K M B systems, s. r. o.
Dr. Milady Horákové 559, 460 06
Liberec VII – Horní Růžodol
460 07 Liberec
Czech Republic
Tel. +420 485 130 314
E-mail: kmb@kmb.cz, Web: www.kmb.cz

App note 0036

Modbus registers reading using Teltonika modem

Document revision	Release date	For version		
		Hardware	Firmware	Software ENVIS
1.0	1.11.2024	with Ethernet interface	$\geq$ 4.0	$\geq$ 2.0

Contents

1 Teltonika modem

When KMB devices are used in remote areas, a GPRS modem can be used for connecting these devices to the internet and enable remote access into these devices. This document describes, how to set system like that, including automatic control of values measured by devices and how to be informed about unusual states. For this purpose, a modem from Teltonika company will be used.

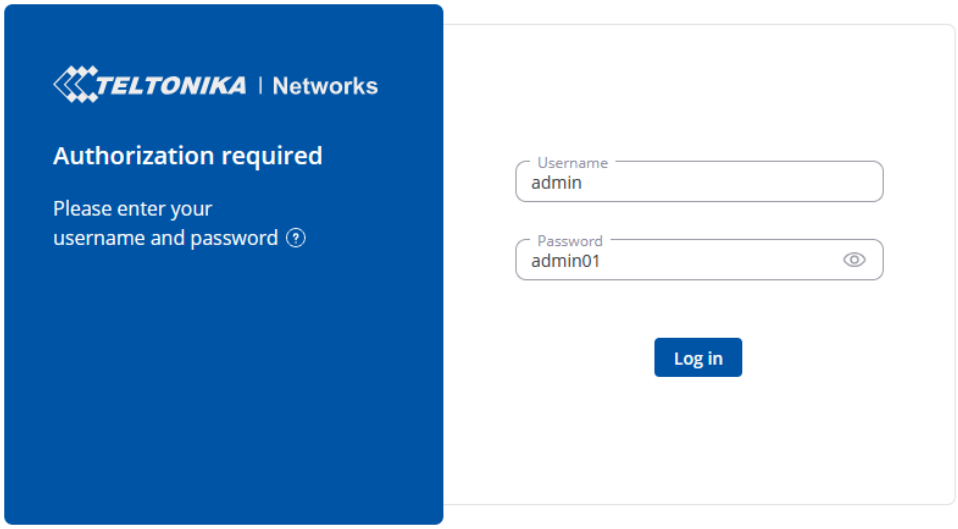
While writing this guide, Teltonika TRB140 modem is used with FW version *TRB1_R_00.07.09.4*.

For functional setup, KMB device with Ethernet interface, modem equipped with SIM card for data and SMS communication are required. When multiple devices are used, network switch is also required.

1.1 First settings

After unpacking the modem, unscrew panel to insert SIM card. When SIM card is inserted, screw the panel back on. Connect the included power adapter and use a network cable to connect the modem directly to the PC – only the modem should be connected directly to the PC without any other network elements for proper functioning. Also, connect the antenna to the modem.

