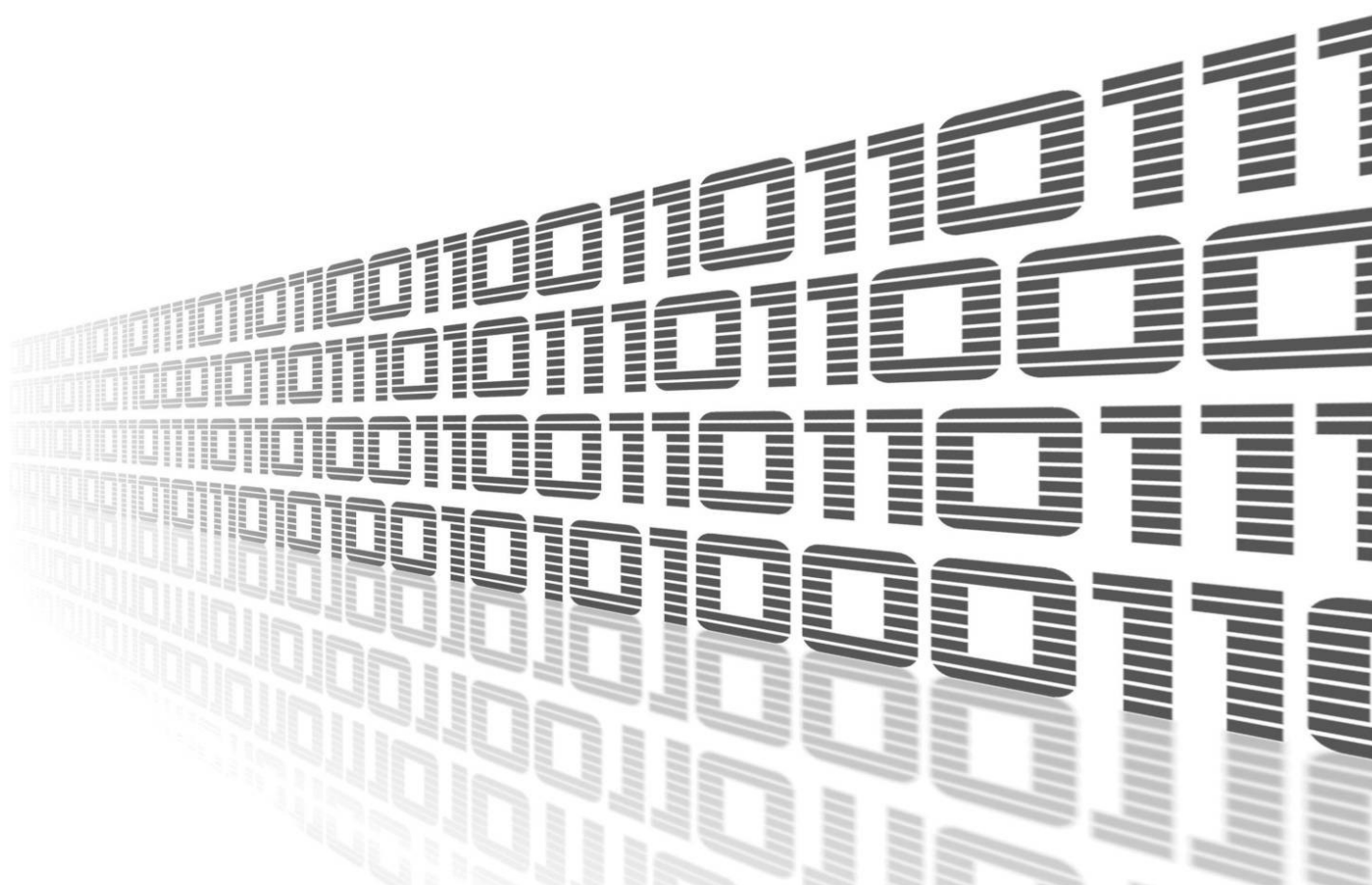




Protocol MODBUS TCP2RTU



© 2026 Advantech Czech s.r.o. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photography, recording, or any information storage and retrieval system, without prior written consent. Information in this manual is subject to change without notice and does not represent a commitment by Advantech.

