

# Using the RS485 Interface of a Meerstetter TEC Controller

## Application Note

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# 1 Introduction

This Application Note documents the use of the RS485 Interface of a Meerstetter engineering TEC Controller. Additionally, the use of a Serial Server to connect over Ethernet is also described.

The Serial Server is connected to the TEC Controller via RS485.

We used the following device as serial server:

- Moxa NPort 5130 (by the way the password is “moxa”)

Please note that other devices from other manufacturers are often very similar in setup and will work as well.

## 1.1 Alternative

Some customers told us that a USB server also works very well. Meerstetter Engineering has not tested this device.

Product: Industrial USB 2.0 Over IP Network 4-Port Hub – TCP/IP Network

Model: USBNET-400i

Manufacturer: Coolgear

Link: <https://www.coolgear.com/product/industrial-usb-2-0-ip-network-4-port-hub-share-usb-device-tcpip-network>

Advantages:

- You have an electrical insulation between each TEC Controller and the Server, because the TECs USB interface is electrically isolated.
- It might be simpler than using RS485
- You have an individual connection to each TEC Controller
- Works good with the TEC Service Software

Disadvantages:

- USB is sometimes not very reliable
- You still must use the FTDI Drivers on the client computer and cannot just open a TCP port and communicate with the TEC Controllers.

## 2 RS485

- RS485 allows communication between a host and a single or multiple TEC Controllers in a bus-like network structure. Every TEC Controller offers one RS485 channel on the PBC<sup>1</sup> connector, some even two. (See corresponding [Datasheets](#))

### 2.1 Wiring

When operating multiple transceivers in a RS485 network, the transmission line must be properly terminated at the beginning and at the end. Use the provided onboard 120  $\Omega$  resistor of the TEC controllers as termination. By default, this resistor is not assembled.

- Twisted-pair cables should be used to connect the nodes.
- Each node in a RS485 network must have the same electrical potential. Depending on the Application a third Ground Wire might be necessary.
- The TEC Controllers are equipped with a 1-unit load RS485 transceiver which allows up to 32 devices on the same bus.

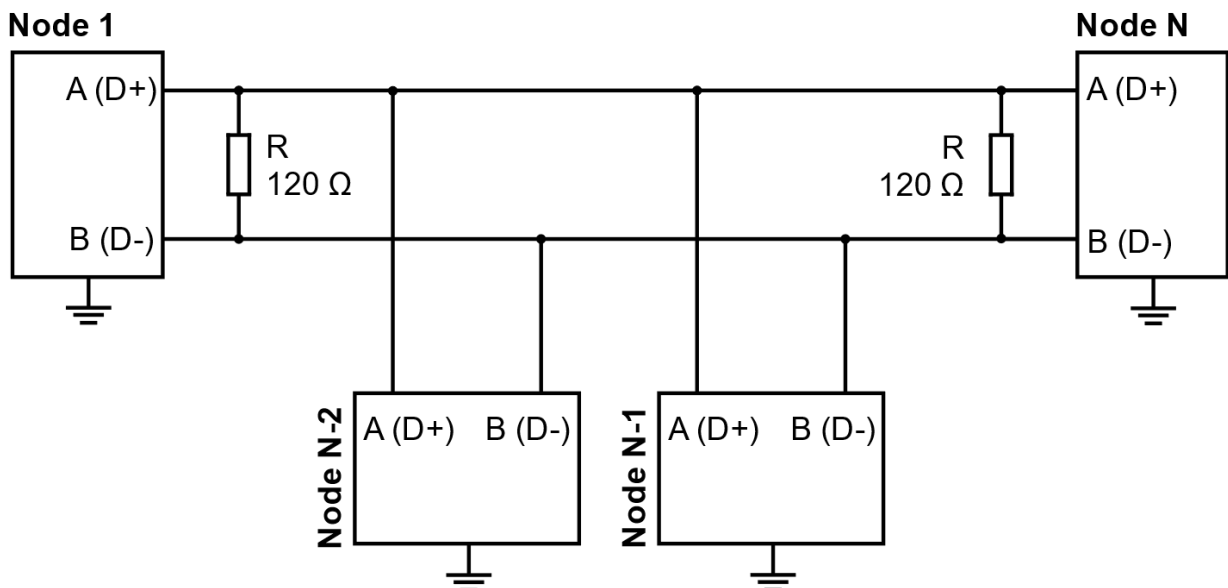


Figure 1. A multi-point RS485 network containing N nodes. Node 1 could be a computer and the others could represent TEC Controllers.

### 2.2 Using the Service Software

The Service Software can only connect to a FTDI USB to RS485 Chip or to TCP port 50'000. Because of this, a USB to RS485 by FTDI like the USB-RS485-WE-1800-BT has to be used to connect to the Service Software.

