

TCP2RS+



The TCP2RS+ is a communications gateway used to convert the physical Ethernet environment to serial RS-485 or RS-232 communications or vice versa in the routing mode.

This document provides the instructions for use and describes the operation of the TCP2RS+ device. You can download the manual from CIRCUTOR's web site in case it is misplaced:
www.circutor.com

Warning: Before performing any maintenance operations, connection modifications, repairs, etc., you must disconnect the unit from the power supply. If you suspect an operational fault in the unit or in its protection system, remove the unit from service. The design of the unit makes it easy to replace in the event of a fault.

1.- DESCRIPTION

The purpose of the TCP2RS+ device is to convert the physical series environment to Ethernet communications with TCP/IP communication packets. The gateway is responsible for the transparent conversion under TCP or UDP connections. The operation is determined by the parameterisation carried out in the internal configuration web menu.

2.- COMMUNICATION

The device is equipped with a self-detecting 10BaseT / 100Base TX connection for the physical connection of the TCP2RS+ converter to an Ethernet network. For its configuration has an internal web site from which the user can define the network protocol used to communicate with the management software or communications system master.

2.1.- Ethernet addressing

The device is connected to the master communication system by means of an IP connection, and the addressing parameters must be configured. The configuration modes include the assignment of a fixed IP or configuration of a DHCP name.

2.1.1.- Ethernet address assignment

To configure the IP address configuration in any of the available formats, run program IPSetup.exe, which can be downloaded at the link:

<http://docs.circutor.com/docs/ipsetup.zip>

2.1.2.- Fixed IP assignment

To assign the fixed IP address, enter the MAC address shown on the permanent side label attached to the device, the format of which is 00:26:45:XX:XX:XX.

MAC	00:26:45:00:01:9f
Dirección	172 . 16 . 4 . 130
Netmask	255 . 255 . 0 . 0
Gateway	172 . 16 . 4 . 1
<input type="button" value="Configurar"/> <input type="button" value="Salir"/>	

In the Address field, enter the IP address being configured; do the same with the (Netmask) and the

(Gateway) port if necessary. After entering the device settings, press "Setup" to send the configuration to the equipment.

2.1.3.- DHCP IP assignment

To assign the DHCP name, choose this option using the arrow on the upper right, and select On. Once the configuration fields have been enabled, enter the MAC address that can be seen on the permanent side label attached to the device, the format of which is 00:26:45:XX:XX:XX. In the Address field, enter an unused, temporary IP address, which is within the working range of your computer. In the Host Name field, enter the DHCP name to be assigned to the equipment. Optionally, the user can configure the parameters of the ClientID field. The default VendorID of the device is CIRCUTOR.

DHCP <input checked="" type="radio"/> On <input type="radio"/> Off	
MAC	Host Name
00:26:45:00:01:9f	bus1
Dirección	Client ID
172 . 16 . 4 . 130	
Netmask	Primary DNS Server
Gateway	Secondary DNS Server
<input type="button" value="Configurar"/> <input type="button" value="Salir"/>	

2.2.- Configuration web site

After connecting to the Local Area Network (LAN), and configuring the IP address or the DHCP name, the device has an internal web site where all the parameters related to the network protocol and configuration of the serial port can be configured. To access the web site, simply use a conventional Internet browser and enter the IP address or the name assigned to the device (for example <http://172.16.4.130>)

2.2.1.- IP address or DHCP name

The internal web site can be used by the user to apply changes to the DHCP name or to the IP address previously assigned to the device.

Network setup	
Host name	CIRCUTOR
DHCP	<input checked="" type="checkbox"/> On <input type="checkbox"/> Off
Address	
Netmask	
Gateway	
Primary DNS server	
Secondary DNS server	

2.2.2.- Network protocol

The device can be connected to the master communications system by means of three types of network protocols and to a configurable port (TCP, UDP or Modbus/TCP). In the case of the Modbus/TCP protocol, port modification will be disabled and fixed at 502.

Protocol setup	
Protocol	UDP
Port	10001
Packing timeout	10

2.2.3.- Configuration of the Serial port

The communications bus parameters can be fully configured in terms of type of serial Interface (RS-485/RS-232), transmission speed (from 4800 bps to 115.2 kbps), data bits (7 or 8), parity (no parity, odd or even) and stop bit (1 or 2). The data will be configured by default to 8 by selecting the Modbus/TCP communications protocol.

Serial port setup	
Interface	485
Baud rate	19200
Data bits	8
Parity	None
Stop bits	1

2.2.4.- Configuration of the setup password

Password can be activated to enable the edition password. In case to use, the access user is "admin" and the setup password introduced.

Security setup	
Password	<input type="radio"/> On <input checked="" type="radio"/> Off
New password	
Repeat password	

2.2.5.- Device information

The lower part of the screen shows the firmware version and the machine address of the device (the same address as that shown on the permanent side label).

Information	
Version	1.0
MAC	00:26:45:00:01:01

2.2.6.- Save changes

Once any change has been made to the aforementioned sections, the information must be saved using the "Save Setup" option. If you wish to return to the default configuration, select "Load default setup".

