neutral / Three-phase / Three-phase with neutral
Impedance	5 MΩ
Overload	1.15 Un

Current inputs

Maximum CT primary	5000 A
Rated input current (Ib)	5 A
Supported CT	Supported external CT with ration up to 1000
Measured current	Up to 5000 mA
Starting current	0.001 Ib
Permissible current overload	6A continuous
	20 A 10 sec
	50 A 1 sec
Frequency range (configurable)	47 – 53 (50 Hz nominal)
	57 – 63 (60 Hz nominal)

Measuring characteristics

Accuracy class	0.5
Active power measurement precisions class	0.5
Reactive power measurement precision class	0.5
Power factor (PW) precision class	0.5
Frequency measurement precision class	0.5
Voltage harmonics	up to 31st harmonic

Current harmonics	up to 31st harmonic
Sampling rate	64 samples / cycle

Digital outputs

Number of outputs	3
Type	Form A solid state relay
Maximum load voltage	30 V AC / 60 V DC
Maximum load current	125 mA
ON resistance	8 Ω
Isolation	2500 V RMS for 1 minute

Communication

Interfaces	**10/100Mbps Ethernet**	1 port
		Modbus TCP, ICMP server, DHCP client, Lan Discovery, Web server
	RS 485	1 port
		Modbus RTU
		2.5 kV RMS, double isolated
Protocols		Modbus TCP
		Modbus RTU

Mechanical characteristics

Dimensions		88 x 94 x 58 mm (5 modules)
Net weight		300 g
Case	**Material**	Plastic, PC (UL 94 V-0)
	Mounting	35 mm DIN rail
	IP degree of protection	<IP40 - Not evaluated by UL

Environment

Operating temperature	-25 to 70 C°
Storage temperature	-40 to 80 C°
Relative humidity	5 to 95 % non-condensing
Altitude	<2000 m
Pollution degree	2

EMC

Harmonic emissions	IEC 61000-3-2	class A
Flicker limitations	IEC 61000-3-3	Compliant
Immunity to ESD	IEC 61000-4-2	Level 4
Immunity to radiated fields	IEC 61000-4-3	Level 3
Immunity to fast transients	IEC 61000-4-4	Level 4
Immunity to surges	IEC 61000-4-5	Level 4
Conducted RF disturbances	IEC 61000-4-6	Level 3
Immunity to magnetic fields	IEC 61000-4-8	Level 3
Immunity to voltage dips and interruptions	IEC 61000-4-11	Compliant
Radiated RF emissions	EN 55011 + EN 55016-2-3	Class A
Conducted RF emissions	EN 55011 + EN 55016-2-1	Class A

Safety

CE	Compliant to Low Voltage Directive 2014/35/EU and EMC Directive 2014/30/EU
Standards	EN 61010-1:2010
	EN 61010-2-030:2010
	EN 61326-1:2013
	EN 61000-6-2:2005 + AC:2005
	EN 61000-6-4:2007 + A1:2011
Protection class	Class II according to EN 61010-1:2010 Double insulated for user accessible parts

Sustainability

EU RoHS Directive	Compliant
Toxic heavy metal free	Yes
Mercury free	Yes
WEEE	At its end of service life, the product must be disposed of and recycled following specific waste collection regulations on EU markets.

Netico GmbH

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