RS485 Interface – Application Note

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Developed, assembled, and tested in Switzerland

Index

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1 Introduction

This application note documents the use of the RS485 interface of a Meerstetter Engineering device. Additionally, the use of a serial server to connect over Ethernet is also described.

The serial server is connected to the Meerstetter Engineering device via RS485.

We used the following device as serial server:

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

Please note that other devices from other manufacturers are often very similar in setup and should 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 8-Port Hub – TCP/IP Network

Model: USBNET-400i

Manufacturer: Coolgear

Link: USBNET-400i USB 2.0 Over IP Network 8-Port Hub (coolgear.com)

Advantages:

- You have an electrical isolation between each Meerstetter Engineering device and the server, because the USB interface is electrically isolated
- It might be simpler than using RS485
- You have an individual connection to each device
- Works well with the Meerstetter Engineering software

Disadvantages:

- USB is sometimes not very reliable
- You still have to use the FTDI Drivers on the client computer and cannot just open a TCP port and communicate with the devices

2 RS485

RS485 allows communication between a host and a single or multiple devices in a bus-like network structure. Every Meerstetter Engineering device offers at least one RS485 channel, some even more. (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 Ω resistor of the devices 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.
- Meerstetter Engineering devices are equipped with a 1-unit load RS485 transceiver which allows up to 32 devices on the same bus.

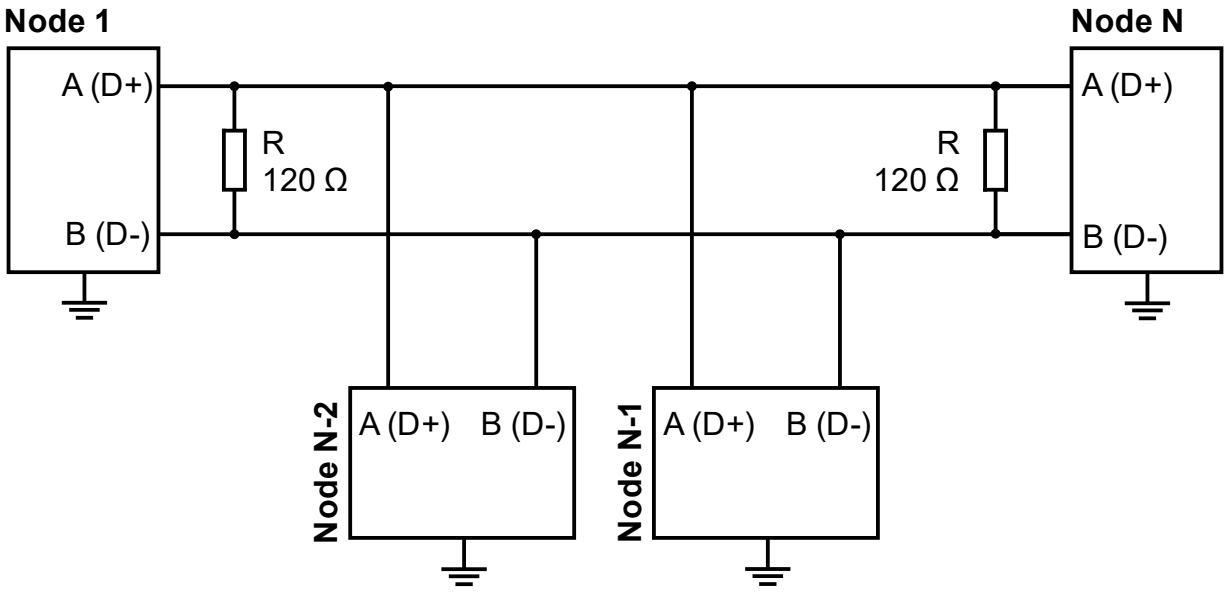

Figure 1. A multi-point RS485 network containing N nodes. Node 1 could be a computer and the others could represent Meerstetter Engineering devices.

2.2 Using the Software

Meerstetter Engineering software can only connect to a FTDI USB to RS485 chip or to TCP port 50’000. Because of this, a USB to RS485 cable by FTDI like the USB-RS485-WE-1800-BT must be used to connect to the software.