2.3.- Configuration of network protocols

2.3.1.- TCP Protocol

In the protocol stack TCP/IP, TCP is the intermediate layer between the Internet protocol (IP) and the application. In general, applications need reliable communications. The IP layer offers an unreliable datagram service (no confirmation), so the TCP adds the functions required to offer a secure, error-free and zero loss service for the communications between two systems.

Protocol setup	
Protocol	TCP
Port	10001
Packing timeout	10

- **Protocol:** TCP Mode
- **Port:** Destination TCP Port Lumber
**In any case you can configure the port 80, so is the web configuration port*
- **Packing timeout:** maximum waiting time

2.3.2.- UDP Protocol

The User Datagram Protocol (UDP) is a message-oriented minimum transport level protocol that has been documented in the RFC 768 of the IETF. In the Internet protocol family, UDP provides a simple interface between the network layer and the application layer. UDP does not offer guarantees during the delivery of its messages and the UDP origin does not withhold the states of UDP messages sent to the network. UDP only adds the multiplexing functionality to the application and the verification sum of the header and useful load. Any type of guarantees for the transmission of information must be implemented in higher layers.

Protocol setup	
Protocol	UDP
Port	10001
Packing timeout	10

- **Protocol:** UDP Mode
- **Port:** Destination UDP Port Lumber
**In any case you can configure the port 80, so is the web configuration port*
- **Packing timeout:** maximum waiting time

2.3.3.- Modbus/TCP Protocol

Modbus/TCP is a variation or extension of the Modbus® protocol, which enables it to be used on the TCP/IP transport layer. Therefore, Modbus/TCP can be used throughout the Local Area Network or the Internet. This was one of the objectives that motivated its development (the specification of the protocol was submitted to the IETF (Internet Engineering Task Force)).

Protocol setup

Protocol: ModbusTCP
 Port: 502
 RTU timeout: 500
 TX delay: 30

- **Protocol:** Modbus/TCP Mode
- **Port:** Fixed port number 502
- **RTU timeout:** maximum bus waiting time
- **TX delay:** additional delay on serial RS bus

2.3.4.- Modbus Protocol/TCP Bridges (routing)

The purpose of this work mode is to implement RS-485 or RS-232 networks over existing Ethernet network infrastructures, either Local Area Networks or remote networks.

In the Modbus/TCP Bridges mode the unit performs a constant supervision of the Modbus RTU frames received through the serial port of the TCP2RS+, and its function is to address the frames in accordance with the features programmed in the unit's configuration web menu.

To do so, the master TCP2RS+ must be configured with the Modbus Protocol/TCP Bridges, as shown in Figure 2. Its purpose is to address the frames received through the RS port, depending on the node number and destination IP at which the Modbus sentence is sent.

The paths must be loaded into the device before performing the addressing operations.

The slave TCP2RS+ device(s) must be configured with the standard procedure in the Modbus/TCP protocol, with the serial port communications parameters and in accordance with the equipment that is physically connected to the RS-232 or RS-485

communications bus (speed, parity, data bits and stop bit).

2.3.4.1.- Loading path to the master equipment

In the case of RS-232 or RS-485 topologies over Ethernet networks, the paths being addressed must be loaded to the master, according the Modbus® node number.

Protocol setup

Protocol: ModbusTCP bridges

Addresses	Local	Remote	Host	Port
1	1	172.16.4.160		502
2	2	172.16.4.160		502
3	1	172.16.4.161		502
4	4	172.16.4.161		502

List of routes

TCP2RS+ can be used to address the node numbers. In some cases, the slave equipment located in different Ethernet networks and connected to different TCP2RS+ can have a peripheral number parameterised that is the same as other devices in other IP networks.

To make sure that the user does not have to change the node numbers, TCP2RS+ can convert the node number in the Modbus frame, replacing the local node number issued by the communications master number with the real node that the equipment has available.

In the **List of routes**, in the example of the Local node No. 3, how the master sends the Modbus command for node 03 and TCP2RS+ replaces node

03 with node 01 in the Modbus/TCP frame, sending the Modbus command to the slave TCP2RS+ converter with 172.16.4.161. Even when there is a different node number that is identical to that of bus IP 172.16.4.160 (first path position), TCP2RS+ routes the information in accordance with the node number and Ethernet address (IP) previously loaded to the device.

- **Local Address:** Local node in the master
- **Remote Address:** Real node in the slave
- **Host:** IP of the destination or slave TCP2RS+
- **Port:** IP Port of the destination connection (502)

2.3.4.2.- Parameterisation of IP connection ports

Modbus/TCP works in the fixed mode with TCP port number 502. For this reason, there may be a problem when working in remote mode, with installations where the connection is established through a router, in which various communication buses may operate in parallel to slave TCP2RS+.

In the Modbus Bridges mode, TCP2RS+ allows the random parameterisation of the connection TCP port, receiving the prior configurations on the router connecting to the Internet. It is worth noting that, in this mode, the routing functions would be carried out by the connection router first, and then by the configuration of the internal web menu of the device (path load).