Advantech Czech s.r.o. shall not be liable for any incidental or consequential damages arising from the use, performance, or furnishing of this manual.

All brand names used in this manual are registered trademarks of their respective owners. The use of trademarks or other designations in this publication is for reference purposes only and does not imply endorsement by the trademark holder.

Used symbols



Important

Important — Indicates a risk to personal safety or potential damage to the router. Follow these instructions precisely to prevent injury or equipment damage.



Warning

Warning — Highlights conditions that may cause malfunction, loss of data, or unexpected behavior in specific situations. Read carefully before proceeding.



Info

Info — Provides helpful tips, context, or references that improve understanding but are not strictly required to complete the task.

Contents

1. Description	1
1.1 Protocol Frame Format	1
2. Web Interface	2
3. Configuration	3
3.1 Serial Interface Configuration	3
4. I/O Extensions	6
4.1 Basic Characteristic	6
4.2 Address Space of Router	6
5. Related Resources	8

List of Figures

1	Modbus message on TCP/IP	1
2	Modbus message on serial line	1
3	Menu	2
4	Serial interface configuration	3

List of Tables

1	Configuration form	4
2	I/O	6
3	Other information	7

1. Description

Warning

Router app *Protocol MODBUS TCP2RTU* is not included in the standard router firmware. Uploading of this router app is described in the Configuration manual (see Chapter [Related Resources](#)).

Modbus TCP2RTU router app provides the conversion of MODBUS TCP protocol to MODBUS RTU protocol, which can be used on the serial line. RS-232 or RS-485/422 interface, or a USB converter, can be used for serial communication in the Advantech router.

Only interfaces actually present in the router are shown in the configuration menu, each labeled with its real name. Automatic recognition of RS-485 from RS-422 is supported.

The router app also supports *Modbus wake-up*, a proprietary mechanism that allows communication with RTU devices that use a power-saving sleep mode, and *Modbus TCP Security*, which secures the MODBUS TCP connection using TLS encryption. Both features are configured per port; see Section [Serial Interface Configuration](#) for details.

1.1 Protocol Frame Format

Info

Understanding the MODBUS frame format described in this section is not required to use the router app; it is provided as background information.

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.

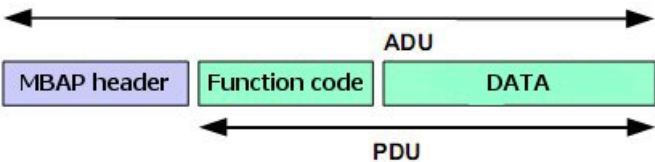


Figure 1: Modbus message on TCP/IP

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.

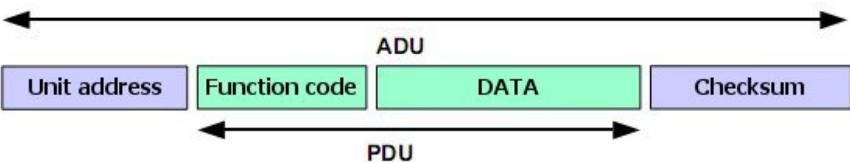


Figure 2: Modbus message on serial line

2. Web 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: *Information*, *Configuration* and *Administration*.

Information contains *Statistics*, which shows statistical information, and *System Log*, which shows only log messages related to this router app.

Configuration contains one item for every serial port physically present in the router, labeled with the port's real name (for example, *RS-232* or *RS-485/422*; if both ports share the same name, they are distinguished as, e.g., *RS-232 (1)* and *RS-232 (2)*), plus a *USB Port* item, regardless of whether a USB-to-serial converter is connected. Ports that are not present in the router do not appear in the menu.

Administration contains only *Return*, which 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.

Information
Statistics
System Log
Configuration
RS-232
RS-485
USB Port
Administration
Return

Figure 3: Menu

Info

Configuration settings can be changed only by users with the *Admin* role. Users with the *User* role can view the configuration, but the *Apply* button is not available to them.

3. Configuration

3.1 Serial Interface Configuration

Each port is configured using a separate form. The figure below shows the form for a serial port (RS-232 in this example). Meaning of the individual items is described in the next table.

