Modbus/TCP

NETIO M2M API protocols docs

Protocol version: NETIO Modbus/TCP specification v13

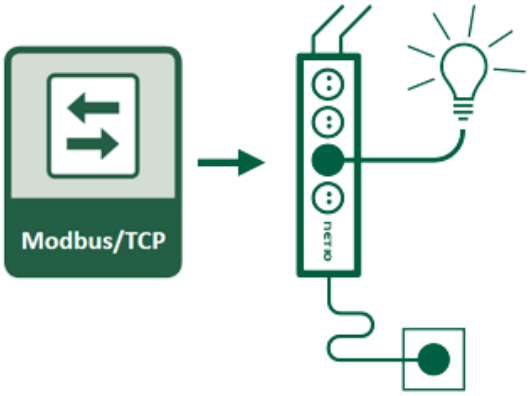
26.5.2022

Short summary

Modbus/TCP is a Modbus variant used for communications over TCP/IP networks, typically connecting over port 502. Modbus is a serial communications protocol originally published by Modicon (now Schneider Electric) in 1979 for use with its programmable logic controllers (PLCs).

Modbus has become a de facto standard communication protocol and is now a commonly available means of connecting industrial electronic devices.

Modbus/TCP is implemented in NETIO products as M2M API protocol. NETIO device is Modbus/TCP server (slave) sharing output states and energy measured values on the Bit / Bytes registers.



NETIO power outputs can be controlled with the Modbus/TCP protocol. Power Outputs can be power sockets 230V for PowerBOX 3Px/4Kx/PowerCable REST or power outlets IEC-320 110/230V for NETIO PowerPDU 4C/4PS/4KS/8QS/PowerCable REST or terminal blocks for PowerDIN 4PZ.

- Modbus/TCP M2M API protocol must be enabled in the WEB configuration of the device.
- To increase security, there is the **IP filter** on the web interface. You can define IP range of allowed IP addresses.

Supported devices

	Controlled outputs	Metered outputs
NETIO **PowerBOX 3Px**	**3**	**-**
NETIO **PowerBOX 4Kx**	**4**	***4***
NETIO **PowerCable REST 101x**	**1**	***1***
NETIO **PowerDIN 4PZ**	**4**	***2***
NETIO **PowerPDU 4C**	**4**	***4***
NETIO **PowerPDU 4PS**	**4**	**-**
NETIO **PowerPDU 4KS**	**4**	***4***
NETIO **PowerPDU 8QS**	**8**	***1 + all***

Modbus functions & properties

- **01** = Read Coils (NETIO: read On/Off state of one power output)
- **02** = Read Discrete Input (NETIO: read On/Off state of one Digital Input)
- **03** = Read Holding Registers (NETIO: read how many outputs available on the device)
- **04** = Read Input Registers (NETIO: read measurement values)
- **05** = Write Single Coil (NETIO: write On/Off state to one power output)
- **06** = Write Single Register (NETIO: write Action; (Toggle for example) to one power output)
- **15** (0x0F) = Write Multiple Coils
- **16** (0x10) = Write Multiple Registers

Protocol properties

- Modbus/TCP **Unit ID** is ignored. Can be anything 0 to 247
- Output number is the same as written on the device (1 to 4), here used as xx = 01 to 04.
- **Wire Address** = **Register Address** – **1**
  - The **Wire Address** **starts from 0**
  - The **Register Address** starts from **1**
  - Register Address is called “PLC based addressing” in some applications (Modbus Poll for example)
  - Some utilities use the Wire Address (QModMaster used in AN27 for example)

Quick start with Modbus/TCP & NETIO

Output (power socket) addressing

Output (power socket) number	**Register Address** (“R” = register type address as described below)		**Wire Address** (“R” = register type address as described below)	
(“x”)	**Format (“Rxx”)**	***Example***	Format (“Rxx”)	*Example*
1	**R02**	***102***	R01	*101*
2	**R03**	***103***	R02	*102*
3	**R04**	***104***	R03	*103*
4	**R05**	***105***	R04	*104*

How to monitor and control output as a Coil

Register Address	**R / W**	**Type**	**Function**	**Description**	**Read/Write Values**
1xx	R	bit	01	Read state of xx power sockets (0/False = off , 1/True = on)	0 or 1 False or True
1xx	W	bit	05	Set state to the xx output (0/False = off , 1/True = on)	0 or 1 False or True

Examples

Register Address	**Wire Address**	**R / W**	**Type**	**Function**	**Description**	**Read/Write Values**
102	101	W	bit	05	Set the **1st** output to On	1 True
104	103	W	bit	05	Set the **3rd** output to Off	0 False

- With function 05 write 1 (True) to Register address 102 to **switch Output 1 ON**
- With function 05 write 0 (False) to Register address 102 to **switch Output 1 OFF**
- With function 05 write 0 (False) to Register address 104 to **switch Output 3 OFF**

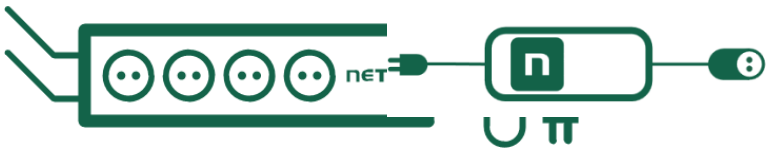
How to control output as a Holding register

Register Address	R / W	Type	Function	Description	Read/Write Values
1xx	R	uInt16	03	Read state of xx power socket output as 2 bytes value (0 or 1 as output Off/On)	0 or 1
1xx	W	uInt16	06	Set action to the xx output (0=off, 1=on, 2=short OFF, 3=short ON, 4=toggle, 5 = nothing)	0 to 5

Examples

Register Address	Wire Address	R / W	Type	Function	Description	Read/Write Values
102	101	R	uInt16	03	Read the **1st** output state	0 or 1
104	103	W	uInt16	06	Toggle the **3rd** output	4

- With function 03 Read **state of Output 1** from Register address 102 (Wire Address 101)
- With function 06 write 1 to Register address 102 to **switch Output 1 ON**
- With function 06 write 4 to Register address 102 to **Toggle Output 1**
- With function 06 write 4 to Register address 105 to **Toggle Output 4**



General NETIO output functions

Output Actions – “write” function

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

Output Status – “read” function

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

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 milliseconds (0,1s).

This interval is unique for Modbus/TCP protocol. It is valid only for a single protocol session (the following short ON / Short OFF command). When the connection is closed or restarted, the interval is reset to the device default value (defined in the web administration for each output).

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 seconds after power-up.
After this time, all outputs are set to the selected state:

- **ON** - switched on
- **OFF** - switched off
- **Last Output state** - After a power outage, the NETIO device sets power output to the last stored state of this one output.

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

Energy metering

- PowerBOX 4Kx
- PowerPDU 4C/4KS/8QS
- PowerDIN 4PZ
- PowerCable REST 101x

Note: Other NETIO devices do not support energy metering features.

