

DY-5022
Protocol Converter
ModBUS TCP/ModBUS RTU
User Manual
Revision 1.0

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UPDATED DOCUMENTATION:

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REVISION LIST:

Revision	Date	Author	Chapter	Description
1.00	1/2006	ASCON	All	First release version

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CHARACTERISTICS

The protocol converter Modbus TCP slave to RTU master is an electronic device which is mountable on a DIN guide. It allows information to be exchanged between a serial RS485 bus and Ethernet 10/100 bus through the protocols ModBUS RTU and ModBUS TCP. This device also includes the following characteristics:

- Power supply 12...24 Vac/dc (3 VA)
- Opto-isolated RS485
- Mountable on Rail DIN
- Temperature range 0...70°C
- EMS EN 61000-6-2

The protocol converter Modbus TCP slave to RTU master can be easily configured through the configuration utility which allows different projects to be handled, saved within your PC and downloaded to the device.

It can be used in two operative ways: routing and natting. In the routing mode, the command modbus is forwarded on the serial line using the same requested addresses. The the natting mode, the device addresses and data are modified through a translation table of the addresses.

USE OF DY-5022 COMPOSITOR SOFTWARE

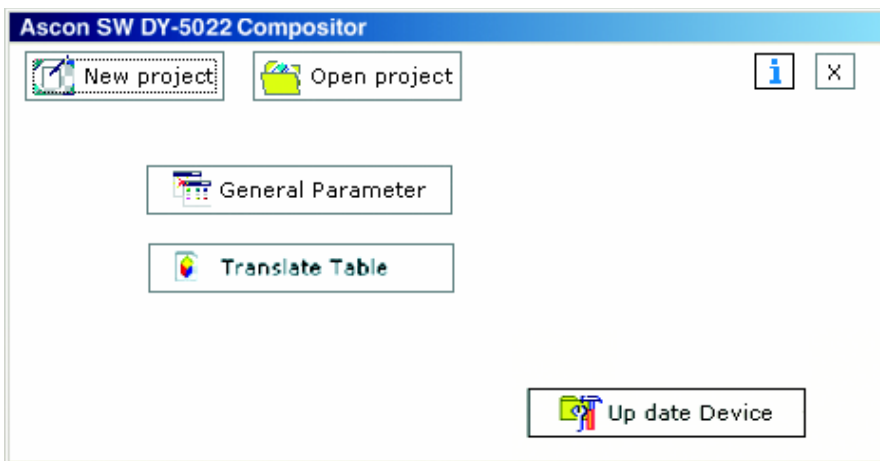
INTRODUCTION

The software allows for the device parameters to be defined.

After installing the software (downloadable from the site www.ascon.it in section *download/software*. Find the program:

Ascon_SW_DY-5022_Compositor.zip), a connection is created within the launching menu.

Note: the first time you enter the Software Download area, you need to register yourself, by clicking on the register button.



The “New Project” button creates the folder which contains all the project files:

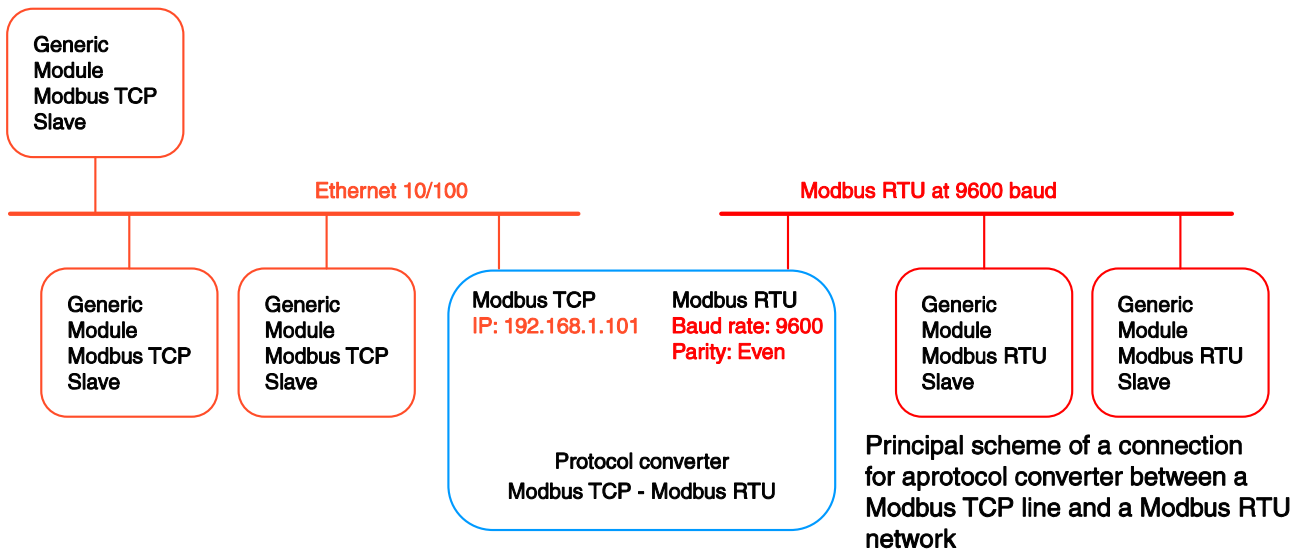
- The **project** is the complex of files that define a particular configurations of the protocol converter *Modbus TCP to Modbus RTU*. This file can also be imported and exported.
- To **clone** the configurations of a protocol converter *Modbus TCP to Modbus RTU* in order to configure another device in the same way, it is necessary to maintain the folder and all its contents.
- To **clone** a project in order to obtain a **different version** of the project, it is enough to duplicate the project folder with another name and open the new folder with the button “Open Project”.