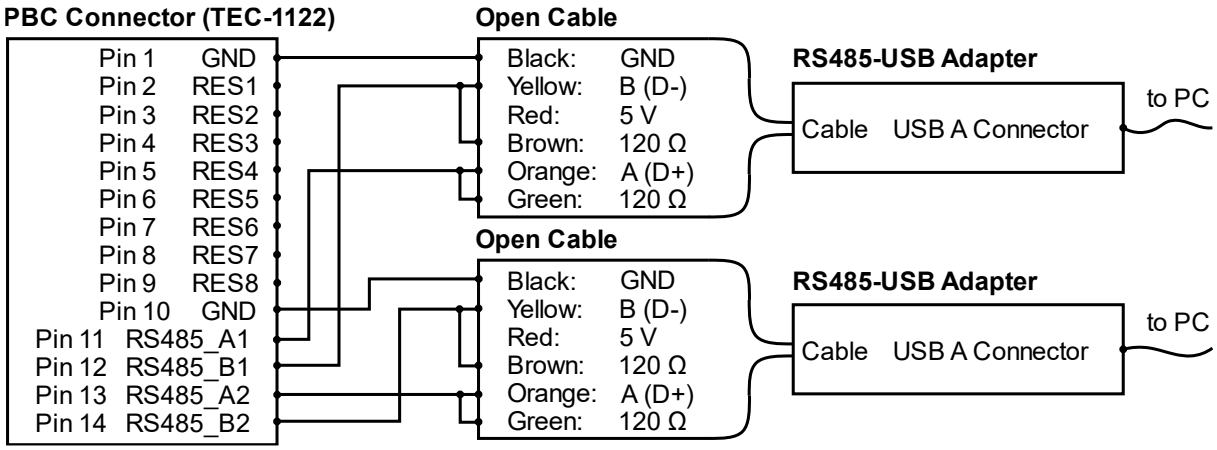

Figure 2. Wiring between the GPIO connector of a TEC-1122 controller and the USB-RS485-WE-1800-BT adapter. This example is only valid for TEC-1122 and TEC-1123 controllers. (See datasheet of other devices)

2.3 Addressing

To address all devices separately in a RS485 network, every device 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 devices receive and respond to that command, regardless of their actual address.

When the address 255 is used to broadcast a command all the connected devices 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 Meerstetter Engineering devices feature half-duplex RS485 interfaces only 3 wires need to be connected.

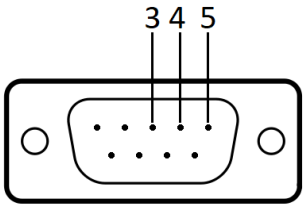

Figure 3: NPort pinout

NPort Pin No.	Device Pin
3	RS485 D+
4	RS485 D-
5	GND

Table 1: Connections

4 Configuration

This chapter describes how a Meerstetter Engineering device, and a serial server can be configured so that they will work together.

4.1 Meerstetter Engineering Device Configuration

The RS485 interface of the Meerstetter Engineering device 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 RS485 interface settings of the device.

4.2 Serial Server Configuration

Screenshots of the web interface of the serial server have been made to show its settings.

4.2.1 Network Settings

The network settings must be defined so that they work with your system.

4.2.2 Serial Settings

The Baud rate of the server must match the Baud rate of the Meerstetter Engineering device.

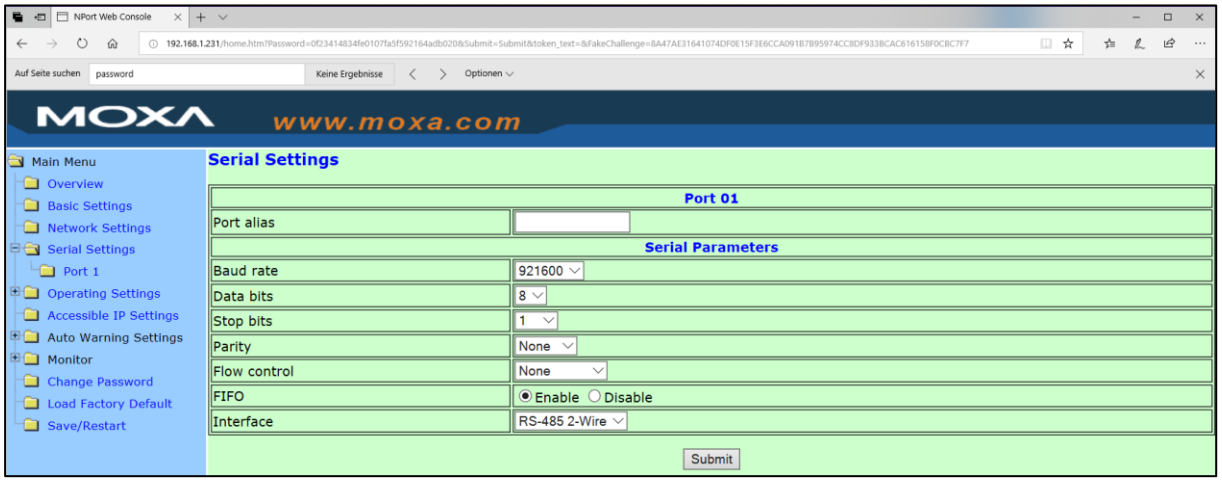

Figure 4. Baud rate settings (Please set an appropriate speed for your device/settings)