Parameters for **each power output**:

Variable	Unit	Description
Current	mA	Immediate current for the specific power output
TPF (True Power Factor)	-	Immediate True Power Factor for the specific power output
Load	W	Immediate load for the specific power output
Phase	°	Phase shift between Current & Voltage 0° to 360°
Energy counter	Wh	Energy counter value for the specific power output (4Bytes)
Reverse Energy counter	Wh	Reverse Energy counter for the specific power output (4Bytes) - energy supplied by connected device back to power grid
Energy NR counter	Wh	NonResettable Energy counter for the specific power output (4Bytes)
ReverseEnergy NR counter	Wh	NonResettable Reverse Energy counter for the specific power output (4Bytes) - energy supplied by connected device back to power grid

Parameters for the **whole device**:

Variable	Unit	Description
Voltage	V	Immediate voltage
Frequency	Hz	Immediate frequency
TotalCurrent	mA	Immediate total current through all power outputs
Overall TPF	-	Immediate True Power Factor – weighted average from all meters
TotalLoad	W	Total Load of all power outputs (device's own internal consumption is not included)
TotalPhase	°	Total Phase shift between Current & Voltage 0° to 360°
TotalEnergy counter	Wh	Immediate value of the Total Energy counter (4Bytes)
TotalReverseEnergy counter	Wh	Total Reverse Energy counter (4Bytes) - energy supplied by connected devices back to power grid
TotalEnergy NR counter	Wh	NonResettable Total Energy counter (4Bytes)
TotalReverseEnergy NR counter	Wh	NonResettable Total Reverse Energy counter (4Bytes) - energy supplied by connected devices back to power grid

Energy NR counter / TotalEnergy NR counter

Energy NR counter and TotalEnergy NR counter are Read only values [Wh] and cannot be reset by the user. This also applies for ReverseEnergy NR counters.

Summary for PowerCable REST 101x:

Variable	Unit	Description
1x Voltage	V	Immediate voltage
1x Frequency	Hz	Immediate frequency
1x Current	mA	Immediate total current
1x TPF (True Power Factor)	-	Immediate True Power Factor
1x Load	W	Total Load of all power outputs
1x Phase	°	Phase shift between Current & Voltage 0° to 360°
1x Energy counter	Wh	Value of the Energy counter
1x ReverseEnergy counter	Wh	Value of the Reverse Energy counter
1x Energy NR counter	Wh	Read only register with Energy NR counter
1x ReverseEnergy NR counter	Wh	Read only register with ReverseEnergy NR counter
1x EnergyStart	-	Date and time of the last reset of energy counter

Digital Inputs (DI)

- PowerDIN 4PZ – 2 Digital Inputs
- PowerPDU 4KS – 1 Digital Input
- PowerPDU 8QS – 1 Digital Input

Note: Other NETIO devices do not support Digital Inputs.

Parameters for **each Digital Inputs**:

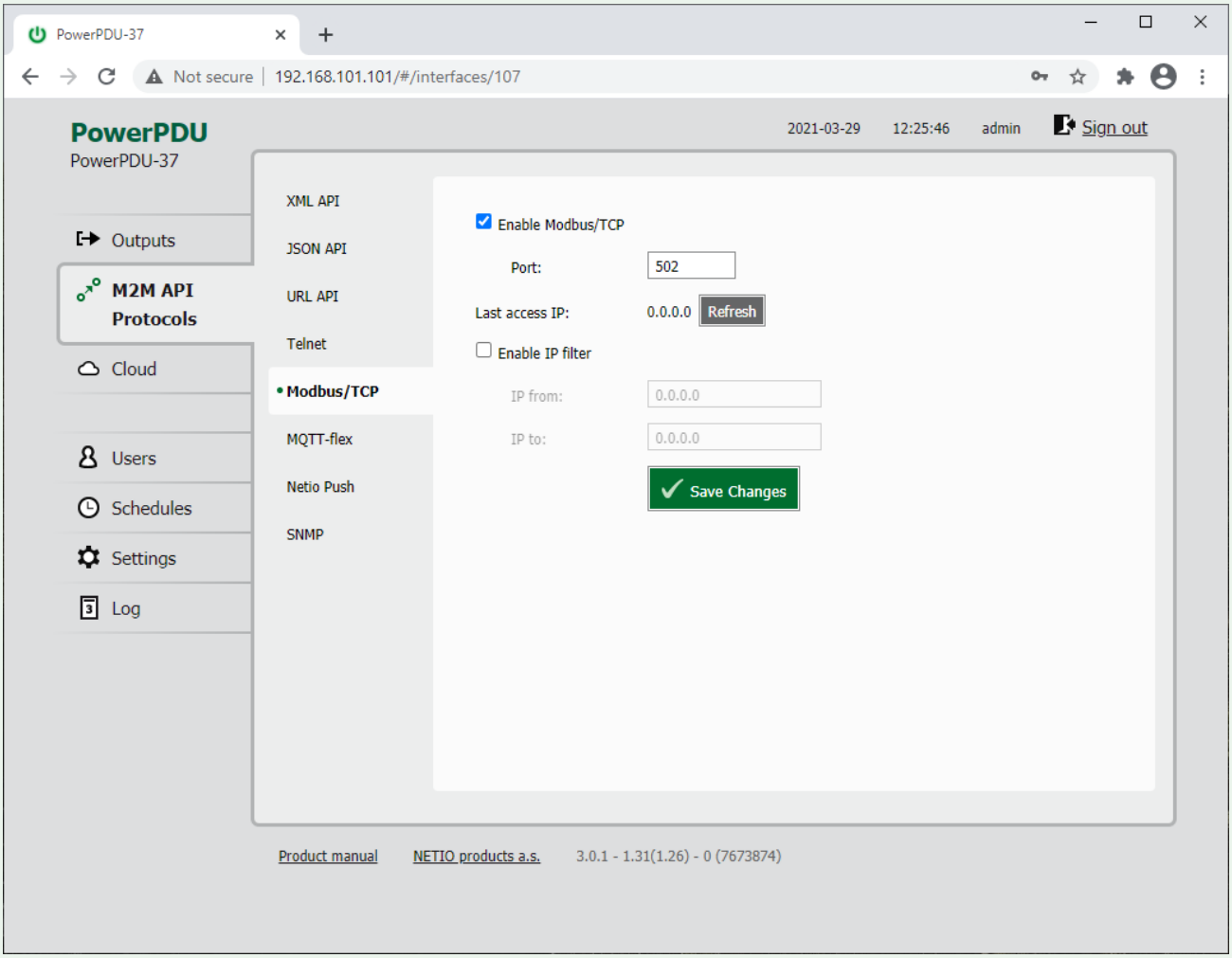
Variable	Description
Digital Input state	Immediate Digital Input state – open (0) / closed (1)
S0 counter	S0 counter for the specific Digital Input (4Bytes)

S0 counter

S0 counter is Read only and cannot be reset by user.

WEB configuration of Modbus/TCP

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 "Modbus/TCP" tab.



