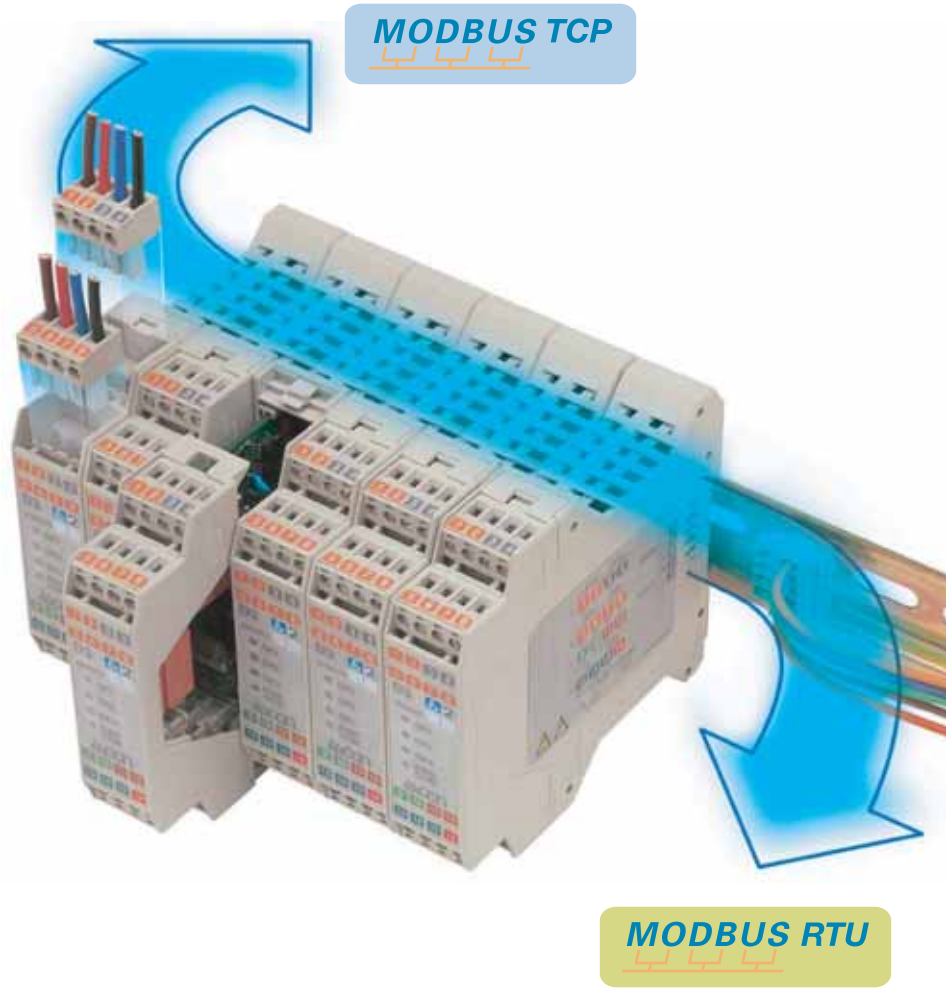
deltadue **Protocol Converter ModBUS TCP/ModBUS RTU DY-5220 line**

User Manual

13.05 - Code: ISTR_U_DY5220_E_01_--



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Prerequisites

Updated documentation

It is advised that you always check our Internet site (`www.ascontecnologic.com`) for the most current updates.

Once connected to the web-site, search:

DY

then click on **DY** in the result page. In the lower part of the product page (in any language) is present the download area with links to the documents available for the instrument (in the available languages).

- Download the file: **DY 5220 - User Manual**

Revision list

Revision	Date	Author	Chapter	Description
0	11/2008	ASCON	All	First release version
1	05/2013	Ascon Tecnologic	All	Second release version

Using this manual

Specifications within the text of this manual are given in the International System of Units (SI), with non SI equivalents in parentheses.

Fully Capitalized words within the text indicate markings found on the equipment.

Words **in bold** style within the text indicate markings found in the Configuration Tools.

