Telnet/KSHELL

NETIO M2M API protocols docs

Protocol version: KSHELL V1.5

Short summary

Telnet/KSHELL protocol is command based M2M API protocol, where NETIO device supports Telnet connections and the defined command set can be used to read / write NETIO power outputs (230V power sockets or IEC-320 power outlets 110/230V). Metering is not supported.

- Telnet/KSHELL M2M API protocol must be enabled first in the WEB configuration of the respective device. For details, see the "NETIO WEB configuration" chapter.
- Most of NETIO devices supports 1 M2M protocol in 1 time only.

Supported devices

NETIO 4x Linux based devices: networked power sockets with LAN / WiFi connectivity.

- NETIO 4, 4All (obsolete products)
- NETIO PowerPDU 4C

Note: NETIO 4x firmware – 3.0.1 and later

Other NETIO devices: networked power sockets with LAN / WiFi connectivity.

- NETIO PowerCable REST 101x
- NETIO PowerBOX 3Px, 4Kx
- NETIO PowerDIN 4KZ
- NETIO PowerPDU 4PS, 8QS

Note: Firmware – 3.0.1 and later,
       There have to be enabled Telnet protocol (1 protocol only supported in one time)

Quick start with Telnet/KSHELL

Telnet connection to the NETIO device IP address and its Telnet port

NETIO Telnet/KSHELL basic Control command sequence

```
login <username> <password>
port <output> <action>
quit
```

<output> replace by output number
<action> replace by parameter: 0 - off, 1 - on, 2 - short off, 3 - short on, 4 - toggle

Example – log in user (username: *netiotelnet*, password: *telnet321*) and toggle output 1:

```
login netiotelnet telnet321<CR><LF>
port 1 4<CR><LF>
quit
```

General NETIO 4x output functions

Output status – "read" function (monitoring)

- **0** – Power **OFF**
- **1** – Power **ON**

Output actions – "write" function (control)

- **0 –** Turn **OFF**
- **1 –** Turn **ON**
- **2 –** Short OFF delay (restart)
- **3 –** Short ON delay
- **4 –** Toggle (invert the state)
- **5 –** No change

Short ON / OFF delay

This command switches a power output On / Off for a defined time. It is useful for example to power-cycle a server with a defined switch-off time, or to switch on a pump for a defined time.

This "short" delay is protected: the power output will remain in the defined state regardless of any other M2M requests received. During this time, the output state can only be changed by pressing the button on the NETIO device and this action cancel M2M short ON/OFF command for the particular output. Other requests to control the particular output are simply ignored.

The short ON / OFF delay interval can be defined in the device web administration. It is specified in ms (milliseconds) and rounded up to hundreds of miliseconds (0,1s).

Security issues

Do not use default usernames and passwords! Keep your Ethernet and WiFi networks secured.

Power-Up outputs state

All outputs are Off during the first 25 to 30 seconds after power-up.
After this time, all outputs are set to the selected state:

- **Last Output state**
  After a power outage, the NETIO device sets each power output to the last stored state of this one output. The current state of each power output (socket/power outlet) is internally stored every 8 seconds.

Note:　　　**Function Scheduler** is checked in Power-Up initialization. When enabled, it can affect one or more power output stated based on current time and date.
Custom based **Lua scripts** can affect output stated too.

WEB configuration + User rights

M2M API protocols can be enabled and configured only over the web administration – select "M2M API Protocols" in the left-hand side menu and then select the "Telnet/KSHELL" tab.