Picture 1 –M2M API Protocols / Modbus/TCP settings GUI

- **Enable Modbus/TCP** – Enable/disable M2M API protocol
- **Port** – socket where Modbus/TCP is responding
- **Last access IP** – The last IP address used by Modbus/TCP communication has come to this device from. There should be IP of your computer when you testing it on simple LAN
- **Enable WRITE (Enable output control)** – Enable write function thus output control. Only read – monitoring function if not checked.
- **Enable IP filter** – Apply basic security – only IP addresses from defined range are allowed to communicate over Modbus/TCP M2M API protocol
    - **Start IP** – Start IP of the "safe" range
    - **End IP (including)** – End IP of the "safe" range including this address

NETIO Modbus/TCP registers

int16 2B signed (integer)
uInt16 2B unsigned (word)
uInt32 4B unsigned (long)

Output (power socket) addressing

Output (power socket) number	**Register Address** (“R” = register type address as described below)		**Wire Address** (“R” = register type address as described below)	
(“x”)	**Format (“Rxx”)**	***Example***	Format (“Rxx”)	*Example*
1	**R02**	***102***	R01	*101*
2	**R03**	***103***	R02	*102*
3	**R04**	***104***	R03	*103*
4	**R05**	***105***	R04	*104*

Digital Inputs addressing - PowerDIN 4PZ / PowerPDU 4KS / PowerPDU 8QS

Digital Input number	**Register Address** (“R” = register type address as described below)		**Wire Address** (“R” = register type address as described below)	
(“x”)	**Format (“Rxx”)**	***Example***	Format (“Rxx”)	*Example*
1	**R02**	***802***	R01	*801*
2	**R03**	***803***	R02	*802*

Holding registers – NETIO I/O Configuration

Register Address	R / W	Type	Function	Description	Read Values
1	R	uInt16	03	How many Digital Inputs are on the device	0 – 2
2	R	uInt16	03	How many Digital Outputs (Power Sockets/Outlets) are on the device	1 – 4
3	R	uInt16	03	How many Power Sockets/Outlets with metered outputs	0 – 4

Example: Amount of outputs on the device

Register Address	Wire Address	R / W	Type	Function	Description	Read Values
2	1	R	uInt16	03	How many Digital Outputs (Power Sockets/Outlets) are on the device	4

Coils – NETIO I/O control COILS block

It's possible to control each power socket output only as 0/1 bit with the coils via Modbus/TCP.

Register Address	R / W	Type	Function	Description	Read/Write Values
1xx	R	bit	01	Read state of xx power sockets (0/False = off , 1/True = on)	0 or 1 False or True
1xx	W	bit	05	Set state of the xx output (0/False = off , 1/True = on)	0 or 1 False or True

Example: Set output

Register Address	Wire Address	R / W	Type	Function	Description	Read/Write Values
102	101	W	bit	05	Set the **1st** output to On	1 True
104	103	W	bit	05	Set the **3rd** output to Off	0 False

Discrete Input – NETIO Digital Input state

It's possible to read a state of Digital Input as 0/1 bit using the Discrete Input via Modbus/TCP.

Register Address	R / W	Type	Function	Description	Read Values
8xx	R	bit	02	Read state of xx Digital Input (0/False = open , 1/True = closed)	0 or 1 False or True

Example: Read DI (Digital Inputs)

Register Address	Wire Address	R / W	Type	Function	Description	Read Values
802	801	R	bit	02	Read 1st DI state	0 / 1 False / True

Note: Inputs (register address 8xx) are available only for NETIO PowerDIN 4PZ and PowerPDU 4KS/8QS devices.

Holding registers – NETIO I/O control WORD block

We recommend to use the registers to control the NETIO device.
It's possible to write not only 0/1 as with coil bit output, but even standard NETIO output actions like Toggle or Short On / Short Off.

Register Address	R / W	Type	Function	Description	Read/Write Values
1xx	R	uInt16	03	Read state of xx power socket output as 2 bytes value (0 or 1 as output Off/On)	0 or 1
1xx	W	uInt16	06	Set action to the xx output (0=off, 1=on, 2=short OFF, 3=short ON, 4=toggle, 5 = nothing)	0 to 5
2xx	R	uInt16	03	Read "short" delay time for xx output (short ON/OFF time). Value in tenth of a seconds (1/10s) e.g. 50 = 5sec	0 to 2^{16}-1
2xx	W	uInt16	06	Write "short" delay time for xx output (short ON/OFF time). Value in tenth of a seconds (1/10s) e.g. 50 = 5sec	0 to 2^{16}-1
8xx	R	uInt16	03	Read state of xx Input as 2 bytes value (0 or 1 as output Open/ Closed)	0 or 1

Note 1: Wire Address = Register Address – 1

Note 2: Inputs (register address 8xx) are available only for NETIO PowerDIN 4PZ and PowerPDU 4KS/8QS devices.

Examples

Register Address	Wire Address	R / W	Type	Function	Description	Read/Write Values
102	101	R	uInt16	03	Read state of 1st power socket as 2 bytes value (0 or 1 as output)	0 or 1
105	104	R	uInt16	03	Read state of 4th power socket as 2 bytes value (0 or 1 as output)	0 or 1
102	101	W	uInt16	06	Toggle output 1 (Power socket /outlet)	4
105	104	W	uInt16	06	Toggle output 4 (Power socket /outlet)	4
202	201	R	uInt16	03	Read "short" delay time of 1st power socket, which is for example 2000ms	20
205	204	R	uInt16	03	Read "short" delay time of 1st power socket, which is for example 50s	500
802	801	R	uInt16	03	Read state of 1st DI as 2 bytes value (0 or 1 as output)	0 or 1
803	802	R	uInt16	03	Read state of 2nd DI as 2 bytes value (0 or 1 as output)	0 or 1

Input registers – NETIO measure block

Register Address	R / W	Type	Function	Description	Read Values
1	R	uInt16	04	Power grid frequency [Hz*100]	0 to 2^{16}-1
2	R	uInt16	04	Voltage [V*10] – RMS	0 to 2^{16}-1
3	R	uInt16	04	TPF (True Power Factor) [-], value = TruePowerFactor / 1000	0 to 2^{16}-1
4	R	uInt16	04	All outputs current [mA]	0 to 2^{16}-1
5	R	int16	04	All outputs power [W]	-2^{15} to 2^{15}-1
6	R	uInt16	04	All outputs Phase shift [° 1/10]	0 to 2^{16}-1

Note: Non-metering devices return zero value for such reads.

Examples

Register Address	Wire Address	R / W	Type	Function	Description	Read Values
1	0	R	uInt16	04	Power grid frequency 50 Hz	5000
2	1	R	uInt16	04	Voltage [V*10] – RMS, which for example say 232 V	2320
3	2	R	int16	04	Overall TPF (True Power factor) [-] , value = TruePowerFactor / 1000, example 0.853 (value 9999=not measured)	853
4	3	R	uInt16	04	All outputs current 800 mA	800
5	4	R	int16	04	All outputs power 5 W	5
6	5	R	int16	04	All outputs Phase shift 180,3° (value 9999=not measured)	1803

Input registers – NETIO energy block

Registers are available on the energy metering devices only, other models return zero value.

