Gutor PxW and WxW

USER MANUAL — MODBUS Functionality of the Network Management Card (NMC)

Contents

Rev.	Description of change Original document #: 7RA9193GB	Issued	Validated	Approved	Date
01	First edition / New design	mp	LOA	LUS	13-01-06
02	Delay between the polls > 10 seconds	mp	TVO	LUS	15-03-30
03	«Read Coil Registers Status Table» updated	mp	SKI	SKI	16-11-03

1. CONFIGURING MODBUS FUNCTIONALITY

MODBUS/RTU by 4-Wire RS485

The MODBUS / RTU can be either configured by the command line interface or by the web interface (HTTP).

For the MODBUS / RTU connector pinout see 7RG9032GB in section 6.2

Command Line Interface

To manually configure the modbus settings the Network Management Card needs to have a connection to the UPS. If the connection to the UPS is established, the 'modbus' command can be used in the command line interface to change the modbus settings.

Option	Arguments	Description
?		To display the command help.
-a	enable | disable	To enable or disable the modbus converter functionality.
-br	9600 | 19200	To change the MODBUS RS485 baud rate.
-pr	even | odd | none	To change the parity bit setting.
-s	1 – F7	To change the slave address (in hex)
-ResetToDef		To reset the settings to the default values.

Example 1: To view the modbus settings of the Network Management Card, type:

`modbus and press ENTER`

Example 2: To manually change the baud rate to `19200` baud for the Network Management Card, type:

```
modbus -br 19200
```

Example 3: To manually change the slave address to `243` (0xF3), type the value in hex format:

```
modbus -s F3
```

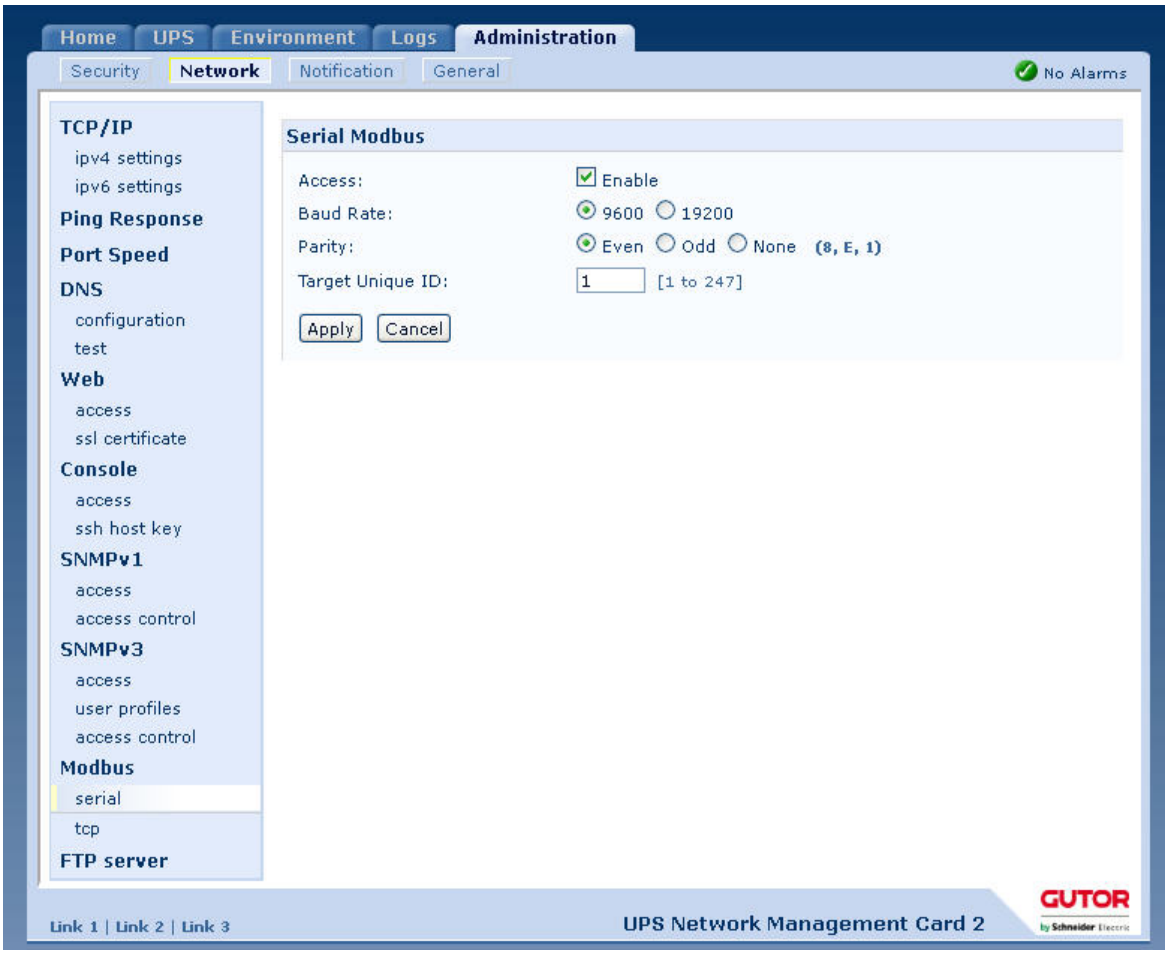
Web Interface (HTTP)

