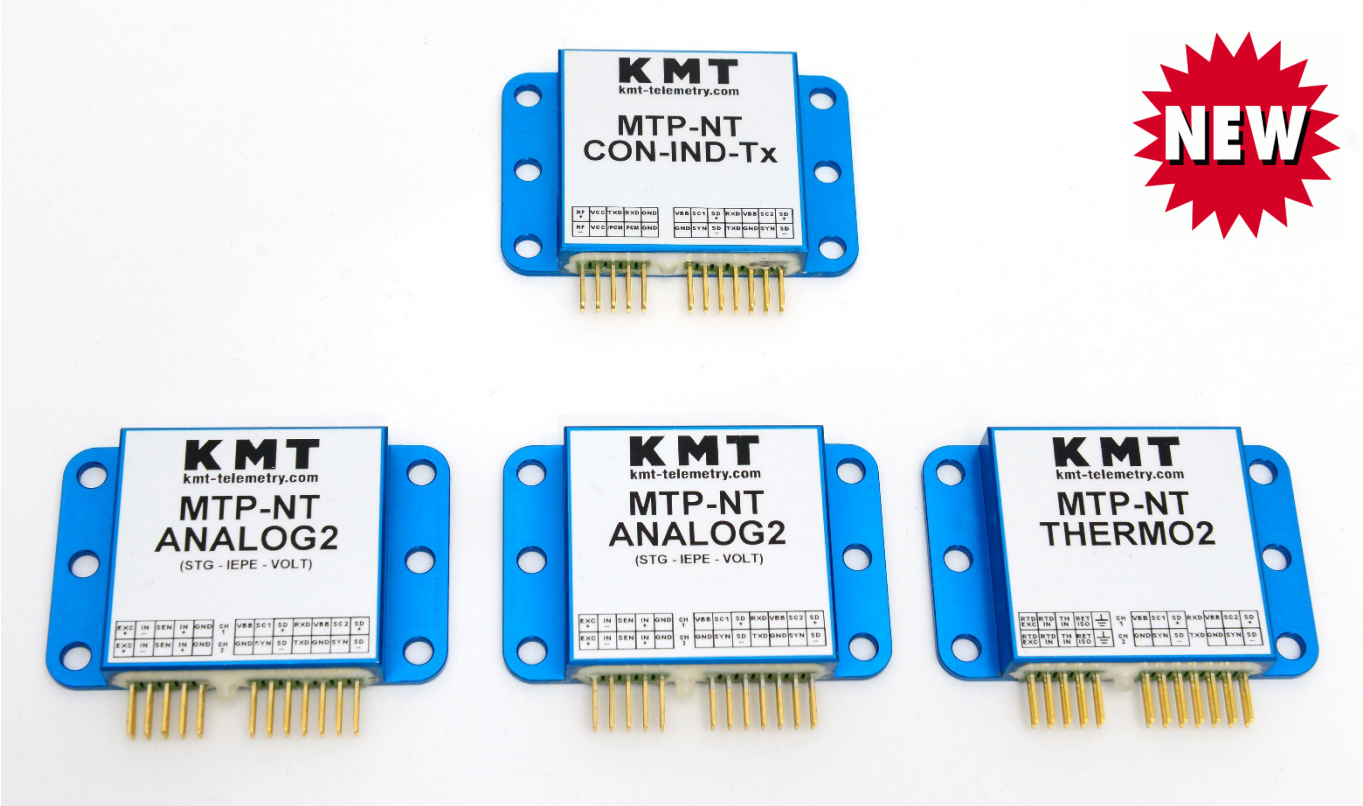
KMT - Kraus Messtechnik GmbH
Gewerbering 9 • 83624 Otterfing • Germany ☎ +49-8024-48737 Fax.-5532
https:// www.kmt-telemetry.com info@kmt-telemetry.com

MTP-NT

Software User Manual

Sophisticated multi-channel telemetry system for rotating application, fully software programmable



INSTRUCTIONS FOR QUALIFIED PERSONNEL ONLY!