Register Address	R / W	Type	Function	Description	Read Values
1xx	R	uInt16	04	xx Output current [mA] – RMS (xx = Output number, 01 for whole device)	0 to 2^{16}-1
2xx	R	int16	04	xx Output power [W] – Instantaneous RMS (xx = Output number, 01 for whole device)	-2^{15} to 2^{15}-1
300+01+**x***2	R	uInt32	04	**x** Output Energy counter [Wh] - 4B value, these are **2 upper Bytes** (**x** = Output number, 0 for whole device)	0 to 2^{32}-1
300+01+**x***2+1	R		04	**x** Output Energy counter [Wh] - 4B value, these are **2 lower Bytes** (**x** = Output number, 0 for whole device)	
4xx	R	uInt16	04	xx Output TPF [-] / 1000 (xx = Output number, 01 for whole device)	0 to 2^{16}-1
5xx	R	Int16	04	xx Phase shift [°] / 10 (xx = Output number, 01 for whole device)	-2^{15} to 2^{15}-1
600+01+**x***2	R	uInt32	04	**x** Output ReverseEnergy counter [Wh] - 4B value, these are **2 upper Bytes** (**x** = Output number, 0 for whole device)	0 to 2^{32}-1
600+01+**x***2+1	R		04	**x** Output ReverseEnergy counter [Wh] - 4B value, these are **2 lower Bytes** (**x** = Output number, 0 for whole device)	
800+01+**x***2	R	uInt32	04	**x** Input S0 counter - 4B value, these are **2 upper Bytes**	0 to 2^{32}-1
800+01+**x***2+1	R		04	**x** Input S0 counter - 4B value, these are **2 lower Bytes**	
1000+01+**x***2	R	uInt32	04	**x** Output Energy counter **NR** [Wh] - 4B value, these are **2 upper Bytes** (**x** = Output number, 0 for whole device)	0 to 2^{32}-1
1000+01+**x***2+1	R		04	**x** Output Energy counter **NR** [Wh] - 4B value, these are **2 lower Bytes** (**x** = Output number, 0 for whole device)	
1100+01+**x***2	R	uInt32	04	**x** Output ReverseEnergy counter **NR** [Wh] - 4B value, these are **2 upper Bytes** (**x** = Output number, 0 for whole device)	0 to 2^{32}-1
1100+01+**x***2+1	R		04	**x** Output ReverseEnergy counter **NR** [Wh] - 4B value, these are **2 lower Bytes** (**x** = Output number, 0 for whole device)	

Note 1: Inputs S0 counters (reg. address 8xx) are available only for NETIO PowerDIN 4PZ and PowerPDU 4KS/8QS devices.

Examples

Register Address	Wire Address	R / W	Type	Function	Description	Read Values
102	101	R	uInt16	04	1st Output current 180 mA RMS	180
101	100	R	uInt16	04	Whole device (all outputs together) current 800 mA RMS	800
303	302	R	uInt16	04	1st Output energy counter 1135 Wh - 4B value, these are 2 upper Bytes	0 (uInt16)
304	303	R	uInt16	04	1st Output energy counter 1135 Wh - 4B value, these are 2 lower Bytes	1135 (uInt16)
309	308	R	uInt16	04	4th Output energy counter 950 Wh - 4B value, this are 2 upper Bytes	0 (uInt16)
310	309	R	uInt16	04	4th Output energy counter 950 Wh - 4B value, this are 2 lower Bytes	950 (uInt16)
301	300	R	uInt16	04	All Output energy counter 3092 Wh - 4B value, these are 2 upper Bytes	0 (uInt16)
302	301	R	uInt16	04	All Output energy counter 3092 Wh - 4B value, these are 2 lower Bytes	3092 (uInt16)
803	802	R	uInt16	04	1st DI S0 counter 143648 - 4B value, these are 2 upper Bytes	0 (uInt16)
804	803	R	uInt16	04	1st DI S0 counter 143648 - 4B value, these are 2 lower Bytes	143648 (uInt16)
1001	1000	R	uInt16	04	All Output energy counter NR 5164 Wh - 4B value, these are 2 upper Bytes	0 (uInt16)
1002	1001	R	uInt16	04	All Output energy counter NR 5164 Wh - 4B value, these are 2 lower Bytes	5164 (uInt16)
1103	1102	R	uInt16	04	1st Output Energy counter NR 11487 Wh - 4B value, these are 2 upper Bytes	0 (uInt16)
1104	1103	R	uInt16	04	1st Output Energy counter NR 11487 Wh - 4B value, these are 2 lower Bytes	11487 (uInt16)

NETIO PowerCable REST

Function	Register	Value	Description
0x01	102(101)	0/1	Read 1st output state (101 when Wire address used)
0x03	1	uInt16	Number of digital inputs
0x03	2	uInt16	Number of digital outputs
0x03	3	uInt16	Number of metered digital outputs
0x03	102	uInt16	1st output state
0x03	202	uInt16	"Short" delay of 1st output [1/10sec]
0x04	1	uInt16	Power grid frequency [1/100 Hz]
0x04	2	uInt16	Voltage [1/10 V] – RMS
0x04	3	uInt16	OverAll TruePowerFactor [1/1000]
0x04	4	uInt16	All outputs current [mA] (double)
0x04	5	uInt16	All outputs power [W] (double)
0x04	6	Int16	All outputs Phase shift [1/10°]
0x04	101	uInt16	All outputs current [mA]
0x04	102	uInt16	1st output current [mA]
0x04	201	uInt16	All outputs power [W]
0x04	202	uInt16	1st output power [W]
0x04	301	uInt16	All outputs energy counter - 2 upper bytes [Wh]
0x04	302	uInt16	All outputs energy counter - 2 lower bytes [Wh]
0x04	303	uInt16	1st output energy counter - 2 upper bytes [Wh]
0x04	304	uInt16	1st output energy counter - 2 lower bytes [Wh]
0x04	402	uInt16	1st output TPF [1/1000]
0x04	502	Int16	1st output Phase shift [1/10°]
0x04	601	uInt16	All out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	602	uInt16	All out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	603	uInt16	1st out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	604	uInt16	1st out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	1001	uInt16	All outputs energy cnt. NR - 2 upper bytes [Wh]
0x04	1002	uInt16	All outputs energy cnt. NR - 2 lower bytes [Wh]
0x04	1003	uInt16	1st outputs energy cnt. NR - 2 upper bytes [Wh]
0x04	1004	uInt16	1st outputs energy cnt. NR - 2 lower bytes [Wh]
0x04	1101	uInt16	All out. reverseEnergy cnt. NR - 2up.bytes [Wh]
0x04	1102	uInt16	All out. reverseEnergy cnt. NR - 2lo.bytes [Wh]
0x04	1103	uInt16	1st out. reverseEnergy cnt. NR - 2up.bytes [Wh]
0x04	1104	uInt16	1st out. reverseEnergy cnt. NR - 2lo.bytes [Wh]

0x05	102	0/1	Write On/Off to 1st output
0x06	102	uInt16	Set action to 1st output
0x06	202	uInt16	Set "Short" delay of 1st output [1/10sec]