By opening the web browser and navigating to the Network Management Card's IP address, the MODBUS / RTU setting can be changed. When the TCP / IP settings are not yet configured, first see the documentation 7RG9032GB in section 4, where it is described how to configure the IP address of the Network Management Card.

- Log in on the page.
- Use **gutor** for the user name and password.
- The MODBUS serial settings can be changed by clicking on:

  Administration > Network > Modbus > serial

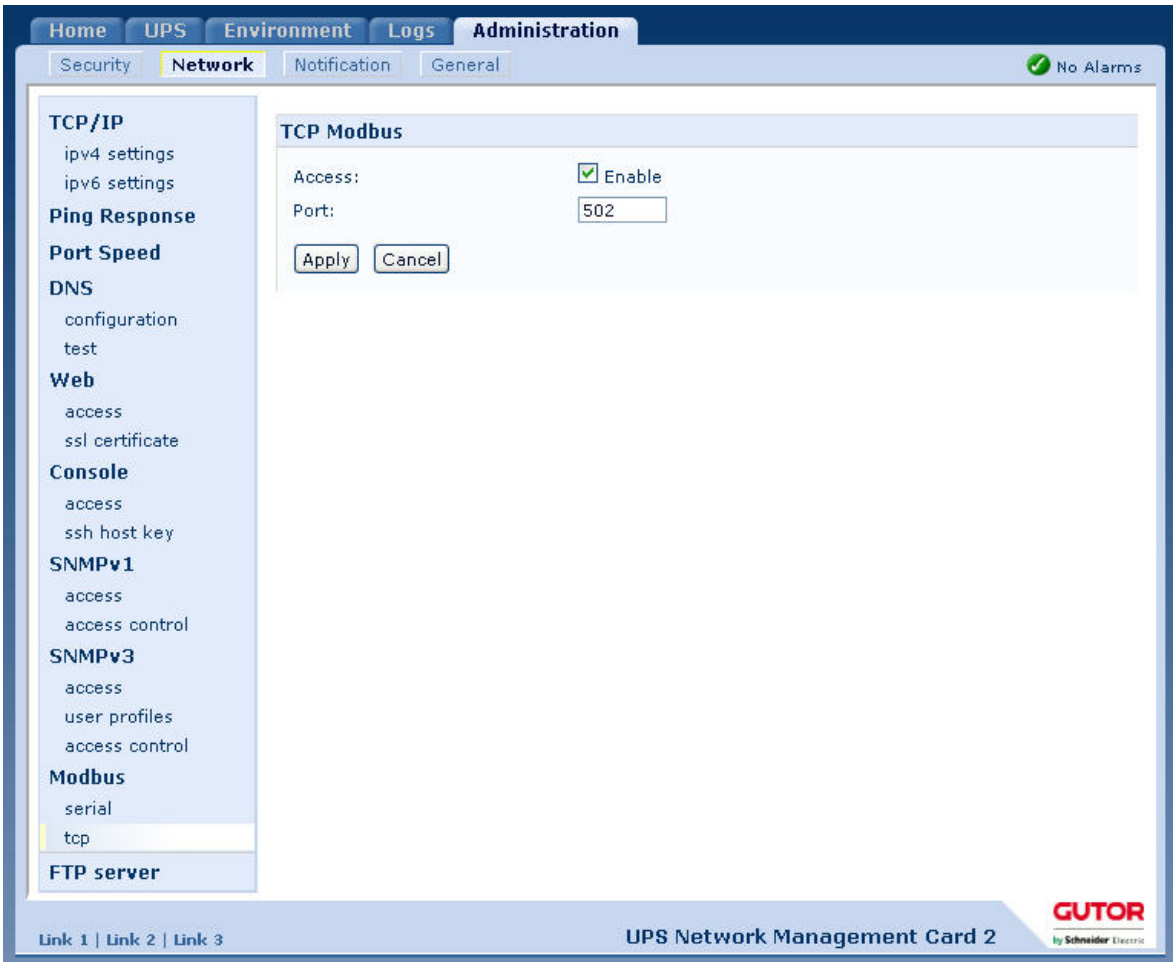
- There the settings can be changed as shown in the following picture.