MODBUS-TCP2RTU Configuration	
RS-232	
☐ Enable TCP2RTU on RS-232	
Baudrate	9600 ▼
Parity	none ▼
Stop Bits	1 ▼
Split Timeout	200 msec
Response Timeout	1000 msec
☐ Enable Wake-Up	
RTU Device Sleeps After Inactivity	12 sec
RTU Device Wakes Up In	100 msec
TCP Mode	server ▼
Server Address	
Use TLS (Modbus Security)	☐
Server Certificate	Load From File...
Server Private Key	Load From File...
Client CA Certificate	Load From File...
TCP Port	502 (standard port: 502, or 802 for TLS)
Allow Single Connection Only	☐
Disconnect After Inactivity *	sec
When Bad or No RTU Response	send gateway exception ▼
☐ Enable Access Control List	
Allowed IP Address *	Subnet Mask *
Maximum 10 items	
☐ Enable I/O Extensions	
Unit ID	240
* can be blank	
Apply	

Figure 4: Serial interface configuration

The configuration form is the same for every serial port and for the USB port; only the USB form additionally shows a read-only *USB-Serial Converter* status (*connected* or *unavailable now*).

Info

- USB Configuration is only available for products equipped with a USB port.
- Fields that do not apply to the current configuration (for example, *Server Address* in *Server* mode, or the wake-up, TLS, and Access Control List items when their respective checkboxes are cleared) are grayed out automatically.

Item	Description
Enable	Enables conversion of MODBUS TCP/IP protocol into MODBUS RTU on this port. The item label includes the port's real name, e.g. <i>Enable TCP2RTU on RS-232</i> .
USB-Serial Converter	Indicates whether a converter is currently connected to the USB interface.
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)
Response Timeout	Time interval, in milliseconds, in which a response from the RTU device is expected. The router's reaction to a missing or invalid response is set by the <i>When Bad or No RTU Response</i> item below.
Enable Wake-Up	Enables the <i>Modbus wake-up</i> mechanism for RTU devices that use a power-saving sleep mode. When enabled, before sending a request to a device that may be asleep, the router app first sends a single dummy byte, waits for the time set in <i>RTU Device Wakes Up In</i> , discards any data received in the meantime, and only then sends the actual request. This mechanism is proprietary and is not part of the MODBUS standard.
RTU Device Sleeps After Inactivity	Time, in seconds, of inactivity on the serial line after which the RTU device is assumed to have gone to sleep. Applicable only if <i>Enable Wake-Up</i> is selected.
RTU Device Wakes Up In	Time, in milliseconds, that the RTU device needs to wake up after receiving the wake-up byte. Applicable only if <i>Enable Wake-Up</i> is selected.
TCP Mode	Selection of mode: • Server – TCP server • Client – TCP client The common scenario is the router acting as the server. <i>Client</i> mode is useful when the router is behind NAT.
Server Address	Defines server address when selected mode is <i>Client</i> (in <i>TCP Mode</i> item).
Use TLS (Modbus Security)	Enables <i>Modbus TCP Security</i> , which secures the MODBUS TCP connection using TLS encryption. If selected, the <i>Certificate</i> , <i>Private Key</i> , and <i>CA Certificate</i> items below must also be filled in.
Certificate	Certificate of the router app, in PEM format. If it was issued through one or more intermediate CAs, append their certificates after it in the same field (do not include the root CA certificate). Labeled <i>Server Certificate</i> in <i>Server</i> mode or <i>Client Certificate</i> in <i>Client</i> mode. Applicable only if <i>Use TLS</i> is selected.
Private Key	Private key belonging to the <i>Certificate</i> , in PEM format. Labeled <i>Server Private Key</i> in <i>Server</i> mode or <i>Client Private Key</i> in <i>Client</i> mode. Applicable only if <i>Use TLS</i> is selected.

