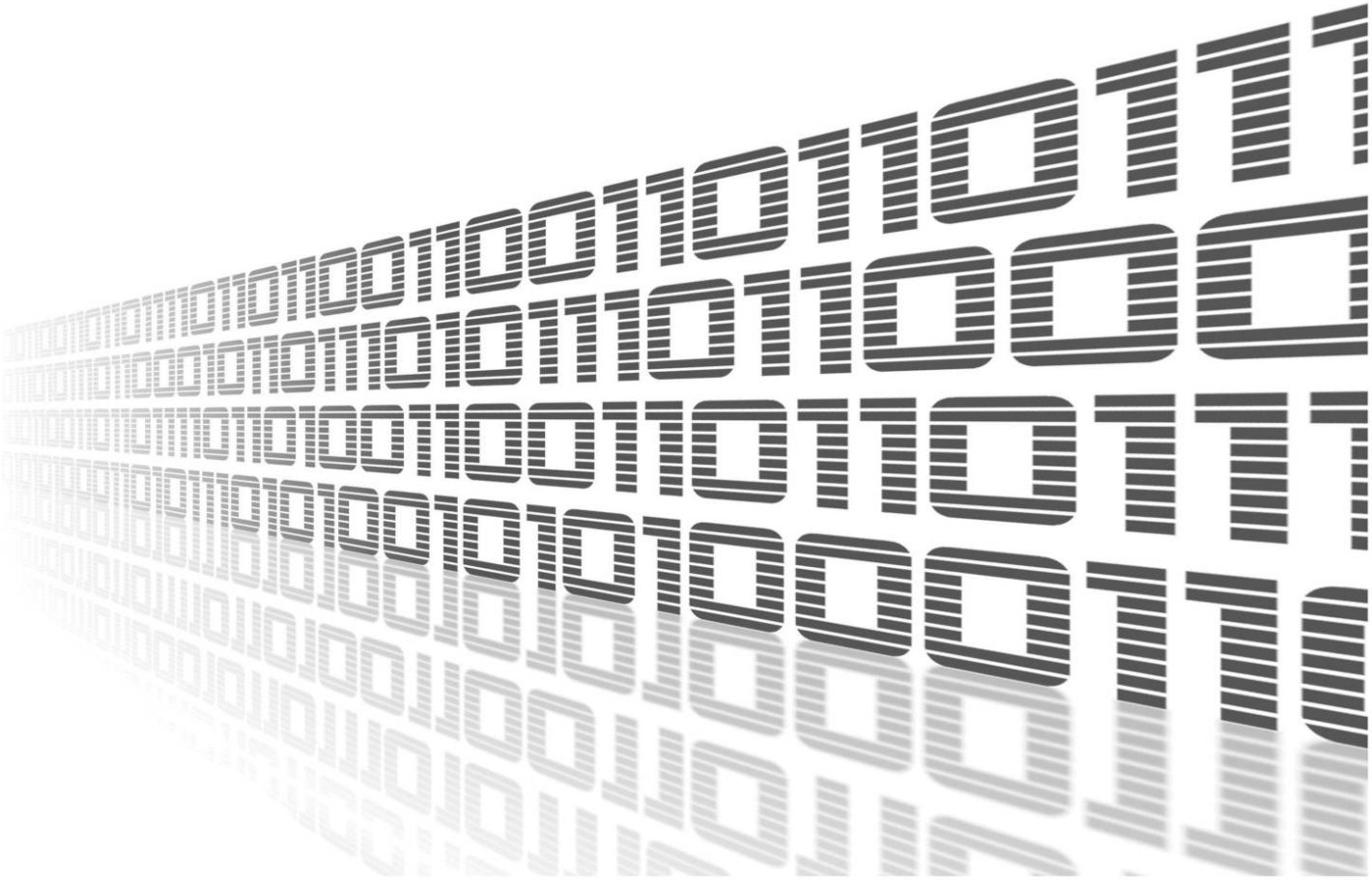
ADVANTECH

RouterApp

Protocol MODBUS-RTUMAP



Advantech Czech s.r.o., Sokolska 71, 562 04 Usti nad Orlici, Czech Republic
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Used symbols

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

Attention – Problems that can arise in specific situations.