When the project is created or opened, it is possible to access the various configuration sections of the device:

- **General Parameter,**
- **Translate Table,**

GENERAL PARAMETER

This section defines the main communication parameters of two busses where the Programmable Modbus TCP to Modbus RTU Protocol Converter is inserted.



General Parameter

Operation Mode

Routing Mode NAT Mode

MODBUS TCP

IP Address
192 . 168 . 0 . 101

Subnet Mask
255 . 255 . 255 . 0

Port
502

Advanced Parameter

MODBUS RTU

Baud rate 9600

Parity NONE

Timeout (ms) 1000

System Data Offset 0

OK Cancel

- The Operation Mode field defines the operation of the protocol converter in Routing or NAT modes. (see the next description).
- In the IP Address field, insert the IP Address of the Ethernet port.
- In the Subnet Mask field, insert the Subnet Mask of the Ethernet port.
- The Port field defines which port is to be used for communication on the Modbus TCP (in default, this has the predetermined standard value of 502)
- In the field Baud Rate, the speed of the BUS Modbus RTU is defined.
- In the field Parity, the parity of the BUS Modbus RTU is defined.
- Timeout is the maximum time the Protocol Converter waits for a response from the Slave RTU.
- System Data Offset is the system variables offset.

The button Advanced Parameter displays a window where it is possible to give the public and private name of the SNMP Community.

SNMP Community Name

SNMP Community Name

Public public [Max. 13 Chars]

Private private [Max. 13 Chars]

OK Cancel

OPERATIONAL MODE

ROUTING

A few characteristics of the Modbus RTU package have been modified in the standard of the Modbus TCP protocol: two bytes of the final CRC were eliminated (no longer necessary because the information reaches its destination already corrected). The first byte of the slave identification was changed, leaving the one that is called PDU. A frame denominated as MBAP header with dimensions of 7 bytes was added to the head of the PDU. MBAP is composed by:

word transaction identifier (copied from the slave in the response phase)
word protocol identifier (0=Modbus protocol)
word length (number of successive bytes)
byte unit identifier (used for routing operation)

By using the last byte of the MBAP header, it is possible to carry out the **routing** from a requested Modbus TCP toward a serial line using the address from the slave which is specified by the byte unit identifier.

Example:

A requested Modbus TCP made in the device as the address 192.168.0.200 for the holding register address \$2000, which is MBAP unit identifier has the value of 2. It will be followed by the request on the serial for the device with the address 2 at the word \$2000. After the request has been made, the RTU will respond. The master TCP will be given the same response which will be reconstructed according to the specifications of the Modbus TCP.

If the RTU slave responds with an exception, that very exception code will be transmitted again to the TCP master. In case the RTU slave does not respond in the time defined by the Timeout parameter, an exception response will be given: error code \$0B.

NATTING

When using the operation mode, Natting, the requested data will be processed through a table of translations of the Modbus network addresses. Below is an illustration of this situation:

CONFIGURATION OF THE VARIABLES

Section “Translate Table”

Within the section, “Translate Table”, you can define the variables that can be read or written by the TCP bus on the RTU bus when the device is in NAT mode.

