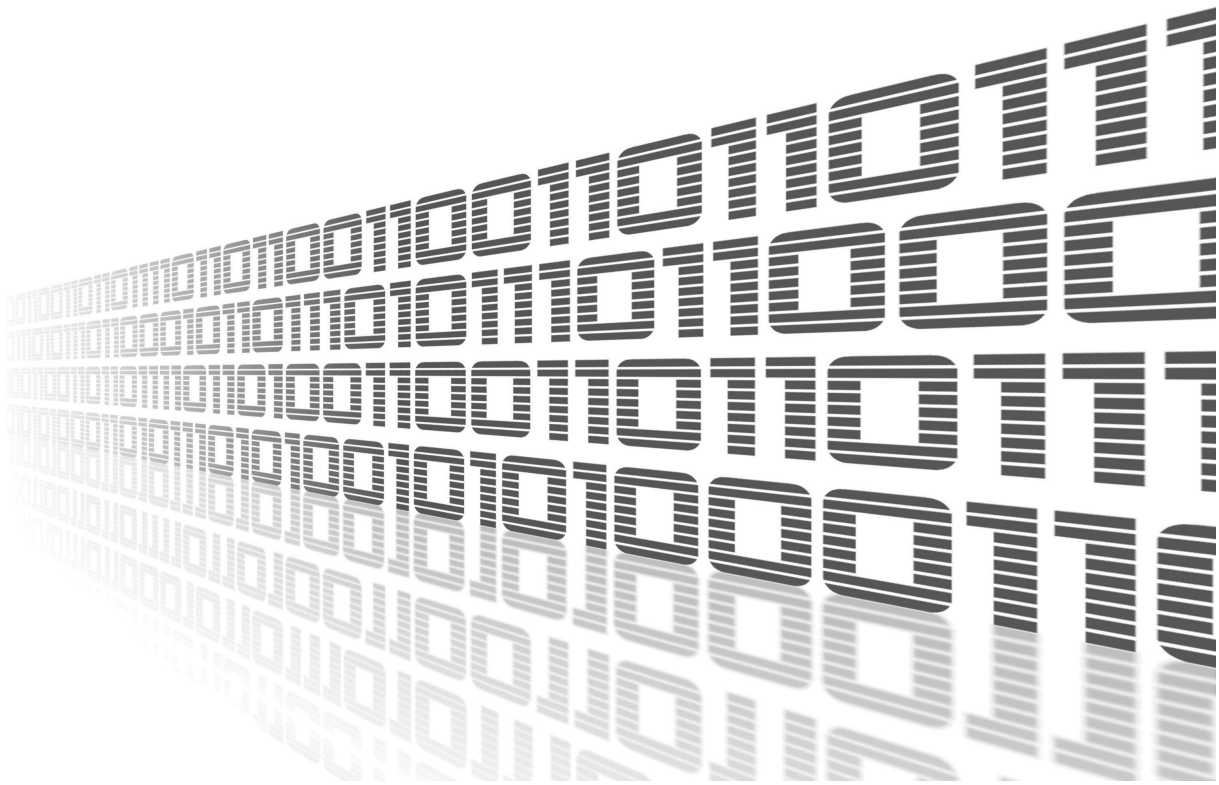
RouterApp

Protocol Modbus TCP2RTU

APPLICATION NOTE



ADVANTECH

Used Symbols

Danger – Information regarding user safety or potential damage to the router.

Attention – Problems that can arise in specific situations.

Information, notice – Useful tips or information of special interest.

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1. Description

Router app *Protocol Modbus TCP2RTU* is not contained in the standard router firmware. Uploading of this router app is described in the Configuration manual (see Chapter Related Documents).

Modbus TCP2RTU router app provides the conversion of MODBUS TCP protocol to MODBUS RTU protocol, which can by used on the serial line. RS232 or RS485/422 interface can be used for serial communication in the Advantech router.

There is a common part PDU For both protocols. MBAP header is used for identification when sending MODBUS ADU to TCP/IP. Port 502 is dedicated for MODBUS TCP ADU.

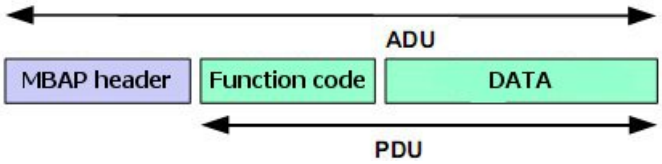

Figure 1: Modbus message on TCP/IP

When sending a PDU to the serial line, the address of destination unit obtained from a MBAP header as UNIT ID is added to the PDU along with the checksum.