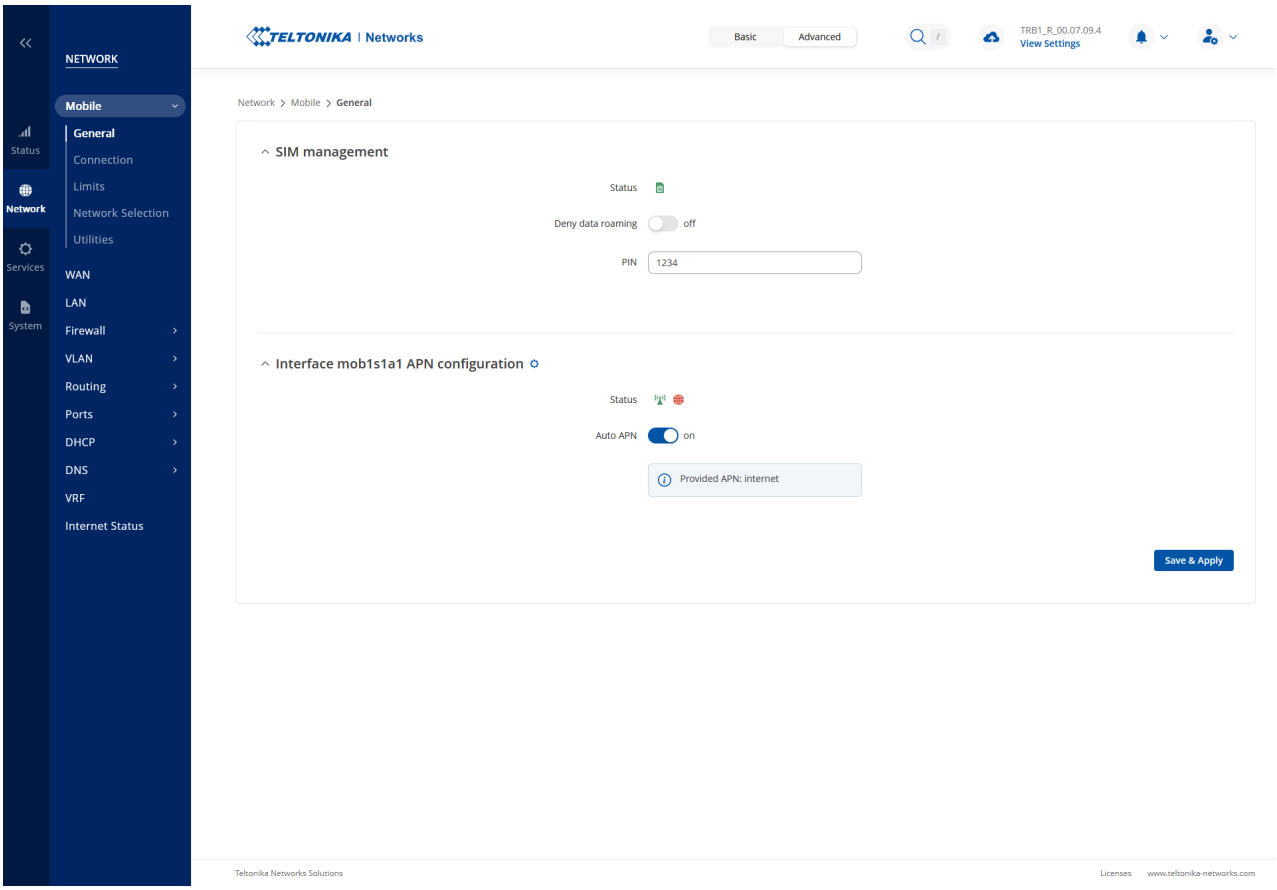
All modem settings are done via a web browser. After turning on the modem, enter its IP address (default is 192.168.2.1) and log in to the management interface (the default login is username *admin* and password admin01). After logging in, a password change is required; this new password should be remembered for future management and configuration of the modem.



Obrázek 1: Login window

After logging in and changing the password, switch to the advanced settings mode at the top of the screen (select Advanced instead of Basic).