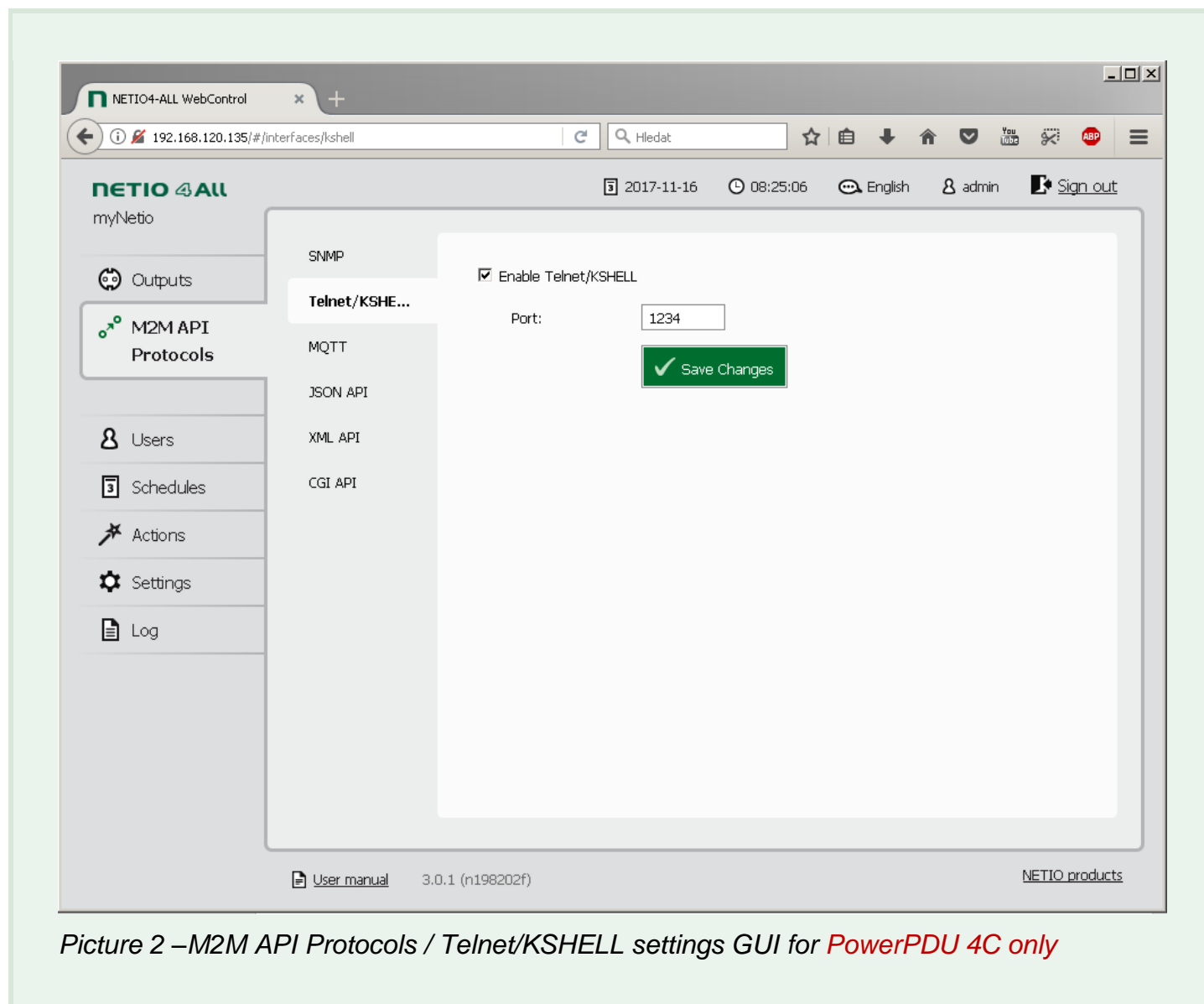Only 1 protocol can be activated in 1 time.