Warnings, Cautions and Notes are used to emphasize critical instructions:



DANGER!

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Caution
Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Note: Highlights important information about an operating procedure or the equipment.

Current Documentation on the Internet

Make sure you are always working with the latest version of this document.

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http://www.ascontecnologic.com

Chapter 1
Characteristics

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

It can be used in two operating modes: routing and natting. In the routing mode, the command modbus is forwarded on the serial line using the same requested addresses.

In the natting mode, the device addresses and data are modified through a translation table of the addresses.

Chapter 2
Using the Compositor Software

2-1 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-**5220**_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:

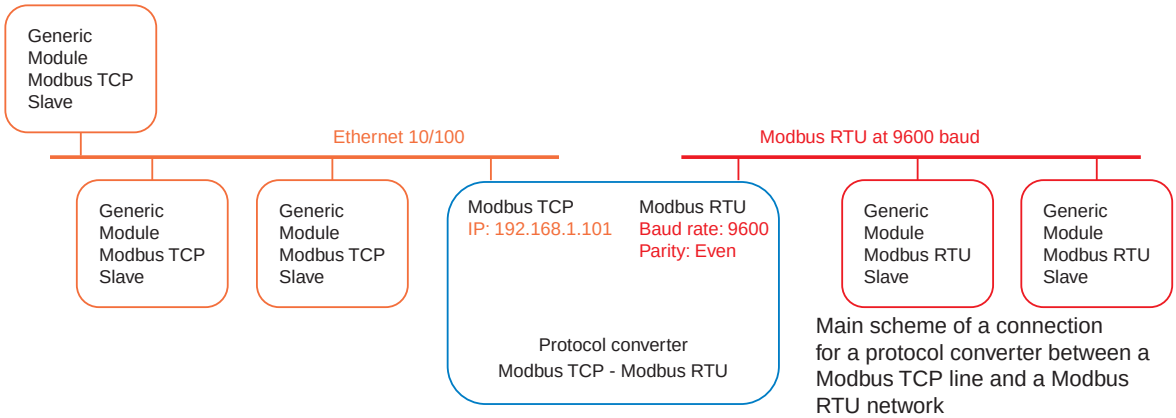
- The **project** is the compilation of files that define a particular configuration of the protocol converter *Modbus TCP to Modbus RTU*. This file can also be imported and exported.
- To **clone** the configurations of a protocol converter *Modbus TCP to Modbus RTU* in order to configure another device 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, simply 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:

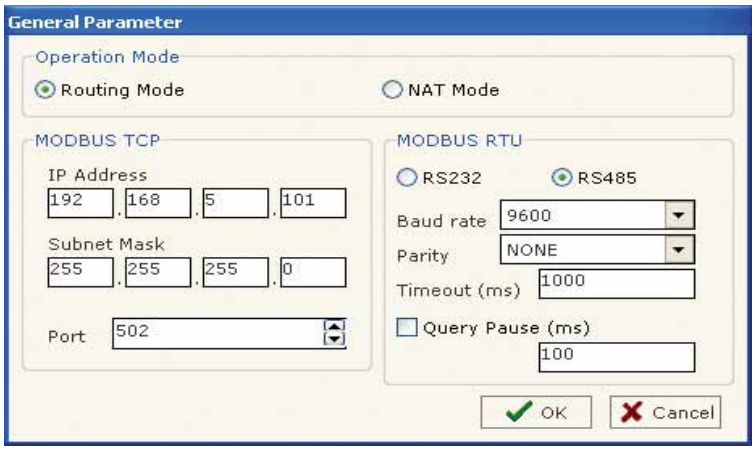
- **General Parameter,**
- **Translate Table**,
- **Ping Device**.

2-1-1 General parameter

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



Main scheme of a connection for a protocol converter between a Modbus TCP line and a Modbus RTU network



- The Operation Mode field defines the operation of the protocol converter in Routing or NAT modes (see the "*Operating Modes*" paragraph).
- 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.
- Query Pause is the pause between two consecutive requests.