NETIO PowerPDU 4C

Function	Register	Value	Description
0x01	102(101)	0/1	Read 1st output state (101 when Wire address used)
0x01	103	0/1	Read 2nd output state
0x01	104	0/1	Read 3rd output state
0x01	105	0/1	Read 4th output state
0x03	1	uInt16	Number of digital inputs
0x03	2	uInt16	Number of digital outputs
0x03	3	uInt16	Number of metered digital outputs
0x03	102	uInt16	1st output state
0x03	103	uInt16	2nd output state
0x03	104	uInt16	3rd output state
0x03	105	uInt16	4th output state
0x03	202	uInt16	"Short" delay of 1st output [1/10sec]
0x03	203	uInt16	"Short" delay of 2nd output [1/10sec]
0x03	204	uInt16	"Short" delay of 3rd output [1/10sec]
0x03	205	uInt16	"Short" delay of 4th output [1/10sec]
0x04	1	uInt16	Power grid frequency [1/100 Hz]
0x04	2	uInt16	Voltage [1/10 V] - RMS
0x04	3	uInt16	OverAll TruePowerFactor [1/1000]
0x04	101	uInt16	All outputs current [mA]
0x04	102	uInt16	1st output current [mA]
0x04	103	uInt16	2nd output current [mA]
0x04	104	uInt16	3rd output current [mA]
0x04	105	uInt16	4th output current [mA]
0x04	201	uInt16	All outputs power [W]
0x04	202	uInt16	1st output power [W]
0x04	203	uInt16	2nd output power [W]
0x04	204	uInt16	3rd output power [W]
0x04	205	uInt16	4th output power [W]
0x04	301	uInt16	All outputs energy counter - 2 upper bytes [Wh]
0x04	302	uInt16	All outputs energy counter - 2 lower bytes [Wh]
0x04	303	uInt16	1st output energy counter - 2 upper bytes [Wh]
0x04	304	uInt16	1st output energy counter - 2 lower bytes [Wh]

0x04	305	uInt16	2nd output energy counter - 2 upper bytes [Wh]
0x04	306	uInt16	2nd output energy counter - 2 lower bytes [Wh]
0x04	307	uInt16	3rd output energy counter - 2 upper bytes [Wh]
0x04	308	uInt16	3rd output energy counter - 2 lower bytes [Wh]
0x04	309	uInt16	4th output energy counter - 2 upper bytes [Wh]
0x04	310	uInt16	4th output energy counter - 2 lower bytes [Wh]
0x05	102	0/1	Turn On/Off 1st output (Write)
0x05	103	0/1	Turn On/Off 2nd output
0x05	104	0/1	Turn On/Off 3rd output
0x05	105	0/1	Turn On/Off 4th output
0x06	102	uInt16	Set action to 1st output
0x06	103	uInt16	Set action to 2nd output
0x06	104	uInt16	Set action to 3rd output
0x06	105	uInt16	Set action to 4th output
0x06	202	uInt16	Set "Short" delay of 1st output [1/10sec]
0x06	203	uInt16	Set "Short" delay of 2nd output [1/10sec]
0x06	204	uInt16	Set "Short" delay of 3rd output [1/10sec]
0x06	205	uInt16	Set "Short" delay of 4th output [1/10sec]

NETIO PowerPDU 4PS

Function	Register	Value	Description
0x01	102(101)	0/1	Read 1st output state (101 when Wire address used)
0x01	103	0/1	Read 2nd output state
0x01	104	0/1	Read 3rd output state
0x01	105	0/1	Read 4th output state
0x03	1	uInt16	Number of digital inputs
0x03	2	uInt16	Number of digital outputs
0x03	3	uInt16	Number of metered digital outputs
0x03	102	uInt16	1st output state
0x03	103	uInt16	2nd output state
0x03	104	uInt16	3rd output state
0x03	105	uInt16	4th output state
0x03	202	uInt16	"Short" delay of 1st output [1/10sec]
0x03	203	uInt16	"Short" delay of 2nd output [1/10sec]
0x03	204	uInt16	"Short" delay of 3rd output [1/10sec]
0x03	205	uInt16	"Short" delay of 4th output [1/10sec]
0x05	102	0/1	Turn On/Off 1st output (Write)
0x05	103	0/1	Turn On/Off 2nd output
0x05	104	0/1	Turn On/Off 3rd output
0x05	105	0/1	Turn On/Off 4th output
0x06	102	uInt16	Set action to 1st output
0x06	103	uInt16	Set action to 2nd output
0x06	104	uInt16	Set action to 3rd output
0x06	105	uInt16	Set action to 4th output
0x06	202	uInt16	Set "Short" delay of 1st output [1/10sec]
0x06	203	uInt16	Set "Short" delay of 2nd output [1/10sec]
0x06	204	uInt16	Set "Short" delay of 3rd output [1/10sec]
0x06	205	uInt16	Set "Short" delay of 4th output [1/10sec]

NETIO PowerBOX 3Px

Function	Register	Value	Description
0x01	102(101)	0/1	Read 1st output state (101 when Wire address used)
0x01	103	0/1	Read 2nd output state
0x01	104	0/1	Read 3rd output state
0x03	1	uInt16	Number of digital inputs
0x03	2	uInt16	Number of digital outputs
0x03	3	uInt16	Number of metered digital outputs
0x03	102	uInt16	1st output state
0x03	103	uInt16	2nd output state
0x03	104	uInt16	3rd output state
0x03	202	uInt16	"Short" delay of 1st output [1/10sec]
0x03	203	uInt16	"Short" delay of 2nd output [1/10sec]
0x03	204	uInt16	"Short" delay of 3rd output [1/10sec]
0x05	102	0/1	Turn On/Off 1st output (Write)
0x05	103	0/1	Turn On/Off 2nd output
0x05	104	0/1	Turn On/Off 3rd output
0x06	102	uInt16	Set action to 1st output
0x06	103	uInt16	Set action to 2nd output
0x06	104	uInt16	Set action to 3rd output
0x06	202	uInt16	Set "Short" delay of 1st output [1/10sec]
0x06	203	uInt16	Set "Short" delay of 2nd output [1/10sec]
0x06	204	uInt16	Set "Short" delay of 3rd output [1/10sec]

NETIO PowerDIN 4PZ

Function	Register	Value	Description
0x01	102(101)	0/1	Read 1st output state (101 when Wire address used)
0x01	103	0/1	Read 2nd output state
0x01	104	0/1	Read 3rd output state
0x01	105	0/1	Read 4th output state
0x02	802	0/1	Read 1st input state
0x02	803	0/1	Read 2nd input state
0x03	1	uInt16	Number of digital inputs
0x03	2	uInt16	Number of digital outputs
0x03	3	uInt16	Number of metered digital outputs
0x03	102	uInt16	1st output state
0x03	103	uInt16	2nd output state
0x03	104	uInt16	3rd output state
0x03	105	uInt16	4th output state
0x03	202	uInt16	"Short" delay of 1st output [1/10sec]
0x03	203	uInt16	"Short" delay of 2nd output [1/10sec]
0x03	204	uInt16	"Short" delay of 3rd output [1/10sec]
0x03	205	uInt16	"Short" delay of 4th output [1/10sec]
0x03	802	uInt16	1st input state
0x03	803	uInt16	2nd input state
0x04	1	uInt16	Power grid frequency [1/100 Hz]
0x04	2	uInt16	Voltage [1/10 V] - RMS
0x04	3	uInt16	OverAll TruePowerFactor [1/1000]
0x04	4	uInt16	All outputs current [mA] (double)
0x04	5	uInt16	All outputs power [W] (double)
0x04	6	Int16	All outputs Phase shift [1/10°]
0x04	101	uInt16	All outputs current [mA]
0x04	102	uInt16	1st output current [mA]
0x04	103	uInt16	2nd output current [mA]
0x04	201	uInt16	All outputs power [W]
0x04	202	uInt16	1st output power [W]
0x04	203	uInt16	2nd output power [W]
0x04	301	uInt16	All outputs energy counter - 2 upper bytes [Wh]
0x04	302	uInt16	All outputs energy counter - 2 lower bytes [Wh]
0x04	303	uInt16	1st output energy counter - 2 upper bytes [Wh]
0x04	304	uInt16	1st output energy counter - 2 lower bytes [Wh]
0x04	305	uInt16	2nd output energy counter - 2 upper bytes [Wh]
0x04	306	uInt16	2nd output energy counter - 2 lower bytes [Wh]