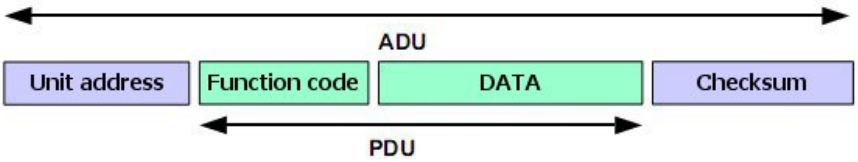

Figure 2: Modbus message on serial line

The module supports configuration of two independent serial interfaces, if available in the router. Automatic recognition of port RS485 from RS422 is supported. Detailed information about the serial interface can be found in the User's manual of the router or Expansion port (RS485/422, see [2]).

2. Interface

Web interface is accessible by pressing the module name on the *Router apps* page of the router Web interface.

The left part menu of the Web interface contains these sections: *Status*, *Configuration* and *Customization*. Status section contains *Stats* which shows statistical information and *System Log* which shows the same log as in the router's interface. Configuration section contains *Port 1*, *Port 2* and *USB* items and Customization contains only menu section switches back from the module's web page to the router's web configuration pages. The main menu of module's GUI is shown on Figure 1.

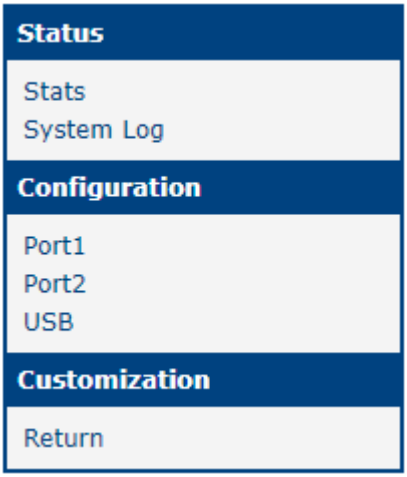

Figure 3: Menu

3. Configuration

3.1 Port Configuration

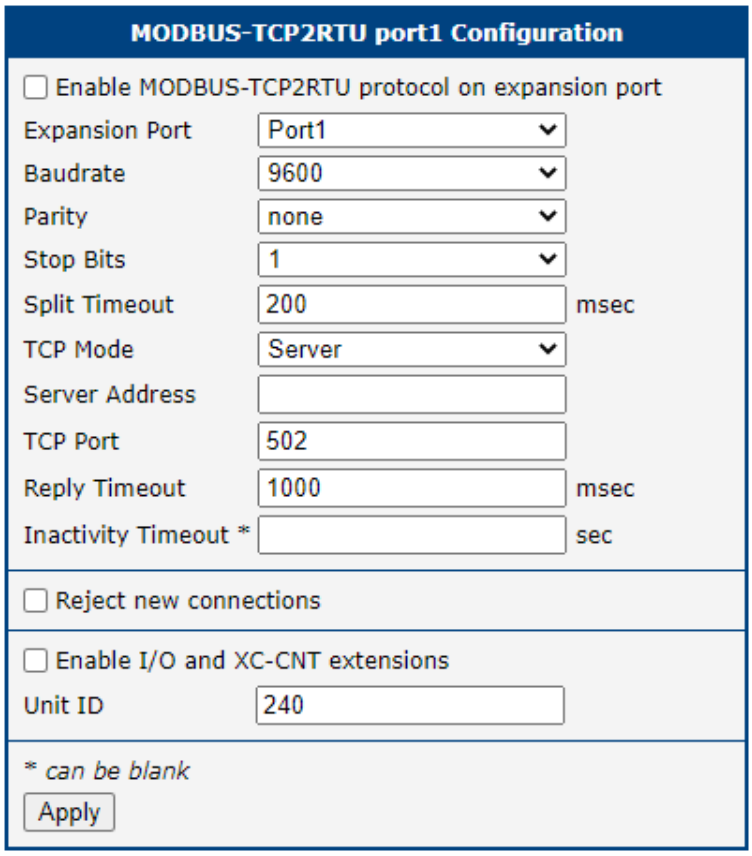

Figure 4: Port Configuration

Meaning of the individual items:

Item	Description
Enable	Enables conversion of MODBUS TCP/IP protocol into MODBUS RTU
Expansion port	Expansion port, where the MODBUS RTU connection will be established. If there is no a MODBUS RTU device connected to the serial interface, it can be set up to "None" and this serial interface can be used for communication with another device. Only internal registers of the router can be read out in this case. For more information see Chapter 4.2.