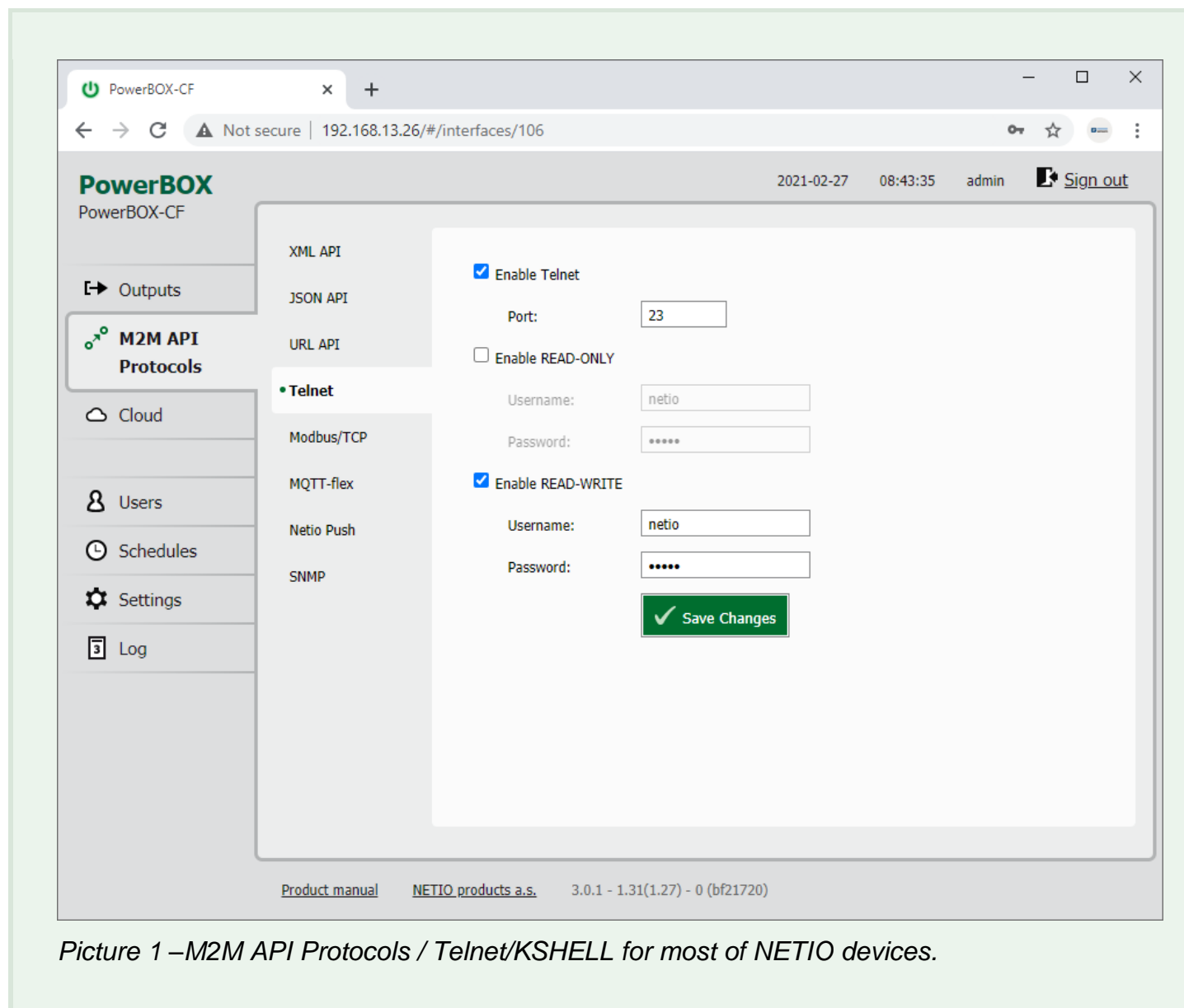
Picture 1 –M2M API Protocols / Telnet/KSHELL for most of NETIO devices.