0x04	402	uInt16	1st output TPF [1/1000]
0x04	403	uInt16	2nd output TPF [1/1000]
0x04	502	Int16	1st output Phase shift [1/10°]
0x04	503	Int16	2nd output Phase shift [1/10°]
0x04	601	uInt16	All out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	602	uInt16	All out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	603	uInt16	1st out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	604	uInt16	1st out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	605	uInt16	2nd out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	606	uInt16	2nd out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	803	uInt16	1st digital input S0 counter - 2 upper bytes
0x04	804	uInt16	1st digital input S0 counter - 2 lower bytes
0x04	805	uInt16	2nd digital input S0 counter - 2 upper bytes
0x04	806	uInt16	2nd digital input S0 counter - 2 lower bytes
0x04	1001	uInt16	All out. energy cnt. NR - 2 upper bytes [Wh]
0x04	1002	uInt16	All out. energy cnt. NR - 2 lower bytes [Wh]
0x04	1003	uInt16	1st out. energy cnt. NR - 2 upper bytes [Wh]
0x04	1004	uInt16	1st out. energy cnt. NR - 2 lower bytes [Wh]
0x04	1005	uInt16	2nd out. energy cnt. NR - 2 upper bytes [Wh]
0x04	1006	uInt16	2nd out. energy cnt. NR - 2 lower bytes [Wh]
0x04	1101	uInt16	All out. reverseEnergy cnt. NR - 2up.bytes [Wh]
0x04	1102	uInt16	All out. reverseEnergy cnt. NR - 2lo.bytes [Wh]
0x04	1103	uInt16	1st out. reverseEnergy cnt. NR - 2up.bytes [Wh]
0x04	1104	uInt16	1st out. reverseEnergy cnt. NR - 2lo.bytes [Wh]
0x04	1105	uInt16	2nd out. reverseEnergy cnt. NR - 2up.bytes [Wh]
0x04	1106	uInt16	2nd out. reverseEnergy cnt. NR - 2lo.bytes [Wh]
0x05	102	0/1	Turn Off/On 1st output (Write)
0x05	103	0/1	Turn Off/On 2nd output
0x05	104	0/1	Turn Off/On 3rd output
0x05	105	0/1	Turn Off/On 4th output
0x06	102	uInt16	Set action to 1st output
0x06	103	uInt16	Set action to 2nd output
0x06	104	uInt16	Set action to 3rd output
0x06	105	uInt16	Set action to 4th output
0x06	202	uInt16	Set "Short" delay of 1st output [1/10sec]
0x06	203	uInt16	Set "Short" delay of 2nd output [1/10sec]
0x06	204	uInt16	Set "Short" delay of 3rd output [1/10sec]
0x06	205	uInt16	Set "Short" delay of 4th output [1/10sec]

NETIO PowerPDU 4KS

Function	Register	Value	Description
0x01	102(101)	0/1	Read 1st output state (101 when Wire address used)
0x01	103	0/1	Read 2nd output state
0x01	104	0/1	Read 3rd output state
0x01	105	0/1	Read 4th output state
0x02	802	0/1	Read 1st input state
0x03	1	uInt16	Number of digital inputs
0x03	2	uInt16	Number of digital outputs
0x03	3	uInt16	Number of metered digital outputs
0x03	102	uInt16	1st output state
0x03	103	uInt16	2nd output state
0x03	104	uInt16	3rd output state
0x03	105	uInt16	4th output state
0x03	202	uInt16	"Short" delay of 1st output [1/10sec]
0x03	203	uInt16	"Short" delay of 2nd output [1/10sec]
0x03	204	uInt16	"Short" delay of 3rd output [1/10sec]
0x03	205	uInt16	"Short" delay of 4th output [1/10sec]
0x03	802	uInt16	1st input state
0x04	1	uInt16	Power grid frequency [1/100 Hz]
0x04	2	uInt16	Voltage [1/10 V] – RMS
0x04	3	uInt16	OverAll TruePowerFactor [1/1000]
0x04	4	uInt16	All outputs current [mA] (double)
0x04	5	uInt16	All outputs power [W] (double)
0x04	6	Int16	All outputs Phase shift [1/10°]
0x04	101	uInt16	All outputs current [mA]
0x04	102	uInt16	1st output current [mA]
0x04	103	uInt16	2nd output current [mA]
0x04	104	uInt16	3rd output current [mA]
0x04	105	uInt16	4th output current [mA]
0x04	201	uInt16	All outputs power [W]
0x04	202	uInt16	1st output power [W]
0x04	203	uInt16	2nd output power [W]
0x04	204	uInt16	3rd output power [W]
0x04	205	uInt16	4th output power [W]
0x04	301	uInt16	All outputs energy counter - 2 upper bytes [Wh]
0x04	302	uInt16	All outputs energy counter - 2 lower bytes [Wh]
0x04	303	uInt16	1st output energy counter - 2 upper bytes [Wh]
0x04	304	uInt16	1st output energy counter - 2 lower bytes [Wh]

