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TCP2RTU

MODBUS TCP to MODBUS RTU/ASCII Gateway

MODBUS RTU/ASCII on RS232, RS485 or RS422

TCP2RTU

Datasheet

Created: 2/13/2008

Last update: 8/16/2016 9:37 AM

Number of pages: 17

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CONTENT

FIRST CONNECTION

1. Make all connections as described in chapter "Connection" on page 14.

2. If the initial IP address 192.168.1.254 does not comply with your computer network, you can change it using one of the methods described in chapter IP s Change on page 8.

3. Enter the address of TCP2RTU into your web browser. For the initial address it is http://192.168.1.254/ .

4. The configuration WEB page in TCP2RTU opens up enabling you to change all the device parameters.

DESCRIPTION

TCP2RTU is a transparent bidirectional converter of the MODBUS TCP protocol, running over Ethernet, into the MODBUS RTU or ASCII protocol, running over RS232, RS485 and RS422 lines. TCP2RTU works both directions since version 1.4. Either as a Modbus gateway (Master) or as a Modbus Slave.

TCP2RTU has been produced in three versions according to the type of the serial communication line. Configuration can be made over the internal WEB interface.

The following picture shows an example of a system communication the MODBUS TCP and RTU protocols.
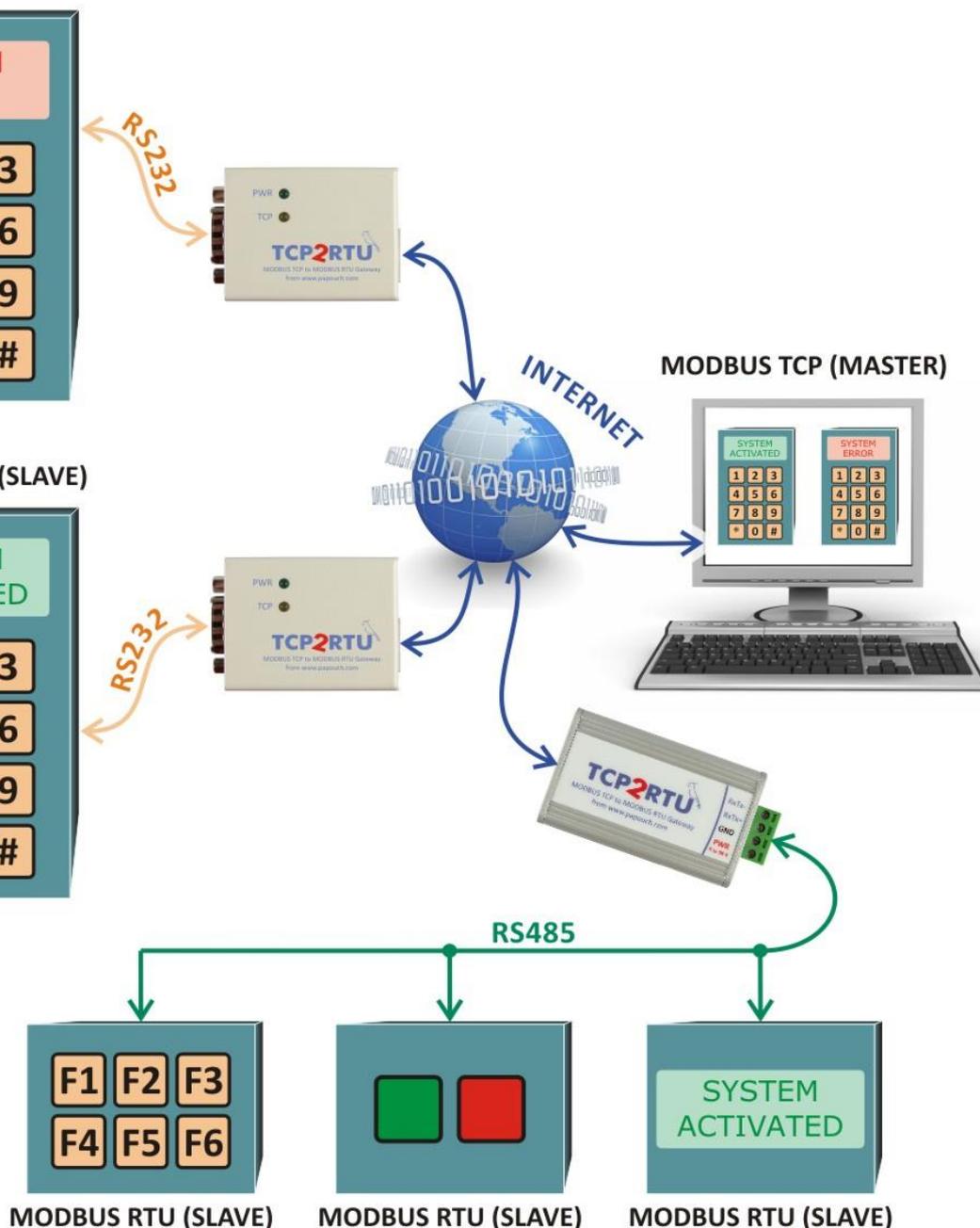
fig. 1 – example of a system communicating over TCP2RTU via MODBUS TCP and RTU protocols