MODBUS/TCP

By opening the web browser and navigating to the Network Management Card's IP address, the MODBUS / TCP setting can be changed. When the TCP / IP settings are not yet configured, first see the documentation 7RG9032GB in section 4, where it is described how to configure the IP address of the Network Management Card.

- Log in on the page.
- Use **gutor** for the user name and password.
- The MODBUS tcp settings can be changed by clicking on:
  Administration > Network > Modbus > tcp
- There the settings can be changed as shown in the following picture.



2. MODBUS ADDRESSING INFORMATION

This section outlines the addressing structure used to expose the UPS system informations to the MODBUS protocol. The following tables are showing, which information can be reached at which address.

2.1 Function Call 01: Read Coil Registers Status Table

The data type for all Read Coil Registers is boolean. The details about the registers are shown in the table below.

Coil Register	Format	Parameter	Notes
00001	B	Output voltage out of range	UPS will transfer to bypass if mains/bypass is within limits. If mains/bypass voltage is out of range UPS will shut down after timeout of undervoltage timer.
00002	B	Battery operation	UPS is running on battery until Battery voltage low is reached.
00003	B	Bypass operation	UPS is operating on bypass, either chosen by user (where applicable) or because of an alarm condition.
00004	B	Low DC shutdown	The DC voltage is below the low CC shutdown level, and the system is in standby.
00005	B	High DC shutdown	The DC voltage is above the high DC shutdown level,and the system is in normal operation. UPS will at first transfer to battery and if battery voltage high condition persists, UPS will transfer to bypass operation.

Coil Register	Format	Parameter	Notes
00006	B	Common fault	Common alarm bit for all alarms in UPS. If cleared consider as "UPS OK" condition.
00007	B	Output current > 100%	UPS is overloaded. If condition persists for longer period of time UPS will either transfer to bypass or shut down.
00008	B	Static Switch temp. > 100°C	Either mains or bypass static switch has temperature alarm. UPS will switch operating mode accordingly.
00009	B	System pushed on	The UPS is turned on by user. Status information bit set for all operating modes and cleared only when UPS is turned off again.
00010	B	Inverter off	Status information bit set when inverter is off or operating in bypass and cleared when in normal or battery operation.
00011	B	System not synchronized	UPS inverter output is not synchronized to bypass input supply.
00012	B	Battery charge current limit (no common alarm)	Status bit that the battery charge current is being limited by the UPS. This alarm will not trigger a common alarm.
00016	B	Battery test active	"Battery monitor test" or "Battery capacity test" is active running.
00021	B	Battery voltage low warning (Low DC warning)	Warning signal that shut down is imminent when running in battery operation.
00023	B	Inverter current > 100%, Current limiter active	Inverter is being overloaded. UPS will current limit.
00025	B	Bypass voltage out of range	In normal or battery operation no change in operating mode on this alarm. In bypass operation however UPS will shut down.
00027	B	Digital input 1	If digital input 1 is open, coil register has value 1.
00028	B	Digital input 2	If digital input 2 is open, coil register has value 1.
00035	B	Inverter fuse blown	The inverter fuse has blown.
00037	B	Aux 1 Error	Aux 1 Error alarm, based on alarms coming from Signaling controller A072.
00038	B	Fan Fault	One of the internal system fans has a fault.
00039	B	High DC warning	The DC voltage is above the high DC warning level, and the system is in normal operation.
00040	B	Inverter Voltage Error	The inverter voltage is out of range.
00043	B	Fault in int. power supply	One of the two internal power supplies has a fault.
00048	B	High temp charger magnetic	The temperature on the charger magnetic is too high.
00049	B	High battery temperature	The temperature on the battery is too high.
00050	B	Battery monitor warning	Conclusion of battery monitor test.
00051	B	Battery monitor alarm	Conclusion of battery monitor test.
00052	B	System locked in operation mode	The system is locked in any operation mode. Result of too often changing operation mode within a certain time period.
00054	B	Calibration stack entered (no common alarm)	The password protected calibration stack was entered. This alarm will not trigger a common alarm.
00055	B	TSM 1/2/3 temperature shutdown	One of the system inverter power modules has a temperature shutdown signal pending.
00056	B	Charger 0°/30° temperature warning	One of the system Charger modules has a temperature warning signal pending.
00057	B	Charger 0°/30° temperature shutdown	One of the system Charger modules has a temperature shutdown signal pending.
00058	B	High output voltage	The system output voltage is too high
00059	B	Static switch temperature > 90°C (EA, EN warning)	One of the system static switch modules (EA or EN) has a temperature warning signal pending.
00060	B	Total DC current limit	The system charger is operating in total DC current limit mode.
00061	B	Low current failure in the AC capacitors	The current in the AC capacitors is below the low warning limit value.
00063	B	No redundancy operation	The system is not operating in redundant operation.
00065	B	Low current shutdown in the AC capacitors	The current in the AC capacitors is below the low shutdown limit value.
00066	B	Mains out of tolerance	The rectifier mains is out of tolerance and the system is in normal operation.
00068	B	Total DC current limit	The system charger is operating in total DC current limit mode.