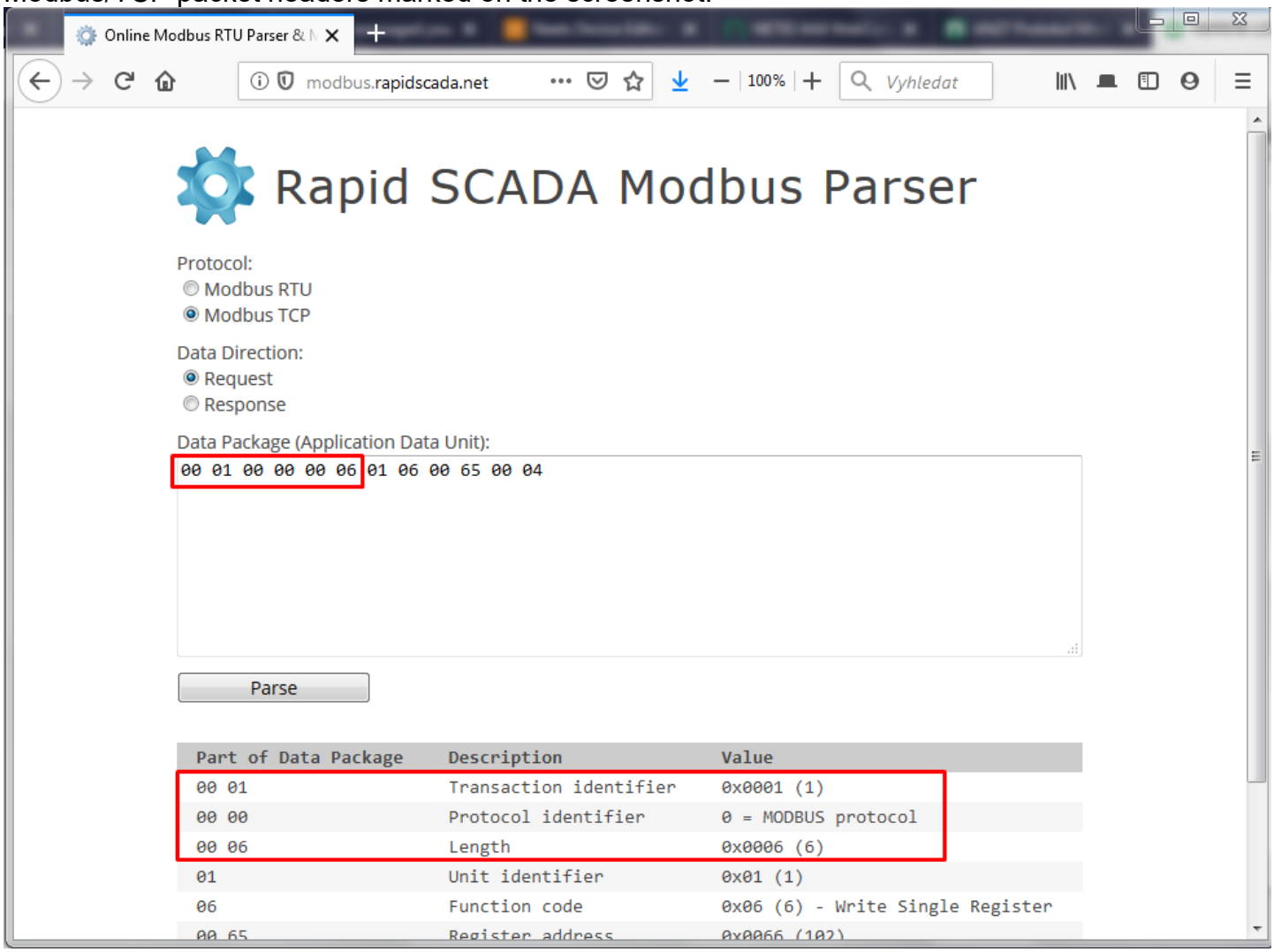
0x04	305	uInt16	2nd output energy counter - 2 upper bytes [Wh]
0x04	306	uInt16	2nd output energy counter - 2 lower bytes [Wh]
0x04	307	uInt16	3rd output energy counter - 2 upper bytes [Wh]
0x04	308	uInt16	3rd output energy counter - 2 lower bytes [Wh]
0x04	309	uInt16	4th output energy counter - 2 upper bytes [Wh]
0x04	310	uInt16	4th output energy counter – 2 lower bytes [Wh]
0x04	402	uInt16	1st output TPF [1/1000]
0x04	403	uInt16	2nd output TPF [1/1000]
0x04	404	uInt16	3rd output TPF [1/1000]
0x04	405	uInt16	4th output TPF [1/1000]
0x04	502	Int16	1st output Phase shift [1/10°]
0x04	503	Int16	2nd output Phase shift [1/10°]
0x04	504	Int16	3rd output Phase shift [1/10°]
0x04	505	Int16	4th output Phase shift [1/10°]
0x04	601	uInt16	All out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	602	uInt16	All out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	603	uInt16	1st out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	604	uInt16	1st out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	605	uInt16	2nd out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	606	uInt16	2nd out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	607	uInt16	3rd out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	608	uInt16	3rd out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	609	uInt16	4th out. reverseEnergy cnt. - 2up.bytes [Wh]
0x04	610	uInt16	4th out. reverseEnergy cnt. - 2lo.bytes [Wh]
0x04	803	uInt16	1st digital input S0 counter - 2 upper bytes
0x04	804	uInt16	1st digital input S0 counter - 2 lower bytes
0x04	1001	uInt16	All out. energy cnt. NR - 2 upper bytes [Wh]
0x04	1002	uInt16	All out. energy cnt. NR - 2 lower bytes [Wh]
0x04	1003	uInt16	1st out. energy cnt. NR - 2 upper bytes [Wh]
0x04	1004	uInt16	1st out. energy cnt. NR - 2 lower bytes [Wh]
0x04	1005	uInt16	2nd out. energy cnt. NR - 2 upper bytes [Wh]
0x04	1006	uInt16	2nd out. energy cnt. NR - 2 lower bytes [Wh]
0x04	1007	uInt16	3rd out. energy cnt. NR - 2 upper bytes [Wh]
0x04	1008	uInt16	3rd out. energy cnt. NR - 2 lower bytes [Wh]
0x04	1009	uInt16	4th out. energy cnt. NR - 2 upper bytes [Wh]
0x04	1010	uInt16	4th out. energy cnt. NR - 2 lower bytes [Wh]
0x04	1101	uInt16	All out. reverseEnergy cnt. NR - 2up.bytes [Wh]
0x04	1102	uInt16	All out. reverseEnergy cnt. NR - 2lo.bytes [Wh]
0x04	1103	uInt16	1st out. reverseEnergy cnt. NR - 2up.bytes [Wh]
0x04	1104	uInt16	1st out. reverseEnergy cnt. NR - 2lo.bytes [Wh]
0x04	1105	uInt16	2nd out. reverseEnergy cnt. NR - 2up.bytes [Wh]
0x04	1106	uInt16	2nd out. reverseEnergy cnt. NR - 2lo.bytes [Wh]
0x04	1107	uInt16	3rd out. reverseEnergy cnt. NR - 2up.bytes [Wh]

0x04	1108	uInt16	3rd out. reverseEnergy cnt. NR - 2lo.bytes [Wh]
0x04	1109	uInt16	4th out. reverseEnergy cnt. NR - 2up.bytes [Wh]
0x04	1110	uInt16	4th out. reverseEnergy cnt. NR - 2lo.bytes [Wh]
0x05	102	0/1	Turn Off/On 1st output (Write)
0x05	103	0/1	Turn Off/On 2nd output
0x05	104	0/1	Turn Off/On 3rd output
0x05	105	0/1	Turn Off/On 4th output
0x06	102	uInt16	Set action to 1st output
0x06	103	uInt16	Set action to 2nd output
0x06	104	uInt16	Set action to 3rd output
0x06	105	uInt16	Set action to 4th output
0x06	202	uInt16	Set "Short" delay of 1st output [1/10sec]
0x06	203	uInt16	Set "Short" delay of 2nd output [1/10sec]
0x06	204	uInt16	Set "Short" delay of 3rd output [1/10sec]
0x06	205	uInt16	Set "Short" delay of 4th output [1/10sec]