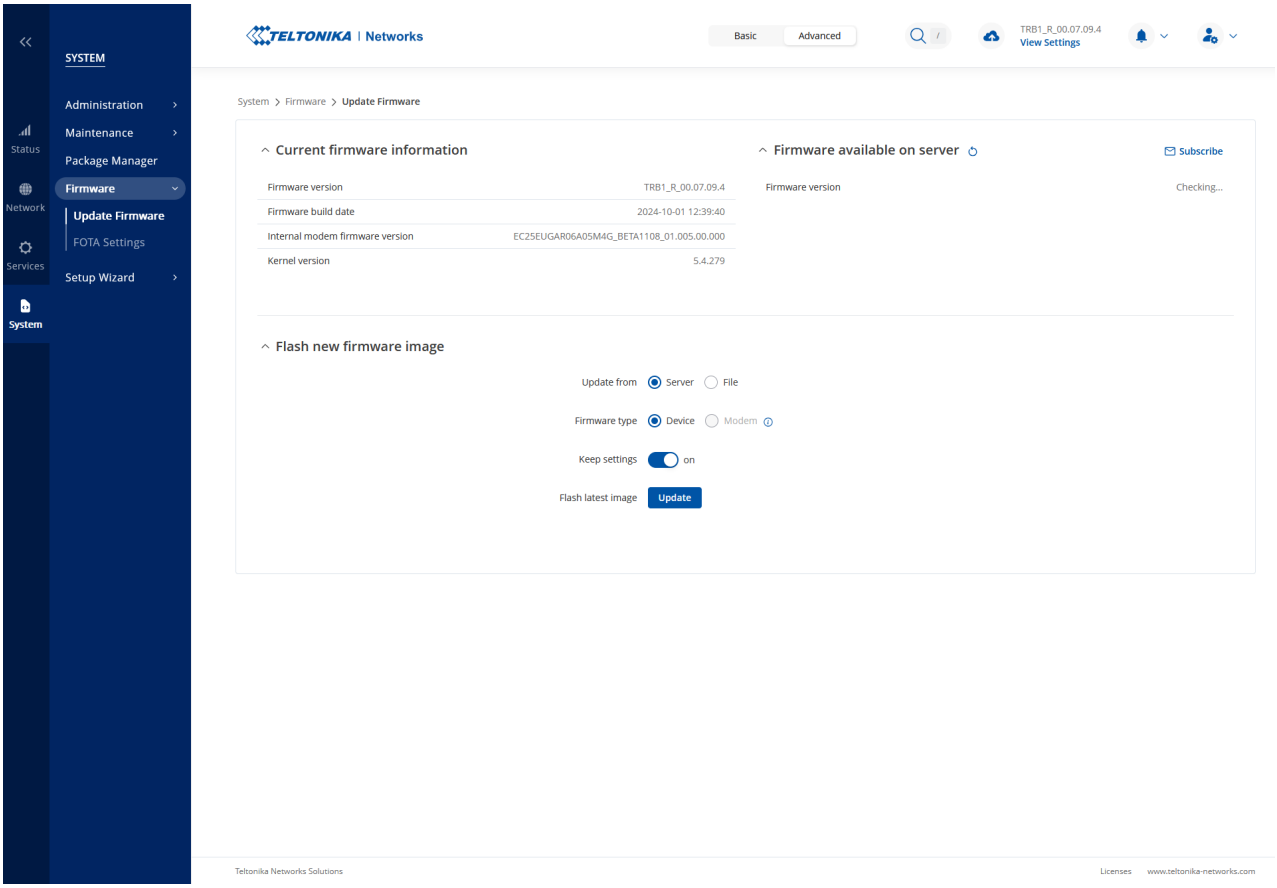
Unlock the SIM card by entering the PIN (if the PIN is not disabled on the SIM card). On the left side of the menu, navigate to the SIM card settings: *Network* — *Mobile* — *General*, and in the *SIM management* category, enter the PIN for the SIM card.



Obrázek 2: SIM card unlock

1.2 FW update

After connecting the modem to the mobile network (visible on the homepage), check the current firmware (FW) version in the modem by clicking on the version number at the top of the screen. If the modem is connected to the network, the firmware can be downloaded directly. Alternatively, you can download the appropriate FW version from the manufacturer's website and upload it to the modem on the same page.