2-1-2 Translate Table

When the "*Operation Mode*" field is set to "**NAT**" mode, the "**Translate Table**" button will be activated. To have an example of the Translate Table see the "*Operating Modes*" paragraph.

2-1-3 Ping device

"Ping device" runs a command to test the IP address of the Protocol converter. Insert the IP address of the Converter and click the "Ping Device" button.
If all is OK the mask shows "**Device Found**".

2-2 Operation mode

2-2-1 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.

2-2-2 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.

Configuring the variables

Translate Table

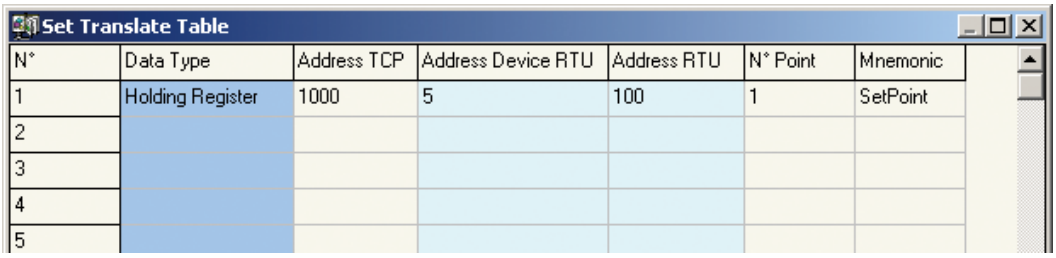
Within the section, "**Translate Table**", you can define the variables that can be read or written by the TCP bus on the RTU bus when the device is in NAT mode.

Example 1:

To write a register, from TCP network (address 1000), in the RTU network on the device at:

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

You need to define the following variable:



In the above scenario:

Specify the type of data between:

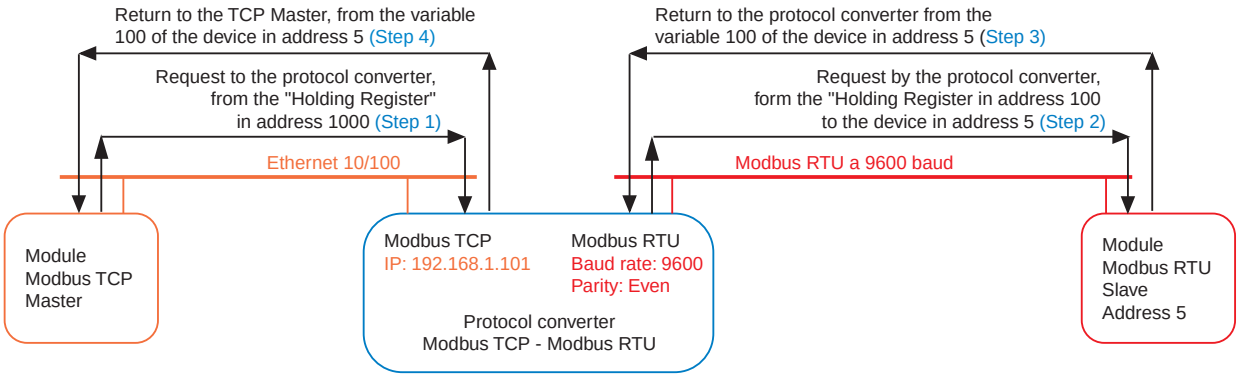
- Holding Register (word in read and write),
- Input Register (word in read).