- **Enable Telnet/KSHELL** – Enable/disable M2M API protocol
- **Port** – socket where Telnet is responding
- **Enable READ-ONLY –** Username & Password with read only rights for the outputs.

- **Enable READ-WRITE –** Username & Password for read / write to the outputs.
   - Default configuration is "netio" as user, and "netio" as password.

NETIO PowerPDU 4C WEB configuration + User rights

M2M API protocols can be enabled and configured only over the web administration – select "M2M API Protocols" in the left-hand side menu and then select the "Telnet/KSHELL" tab.
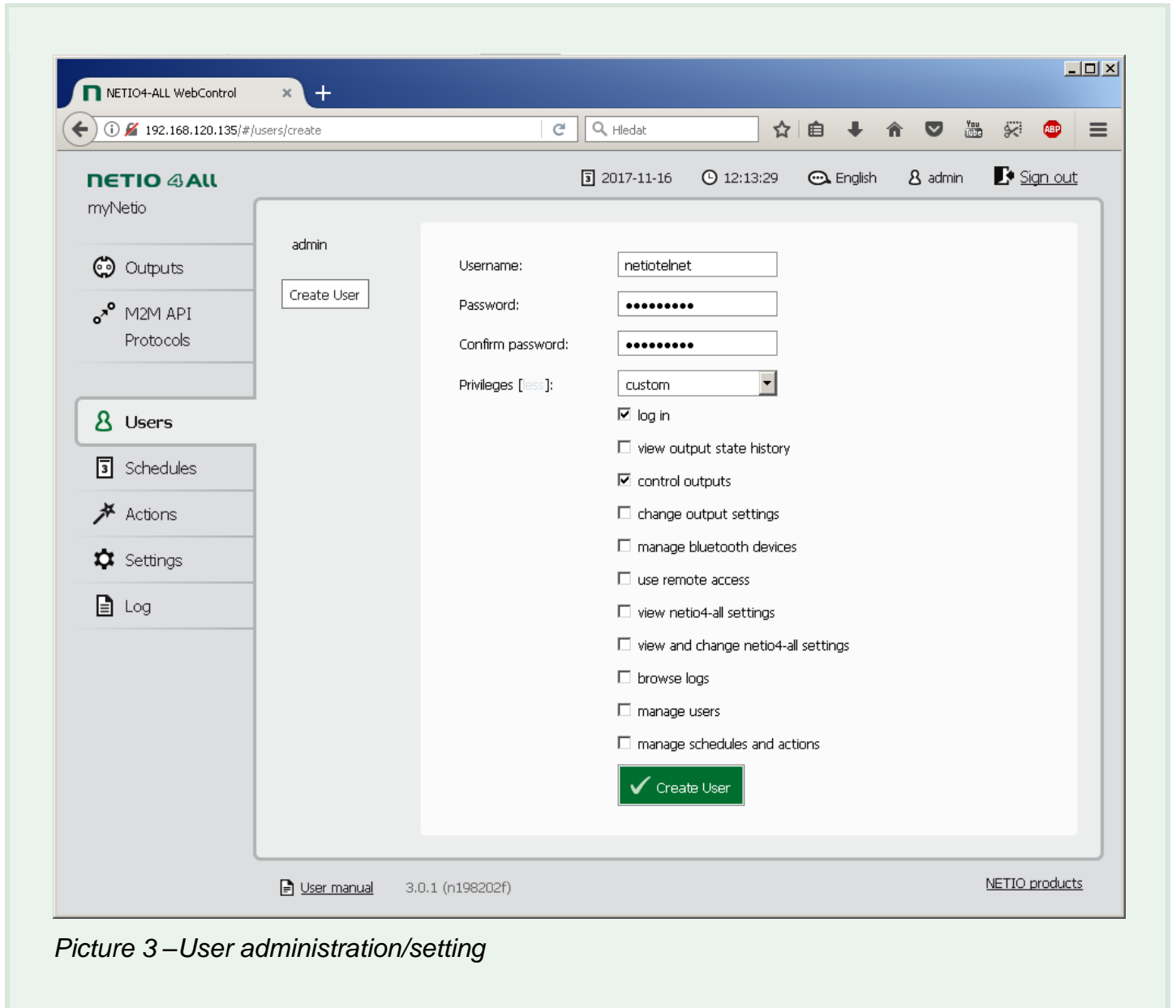

Picture 2 –M2M API Protocols / Telnet/KSHELL settings GUI for PowerPDU 4C only

- **Enable Telnet/KSHELL** – Enable/disable M2M API protocol
- **Port** – socket where Telnet is responding

User for Telnet

We recommend creating a special user with rights to control the Telnet M2M API only.

 It is possible in the web administration – select "Users" in the left-hand side menu and select the "Create User" button. Then enter username and password, click on "more" next to "Privileges" and select only "**log in**" and "**control outputs**" followed by click on the "Create User" button.

Picture 3 – User administration/setting

Note: *Valid for PowerPDU 4C (NETIO 4/4All) only.*
                         For other devices check previous chapter.

NETIO Telnet/KSHELL protocol structure

Telnet connection to an NETIO device IP address and its Telnet port.

When the connection is established the NETIO device return following response and is ready to receive commands.

Telnet welcome message

```
100 HELLO 00000000 - KSHELL V1.5
```

Note: Telnet connection is automatically terminated after 60 seconds of inactivity. It is possible to use command *noop* to keep connection alive for next 60 seconds.

Commands set

Command	Description
login <username> <password>	Log in an user <username> replace by username <password> replace by password Example – log in with username *admin* and password *passwd*: login admin passwd User must be defined in the web administration.
quit	Log out and terminate Telnet connection
noop	Keep Telnet connection alive for next 60 seconds No-operation
Port list [xxxx]	Control/monitor of all outputs based on the parameters *xxxx* (described below) for each output. All parameters *x* must have valid value otherwise the command will not be accepted (e.g. port list 10x1 is invalid). **If no parameters are provided, then it returns states of all outputs.** Outputs are numbered from the left to right (1-2-3-4).
port <output> <action>	Control/monitor of one specific output. <output> replace by output number <action> replace by parameter described below **If <action> is not provided, then it returns states of all outputs.**

Each command must be followed by CR and LF (in ASCII 0D and 0A). Typically, you can use Enter in the terminal.