Example 1:

If you want, from TCP network (address 1000), write a data it the RTU network on the device at:

- Address RTU device 5,
- WORD 100 (Address RTU)

You need to define the following variable:

N°	Data Type	Address TCP	Address Device RTU	Address RTU	N° Point	Mnemonic
1	Holding Register	1000	5	100	1	SetPoint
2	Input Register	150	5	234	1	Temperature
3						
4						
5						
6						

In the above scenario:

Specify the type of data between:

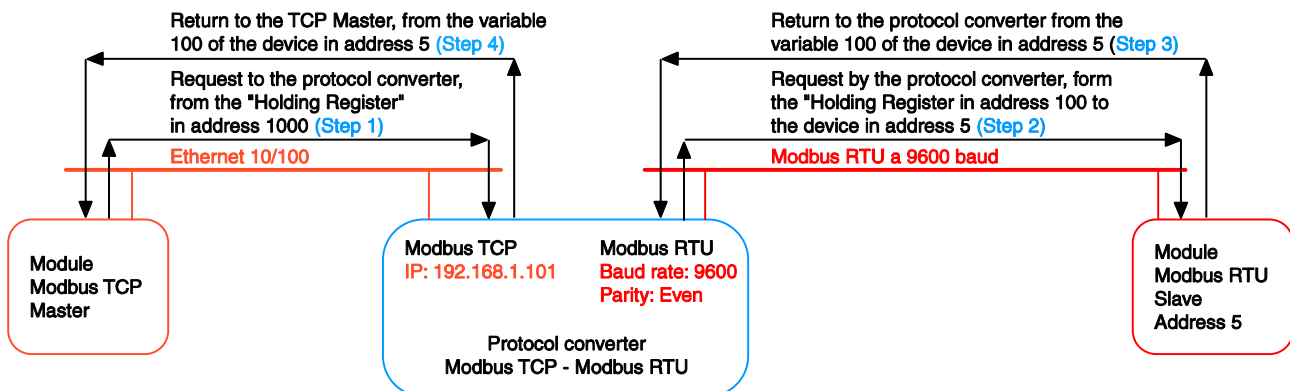
- Holding Register (word in read and write),
- Input Register (word in read).

From the side of the MODBUS TCP

- Address of data to read

From the side of the MODBUS RTU

- Address of the device to interrogate
- Address of data to read on device



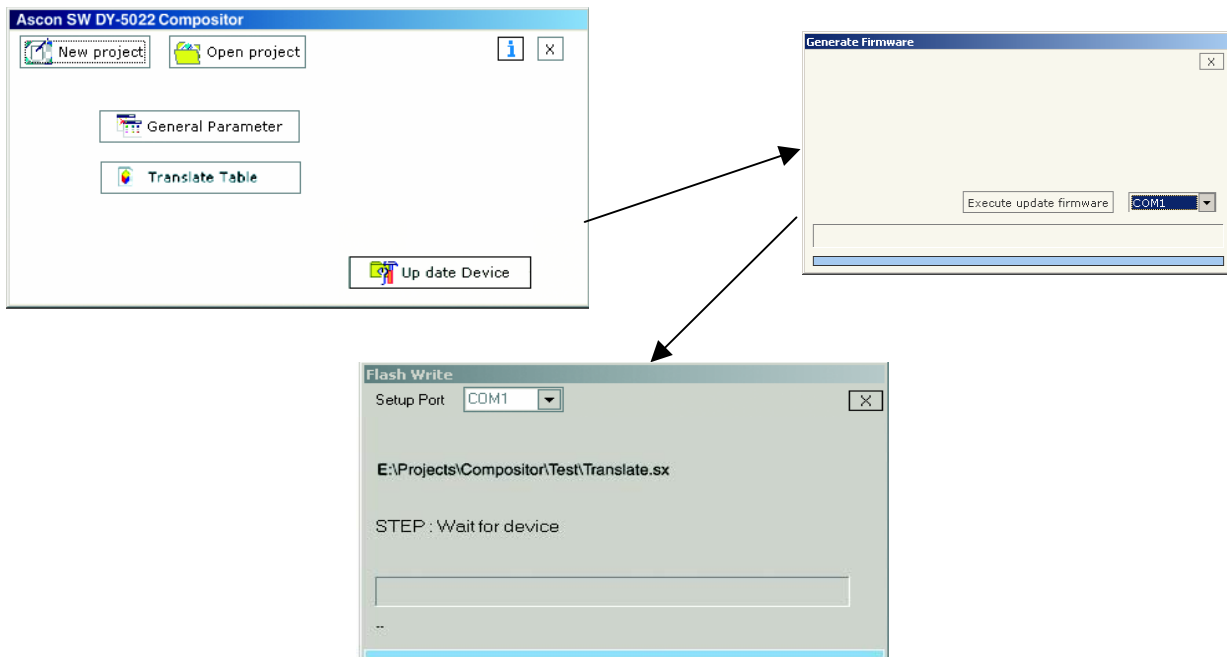
The data of the columns have the following meanings:

- "DATA TYPE" indicates the type of data that is being considered
- "ADDRESS TCP" indicates the virtual address of the present data in a device in the RTU Modbus
- "ADDRESS DEVICE RTU" indicates the address of the device on the RTU Modbus that contains the data
- "ADDRESS RTU" indicates the address of the data on the RTU device
- "N° POINT" indicates the number of consecutive data that you want to configure. For example, you create Address TCP=1000, Address RTU=100 and N° point = 5, the following gets set-up automatically: addresses TCP 1001, 1002, 1003, 1004 and the variables RTU 101, 102, 103, 104.

If the RTU slave responds with an exception, that very exception code will be transmitted to the TCP master. In the case where the RTU slave does not respond within the allotted time defined by the Timeout parameter, an exception response will be given: error code \$0B.

DEVICE UPDATE

In order to download the parameters, you must click the button “Update device” on the main window.



1. At this point, you must boot the Protocol Converter with the provided jumper. See the “Connection scheme” hereafter.
2. Select the serial port which performs the update. Click on “Execute update firmware”.
3. Wait for the running bar to finish.
4. Remove the jumper and reboot the Protocol Converter.

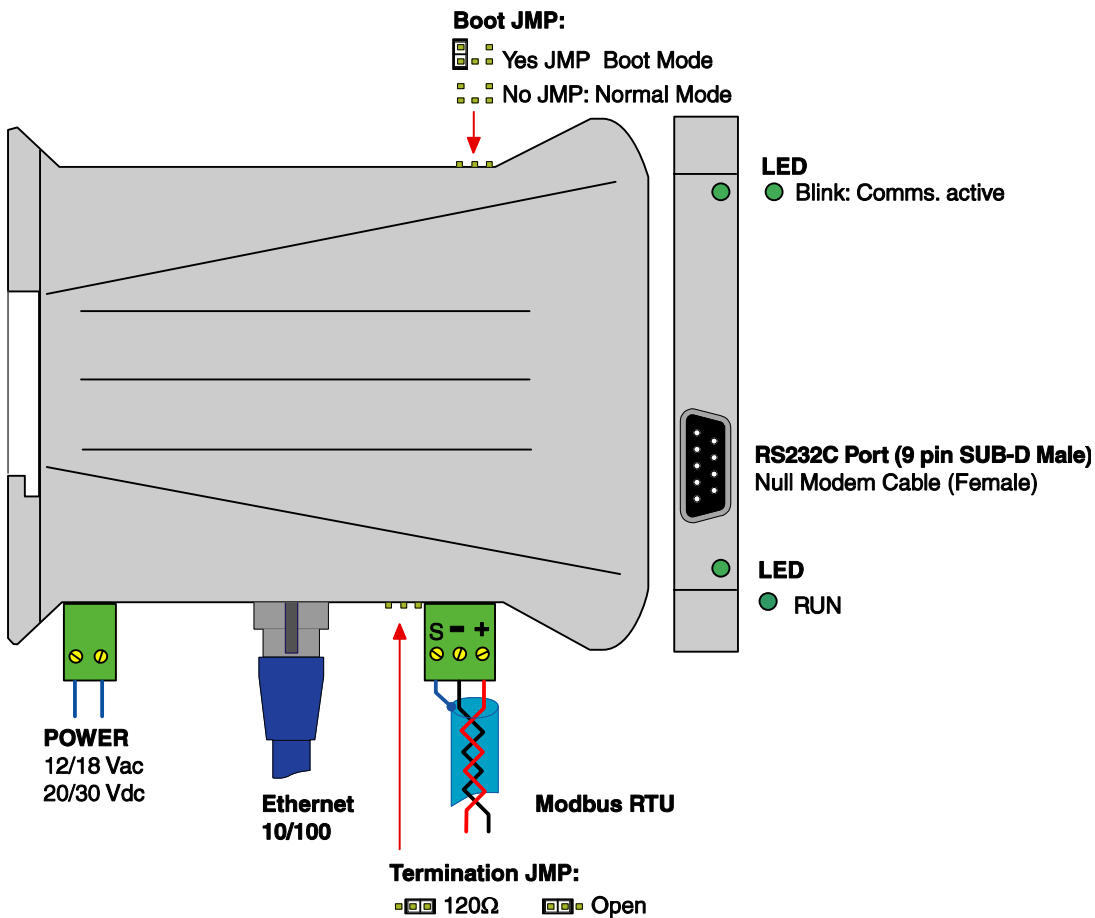
TABLE OF VARIABLE SYSTEMS

Based on the address specified by the offset parameter, some system variables are shown. They are readable from the TCP Modbus through the function 03, when specifying the appropriate address.