Coil Register	Format	Parameter	Notes
00069	B	Charger temperature too high	One of the system charger modules has a temperature warning, or a shutdown signal is pending.

GENERAL EXPLANATION:

The delay between the polls should be more than 10 seconds because the update rate of most of the registers is about 10 seconds

All coil registers in the range of 00001 – 00071 which are not mentioned in the table above are reserved.

Coil Register: Number of the Read Coil Register on function call 01. Note that a value of 1 in the Read Coil Registers means that the individual status or alarm mentioned in the column Parameter is active.

Format: Data type format B means Boolean.

Parameter: Boolean name / source.

Notes: Some additional information about the individual parameter.

2.2 Function Call 03: Read Holding Registers Table

The data type for all Read Holding Registers is 16-Bit unsigned integer. The details about the registers are shown in the table below.

Holding Register	Format	Parameter	Unit of measure	Factor	Notes
40001	FFFF	Output Voltage L1	V	1	Phase L1 to Phase L2.
40002	FFFF	Output Voltage L2	V	1	Phase L2 to Phase L3.
40003	FFFF	Output Voltage L3	V	1	Phase L3 to Phase L1.
40004	FFFF	Mains voltage L1	V	1	Phase L1 to Phase L2.
40005	FFFF	Mains voltage L2	V	1	Phase L2 to Phase L3.
40006	FFFF	Mains voltage L3	V	1	Phase L3 to Phase L1.
40007	FFFF	Bypass voltage L1	V	1	Phase L1 to Phase L2.
40008	FFFF	Bypass voltage L2	V	1	Phase L2 to Phase L3.
40009	FFFF	Bypass voltage L3	V	1	Phase L3 to Phase L1.
40010	FFFF	Mains current L1	A	1	
40011	FFFF	Mains current L2	A	1	
40012	FFFF	Mains current L3	A	1	
40013	FFFF	Output current L1	A	1	
40014	FFFF	Output current L2	A	1	
40015	FFFF	Output current L3	A	1	
40016	FFFF	Output peak current L1	A	1	
40017	FFFF	Output peak current L2	A	1	
40018	FFFF	Output peak current L3	A	1	
40019	FFFF	Total DC current	A	1	
40020	FFFF	Battery current	A	1	
40022	FFFF	Operation mode	N/A	1	Value reflects the actual operation mode of the system acc. the following scheme: 1 = Standby 2 = Charger Only 3 = Normal operation 4 = Battery operation 5 = Bypass operation 6 = Hot standby 7 = Economy operation 8 = Battery test active
40029	FFFF	Battery voltage	V	1	

Holding Register	Format	Parameter	Unit of measure	Factor	Notes
40031	FFFF	Active systems	N/A	1	1 = single / 2 = parallel.
40035	FFFF	Battery temperature	°C or °F	1	Temperature sensor is an option; shows Fahrenheit or Celsius value depending on UPS firmware setting. If not mounted this field will show a value of around 226!
40038	FFFF	Frequency	Hz	1	
40040	FFFF	System load	%	1	Percent of UPS output power capacity presently used.
40041	FFFF	Battery time left	min	1	
40045	FFFF	Firmware version, first digit	N/A	1	
40046	FFFF	Firmware version, second digit	N/A	1	
40047	FFFF	Firmware version, third digit	N/A	1	

GENERAL EXPLANATION:

The delay between the polls should be more than 10 seconds because the update rate of most of the registers is about 10 seconds.

Not all registers are used for all system types. It is mainly depending on the number of output phases.

All read holding registers in the range of 40001 – 40047 which are not mentioned in the table above are reserved.

Holding Register: Number of the Read Holding Register on function call 03.

Format: Data type format is unsigned integer. FFFF means hexadecimal data format value of 4 digits. This corresponds to an absolute range of decimal 0 – 65535.

Parameter: Measurement name/source.

Unit of measure: The unit of measure in which the respective analog value is measured.

Factor: The factor with which the value is multiplied to transfer it. E.g. if a value has a factor of 10 then the real value is 10 times smaller, the last numeric character shows the 10^{th} of the value.

Notes: Some additional information about the individual parameter.