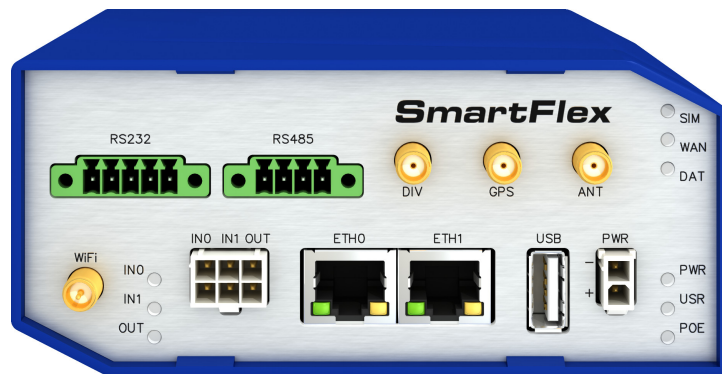# User Module

Modbus RTU2TCP

APPLICATION NOTE

Used symbols

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

Attention – Problems that may arise in specific situations.

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

Example – example of function, command or script.

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1. User Module Description

> User module *Modbus RTU2TCP* is not contained in the standard router firmware. Uploading of this user module is described in the Configuration manual (see [1, 2]).

Modbus RTU2TCP is v2 and v3 router platforms compatible.

The user module in Advantech router enables the conversion of Modbus RTU messages received via serial line – into Modbus TCP messages. These are sent via TCP to the specified Modbus server afterwards. This is useful for applications where a computer is collecting data from e.g. boilers or other devices. The data in Modbus RTU format are sent to the Advantech router via RS485. They are converted to Modbus TCP format and sent via Internet to the Modbus server and then to SCADA. See the figure below:
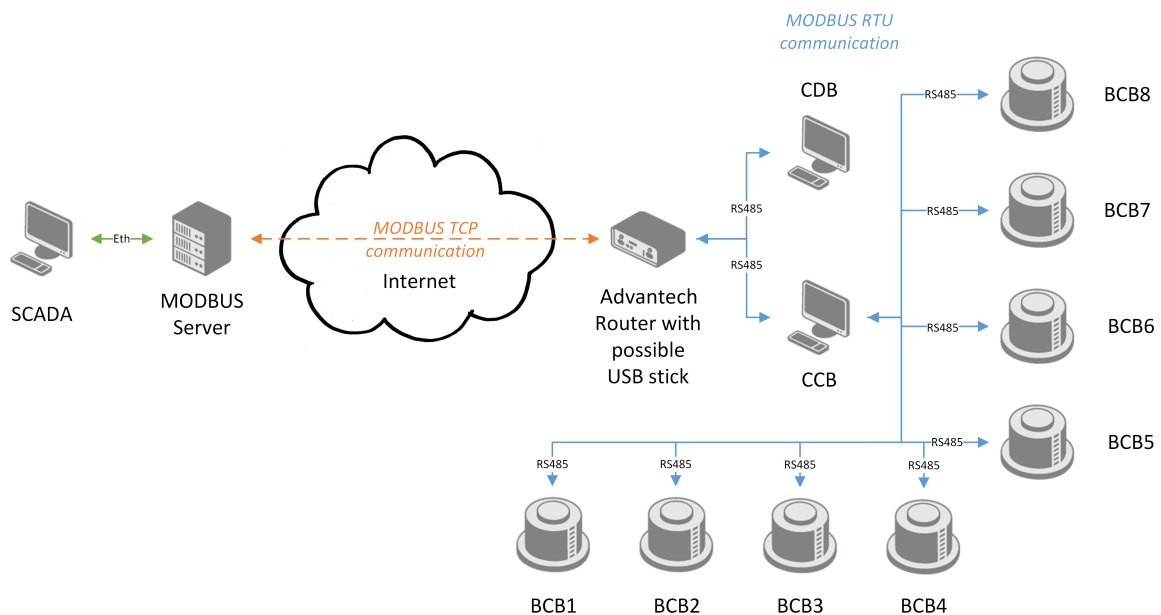

Figure 1: Router with user module converting data from boilers to SCADA

The router with the user module enabled is a RS485 Modbus slave – all data has to be sent to the router by a computer or a cascade display.

The user module can store the received data on the USB flash stick if TCP network connection (Internet) is not available at the moment. It is then resent when connection is established with the proper order of data.