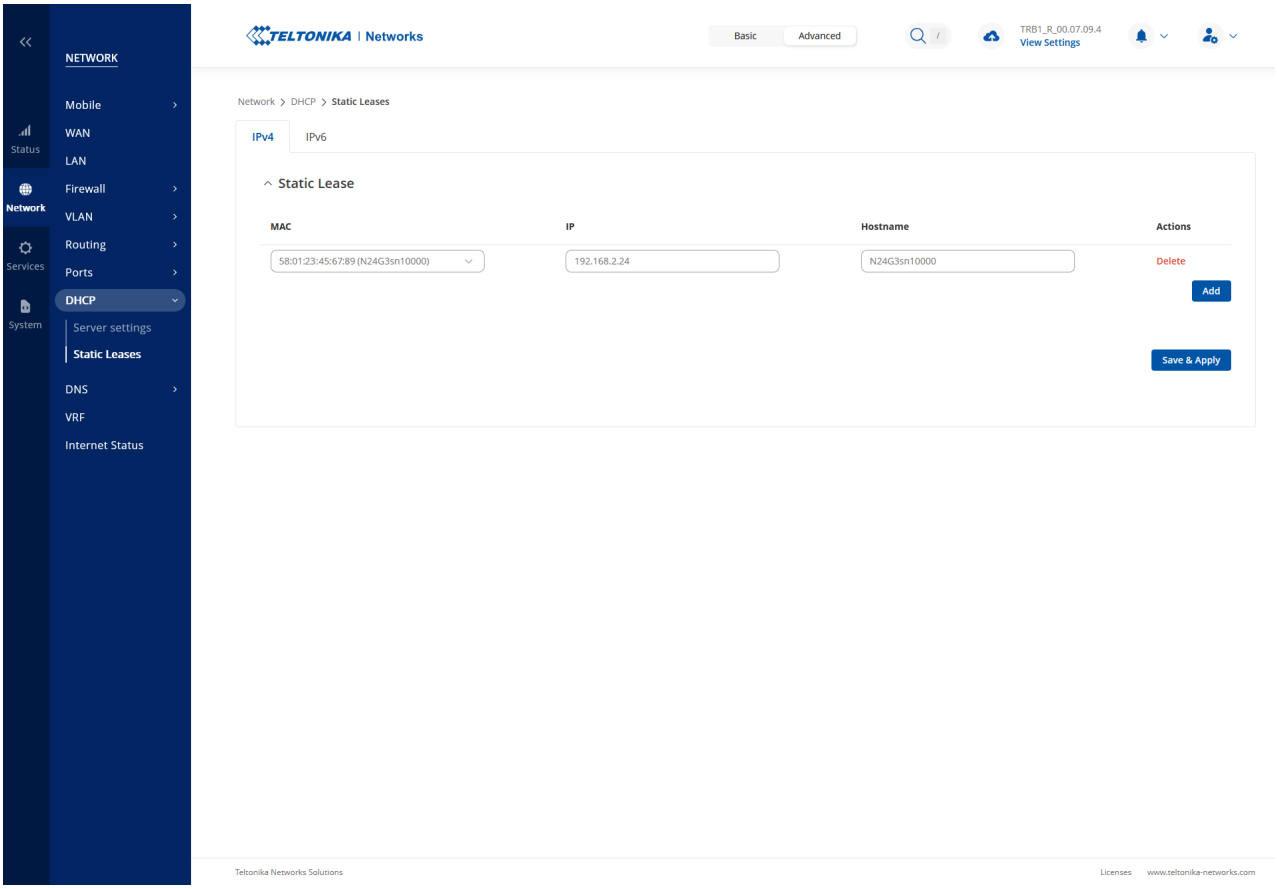


Obrázek 3: FW update

2 KMB device setup

For the proper functioning of the KMB device and Teltonika modem, the KMB device must be configured correctly. The device must have the correct IP address from which the modem will read data. This can be done by enabling DHCP on the device and reserving an address in the DHCP server settings or by directly setting a static address on the device, which should correspond to the network settings (of the modem). For example, if we keep the modem's default address as 192.168.2.1, we should set the device's communication settings to a static address of 192.168.2.2. When connecting multiple devices, each device must have a unique IP address.