CONFIGURATION

TCP2RTU can be configured over the internal WEB page. The page is accessible on the device IP address (the default initial address is 192.168.1.254). [1],[2]

The WEB page is protected by a "login" name and a password. No password has been set by the producer.

fig. 2 – WEB Interface example

It is possible to configure the following items:

IP address

IP address of the device.

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[1] If it is necessary to connect TCP2RTU to a network whose content is not compatible with the initial IP address, the IP address can be changed using the method described on page 5.

[2] The interface has been optimized for the minimum resolution of 1024x768 pixels and for the Windows Explorer 7.0 (former Internet Explorer) and Firefox 2.0 Internet browsers.

Netmask

The mask of the network the device is connected to.

Gateway IP address

The IP address of the PC or router which ensures the communication between the local network and the wide area network.

MODBUS Port

The number of the port for MODBUS TCP.

Direction *Network > Serial:* This port can manage one to two data connections. Requests are handled based on the incoming order.

Direction *Serial > Network:* Modbus port item is used as a remote server port, to which the device tries to connect and send the data received on the serial line.

Modbus Remote IP address

Remote server IP address to which the converter connects when converting data from Serial line to the Ethernet (Serial > Network).

This setting is not used when converting from the Ethernet to Serial line (Network > Serial).

WEB Port

The number of the port providing an access to the WEB interface.

Data Port

Data port to communicate on serial port with no data modification. Simple Ethernet – RSxxx serial line conversion can be done through this option. This function can be used to application debugging or simple data communication. Once this connection is established, other Ethernet data connections are refused. Once the data port is cleared, normal ModBus communication is resumed.

Modbus Mode

Here you can select one of these communication modes on serial line: Modbus RTU or Modbus ASCII.

Direction

This switches the communication direction. You can between *Network > Serial* direction or *Serial > Network* direction.

Baudrate

The communication speed of the serial line. Options: 1200 Bd, 2400 Bd, 4800 Bd, 9600 Bd, 19 200Bd, 38 400 Bd, 57 600 Bd, 115 200 Bd.

Serial Mode

Here you can select one of these combinations of data bits, parity and number of stop bits:
- 8 data bits,   No parity,   1 stop bits
- 8 data bits,   Odd parity,   1 stop bits
- 8 data bits,   Even parity,   1 stop bits
- 8 data bits,   No parity,   2 stop bits
- 8 data bits,   Odd parity,   2 stop bits
- 8 data bits,   Even parity,   2 stop bits

- 7 data bits, No parity, 1 stop bits (Modbus ASCII only)
- 7 data bits, Odd parity, 1 stop bits (Modbus ASCII only)
- 7 data bits, Even parity, 1 stop bits (Modbus ASCII only)
- 7 data bits, No parity, 2 stop bits (Modbus ASCII only)
- 7 data bits, Odd parity, 2 stop bits (Modbus ASCII only)
- 7 data bits, Even parity, 2 stop bits (Modbus ASCII only)

Old password

If you wish to change your password, enter the previous password into this field.