4.2.3 Operating Settings

For use with the Meerstetter Engineering software the TCP port must 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 software reset and reconnect behavior. You may also set this value much lower, but then the firmware update process will fail. (It closes the TCP channel after 6s of no activity).

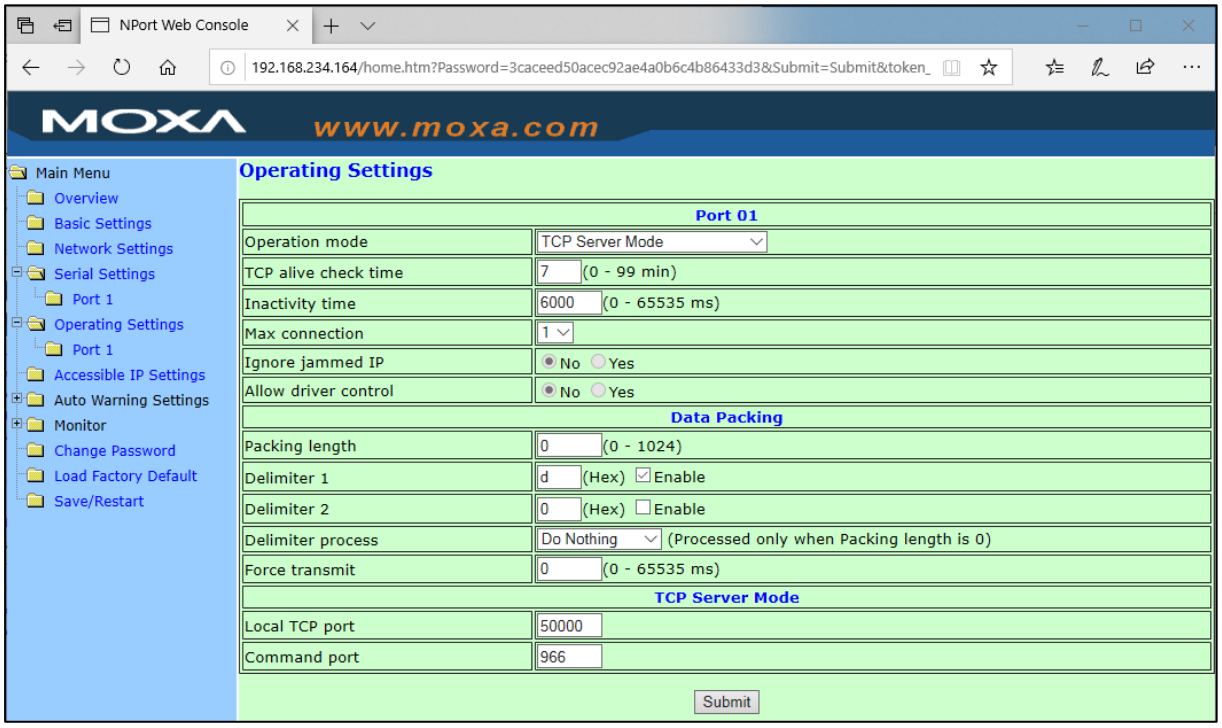

Figure 5. Operating Settings

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 Software

If the TCP port has been set to 50’000 and the network configuration allows it, Meerstetter Engineering software is able to connect to any corresponding device over Ethernet.