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<sup>1</sup> Plattform Bus Connector

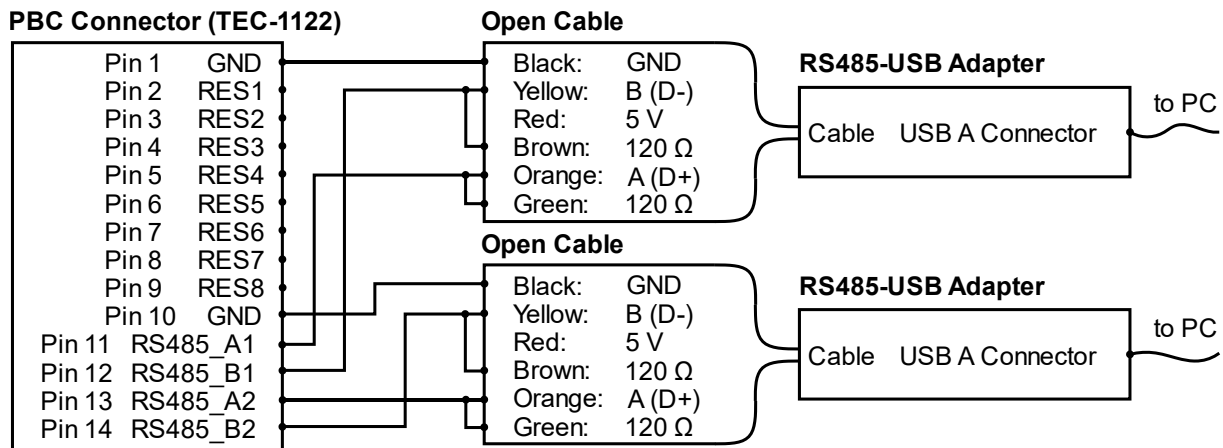


Figure 2. Wiring between the TEC Controllers PBC connector and the USB-RS485-WE-1800-BT adapter. This example is only valid for TEC-1122 and TEC-1123. (See datasheet of other controllers)

## 2.3 Addressing

To address all TEC Controllers separately in a RS485 network, every Controller needs its own device address. All addresses between 0 and 255 can be used whereby the addresses 0 and 255 have special roles assigned.

When the address 0 is used to broadcast a command, all the connected TEC Controllers receive and respond to that command, regardless of their actual address.

When the address 255 is used to broadcast a command all the connected TEC Controllers receive that command, but they do not send an answer.

### 3 Serial Server

- For this Example, a Moxa NPort 5130 was used.

#### 3.1 Connections

Since the TEC Controller has a half-duplex RS485 interface only 3 wires need to be connected.

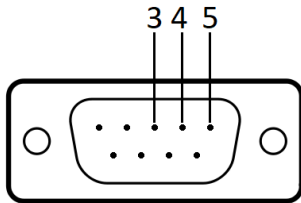


Figure 3: NPort Pinout

<b>NPort Pin No.</b>	<b>TEC Controller Pin</b>
3	RS485 D+
4	RS485 D-
5	GND

Table 1: Connections

## 4 Configuration

This Chapter describes how the TEC Controller and the Serial Server have to be configured.

### 4.1 TEC Controller Configuration

The RS-485 interface of the TEC Controllers is always active and does not need to be configured. However, the response-time is very short which might cause problems. To prevent this, a configurable response delay can be set in the TEC Controller.

### 4.2 Serial Server Configuration

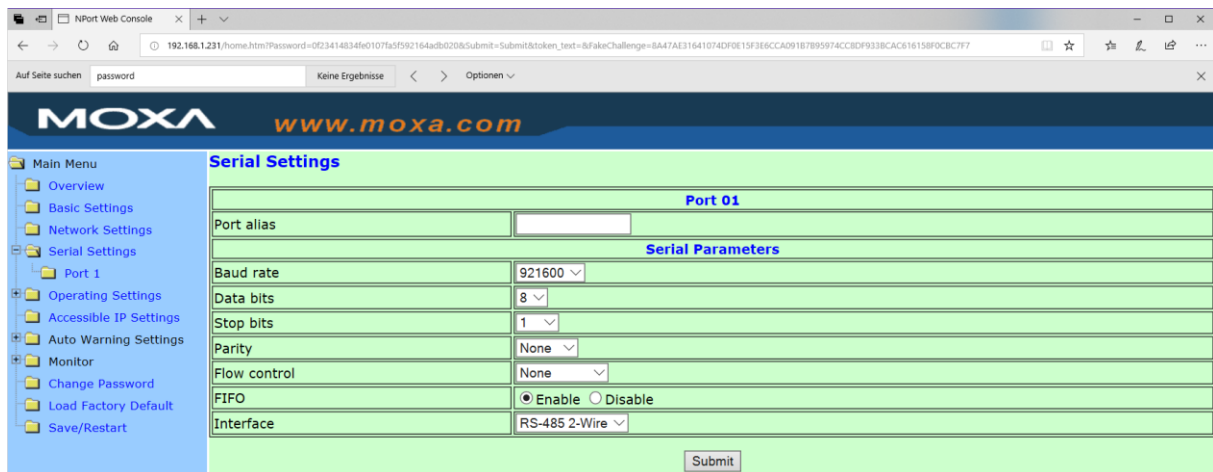
Screenshots of the Serial Servers Web-Interface have been made to show the settings.

