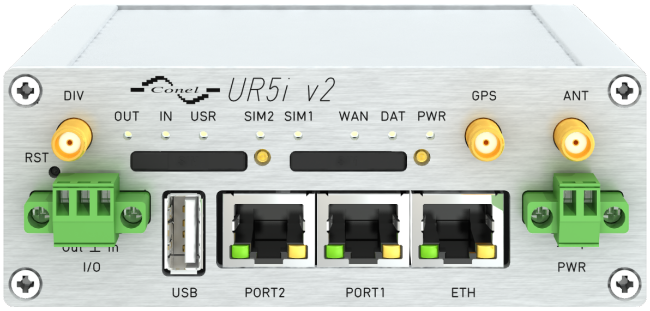
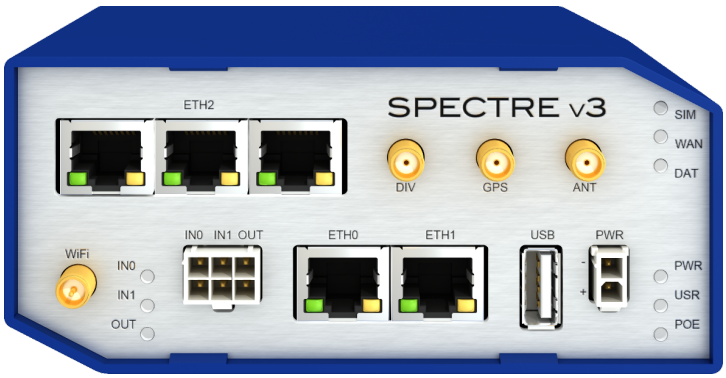
User Module

Modbus TCP2RTU

Application note





B+B SmartWorx

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Used symbols

Danger – important notice, which may have an influence on the user´s safety or the function of the device.

Attention – notice on possible problems, which can arise in specific cases.

Information, notice – information, which contains useful advice or special interest.

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1. Description of user module

User module *Modbus TCP2RTU* is not contained in the standard router firmware. Uploading of this user module is described in the Configuration manual (see [1, 2]).

Modbus TCP2RTU is v2 and v3 router platforms compatible .

User module provides the conversion of MODBUS TCP protocol to MODBUS RTU protocol, which can by used on the serial line. As serial port can be used expansion port RS232 or expansion port RS485/422 fitted in PORT1 or PORT2.

For both protocols is a common part PDU. When sending MODBUS ADU on the TCP/IP is used for identification MBAP header. For MODBUS TCP ADU is dedicated port 502.

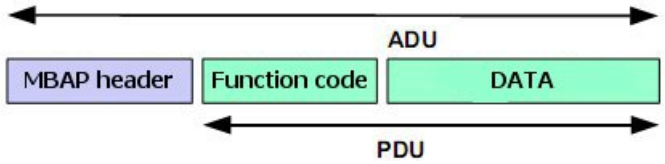

Figure 1: Modbus message on TCP/IP

When sending a PDU on the serial line, is added address destination unit, which is obtained from a MBAP header as UNIT ID and checksum to the PDU.

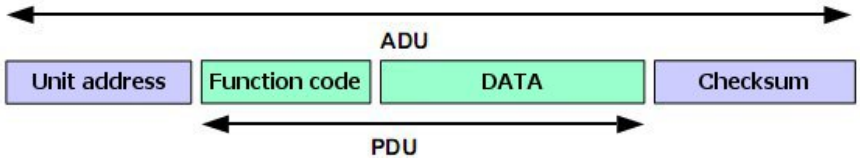

Figure 2: Modbus message on serial line

Now this module supports automatic detection of port RS485. This port is created as expansion board which enables to use of the next hardware interface. Expansion port RS485 is possible fitted into PORT1 and PORT2. Detailed information about this port can be found in User's manual – Expansion port RS485/422 (see [4]).

2. Configuration

For configuration *Modbus TCP2RTU* user module is available web interface, which is invoked by pressing the module name on the *User modules* page of the router web interface. The left part of the web interface contains these items: *Config*, *Stats* and *Return*. *Return* switches this web interface to the interface of the router. *Stats* page displays statistical information. Configuration form can be invoked by pressing *Config* item. Meaning of the individual items is the following:

Item	Description
Enable	Enables conversion of MODBUS TCP/IP protocol into MODBUS RTU
Expansion port	Port on which MODBUS RTU connection will be established: • **PORT1** – Establishes MODBUS RTU connection on PORT 1 • **PORT2** – Establishes MODBUS RTU connection on PORT 2
Baudrate	Applied communication speed
Data Bits	Number of data bits
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.

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Item	Description
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.*

Table 1: Configuration form

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

Note: If some space between the two characters is recognized when receiving and if this space is longer than the parameter value in milliseconds, message from all received data is compiled and then sent.