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Item	Description
Baudrate	Applied communication speed
Parity	Control parity bit: • **none** – No parity will be sent • **even** – Even parity will be sent • **odd** – Odd parity will be sent
Stop Bits	Number of stop bits
Split Timeout	Time for breaking off message (see note below)
TCP Mode	Selection of mode: • **Server** – TCP server • **Client** – TCP client
Server Address	Defines server address when selected mode is *Client* (in *TCP Mode* item).
TCP Port	TCP port on which the router listens to requests for MODBUS TCP connection. For sending MODBUS ADU is reserved port 502.
Reply Timeout	Specifies the time interval in which it is expecting a response. If the response doesn't receive, it will be sent one of these error codes: • *0A* – Transmission path unavailable *Gateway is not able to allocate internal transmission path from the input port to the output port. It is probably overloaded or incorrectly set.* • *0B* – The target device doesn't response *The target device doesn't response, may not be available.*
Inactivity Timeout	Time period after which the TCP/UDP connection is interrupted in case of inactivity
Reject new connections	When enabled, the router rejects any other connection attempts – the router no longer supports multiple connections
Enable I/O and XC-CNT extensions	This option enables direct communication with router. **I/O** (binary inputs and outputs on the router) and internal registers (mentioned in chapter 4.2) works on all platforms (v2, v2i, v3 and v4). **XC-CNT** is expansion board for v2 routers. This form of communication works on v2 platform only.

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Item	Description
Unit ID	ID for direct communication with router. Values can be 1 to 255. The value 0 is also accepted to communicate directly to a MODBUS/TCP or MODBUS/UDP devices. Default value is 240.

Table 1: Configuration form

All changes in settings will be applied after pressing the *Apply* button.

Note: If a time between the two received characters is recognized to be longer than the *Split Timeout* parameter value in milliseconds, the message from all received data is compiled and then it is sent.

3.2 USB Configuration

USB Configuration has nearly the same configuration items as PORT1 and PORT2. Only difference is missing *Enable I/O and XC-CNT extensions* and *Unit ID* items.

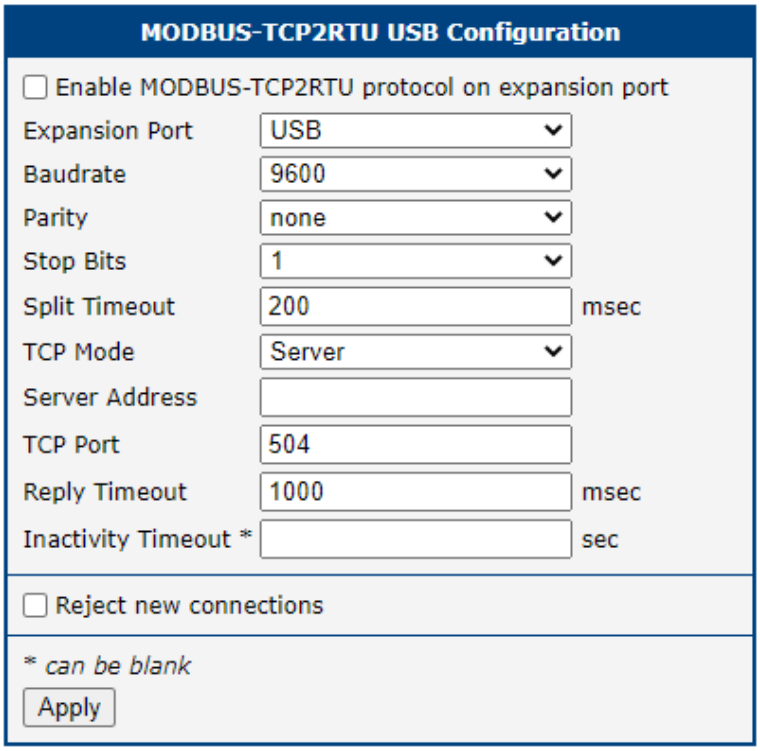

Figure 5: USB Configuration

4. I/O & XC-CNT MODBUS TCP Server

4.1 Basic Characteristic

I/O protocol and XC-CNT MODBUS TCP server is one of the router communication protocol with a *Modbus TCP2RTU* router app based on the I/O interface and XC-CNT expansion boards. Router provides current state of inputs in real time. System can read it using message with 0x03 code (reading values of more registers). Using messages with the code 0x10 (writing values of more registers) system can control digital outputs and set the state counters.