#### 4.2.1 Network settings

The Network Settings have to be made so they work with your system.

#### 4.2.2 Serial Settings

The Baud rate must match the TEC Controller.



The screenshot shows the Moxa web interface for configuring serial settings. The browser address bar shows a URL with a token and challenge. The page title is "MOXA www.moxa.com". A left sidebar menu contains options like Overview, Basic Settings, Network Settings, Serial Settings, and Port 1. The main content area is titled "Serial Settings" and "Port 01". It contains a form with the following fields:

Serial Parameters	
Port alias	<input type="text"/>
Baud rate	921600
Data bits	8
Stop bits	1
Parity	None
Flow control	None
FIFO	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Interface	RS-485 2-Wire

A "Submit" button is located at the bottom right of the form.

Figure 4. Baudrate Settings

### 4.2.3 Operating Settings

For use with the Service Software the TCP-Port has to be set to 50'000. The use of a delimiter is optional, but it improves efficiency.

Set the Inactivity time to 6000ms to enhance the TEC Service Software "Reset TEC" and re-connect behavior. You may also set this value much lower, but then the firmware update will fail. (It closes the TCP channel after 6s no activity).

The screenshot shows the Moxa NPort Web Console interface. The browser address bar displays the URL: 192.168.234.164/home.htm?Password=3caceed50acec92ae4a0b6c4b86433d3&Submit=Submit&token\_. The Moxa logo and website URL (www.moxa.com) are visible at the top. A navigation menu on the left lists various settings categories, with 'Operating Settings' selected. The main content area is titled 'Operating Settings' and is divided into three sections:

- Port 01**:
  - Operation mode: TCP Server Mode (dropdown)
  - TCP alive check time: 7 (0 - 99 min)
  - Inactivity time: 6000 (0 - 65535 ms)
  - Max connection: 1 (dropdown)
  - Ignore jammed IP:  No  Yes
  - Allow driver control:  No  Yes
- Data Packing**:
  - Packing length: 0 (0 - 1024)
  - Delimiter 1: d (Hex)  Enable
  - Delimiter 2: 0 (Hex)  Enable
  - Delimiter process: Do Nothing (dropdown) (Processed only when Packing length is 0)
  - Force transmit: 0 (0 - 65535 ms)
- TCP Server Mode**:
  - Local TCP port: 50000
  - Command port: 966

A 'Submit' button is located at the bottom right of the settings area.

Figure 5. Operating Settings

### 4.2.4 Other Settings

The other settings were left in their default configuration. However, they might need to be changed for it to work in your system.

## 4.3 Connecting to the Service Software

If the TCP Port has been set to 50'000 and the network configuration allows it the Service Software is able to connect to any TEC Controller over ethernet. The "Communication Interface" and the "Ethernet Address" have to be changed.



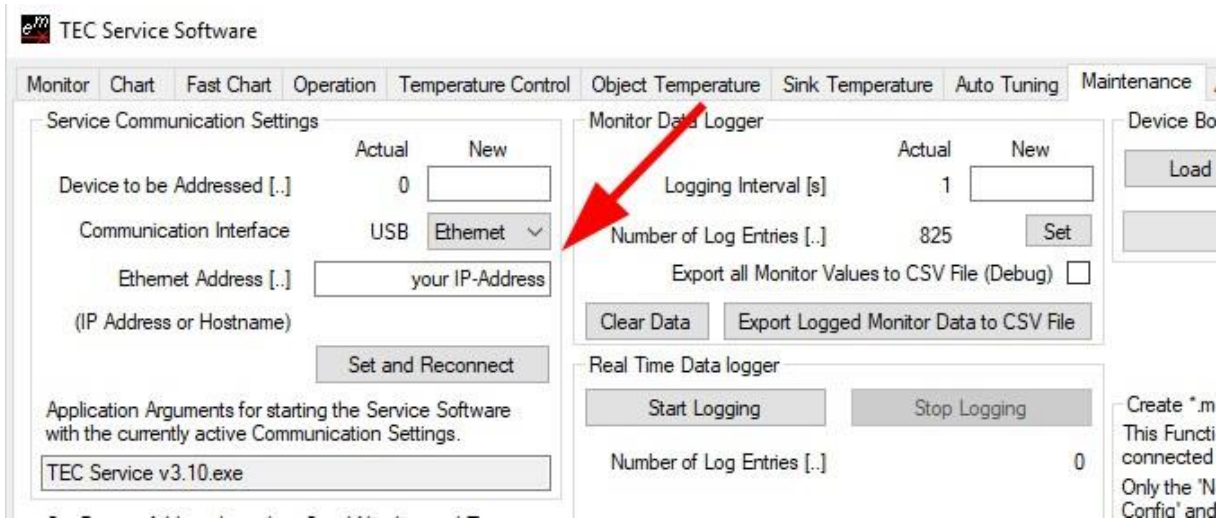


Figure 6. Connecting over Ethernet