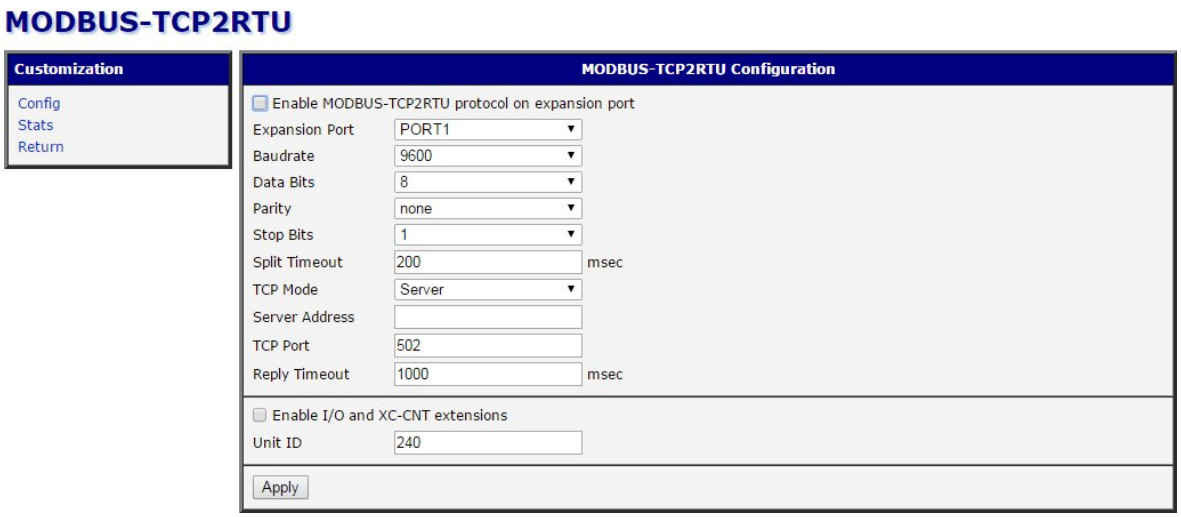

Figure 3: Configuration form

3. I/O & XC-CNT MODBUS TCP server

3.1 Basic characteristic

I/O protocol and XC-CNT MODBUS TCP server is one of the router communication protocol with a *Modbus TCP2RTU* user module 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.

3.2 Address space of router

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

Table 2: I/O

Address	Access	Description
0x0410	R/-	upper 16 bits of AN1 value, always 0
0x0411	R/-	lower 16 bits of AN1 value, value from 12-bit A-D converter
0x0412	R/-	upper 16 bits of AN2 value, always 0
0x0413	R/-	lower 16 bits of AN2 value, value from 12-bit A-D converter
0x0414	R/W	upper 16 bits of CNT1
0x0415	R/W	lower 16 bits of CNT1
0x0416	R/W	upper 16 bits of CNT2
0x0417	R/W	lower 16 bits of CNT2
0x0418	R/-	state of upper 16 binary inputs: • bits 0 to 15 – not used, always 0
0x0419	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	R/W	state of upper 16 binary outputs: • bits 0 to 15 – not used, always 0
0x041B	R/W	state of lower 16 binary outputs: • bit 0 – level at the output BOUT1 • bits 1 to 15 – not used, always 0
0x041C	R/-	not used, always 0
0x041D	R/-	not used, always 0
0x041E	R/-	not used, always 0
0x041F	R/-	not used, always 0

Table 3: XC-CNT – PORT1

Address	Access	Description
0x0420	R/-	upper 16 bits of AN1 value, always 0
0x0421	R/-	lower 16 bits of AN1 value, value from 12-bit A-D converter
0x0422	R/-	upper 16 bits of AN2 value, always 0
0x0423	R/-	lower 16 bits of AN2 value, value from 12-bit A-D converter
0x0424	R/W	upper 16 bits of CNT1
0x0425	R/W	lower 16 bits of CNT1

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Address	Access	Description
0x0426	R/W	upper 16 bits of CNT2
0x0427	R/W	lower 16 bits of CNT2
0x0428	R/-	state of upper 16 binary inputs: • bits 0 to 15 – not used, always 0
0x0429	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	R/W	state of upper 16 binary outputs: • bits 0 to 15 – not used, always 0
0x042B	R/W	state of lower 16 binary outputs: • bit 0 – level at the output BOUT1 • bits 1 to 15 – not used, always 0
0x042C	R/-	not used, always 0
0x042D	R/-	not used, always 0
0x042E	R/-	not used, always 0
0x042F	R/-	not used, always 0

Table 4: XC-CNT – PORT2

Address	Access	Description
0x0430	R/-	upper 16 bits of serial number
0x0431	R/-	lower 16 bits of serial number
0x0432	R/-	1st and 2nd byte of MAC address
0x0433	R/-	3rd and 4th byte of MAC address
0x0434	R/-	5th and 6th byte of MAC address
0x0435	R/-	1st and 2nd byte of IP address MWAN
0x0436	R/-	3rd and 4th byte of IP address MWAN

Table 5: Other information

Notes:

- 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 user module.
- 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.

4. Recommended literature

[1] Conel: **Configuration manual for v2 routers**
[2] Conel: **Configuration manual for v3 routers**
[3] Conel: **User guide – Expansion port RS232**
[4] Conel: **User guide – Expansion port RS485/422**