If DHCP is enabled on the device, the address assignment by the modem can be seen in the image below.



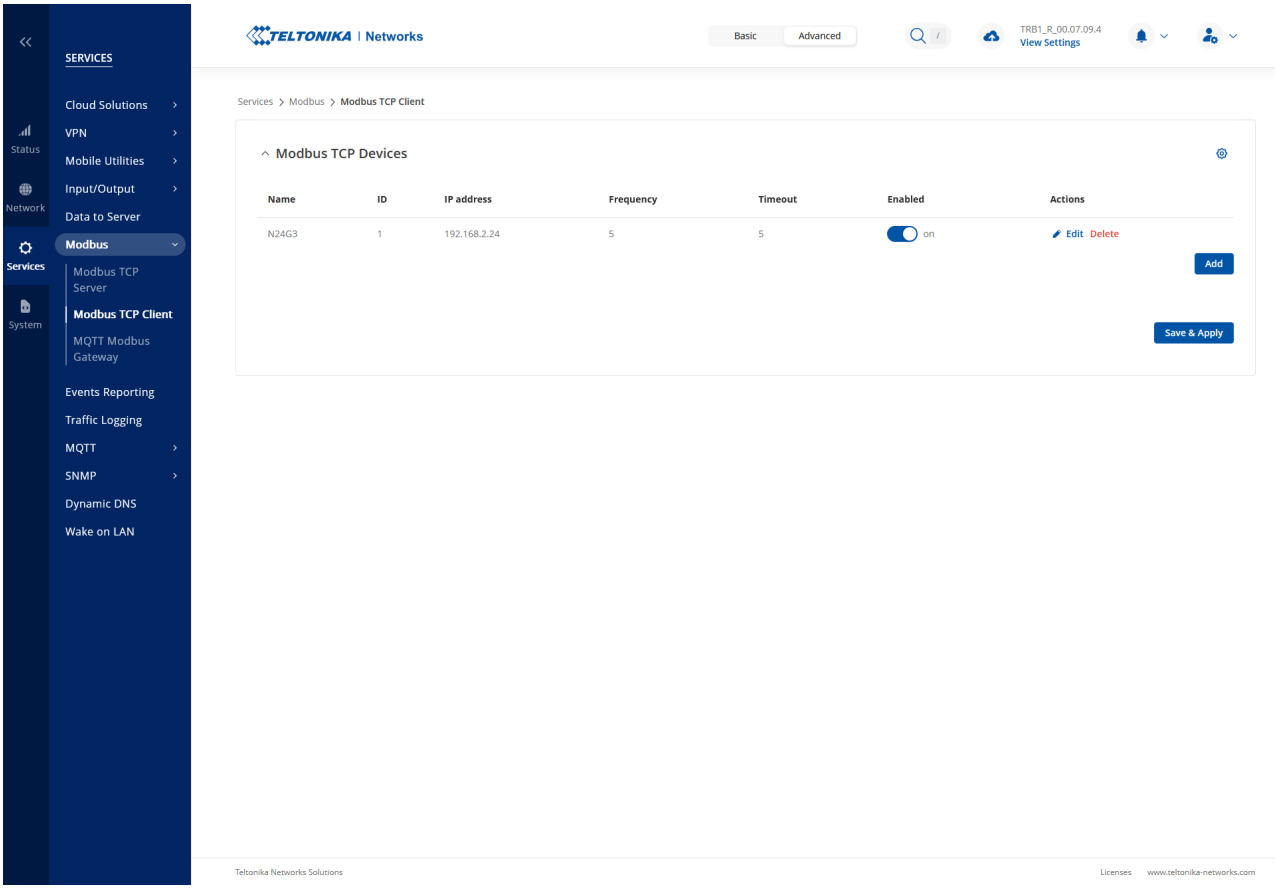
Obrázek 4: DHCP settings

3 Connecting the modem to the device

To connect the modem to the device, both devices must be plugged into the same network – using the appropriate network cable, and in the case of connecting multiple devices, using a network switch. The IP addresses should be set as per the previous steps.