4.2 Address Space of Router

Address	Register No.	Access	Description
0x0400	0x0401	R/-	upper 16 bits of temperature in router [°C] (with sign)
0x0401	0x0402	R/-	lower 16 bits of temperature in router [°C] (with sign)
0x0402	0x0403	R/-	upper 16 bits of the supply voltage [mV]
0x0403	0x0404	R/-	lower 16 bits of the supply voltage [mV]
0x0404	0x0405	R/-	not used, always 0
0x0405	0x0406	R/-	not used, always 0
0x0406	0x0407	R/-	not used, always 0
0x0407	0x0408	R/-	not used, always 0
0x0408	0x0409	R/-	state of upper 16 binary inputs: • bits 0 to 15 – not used, always 0
0x0409	0x040A	R/-	state of lower 16 binary inputs: • bit 0 – level at the input BIN0 • bits 1 to 15 – not used, always 0
0x040A	0x040B	R/W	state of upper 16 binary outputs: • bits 0 to 15 – not used, always 0
0x040B	0x040C	R/W	state of lower 16 binary outputs: • bit 0 – level at the output BOUT0 • bits 1 to 15 – not used, always 0
0x040C	0x040D	R/-	not used, always 0
0x040D	0x040E	R/-	not used, always 0
0x040E	0x040F	R/-	not used, always 0
0x040F	0x0410	R/-	not used, always 0

Table 2: I/O

Address	Register No.	Access	Description
0x0410	0x0411	R/-	upper 16 bits of AN1 value, always 0
0x0411	0x0412	R/-	lower 16 bits of AN1 value, value from 12-bit A-D converter
0x0412	0x0413	R/-	upper 16 bits of AN2 value, always 0
0x0413	0x0414	R/-	lower 16 bits of AN2 value, value from 12-bit A-D converter
0x0414	0x0415	R/W	upper 16 bits of CNT1
0x0415	0x0416	R/W	lower 16 bits of CNT1
0x0416	0x0417	R/W	upper 16 bits of CNT2
0x0417	0x0418	R/W	lower 16 bits of CNT2
0x0418	0x0419	R/-	state of upper 16 binary inputs: • bits 0 to 15 – not used, always 0
0x0419	0x041A	R/-	state of lower 16 binary inputs: • bit 0 – level at the input BIN1 • bit 1 – level at the input BIN2 • bit 2 – level at the input BIN3 • bit 3 – level at the input BIN4 • bits 4 to 15 – not used, always 0
0x041A	0x041B	R/W	state of upper 16 binary outputs: • bits 0 to 15 – not used, always 0
0x041B	0x041C	R/W	state of lower 16 binary outputs: • bit 0 – level at the output BOUT1 • bits 1 to 15 – not used, always 0
0x041C	0x041D	R/-	not used, always 0
0x041D	0x041E	R/-	not used, always 0
0x041E	0x041F	R/-	not used, always 0
0x041F	0x0420	R/-	not used, always 0

Table 3: XC-CNT – PORT1

Address	Register No.	Access	Description
0x0420	0x0421	R/-	upper 16 bits of AN1 value, always 0
0x0421	0x0422	R/-	lower 16 bits of AN1 value, value from 12-bit A-D converter
0x0422	0x0423	R/-	upper 16 bits of AN2 value, always 0
0x0423	0x0424	R/-	lower 16 bits of AN2 value, value from 12-bit A-D converter
0x0424	0x0425	R/W	upper 16 bits of CNT1
0x0425	0x0426	R/W	lower 16 bits of CNT1
0x0426	0x0427	R/W	upper 16 bits of CNT2
0x0427	0x0428	R/W	lower 16 bits of CNT2
0x0428	0x0429	R/-	state of upper 16 binary inputs: • bits 0 to 15 – not used, always 0
0x0429	0x042A	R/-	state of lower 16 binary inputs: • bit 0 – level at the input BIN1 • bit 1 – level at the input BIN2 • bit 2 – level at the input BIN3 • bit 3 – level at the input BIN4 • bits 4 to 15 – not used, always 0
0x042A	0x042B	R/W	state of upper 16 binary outputs: • bits 0 to 15 – not used, always 0
0x042B	0x042C	R/W	state of lower 16 binary outputs: • bit 0 – level at the output BOUT1 • bits 1 to 15 – not used, always 0
0x042C	0x042D	R/-	not used, always 0
0x042D	0x042E	R/-	not used, always 0
0x042E	0x042F	R/-	not used, always 0
0x042F	0x0430	R/-	not used, always 0