Table 1: Configuration form

Item	Description
CA Certificate	Root CA certificate, in PEM format, used to verify the certificate chain presented by the remote side. Only a single certificate is accepted here; any intermediate CA certificate must instead be appended to the remote side's own <i>Certificate</i> . Labeled <i>Client CA Certificate</i> in <i>Server</i> mode or <i>Server CA Certificate</i> in <i>Client</i> mode. Applicable only if <i>Use TLS</i> is selected.
TCP Port	TCP port on which the router listens for MODBUS TCP connection requests (<i>Server</i> mode) or to which it connects (<i>Client</i> mode). The standard port is 502 for unsecured Modbus, or 802 for secured Modbus (when <i>Use TLS</i> is selected).
Allow Single Connection Only	When enabled, the router rejects any other connection attempts while a connection is already active – the router no longer supports multiple simultaneous connections. Applicable only in <i>Server</i> mode. Regardless of this item, the router accepts at most 256 simultaneous connections in <i>Server</i> mode.
Disconnect After Inactivity	Time period, in seconds, after which the TCP/UDP connection is interrupted in case of inactivity. Can be left blank to disable.
When Bad or No RTU Response	Selects the router's reaction when the RTU device does not respond in time or replies with an invalid checksum: • ignore (let TCP timeout) – No MODBUS error is sent back over TCP; the TCP client must rely on its own timeout. • send gateway exception – The router sends MODBUS exception code 0x0B (Gateway Target Device Failed to Respond) back to the TCP client.
Enable Access Control List	Enables filtering of incoming TCP connections by IP address. Up to 10 rules can be defined below, each consisting of an <i>Allowed IP Address</i> and an optional <i>Subnet Mask</i> . If <i>Subnet Mask</i> is left blank, the rule matches only the exact IP address; otherwise, it matches the whole subnet. A connection is accepted only if the client's IP address matches at least one rule. Applicable only in <i>Server</i> mode.
Enable I/O Extensions	Enables direct communication with the router's binary inputs, outputs, and internal information registers over MODBUS. For more information, see Section 4.2.
Unit ID	ID for direct communication with router. Values can be 1 to 255. The value 0 (broadcast) is also accepted to communicate directly to a MODBUS/TCP or MODBUS/UDP devices. Default value is 240.

Table 1: Configuration form (continued)

Info

- *TCP Mode* above only controls which side opens the TCP connection – it has no effect on the MODBUS roles. In this router app, the device on the serial line is always the MODBUS slave (also called the MODBUS server), and whatever connects to it over TCP (typically a SCADA system) is always the MODBUS master (also called the MODBUS client), regardless of the *TCP Mode* setting. If you need the opposite arrangement – the serial-line device acting as the MODBUS master – use the *Modbus RTU2TCP* router app instead.
- The *Certificate* field must contain the router app's own certificate. If it was issued through one or more intermediate CAs, append their certificates after it in the same field, one PEM block after another. Do not include the root CA certificate here.
- The *CA Certificate* field accepts only a single certificate: the root CA certificate that ultimately signs the remote side's certificate chain. Any additional certificates included in this field are ignored.
- 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.

4. I/O Extensions

4.1 Basic Characteristic

The I/O protocol is a router communication protocol used with the *Modbus TCP2RTU* router app, based on the router's I/O interface (see *Enable I/O Extensions* in Section [Serial Interface Configuration](#)). The router provides the current state of inputs in real time. The 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. Messages with different codes (e.g., 0x6 for writing value of a single register) are not supported.

4.2 Address Space of Router

Info

Addresses in the table start from 0. If the implementation uses register numbers starting from 1, the register address needs to be increased by 1.

The following table lists the registers used for direct access to the router's binary inputs, outputs, and counters.