3.- TECHNICAL SPECIFICATIONS

<p>Power circuit:</p> <ul style="list-style-type: none"> - Single-phase (A1 – A2) : - Earth connection terminal: - Frequency: - Maximum consumption: - Working temperature: - Humidity (no condensation) : 	<p>85...264 V_{ac} / 120...300 V_{dc}</p> <p>47...63 Hz</p> <p>4,6 ...7.5 VA</p> <p>-10 ...+60 °C</p> <p>5 ... 95%</p>
<p>Mechanical features:</p> <ul style="list-style-type: none"> - Case material: - Equipment protection degree: - Dimensions (mm): - Weight: - Maximum operating height: 	<p>UL94 - V0 self-extinguishing plastic</p> <p>IP 20</p> <p>35.4 x 73 x 84.68 mm (2 modules)</p> <p>120 g</p> <p>2,000 m</p>
<p>Network interface:</p> <ul style="list-style-type: none"> - Type: - Connector: - Network Protocols - Accesses: 	<p>Ethernet 10BaseT / 100BaseTX self-detectable RJ45</p> <p>TCP / UDP / Modbus/TCP - HTTP</p>
<p>Serial interface:</p> <ul style="list-style-type: none"> - Type: - Transmission speed (configurable): - Data bits: - Parity: - Stop bit 	<p>RS-485 / RS-232 three wires (A/S/B) (RX/GND/TX)</p> <p>4800, 9600,19200, 34800, 57600, 115200 bps</p> <p>7, 8</p> <p>No parity, odd, even</p> <p>1 or 2</p>

<p>LED symbols:</p> <ul style="list-style-type: none"> - Flashing power LED - Flashing RX - Flashing TX - Full/Half (left in RJ45) - 10 M/100 M (right in RJ45) 	<p>Powered unit and CPU activity</p> <p>Activity in the receipt of RS-485 / RS-232 frames</p> <p>Activity in the output of RS-485 / RS-232 frames</p> <p>Green: Full Duplex connection / Yellow: Half Duplex</p> <p>Green: Speed 100 Mbps / Yellow: 10 Mbps</p>
<p>Standards:</p> <p>IEC 60664, VDE 0110, UL 94, EN61010-1, EN55011, EN 61000-4-2, EN 61000-4-3, 61000-4-11, EN 61000-6-4, EN 61000-6-2, EN 61000-6-1, EN 61000-6-3, EN 61000-4-5, CE</p>	
<p>Safety:</p> <p>Installation category Category III / EN61010 double-insulated electric shock protection class II. The equipment must be connected to a power circuit protected with type gI fuses, in compliance with IEC 269, or type M, with values from 0.5 to 1A. It must be fitted with a circuit breaker switch or an equivalent device, in order to be able to disconnect the equipment from the power supply grid. The minimum section of the power supply cable shall be of 1 mm².</p> <p>If the equipment is not used according to the manufacturer's specifications, the protection provided by the equipment may be compromised.</p>	

4.- CONNECTIONS

Figure 1. Standard connection of serial equipment

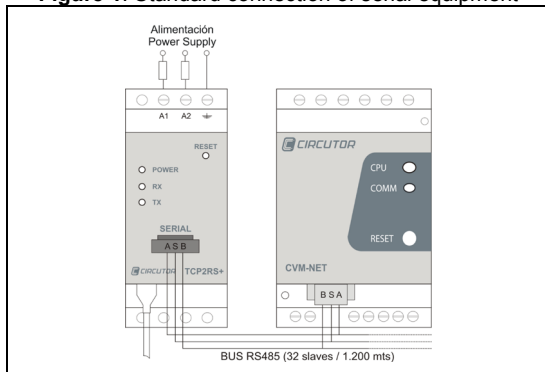
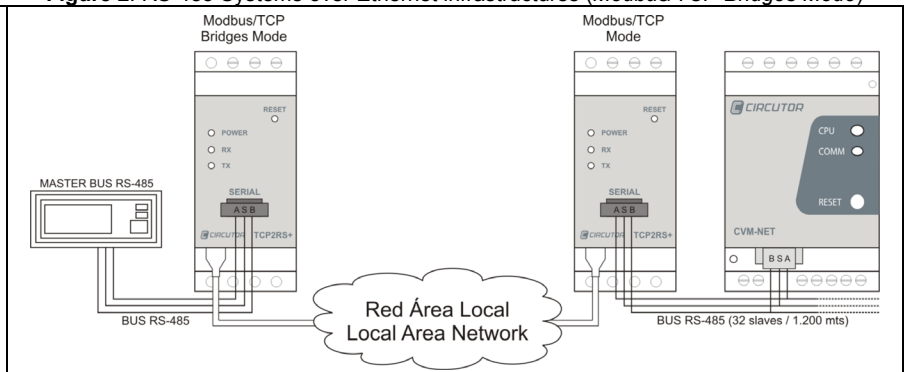


Figure 2. RS-485 Systems over Ethernet infrastructures (Modbus/TCP Bridges Mode)



5.- TECHNICAL SERVICE

If you have any doubts about the operation of the unit or suspect any malfunction, contact our service staff at CIRCUTOR, SA

CIRCUTOR, SA - Technical Assistance

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