Modbus debugging tips

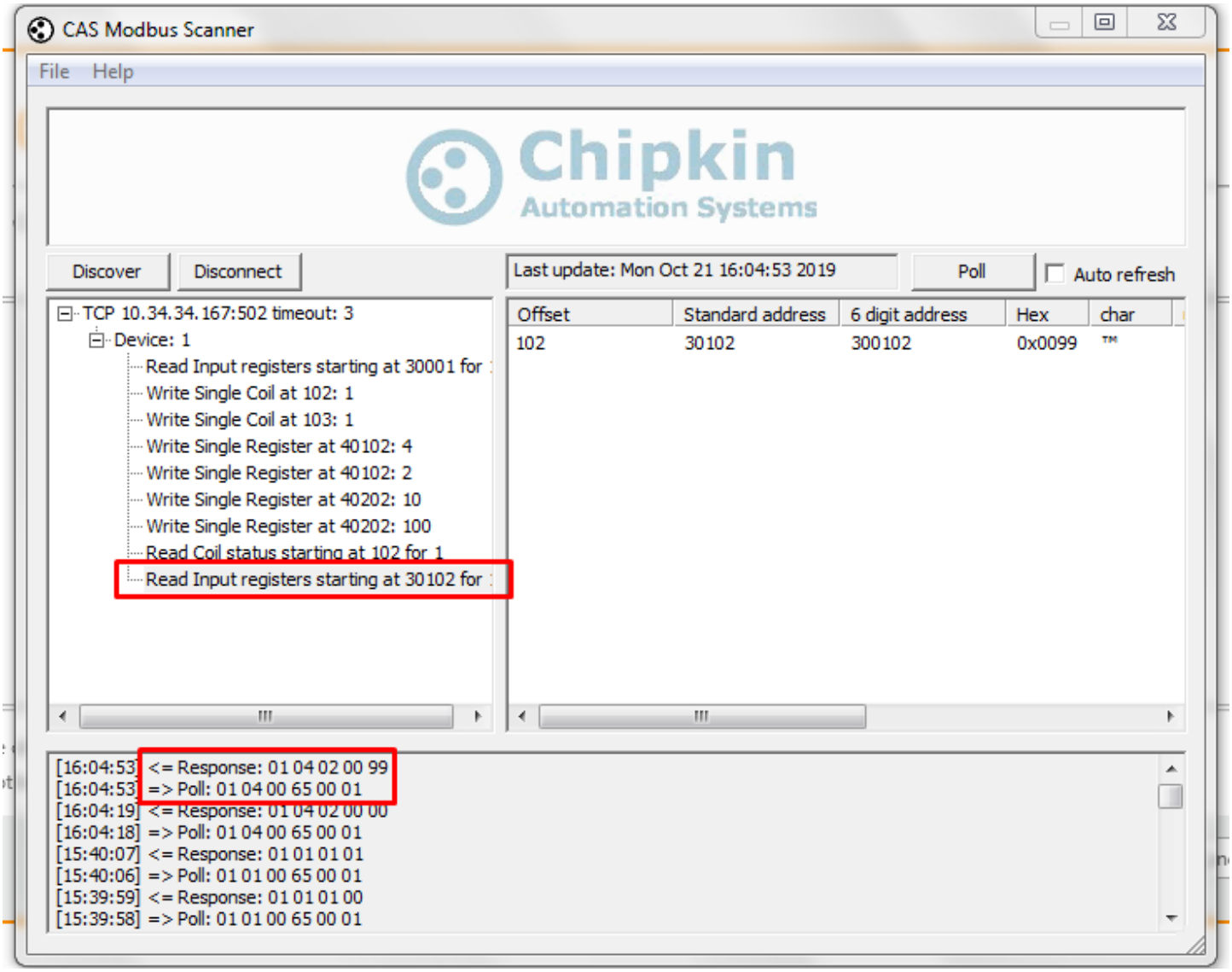
Web tool to debug & test Modbus/TCP commands.
http://modbus.rapidscada.net/

Modbus/TCP packet headers marked on the screenshot:



CAS Modbus Scanner

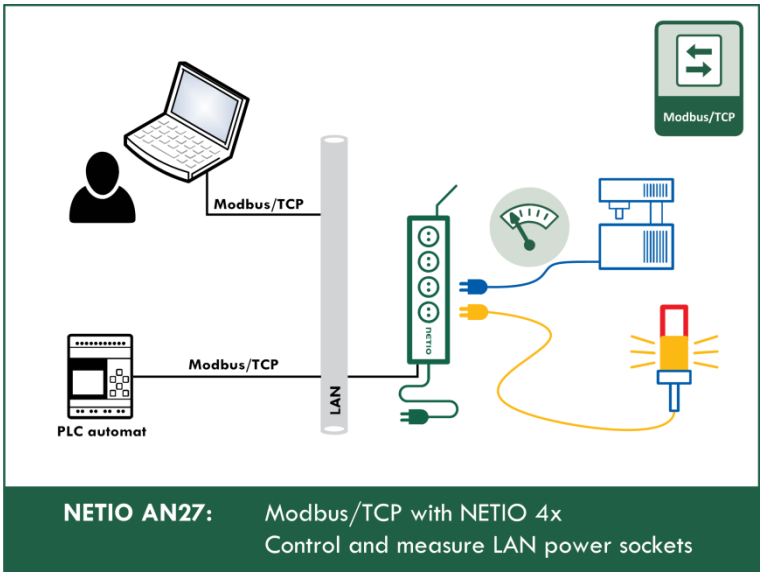
Easy to use Windows utility showing Modbus/TCP commands without Modbus/TCP headers.
https://freemodbus.com/index.html



AN27: Modbus/TCP with NETIO 4x – Control and measure LAN power sockets

The AN27 Application Note demonstrates how to control NETIO 4x smart sockets and PowerCable Modbus devices using the Modbus/TCP protocol.

Modbus/TCP is the de-facto industry standard for connecting sensors and devices to PLCs, SCADA systems and smart home systems. NETIO products can be controlled over Modbus/TCP as 1-bit outputs (“coils”). In addition, values can be measured and advanced control is possible using registers.



>> Read the AN27 on www.netio-products.com

Document history

Document Revision	Publication Date	Description
1.0	8.8.2018	Initial release for FW 3.1.0, spec v12
1.1	28.8.2018	Small mistakes in doc FW 3.1.1, spec v12
1.2	13.9.2018	Better description
1.3	4.10.2018	PowerCable Modbus as supported device added
1.4	5.11.2018	PhaseShift support included
1.5	30.11.2018	AN27 link included.
1.6	31.1.2019	PowerPDU 4C support included
1.7	30.9.2019	TPF values added, 3Px, 4PS support defined
1.8	21.10.2019	Links to useful Modbus/TCP tools added
2.9	12.5.2022	Added Digital Inputs, S0 counters and Reverse Energy NR counters, PowerPDU 4KS support included

Title:
NETIO Modbus/TCP protocol registers map - M2M API by NETIO products

Author:
NETIO products: networked power sockets

Subject:
Modbus/TCP protocol description and register mapping for NETIO PowerPDU, PowerDIN, PowerBox and PowerCable Modbus products

Keywords:

NETIO, modbus/tcp, Modbus protocol, M2M API, power outlet, power socket, output, power control, Modbus kwh, Modbus voltage, Modbus power socket, Modbus power strip, NETIO power sockets, networked power sockets, power outlets 110V, power output 230V, LAN controller power socket, Modbus based power monitoring, Modbus based WIFI power socket, NETIO 4All, NETIO 4C, NETIO 4, NETIO Modbus-TCP registers, truePF, true power factor