Parameters for *port list* and *port* commands

Parameter	Action
0	Turn OFF
1	Turn ON
2	Short OFF delay (restart)
3	Short ON delay
4	Toggle (invert the state)
5	No change
i	Output restart (kept for backward compatibility with KSHELL)
u	No change (kept for backward compatibility with KSHELL)

Command examples

Switch Power output 1 to ON (with login + logout)**:**

```
login <username> <password><CR><LF>
port 1 1<CR><LF>
quit<CR><LF>
```

Toggle Power output 1 (with default username "netio" / password "netio" + login + logout)**:**

```
port 1 4<CR><LF>
```

```
70 6f 72 74 20 31 20 34 0d 0a
```

Switch Power outputs 1-4 to ON:

```
login <username> <password><CR><LF>
port list 1111<CR><LF>
quit
```

Switch Power outputs 1 and 3 to ON, output 4 to OFF and toggle output 2:

```
port list 1410<CR><LF>
```

Switch Power outputs 2 and 3 to ON and keep unchanged outputs 1and 4:
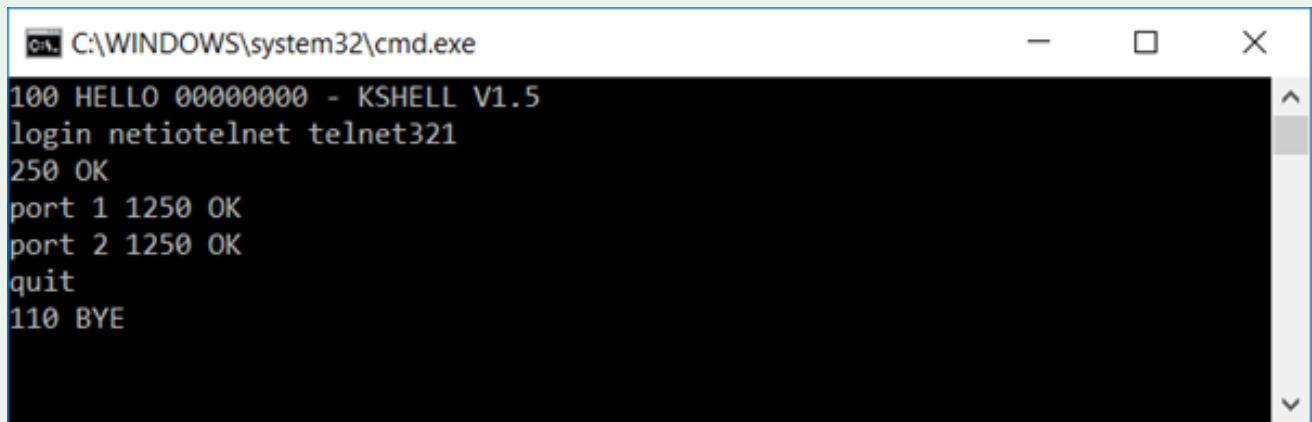
```
port list 5115<CR><LF>
```

Switch Power output 3 to OFF:

```
port 3 0<CR><LF>
```

Example of use in a Windows Terminal

Log in (username: *netiotelnet*, password: *telnet321*), turng outputs 1 and 2 ON and log out.

```
C:\WINDOWS\system32\cmd.exe                        —    □    ✕
100 HELLO 00000000 - KSHELL V1.5
login netiotelnet telnet321
250 OK
port 1 1250 OK
port 2 1250 OK
quit
110 BYE
```

Picture 4 – Windows Terminal

One-command control (Open & close TCP socket)

The outlets can be controlled also by one command using double-byte value in HEX (hexadecimal) and value 0D0A what substitutes Enter.

This option is suitable for control over **generic TCP socket**.

Control sting is created by sequence of commands converted in to HEX using ASCII (e.g. http://www.asciitable.com) and using 0D0A as Enter.

Example - Switch Power output 4 to ON by one-command:

6C	6F	67	69	6E	20	6E	65	74	69	6F	74	65	6C	6E	65	74	20	74	65	6C	6E	65	74	33	32	31	0D	0A	70	6F	72	74	20	34	20	31	0D	0A	71	75	69	74
l	o	g	i	n		n	e	t	i	o	t	e	l	n	e	t		t	e	l	n	e	t	3	2	1			p	o	r	t		4		1			q	u	i	t

"Enters" (<CR><LF>) are highlighted in yellow.

Complete command in HEX

```
6C6F67696E206E6574696F74656C6E65742074656C6E65743332310D0A706F72742034
20310D0A71756974
```

Status codes by TCP socket

Status code	Description
130 CONNECTION TIMEOUT	No command submitted longer than 60 seconds. Results in to a Telnet connection termination.
250 OK	The command accepted
501 INVALID PARAMETR	The command's parameter in not valid.
502 UNKNOWN COMMAND	The command is not valid.