3.1 Setting up modbus register reading

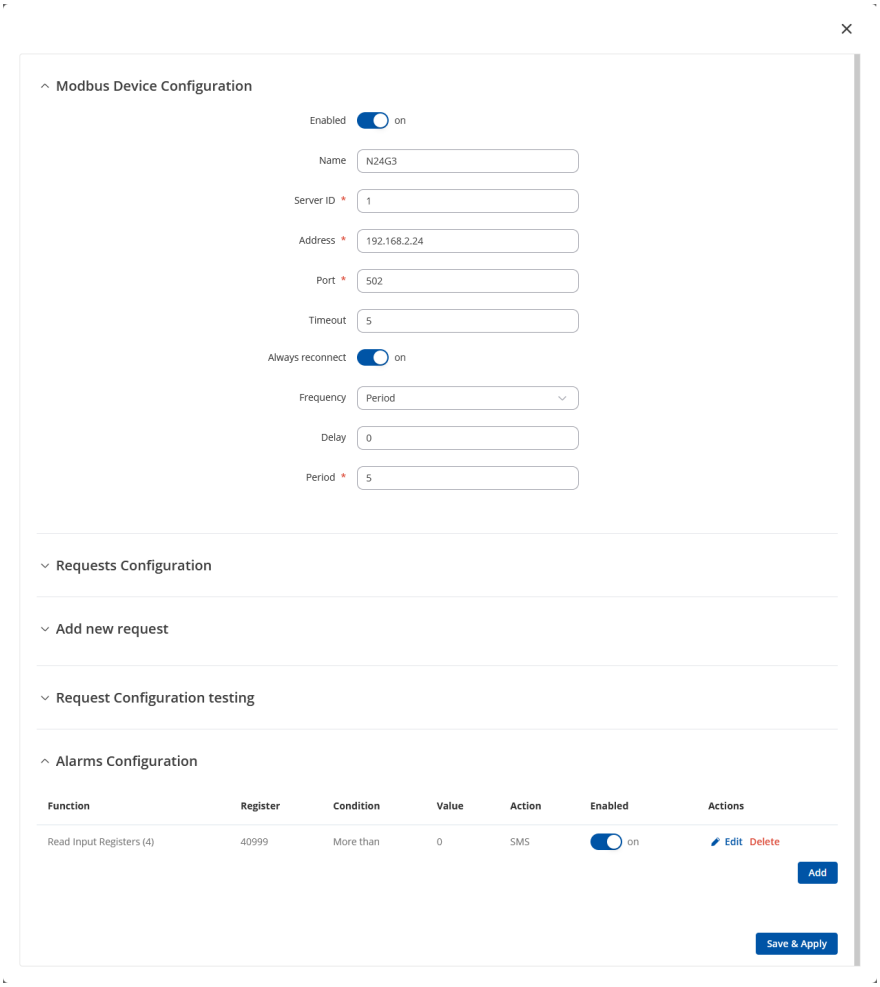
In the modem management interface, navigate to the settings for reading Modbus registers from the device using the menu in the left of the window: *Services* — *Modbus* — *Modbus TCP Client*. Click the *Add* button on the right to add a new device that you want to read from.