Table 4: XC-CNT – PORT2

Address	Register No.	Access	Description
0x0430	0x0431	R/-	upper 16 bits of serial number
0x0431	0x0432	R/-	lower 16 bits of serial number
0x0432	0x0433	R/-	1st and 2nd byte of MAC address
0x0433	0x0434	R/-	3rd and 4th byte of MAC address
0x0434	0x0435	R/-	5th and 6th byte of MAC address
0x0435	0x0436	R/-	1st and 2nd byte of IP address MWAN
0x0436	0x0437	R/-	3rd and 4th byte of IP address MWAN
0x0437	0x0438	R/-	number of active SIM
0x0438	0x0439	R/-	1st and 2nd byte of MWAN Rx Data
0x0439	0x043A	R/-	3rd and 4th byte of MWAN Rx Data
0x043A	0x043B	R/-	5th and 6th byte of MWAN Rx Data
0x043B	0x043C	R/-	7th and 8th byte of MWAN Rx Data
0x043C	0x043D	R/-	1st and 2nd byte of MWAN Tx Data
0x043D	0x043E	R/-	3rd and 4th byte of MWAN Tx Data
0x043E	0x043F	R/-	5th and 6th byte of MWAN Tx Data
0x043F	0x0440	R/-	7th and 8th byte of MWAN Tx Data
0x0440	0x0441	R/-	1st and 2nd byte of MWAN Uptime
0x0441	0x0442	R/-	3rd and 4th byte of MWAN Uptime
0x0442	0x0443	R/-	5th and 6th byte of MWAN Uptime
0x0443	0x0444	R/-	7th and 8th byte of MWAN Uptime
0x0444	0x0445	R/-	MWAN Registration
0x0445	0x0446	R/-	MWAN Technology
0x0446	0x0447	R/-	MWAN PLMN
0x0447	0x0448	R/-	MWAN Cell
0x0448	0x0449	R/-	MWAN Cell
0x0449	0x044A	R/-	MWAN LAC
0x044A	0x044B	R/-	MWAN TAC
0x044B	0x044C	R/-	MWAN Channel
0x044C	0x044D	R/-	MWAN Band
0x044D	0x044E	R/-	MWAN Signal Strength
0x044E	0x044F	R/-	CRC32 value of router configuration
0x044F	0x0450	R/-	CRC32 value of router configuration

Table 5: Other information

Notes:

- Serial number on addresses 0x0430 and 0x0431 are present only in case of 7 digit serial number, otherwise are values on those addresses empty.
- In case of absence XC-CNT board all corresponding values are 0.
- Information about the current fitting and configuration of XC-CNT boards can be found in the system log after starting the router app.
- Writing is in fact possible to all registers. Writing to the registry, which is not designed for writing, is always successful, however there is no physically change.
- Reading values from register address range 0x0437 - 0x044D works on all router platforms.

5. Related Documents

[1] Advantech Czech: **Expansion Port RS232 – User Manual** (MAN-0020-EN)
[2] Advantech Czech: **Expansion Port RS485/422 – User Manual** (MAN-0025-EN)
[3] Advantech Czech: **Expansion Port CNT – User Manual** (MAN-0028-EN)

You can obtain product-related documents on *Engineering Portal* at *icr.advantech.cz* address.

To get your router's *Quick Start Guide*, *User Manual*, *Configuration Manual*, or *Firmware* go to the *Router Models* page, find the required model, and switch to the *Manuals* or *Firmware* tab, respectively.

The *Router Apps* installation packages and manuals are available on the *Router Apps* page.

For the *Development Documents*, go to the *DevZone* page.