New password

If you wish to change your password, enter a new password into this field.

Retype new password

If you wish to change your password, re-enter the new password into this field. (Protection against typing errors)

IP ADDRESS CHANGE

The IP address can be changed by one of the following methods:

- WEB interface

- Telnet protocol

- For First configuration of the IP address, you can use Ethernet configurator.

The WEB interface can be unavailable during the first connection if the initial IP address is not compatible with the network the TCP2RTU device is connected to. In this case, the IP address can be set using the Ethernet configurator or via the ARP protocol and Telnet.

The setup via the ARP protocol and Telnet is described in the following chapter on page 8.

Ethernet configurator

Ethernet configurator can be used to set TME's IP address. You can find the software on our WEB site: www.papouch.com.

(Before running the program, please connect your TME to a switch, hub or router or directly to your PC using crosswired cable.)

Program is in English and Czech language. It also contains a small help telling you what you need to know when setting your TME's IP address.
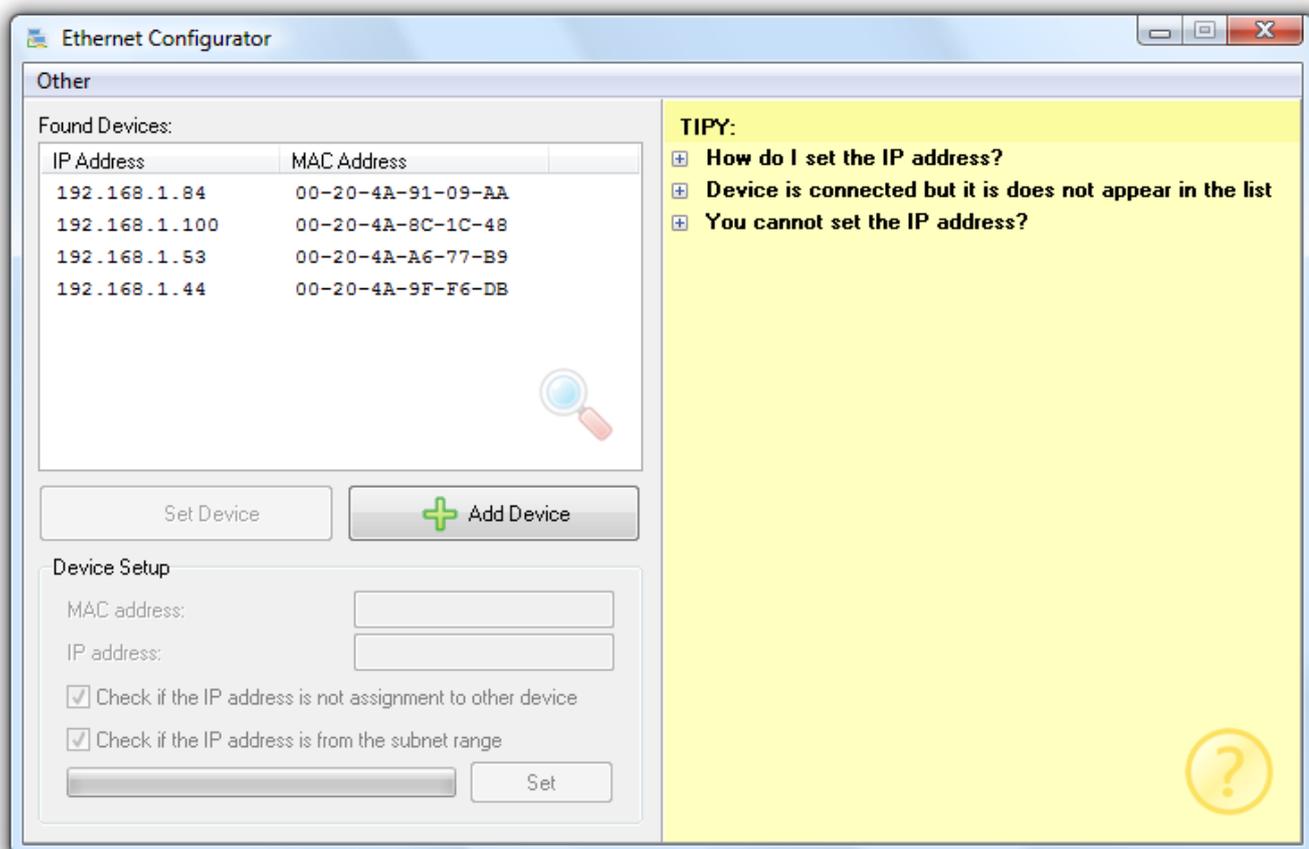
Fig. 3 – Ethernet Configurator software