Obrázek 5: Setting up modbus device

Modbus Device Configuration – configuration of the read device

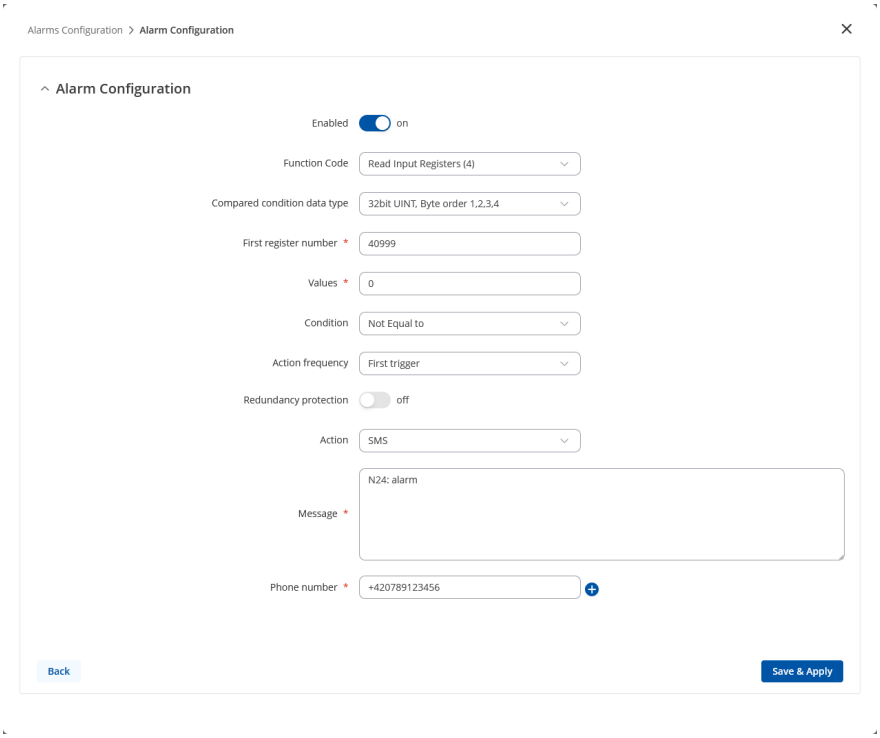
- Use the *Enabled* switch to allow reading from this device.
- In the *Name* field, enter the name of the device (e.g., type or measured object/circuit of the device).
- The *Server ID* is the Modbus address of the device – by default, and if it doesn't need to be changed, it is set to 1.
- In the *Address* field, fill in the IP address of the device (e.g. 192.168.2.2).
- In the *Port* field, enter the network port on which the device uses modbus – typically this does not need to be changed, the default value is 502.
- Enable *Always reconnect* for automatic reconnection to the device after it is disconnected.
- *Number of timeouts* defines the number of connection attempts to the device; for example, enter 5.
- Set *Frequency* to *Period* for periodic reading from the device.
- In the *Period* field, enter the time interval for how often the modem should read data from the device. For example, 10 (for reading every 10s).



Obrázek 6: Parameters of modbus device

Alarm Configuration – configuration of read registers and alarms

- Use the *Enabled* switch to allow reading from this device.
- *Function Code* select *Read Input Registers (4)* for reading current values.
- *Compared condition data type* specifies the data type of the read register.
  - The size of the read register can be found in the modbus manual.
  - For multi-byte data types, their byte order is 1,2,3,4.
- *First register number* is the modbus register address. Compared to the KMB modbus manual, the entered values are 1 greater – starting the numbering at 0 or 1.
  - For example, to read alarms (register 40998), you need to enter 1 greater, which is 40999.
- *Value* specifies the value against which the condition is compared.
- *Condition* is the comparison condition applied to the entered value.
  - The condition is met if the value in the register is *greater / less than / equal to / not equal to / ...* the entered value.
- *Action frequency* indicates the frequency of the action (e.g. sending an SMS). The *First trigger* sends an SMS only once, when the condition is met, not while it persists.
  - If the condition is no longer met and is subsequently met again, another SMS will be sent.
- *Redundancy protection* prevents multiple SMS sends – in our case, this is managed by the sending frequency.
- *Action* defines the action taken when the condition is met – such as sending an SMS.
- In the *Message* field, enter the text of the message that will be received when the condition is met.
- *Phone number* is the telephone number to which the message will be sent when the condition is met.



Obrázek 7: Configuration read modbus registers

There can be multiple read devices and/or their registers, depending on needs and specific requirements.

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