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:

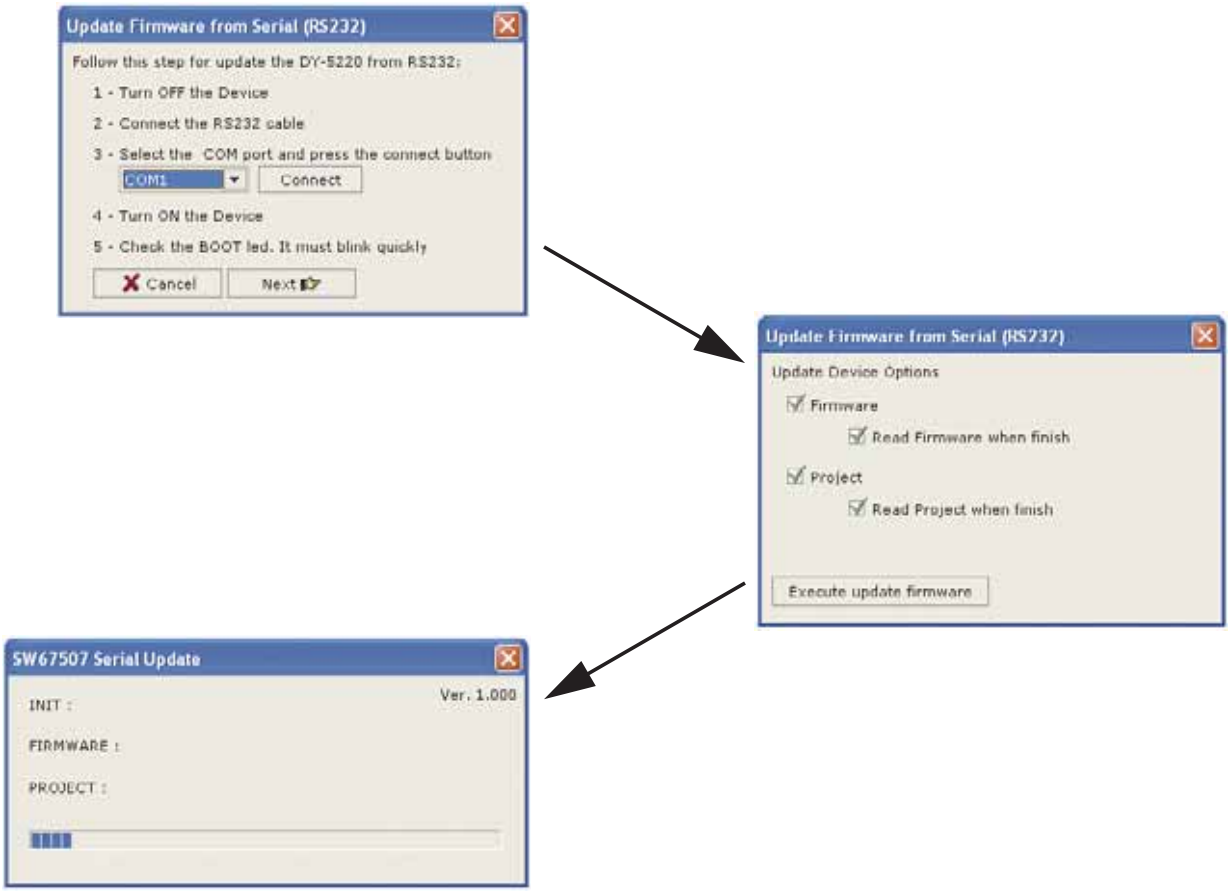
- “DATA TYPE” indicates the type of data that is being considered
- “ADDRESS TCP” indicates the virtual address of the present data in a device in the RTU Modbus
- “ADDRESS DEVICE RTU” indicates the address of the device on the RTU Modbus that contains the data
- “ADDRESS RTU” indicates the address of the data on the RTU device
- “No. 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.