BASIC SETUP VIA TELNET

Connection

IP address is not known

1) Open the window of the cmd. command (In OS Windows choose Start/Run, enter `cmd` into the provided line and press Enter.)

2) Make the following entry into the ARP chart:

   a. Enter `arp -d` and confirm by Enter. This will delete the current ARP table.

   b. Use the following command to allocate an IP address to the module MAC address:

      `arp -s [new_ip_address] [MAC_address_TCP2RTU]`

      <u>example:</u> `arp -s 192.168.1.254 00-20-4a-80-65-6e`

3) Now open Telnet. (By typing in `telnet` and pressing Enter. [3])

4) Type `open [new_ip_address] 1` and confirm.

5) The terminal will display an error message informing the user that no connection has been established. Still it is necessary to carry out the aforesaid in order to enable the module to enter the required IP address into the ARP table.

6) Connect to the module IP address. (Enter `open [IP address in the dotted format] 9999` and press Enter.)

7) So far you only managed to enter the module configuration. The IP address has not been set yet. It must be set using the relevant item in the Server Configuration > IP Address menu. If the configuration is closed without saving the setup and IP address configuration, it is necessary to repeat the whole process!

8) If the IP address is valid, the device will display introductory information ending with the following text:

   Press Enter for Setup Mode

   Now it is necessary to press Enter within three seconds, otherwise the configuration will be closed.

9) The device will display its complete setup.

10) At the end of the list there is a section called "Change setup:" providing a list of parameter groups which can be set. Changes to network parameters can be made through the "Server" section.

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[3] In OS Windows Vista or higher, the client for Telnet is not a standard part of the system. Install it using the following procedure:

   a) Open the "Control Panels/Programs and Features" menu.
   b) On the left, click "Enable or disable features of Windows system " (this option requires the administrator to log in).
   c) The "Features of Windows system" window displays. Here tick the "Telnet service Client" field and click Ok. The client for Telnet will be installed.

IP address is known

1) In OS Windows choose Start/Run, enter `telnet` in the provided line and press Enter. [3]

2) Connect to the module IP address. (Enter `open [IP address in the dotted format] 9999` and press Enter.)

3) If the IP address is valid, the device will display introductory information ending with the following text:

   Press Enter for Setup Mode

   Now it is necessary to press Enter within three seconds, otherwise the configuration will be closed.

4) The device will display its complete setup.

5) At the end of the list there is a section called "Change setup:" providing a list of parameter groups which can be set. Changes to network parameters can be made through the "Server" section.

Main Menu

Individual menu items can be chosen using the numbers written in front of them. Choose the required number and press Enter.

The menu structure is as follows:

```
Change Setup:
  0 Server
  ...
  7 Defaults
  8 Exit without save
  9 Save and exit          Your choice ?
```

Server

Basic Ethernet setups.

The following items can be found in this part:

```
IP Address : (192) .(168) .(001) .(122)
Set Gateway IP Address (N) ?
Netmask: Number of Bits for Host Part (0=default) (16)
Change telnet config password (N) ?
```

IP Address

IP address of the module. The numbers of the IP address shall be entered individually and separated by Enter.

Default value: 192.168.1.254

Set Gateway IP Address

Gateway IP address

In the "Set Gateway IP Address" item enter "Y" to change the Gateway IP address. The system then invites you to change the Gateway IP address. The numbers of the IP address shall be entered individually and separated by Enter.