Address	Access	Description
0x0400	R/-	upper 16 bits of temperature in router [°C] (with sign)
0x0401	R/-	upper 16 bits of temperature in router [°C] (with sign)
0x0402	R/-	upper 16 bits of the supply voltage [mV]
0x0403	R/-	upper 16 bits of the supply voltage [mV]
0x0404	R/-	state of upper 16 bits of BIN2, always 0
0x0405	R/-	state of lower 16 bits of BIN2
0x0406	R/-	state of upper 16 bits of BIN3, always 0
0x0407	R/-	state of lower 16 bits of BIN3
0x0408	R/-	state of upper 16 bits of BIN0, always 0
0x0409	R/-	state of lower 16 bits of BIN0: • bit 0 – level at the input BIN0 • bits 1 to 15 – not used, always 0
0x040A	R/-	state of upper 16 bits of BOUT0, always 0
0x040B	R/W	state of lower 16 bits of BOUT0: • bit 0 – level at the output BOUT0 • bits 1 to 15 – not used, always 0
0x040C	R/-	state of upper 16 bits of BIN1, always 0
0x040D	R/-	state of lower 16 bits of BIN1: • bit 0 – level at the input BIN1 • bits 1 to 15 – not used, always 0
0x040E	R/-	state of upper 16 bits of BOUT1, always 0
0x040F	R/W	state of lower 16 bits of BOUT1: • bit 0 – level at the output BOUT1 • bits 1 to 15 – not used, always 0

Table 2: I/O

The following table lists additional, read-only information registers.

Address	Access	Description
0x0430	R/-	upper 16 bits of serial number
0x0431	R/-	lower 16 bits of serial number
0x0432	R/-	1 st and 2 nd byte of MAC address
0x0433	R/-	3 rd and 4 th byte of MAC address
0x0434	R/-	5 th and 6 th byte of MAC address
0x0435	R/-	1 st and 2 nd byte of IP address MWAN
0x0436	R/-	3 rd and 4 th byte of IP address MWAN
0x0437	R/-	number of active SIM
0x0438	R/-	1 st and 2 nd byte of MWAN Rx Data
0x0439	R/-	3 rd and 4 th byte of MWAN Rx Data
0x043A	R/-	5 th and 6 th byte of MWAN Rx Data
0x043B	R/-	7 th and 8 th byte of MWAN Rx Data
0x043C	R/-	1 st and 2 nd byte of MWAN Tx Data
0x043D	R/-	3 rd and 4 th byte of MWAN Tx Data
0x043E	R/-	5 th and 6 th byte of MWAN Tx Data
0x043F	R/-	7 th and 8 th byte of MWAN Tx Data
0x0440	R/-	1 st and 2 nd byte of MWAN Uptime
0x0441	R/-	3 rd and 4 th byte of MWAN Uptime
0x0442	R/-	5 th and 6 th byte of MWAN Uptime
0x0443	R/-	7 th and 8 th byte of MWAN Uptime
0x0444	R/-	MWAN Registration
0x0445	R/-	MWAN Technology
0x0446	R/-	MWAN PLMN
0x0447	R/-	MWAN Cell
0x0448	R/-	MWAN Cell
0x0449	R/-	MWAN LAC
0x044A	R/-	MWAN TAC
0x044B	R/-	MWAN Channel
0x044C	R/-	MWAN Band
0x044D	R/-	MWAN Signal Strength
0x044E	R/-	CRC32 value of router configuration
0x044F	R/-	CRC32 value of router configuration

Table 3: Other information

Info

- Serial number on addresses 0x0430 and 0x0431 are present only in case of 7 digit serial number, otherwise are values on those addresses empty.
- Addresses 0x0410 to 0x042F are not used and always read as 0.
- 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 Resources

You can obtain all product-related documents, software updates, and supplementary materials on the Advantech *Engineering Portal* at icr.advantech.com.

For easy access to specific resources, please refer to the following sections of the portal:

- **Router Support Materials:** To access your router's supporting documents (such as the *Hardware Manual* and *Configuration Manual*), the latest firmware, or other technical resources, navigate to *Support* → [Router Models](#). Locate your specific model and select the appropriate tab under the *Documents to download* section. Available tabs include *Brochures*, *Manuals*, *Certificates*, *Firmware*, *Images/3D Models*, *PCN/SA*, and *Others*.
- **Router Apps:** To extend your router's functionality, installation packages and comprehensive manuals for various extension modules are available by navigating to *Download* → [Router Apps](#).
- **Application Notes:** For detailed guides, configuration examples, and step-by-step instructions for implementing specific networking features and use cases, navigate to *Download* → [Application Notes](#).
- **Development Documents:** If you are interested in custom scripting, programming your own applications, or compiling custom modules, navigate to [Development](#) page.