Information – Useful tips or information of special interest.

Contents

List of Figures

List of Tables

1. Description of router app

The router app *Protocol MODBUS-RTUMAP* is not included in the standard router firmware. Uploading this router app is described in the *Configuration Manual*.

Using this module, it is possible to periodically read data from *Modbus RTU* devices (meters) into a buffer. Each *read* value is mapped to a new virtual holding register, which is accessible via *Modbus TCP*. The mapped registers are arranged consecutively, but it is possible to reserve gaps to ensure the mapping remains unchanged for future updates. The following figure illustrates how this works:

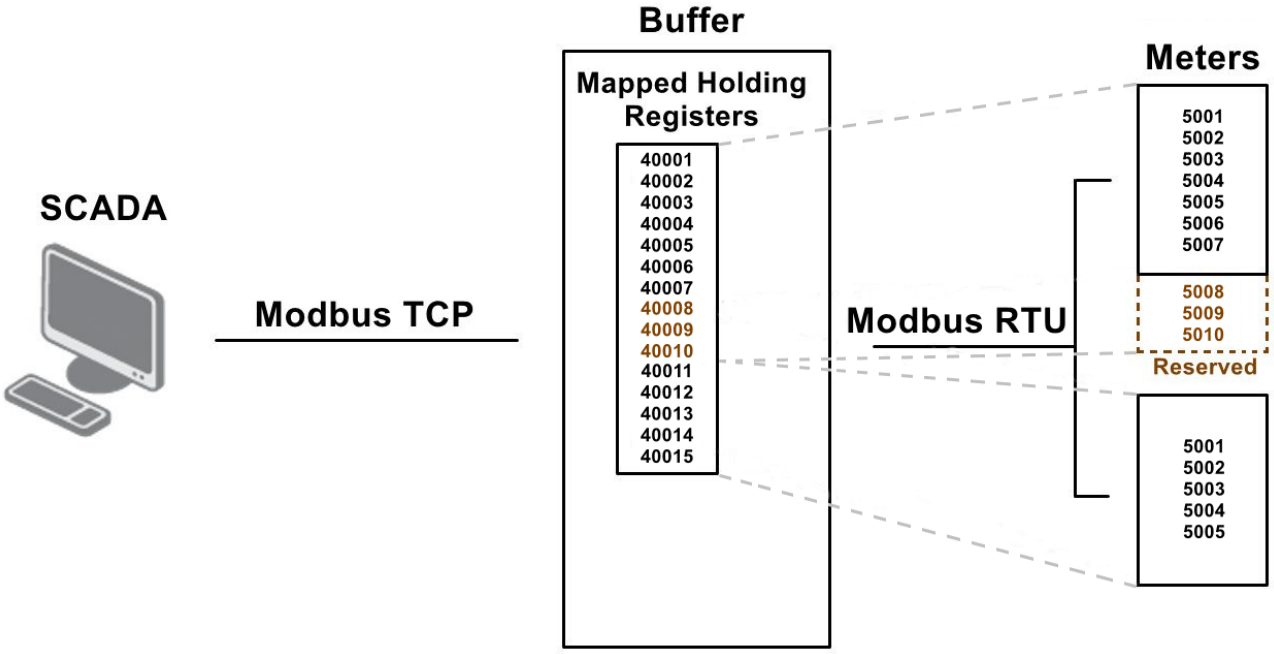

Figure 1: Model diagram

It is also possible to write to the mapped virtual holding registers. The values are then written back to the corresponding registers in the meters. Both single and multiple *write* functions can be used. However, this is only applicable to writable registers (coils and holding registers) on meters. An error is reported for *read-only* registers (discrete inputs and input registers).