2-3 Device update

2-3-1 Serial device update

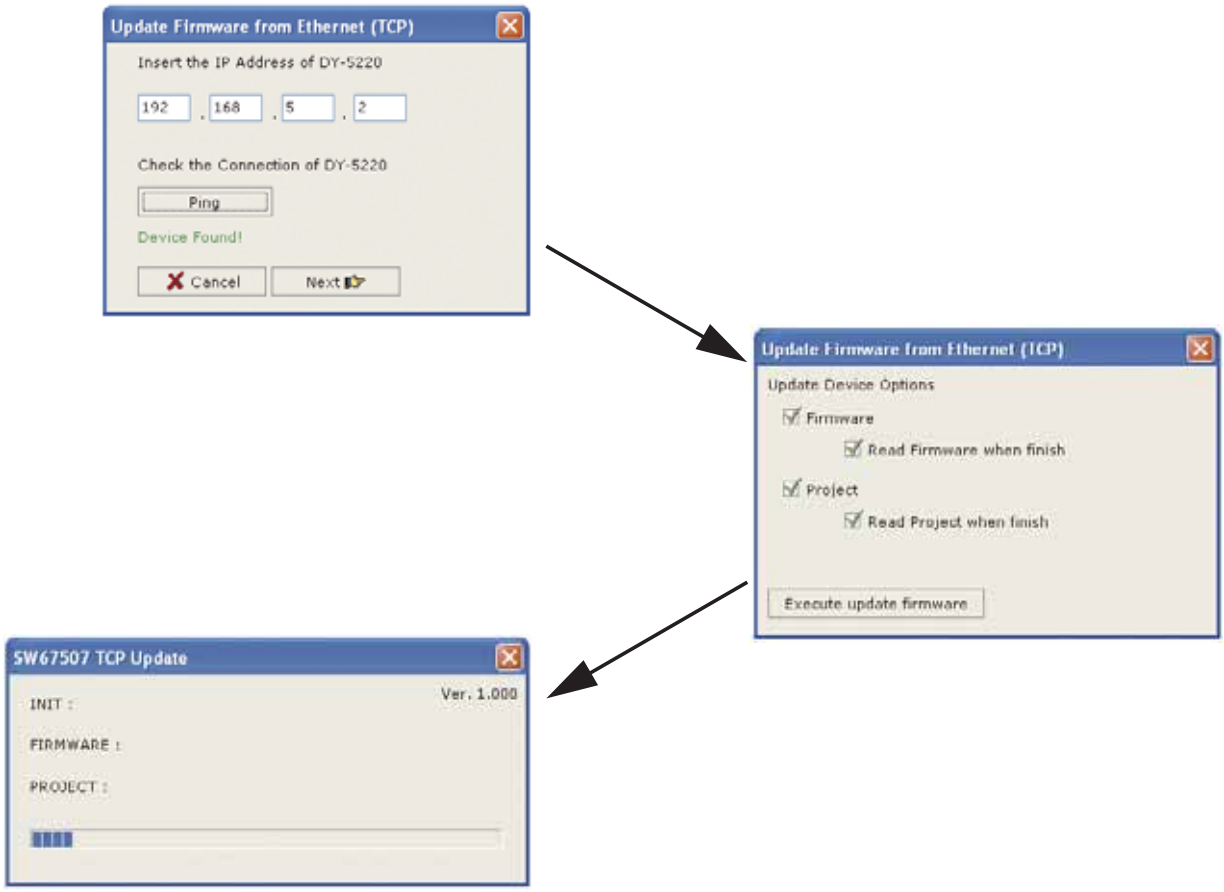
In order to download the parameters, you must click the button “Update Via Serial” on the Compositor main window.



1. At this point, you must boot the Protocol Converter with the provided jumper. See the “Boot jumper” paragraph in “Jumper setting” chapter.
2. Select the serial port which performs the update. Click on “Next” button to access the device options.
3. Select the options needed and click on the button “Execute update firmware” to start the update process.
4. Wait for the graphical bar to reach the end.
5. Remove the jumper and reboot the Protocol Converter.