In the TEC Service Software, the “Communication Interface” and the “Ethernet Address” must be changed in the “Maintenance” tab:

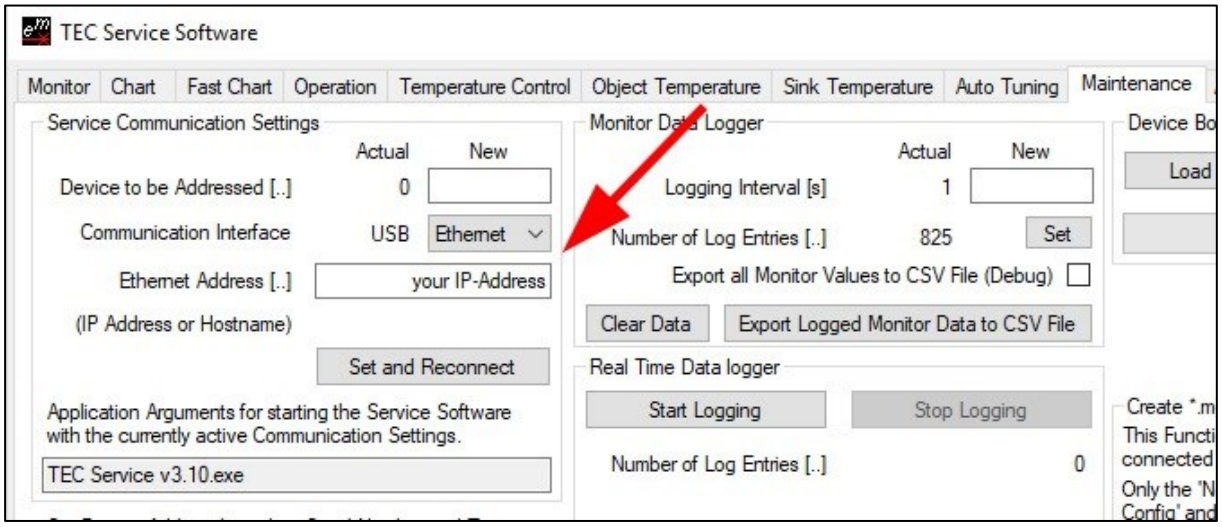

Figure 6. Connecting over Ethernet in the TEC Service Software

In the TEC Configuration Software, the “Use Ethernet (TCP) Connection” option must be selected, and the “Host” address must be changed in the “Connection Criteria Manager” window, which can be accessed through the “Tools” menu in the main window:

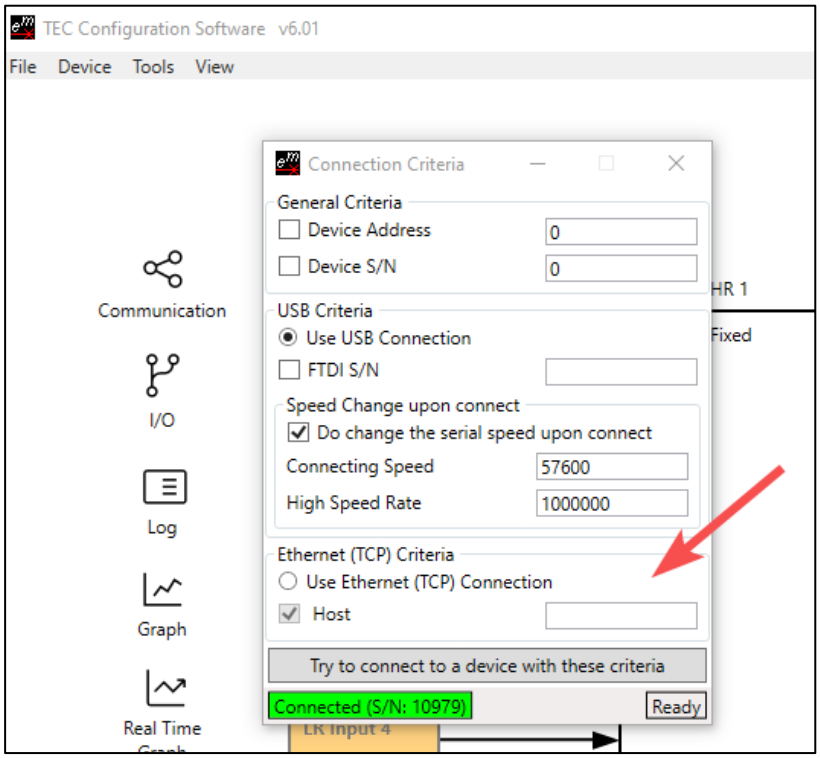

Figure 7. Connecting over Ethernet in the TEC Configuration Software

A Change History

Date of change	Version	Changed / Approved	Change / Reason
1. November 2024	D	XF / SC	• Add: Change History • Add: Meerstetter Engineering logo on the title page • Add: Picture displaying the "Connection Criteria Manager" window, which contains the "Ethernet" settings in the TEC Configuration Software • Mod: Changed the document from a TEC Application Note to a generic Application Note because the concepts apply to all Meerstetter Engineering devices