Netmask

Here you can set the number of bits of the IP address constituting the network part.

The Netmask is set as a number of bits determining the range of possible local network IP addresses. For example, if the value 2 is entered, the Netmask has the following structure `255.255.255.252` . The entered value specifies the number of bits from the right. The maximum is 32.

Default value: 8

Example:

The mask 255.255.255.0 (binary 11111111 11111111 11111111 00000000) corresponds to number 8.
The mask 255.255.255.252 (binary 11111111 11111111 11111111 11111100) corresponds to number 2.

Change telnet config password

Enter new Password

This item can be used to set a new password which is required before any configuration is made via telnet or WEB interface.

In item "Change telnet config password" enter "Y" to change the password. The system then invites you to change the password.

Factory Defaults

By pressing number 7 the device restores the default setting.

Default setting means that the IP address is set to 192.168.1.254, all passwords are cancelled, names and parameters are deleted.

Exit without save

Closing the setting mode without saving the changed parameters.

Save and exit

This option saves the changes. If any parameter has been changed, the device is then restarted. The restart takes several tens of seconds.

TECHNICAL PARAMETERS

Ethernet:

Ethernet connection .... RJ45 Ethernet 10/100BASE-T

Interface compatibility .... Ethernet version 2.0/IEEE 802.3

Initial IP address 192.168.1.254

Initial netmask 255.255.255.0

Login name .... *login*

Login password.. 4 characters max, disabled by default

Serial line

Communication speed [Bd] 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Default communication speed .... 9600 Bd

Number of data bits...................................... 7 or 8

Parity.. none, even, odd

Number of stopbits 1

Version with RS232:

Connector .... CAN 9 M (CAN 9 F upon request)

Used signals .... RXD, TXD, DTR, GND
(in memory positions see RS232)

Weight.. 85 g

Degree of protection.................................... IP30

Operating temperature................................. −25 to +75 °C

Dimensions .... 57 mm x 25 mm x 42 mm

Version with RS485:

Connector .... terminal unit

Used signals .... RxTx+ (A), RxTx- (B)

Weight.. 60 g

Degree of protection.................................... IP30

Operating temperature................................. −25 to +75 °C

Dimensions .... 54 (63) mm x 24 mm x 33 mm

Version with RS422:

Connector .... terminal unit

Used signals .... Tx+, Tx-, Rx+, Rx-

Weight.. 70 g

Degree of protection.................................... IP30

Operating temperature....................................–25 to +75 °C

Dimensions (incl. the clamp)..........................54 (63) mm x 24 mm x 41 mm

Power supply:

Supply voltage ....5 to 36 V

Current consumption – at 12 V ....normally 80 mA

Available versions

Communication line over MODBUS RTU:

- RS485
- RS422
- RS232

Mounting:

- Without a holder *(standard version)*
- With a DIN 35 mm rail mount

Connector for RS232 version:

- D-SUB 9M *(standard version)*
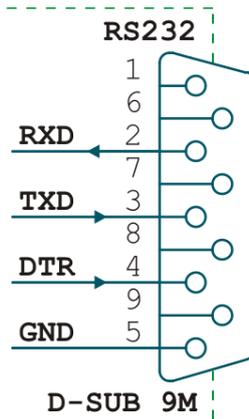
fig. 4 – D-SUB 9M connection (plug)

- D-SUB 9F for direct connection to a PC
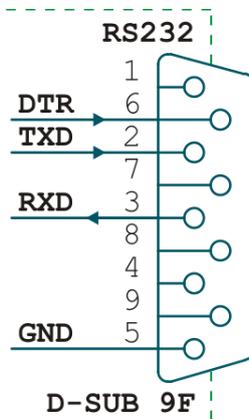
fig. 5 – D-SUB 9F connection (socket)

If you have any other specific requirements concerning the design and functionality of the TCP2RTU module, do not hesitate to contact us.