Login, set **Output 1 = toggle**, logout

```
login netio netio<CR><LF>
port 1 4<CR><LF>
quit<CR><LF>

6c 6f 67 69 6e 20 6e 65 74 69 6f 20 6e 65 74 69 6f 0d 0a
70 6f 72 74 20 31 20 34 0d 0a
71 75 69 74 0d 0a
```

Login, set **Output 1 = 0**, logout

```
login netio netio<CR><LF>
port 1 0<CR><LF>
quit<CR><LF>

6c 6f 67 69 6e 20 6e 65 74 69 6f 20 6e 65 74 69 6f 0d 0a
70 6f 72 74 20 31 20 30 0d 0a
71 75 69 74 0d 0a
```

Login, set **Output 1 = 1**, logout

```
login netio netio<CR><LF>
port 1 1<CR><LF>
quit<CR><LF>

6c 6f 67 69 6e 20 6e 65 74 69 6f 20 6e 65 74 69 6f 0d 0a
70 6f 72 74 20 31 20 31 0d 0a
71 75 69 74 0d 0a
```

Login, set **Output 3 = toggle**, logout

```
login netio netio<CR><LF>
port 3 4<CR><LF>
quit<CR><LF>

6c 6f 67 69 6e 20 6e 65 74 69 6f 20 6e 65 74 69 6f 0d 0a
70 6f 72 74 20 33 20 34 0d 0a
71 75 69 74 0d 0a
```

Login, set **Output 3 = Short Off (restart)**, logout

```
login netio netio<CR><LF>
port 3 3<CR><LF>
quit<CR><LF>

6c 6f 67 69 6e 20 6e 65 74 69 6f 20 6e 65 74 69 6f 0d 0a
70 6f 72 74 20 33 20 33 0d 0a
71 75 69 74 0d 0a
```

FAQ

SSL (secure connection)
The NETIO Telnet/KSHELL M2M API Protocol currently **doesn't support** secured connections.

Uptime
The "Uptime" value is in seconds [s]

NETIO AN (Application Note)

AN10 Telnet control of electrical power sockets (M2M API – KSHELL)

NETIO 4x electrical sockets (NETIO 4 / 4All / 4C) can be controlled over a LAN using the Telnet M2M API protocol and KSHELL commands. The NETIO AN10 Application Note demonstrates how to use Telnet to control individual sockets, gives a brief description of the KSHELL protocol and shows examples how to test the communication in Windows using several utilities.

NETIO AN10: Telnet control of electrical power sockets (M2M API - KSHELL)
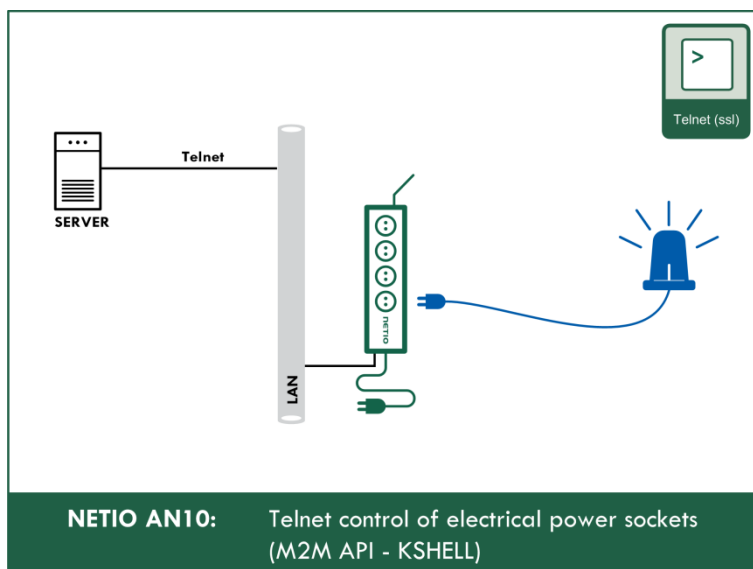
>> Read the AN10 on www.netio-products.com

Document history

Document Revision	Publication Date	Description
1.0	21.11.2017	Initial release - KSHELL V1.5, for FW 3.0.1
1.2	30.11.2018	AN10 description added
1.3	26.02.2021	New NETIO devices (PoweBOX 3Px, ..added)
1.4	03.03.2021	HEX commands extended