offsettab	Description	Read/write
0	Baud rate	R
1	Parity	R
2	Timeout	R
3		
4	Mode operation (0=routing 1=natting)	R
7	Counter RTU request	R
8	Counter RTU Correct response	R
10	Firmware version	R

The address corresponds to offset variable system + offsettab.

CONNECTION SCHEME



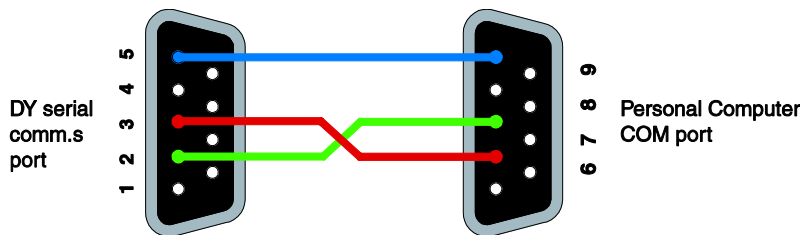
CABLES CHARACTERISTICS

RS232 CABLE

The connection from RS232 socket to a serial port (example one from a personal computer), must be made with a NULL MODEM cable (a serial cable where the pins 2 and 3 are crossed).

It is recommended that the RS232C Cable not exceed 15 meters.

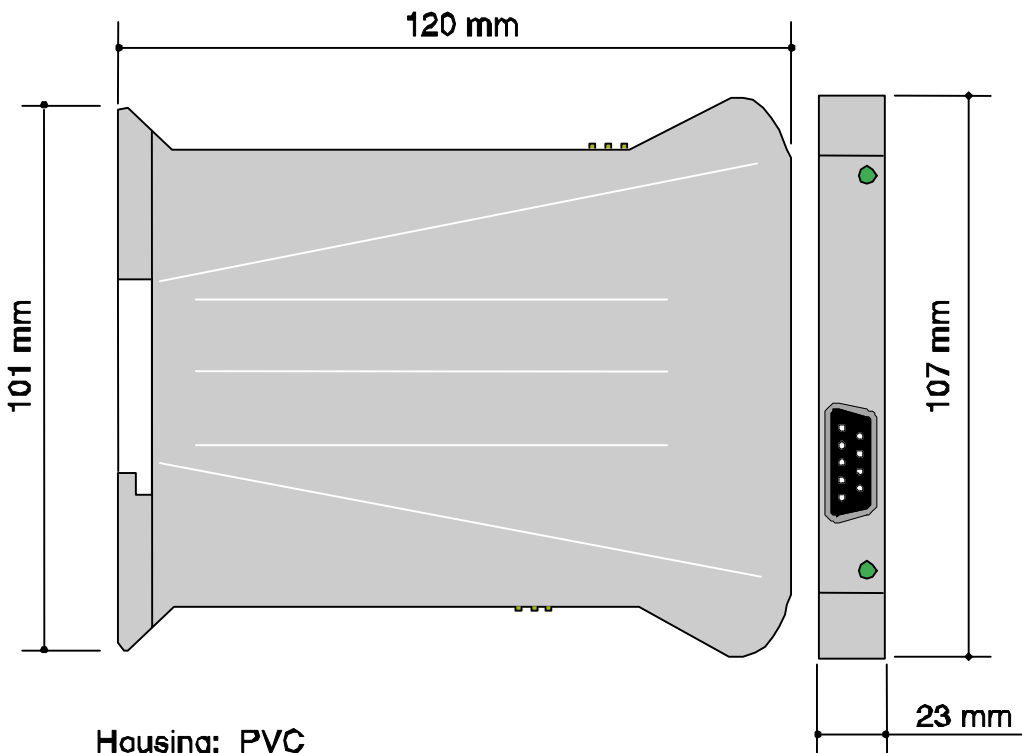
Null modem cable



ETHERNET CABLE

The connection of the connector Ethernet to a HUB must be carried out by a Category 5E cable. The cable has to conform to the T568 norms relative to connections in cat. 5 up to 100 Mbps. The length cannot go beyond 100 meters.

MECHANICAL DIMENSIONS



Housing: PVC
Weight: 200g (approx.)