Discrete registers (Coils and Discrete Inputs) are not mapped 1:1, but as 16-bit groups. For example, when 20 coils need to be *read* from a meter, they are mapped to 2 holding registers. The first 16 coils are mapped to the first register, while the remaining 4 coils are mapped to the second register, leaving 12 bits in this register unused.

Write-back is performed as a full block for the corresponding meter. For example, If the meter is configured to use 32 coils, which are mapped to 2 holding registers, then writing to either of these registers via *TCP* will result in all 32 coils being written back to the device via *RTU*.

If the write-back via *RTU* fails (e.g. the device is powered off or a communication error occurs), the operation is retried continuously until it succeeds. While pending values are waiting to be written, new values from the device are not read. If the client sends another write request before the previous one completes successfully, only the most recent values will be written back.

For configuration, the *RTUMAP* router app has an available web interface, which is invoked by pressing the module name on the *Router Apps* page of the router web interface. The left part of the web interface (i.e. menu) contains *System Log* in the *Information* section, expansion ports *RS-232* & *RS-485* and *USB Port* in the *Configuration* section, and the *Return* item in the *Administration* section, which switches this web interface to the interface of the router. Not all items may be displayed; it depends on the hardware support of the device.

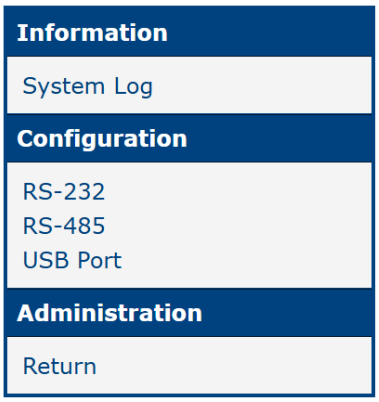

Figure 2: Menu

The RTUMAP router app uses zero-based addressing for registers. This means that register numbering starts from 0.

1.1 System Log

The *System Log* section provides access to runtime system events and diagnostic messages related to the operation of the RTUMAP router app. This includes details such as Modbus communication activity, error reports, and internal application status.

This section is intended primarily for monitoring and troubleshooting. It allows users to verify that the router app is functioning correctly and to identify potential issues, such as failed communication with Modbus devices or configuration errors.

Two buttons are available at the bottom of the System Log view:

- Save Log — saves the full content of the log for later review or archiving.
- Save Report — generates a summary report containing key diagnostic data, useful for technical support or documentation purposes.

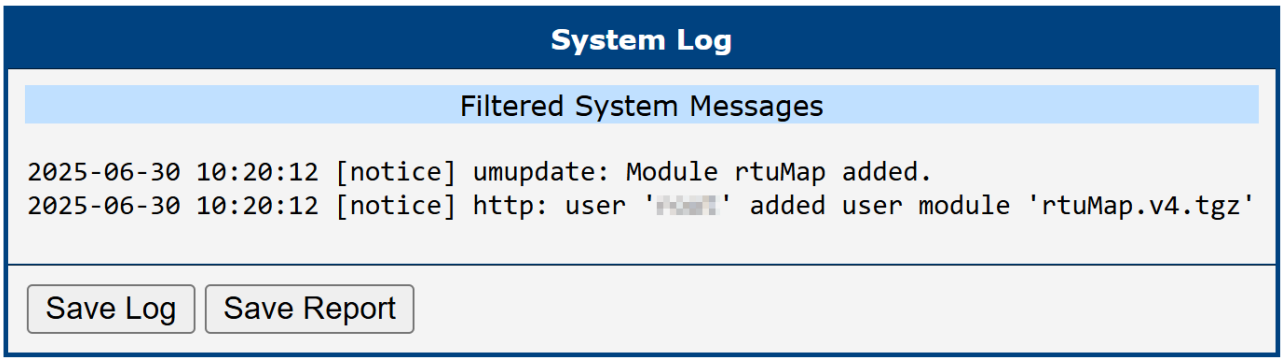

Figure 3: System Log

1.2 Terminology Clarification

Sometimes it is difficult to describe things using standard Modbus terminology, which can lead to confusion. In this document, please interpret the following terms as described below:

- The standalone term **Register** refers to any of the following: *Coil*, *Discrete Input*, *Holding Register*, or *Input Register*.
- **DO** = Discrete Output = *Coil*
- **DI** = Discrete Input
- **AO** = Analog Output = *Holding Register*
- **AI** = Analog Input = *Input Register*

2. Configuration of router app

Configuration of this router app is performed via specified expansion ports *RS-232*, *RS-485*, or *USB Port* forms. Meaning of other items is described in the table below:

Item	Description
Enabled RTUMAP on X	Activate the RTUMAP Router App on one of the following ports: Expansion Port 1, Expansion Port 2, or the USB port – depending on which interface are you currently in use.
Baudrate	Modulation rate (number of distinct symbol changes – signaling events – made to the transmission medium per second).
Data Bits	Number of data bits (*7* or *8*).
Parity	Parity (*none*, *even* or *odd*).
Stop Bits	Number of stop bits (*1* or *2*).
Split Timeout	Time limit for reading each meter (in miliseconds).
Read Period	Period of reading data set from all meters to the buffer (in seconds).
TCP Port	TCP Port Number on which the Modbus master requests are listened to.
Map Registers From	An address on which mapped holding registers start. A Modbus master (e.g. SCADA) reads/writes from/to addresses starting at this address. See bellow items how the next addresses are assigned.
Skipped Discrete Sends	Defines the behavior when a Modbus TCP client attempts to read a skipped discrete register (Coil or Discrete Input). Options are to either return an error or a default logical value (0 or 1).
Skipped Analog Sends	Defines the behavior when a Modbus TCP client attempts to read a skipped analog register (Holding Register or Input Register). Options are to return an error or a predefined default value specified in the configuration.
Number	Row identifier, serves as a unique number for each entry.
Checkbox	Enables/disables reading/writing of values for the related row. When is disabled, the mapping addresses are counted to be reserved and the mapping schema is preserved after enabling.
Meter Address	Modbus device address of a meter.
Start Register	Starting register on the Modbus device (meter) for reading values.
Number of Values	Number of registers that are actively read and mapped from the Modbus device.
Total Reserved	Total number of registers reserved for reading. Allows future increase of Number of Values without changing the mapped address range. Only Number of Values are actually being read, but mapping is calculated as Total Reserved values would be read.
Type of Registers	Depending on the register type, the program selects the appropriate read-/write functions.
Mapped Registers	The range of mapped addresses calculated for this row, based on Mapped Registers From and Number of Values (e.g. 40000–40009).
Skipped Registers	The number of virtual holding register addresses to skip after this row's mapped range before the next one begins. Helps to maintain a stable mapping layout across updates.

Table 1: Configuration Item Descriptions

All changes will take effect after pressing the *Apply* button.

MODBUS-RTUMAP Configuration

RS-232

Enable RTUMAP on RS-232

Baudrate	115200
Data Bits	8
Parity	none
Stop Bits	1
Split Timeout	200 msec
Read Period	5 sec

TCP Port	502
Map Registers From	40000
Skipped Discrete Sends	on (1)
Skipped Analog Sends	fixed value 2

		Meter Address	Start Register	Number of Values	Total Reserved *	Type of Registers	Mapped Registers	Skipped Registers
1	☑	5	1000	1	16	DO (Coils)	40000 - 40000	
2	☑	2	0	23	40	DI (Discrete Inputs)	40001 - 40002	40003 - 40003
3	☑	13	0	20		AO (Holding Registers)	40004 - 40023	
4	☐	13	201	4		AO (Holding Registers)		40024 - 40027
5	☑	13	1000	5	10	AI (Input Registers)	40028 - 40032	40033 - 40037
6	☐							
7	☐							

Maximum 32 items

* *can be blank*

Apply

Figure 4: Configuration form

3. Related Documents

You can obtain product-related documents on *Engineering Portal* at *icr.advantech.com* 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 *Development* page.