2-3-2 TCP device update

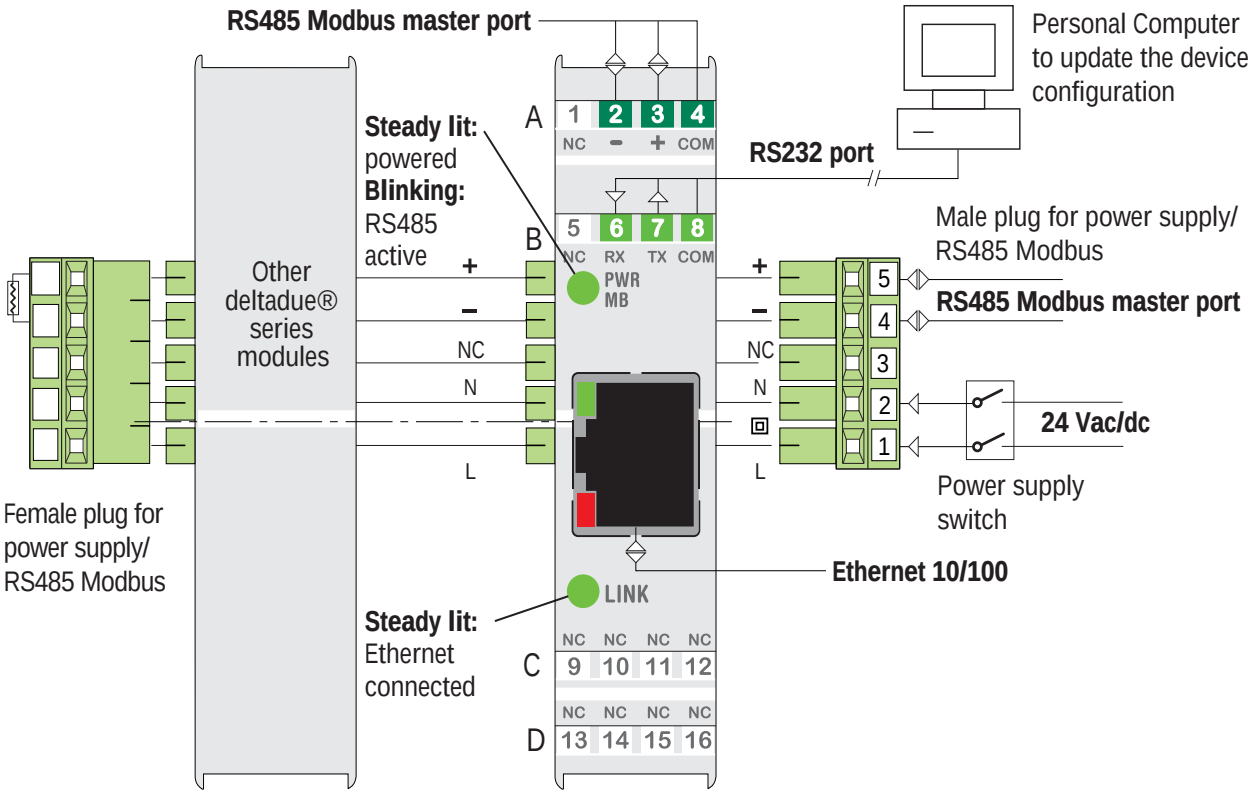
In order to download the parameters, you must click the button “Update Via TCP” on the Compositor main window.



1. At this point, you must insert the IP address of the Protocol Converter. To test the connection you can “Ping” the IP address using the “Ping” button. If all is OK the system answers “**Device found**”.
2. Click on “Next” button to access the device options.
3. Select the options needed and click on the button “Execute update firmware” to start the update process.
4. Wait for the graphical bar to reach the end.

Appendix A
Connections and Jumper

A-1 Connection scheme

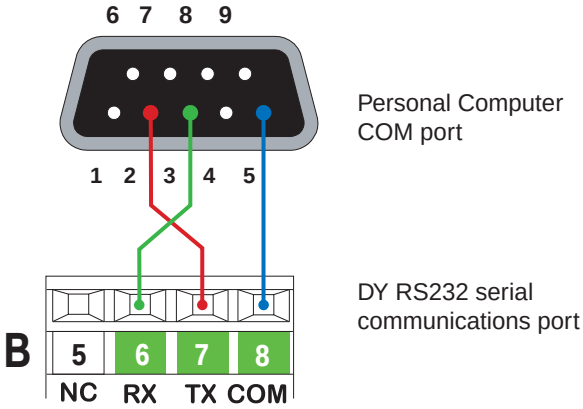


A-2 Cables characteristics

A-2-1 RS232 cable

The connection from the RS232 terminal to a serial port (example: from a personal computer), must be made with a cable exactly like to the pin-out in the following diagram.