1.1 MODBUS RTU and MODBUS TCP Protocol

The conversion of MODBUS RTU protocol to MODBUS TCP protocol is provided by the user module. The MODBUS RTU protocol runs on serial line. The RS232 or RS485/422 expansion port can be used in the router.

Both protocols have a common part – protocol data unit (PDU). They differ in application data unit (ADU) part. The received PDU on the serial line has the address of destination unit as a header and the checksum at the end.
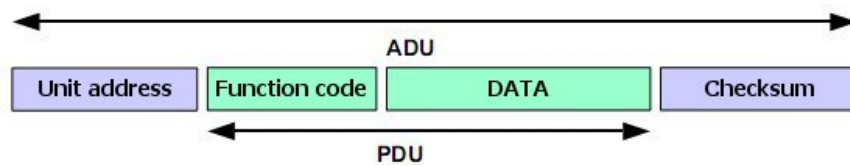

Figure 2: Modbus message on serial line

When sending MODBUS ADU on the TCP/IP, the MBAP header is used for identification. The 502 TCP port is dedicated for MODBUS TCP ADU.
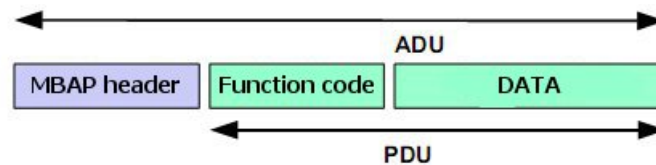

Figure 3: Modbus message on TCP/IP

2. Configuration

Use the Web interface of the user module *Modbus RTU2TCP* to configure it. It is accessible from the router's Web interface by clicking on the *User Modules* page and then the name of the user module. There are just two items in the user module's menu on the left. *Config* is this configuration page and *Return* is to return to the router's Web interface. See the table below for the configuration items explained:

Figure 3: Configuration form

Item	Description
Enable	Enables conversion of MODBUS RTU protocol to MODBUS TCP/IP protocol.
Expansion port	Port the MODBUS RTU connection will be established on: • **PORT1** – MODBUS RTU connection established on PORT 1 • **PORT2** – MODBUS RTU connection established on PORT 2 Look at *General* page in the router or *Expansion Port 1* or *Expansion Port 2* pages to see the position of serial interface in your router.
Baudrate	Serial interface communication speed. 300 to 115200 range.
Data Bits	Number of data bits in serial communication. 7 or 8.

Continued from previous page

Item	Description
Parity	Control parity bit in serial communication: • **none** – No parity will be sent • **even** – Even parity will be sent • **odd** – Odd parity will be sent
Stop Bits	Number of stop bits in serial communication. 1 or 2.
Split Timeout	Time interval to break off the message. If some space between the two characters is recognized on receive and if this space is longer than the parameter value in milliseconds, message from all received data is compiled and sent.
Server Address	Defines server address of the TCP server where data will be sent.
TCP Port	TCP port of the server (above) to send received data on. The 502 port is set for MODBUS ADU by default.
Reply Timeout	Specifies the time interval in which a response is expected. If the response doesn't come, one of these error codes will be sent: • *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.*
Enable Cache on USB memory stick	Enables storing the messages that could not be delivered to the TCP side. Every single Modbus message is saved as a file. Up to 65536 files (messages) can be saved. The user module is regularly trying to sent the oldest message again. If resend is successful, other messages are resent, too. The order of the messages is preserved.

Table 1: Configuration form

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

3. Recommended literature

[1] Advantech B+B SmartWorx: **v2 Routers Configuration Manual** (MAN-0021-EN)
[2] Advantech B+B SmartWorx: **SmartFlex Configuration Manual** (MAN-0023-EN)
[3] Advantech B+B SmartWorx: **SmartMotion Configuration Manual** (MAN-0024-EN)
[4] Advantech B+B SmartWorx: **SmartStart Configuration Manual** (MAN-0022-EN)
[5] Advantech B+B SmartWorx: **ICR-3200 Configuration Manual** (MAN-0042-EN)
[6] Advantech B+B SmartWorx: **Expansion Port RS232 – User Manual**
(MAN-0020-EN)
[7] Advantech B+B SmartWorx: **Expansion Port RS485/422 – User Manual**
(MAN-0025-EN)

Product related documents can be obtained on *Engineering Portal* at
`https://ep.advantech-bb.cz/` address.