CONNECTION

Version with RS232

Fig. 6 – RS232 Connector   *Fig. 7 – Ethernet and power supply connectors*   *Fig. 8*
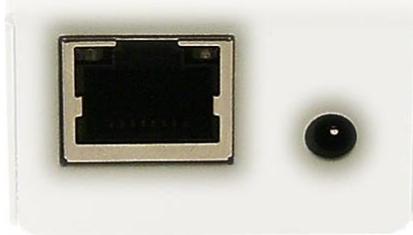
The **Ethernet** interface is connected via the RJ45 connector by a standard (no-patch) cable to the HUB or Switch. The Ethernet connects directly to a PC via a patch cable.

The **power supply** connector is a coaxial connector 3,8 x 1,3 mm. The positive terminal (+) is inside.

RS232 connects via the CAN 9 connector – F version as a standard (plug; see Figure 9). It is possible to order the M version (socket). (RS232 connection is shown on the previous page.)

Version with RS485
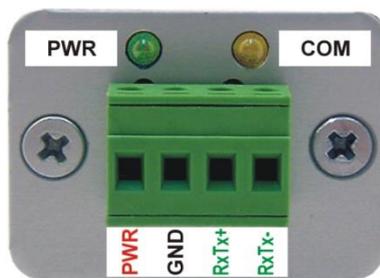
Fig. 9 – Supply and RS485 connectors

The **Ethernet** interface is connected via the RJ45 connector by a standard (no-patch) cable to the HUB or Switch.

On the side you can find clamps for power supply (PWR +; GND) and RS485 communication line (RxTx+; RxTx-) connection, illustrated in Figure 12.

Version with RS422
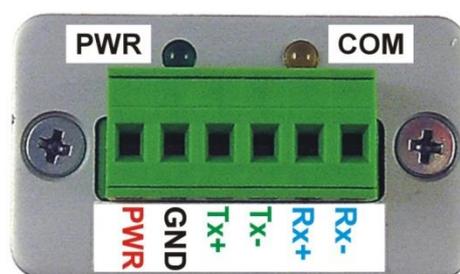
Fig. 10 – Supply and RS422 connectors

The **Ethernet** interface is connected via the RJ45 connector by a standard (no-patch) cable to the HUB or Switch.

On the side you can find clamps for **power supply** (PWR; GND) and **RS422** communication line (Tx+; Tx-, Rx+; Rx-) connection, illustrated in Figure 13.

Connection – related products

Besides converters, it is possible to order the following additional products:

- Switching 12V source (intermediate adaptor).
- 12V source (for DIN rail).
- TP cable for Ethernet connection.
- *For version with RS232:* 2 m cable terminated with a coaxial connector 3.8 x 1.3 mm. On the other end there are only loose conductors for power supply connection.

INDICATIONS

Green LED (PWR)

Supply voltage connection indication.

Yellow LED (TCP)

On when a connection is made on the data port.

Link LED

(Left LED on the Ethernet connector)

Not on .... not connected
Yellow .... connected at the speed of 10Mbps
Green.............. connected at the speed of 100Mbps

Connection type LED

(Right LED on the Ethernet connector)

Not on .... no communication running
Yellow .... Half-Duplex communication
Green.............. Full-Duplex communication

RESET SWITCH

Below the Ethernet connector is a small hole for reset button. This can be activated with a pencil or any pointed object.

Resetting the device by this button causes:

- all parameters set to default values
- IP address 192.168.1.254
- all passwords cancelled

How to reset the device:

1) Turn the device off
2) Push and hold the button below the Ethernet connector
3) Turn the device on - the yellow indicator lights up
4) Wait for app. 5 seconds until the yellow indicator blinks
5) Release the button
6) Resetting finished

CHANGELOG:

Version 1.0

First version.

Version 1.2

- Two communication sockets on one Modbus Port.

- One port for RAW data communication (Ethernet to RSxxx converter).

Version 1.3

- Added Modbus ASCII.

Version 1.4

- Direction switching added. Serial line to Ethernet direction or Ethernet to Serial line directions are possible now. Because of that we have also added the remote server IP address setting.

Papouch s.r.o.

Data transmission in industry, line and protocol conversions, RS232/485/422/USB/Ethernet/GPRS/ WiFi, measurement modules, intelligent temperature sensors, I/O modules, and custom-made electronic applications.

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