It is recommended that the RS232 cable does not exceed 15 meters.



A-2-2 Ethernet cable

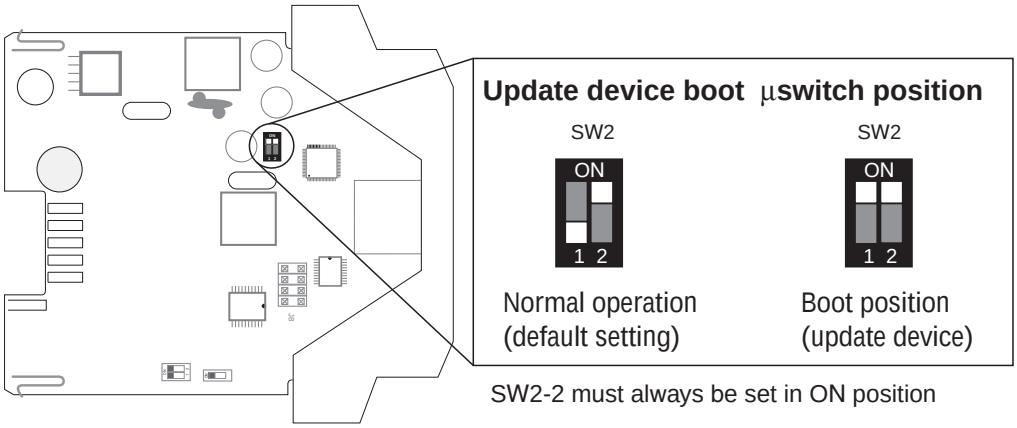
The connection of Ethernet to a HUB must be carried out by a Category 5E cable. The cable has to conform to the T568 norms relative to connections in Cat. 5 up to 100 Mbps. The length cannot go beyond 100 meters.

A-3 Micro-switches setting

On the printed circuit board of the Protocol Converter there are 3 groups of micro-switches that are to be correctly set to let the Protocol Converter function and communicate.

A-3-1 Boot µswitch

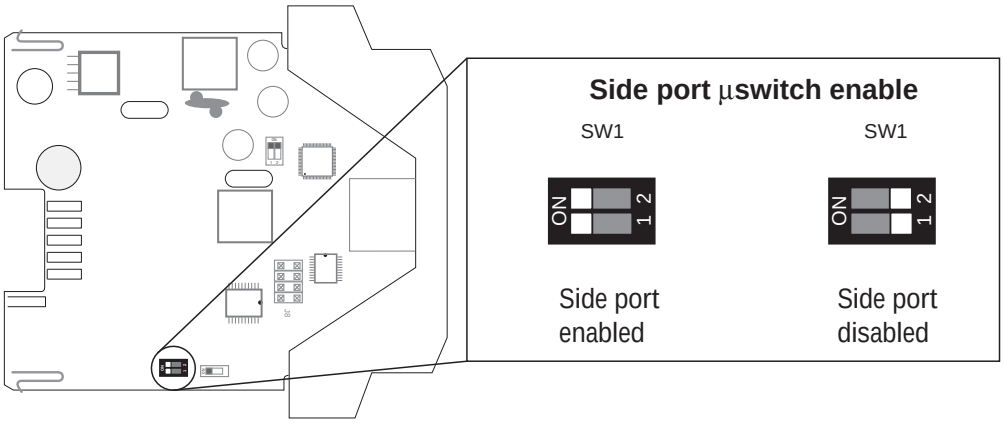
To update the device configuration, the boot switch (SW2) present on the protocol converter PCB must be set as follows.



A-3-2 RS485 ports

The protocol converter has a RS485 line that is routed on 2 different ports:

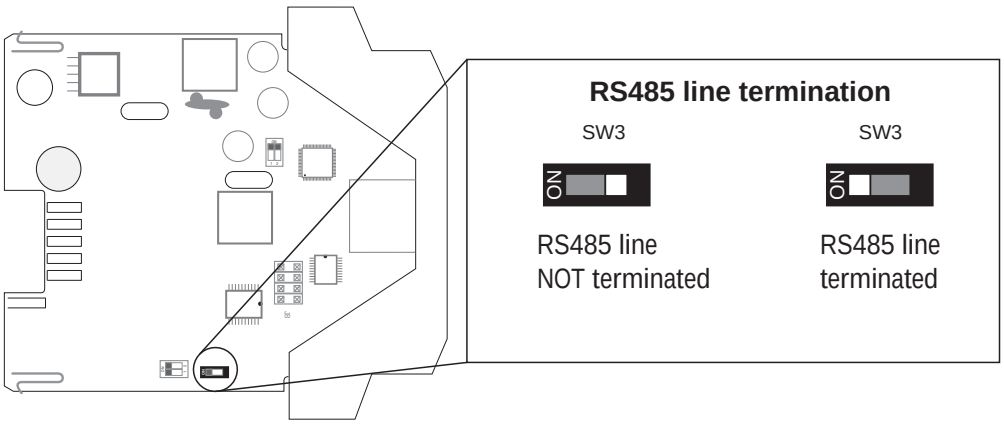
1. The Front RS485 port which can be found at terminal block A (always enabled).
2. The side RS485 port present on the connectors on the side of the converter case.



WARNING

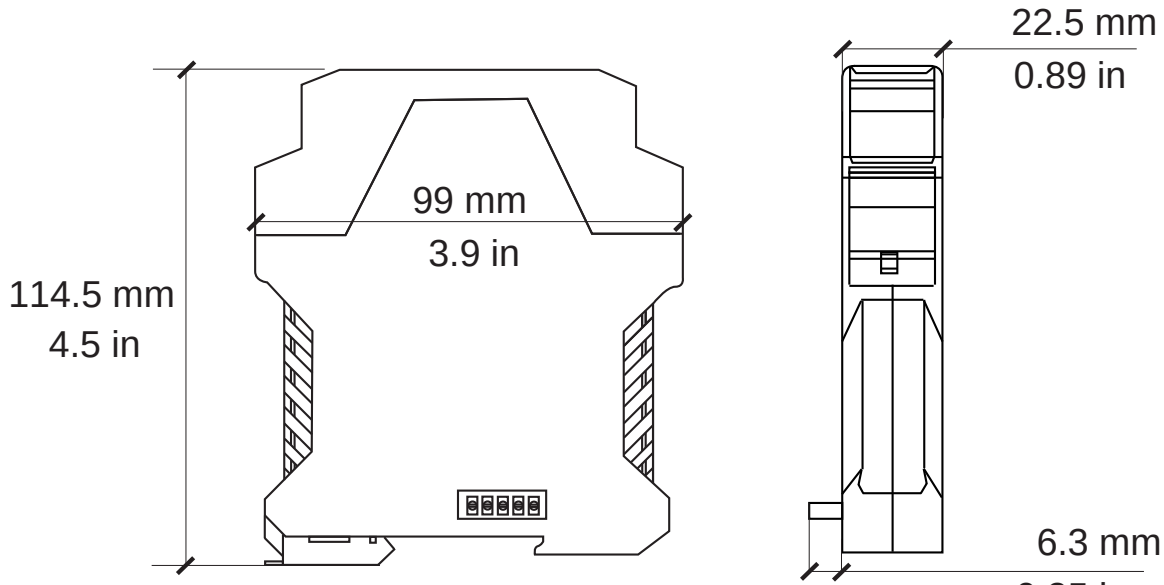
As the protocol converter works as Master on the Fieldbus network, if another **Master** module (i.e.: DX) is connected to the RS485 side port, the RS485 side port of the protocol converter must be disabled.

A-3-3 Terminating the RS485 line



Appendix B
Mechanical characteristics

B-1 Dimensions



Material: PVC
Weight: 200 g approx.