Further resources and the latest document versions

MTP-NT Technical Resources Page:	https://www.kmt-telemetry.com/support/mtp-nt/
MTP-NT User Manual:	https://www.kmt-telemetry.com/support/mtp-nt/Files/MTP-NT-UM.pdf
MTP-NT Software & Information Manual:	https://www.kmt-telemetry.com/support/mtp-nt/Files/MTP-NT-SW.pdf
MTP-NT Inductive Powering User Manual:	https://www.kmt-telemetry.com/support/mtp-nt/Files/MTP-IND-PWR.pdf

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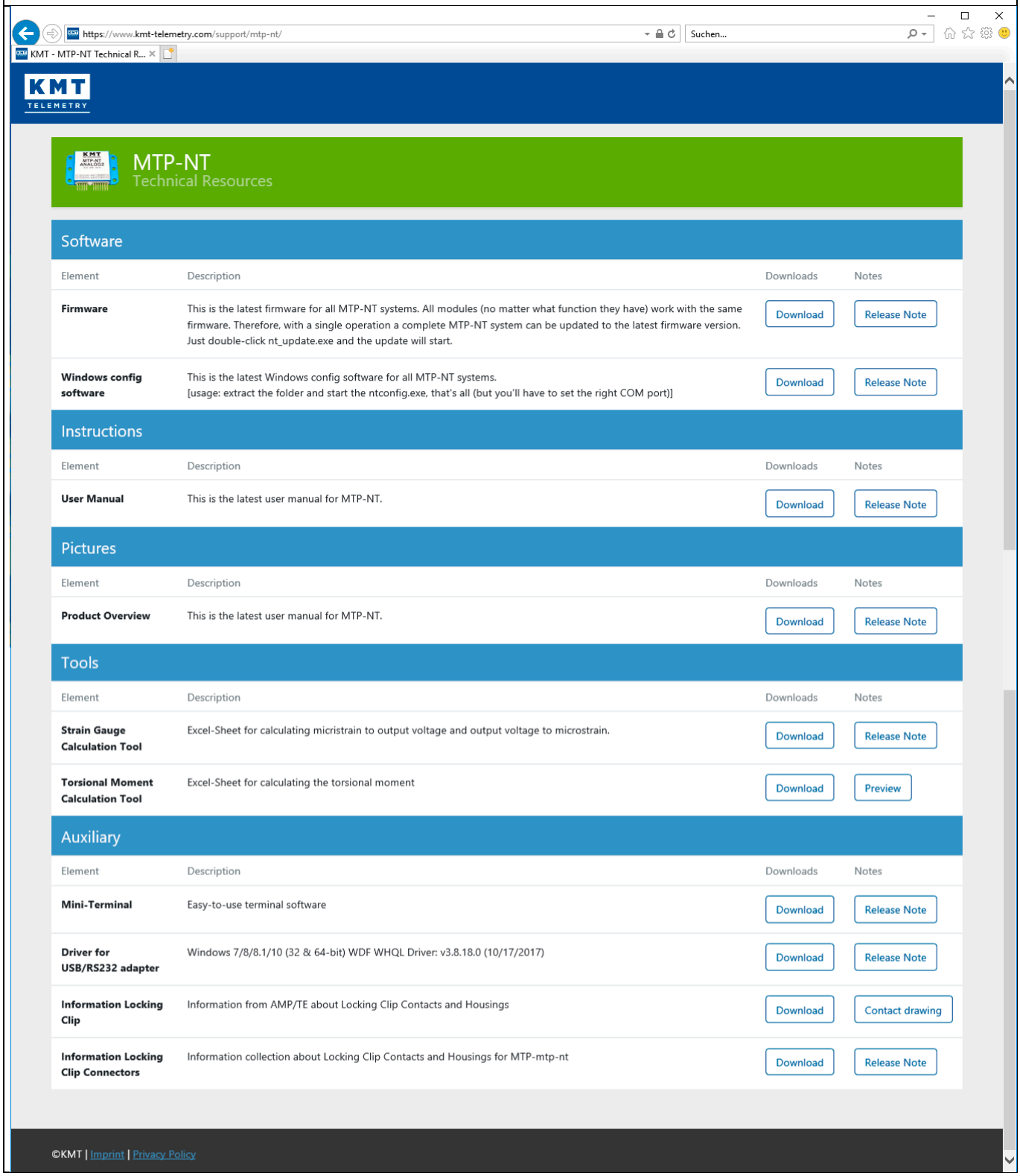
Download latest firmware, windows config software, user manual and other tools under:

https://www.kmt-telemetry.com/support/mtp-nt/



KMT TELEMETRY

MTP-NT
Technical Resources

Software

Element	Description	Downloads	Notes
Firmware	This is the latest firmware for all MTP-NT systems. All modules (no matter what function they have) work with the same firmware. Therefore, with a single operation a complete MTP-NT system can be updated to the latest firmware version. Just double-click nt_update.exe and the update will start.	Download	Release Note
Windows config software	This is the latest Windows config software for all MTP-NT systems. [usage: extract the folder and start the ntconfig.exe, that's all (but you'll have to set the right COM port)]	Download	Release Note

Instructions

Element	Description	Downloads	Notes
User Manual	This is the latest user manual for MTP-NT.	Download	Release Note

Pictures

Element	Description	Downloads	Notes
Product Overview	This is the latest user manual for MTP-NT.	Download	Release Note

Tools

Element	Description	Downloads	Notes
Strain Gauge Calculation Tool	Excel-Sheet for calculating micristrain to output voltage and output voltage to microstrain.	Download	Release Note
Torsional Moment Calculation Tool	Excel-Sheet for calculating the torsional moment	Download	Preview

Auxiliary

Element	Description	Downloads	Notes
Mini-Terminal	Easy-to-use terminal software	Download	Release Note
Driver for USB/RS232 adapter	Windows 7/8/8.1/10 (32 & 64-bit) WDF WHQL Driver: v3.8.18.0 (10/17/2017)	Download	Release Note
Information Locking Clip	Information from AMP/TE about Locking Clip Contacts and Housings	Download	Contact drawing
Information Locking Clip Connectors	Information collection about Locking Clip Contacts and Housings for MTP-mtp-nt	Download	Release Note

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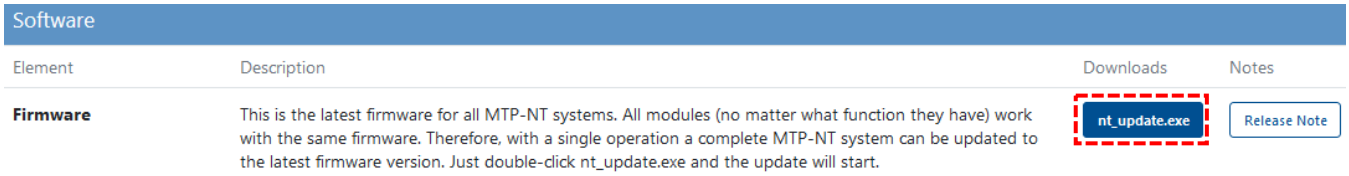
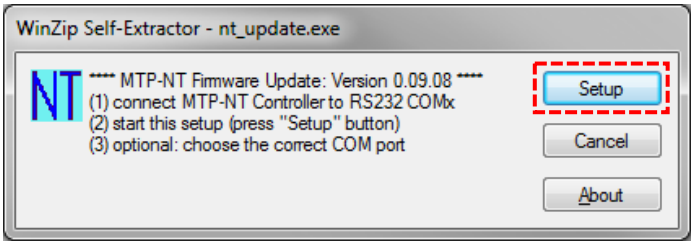
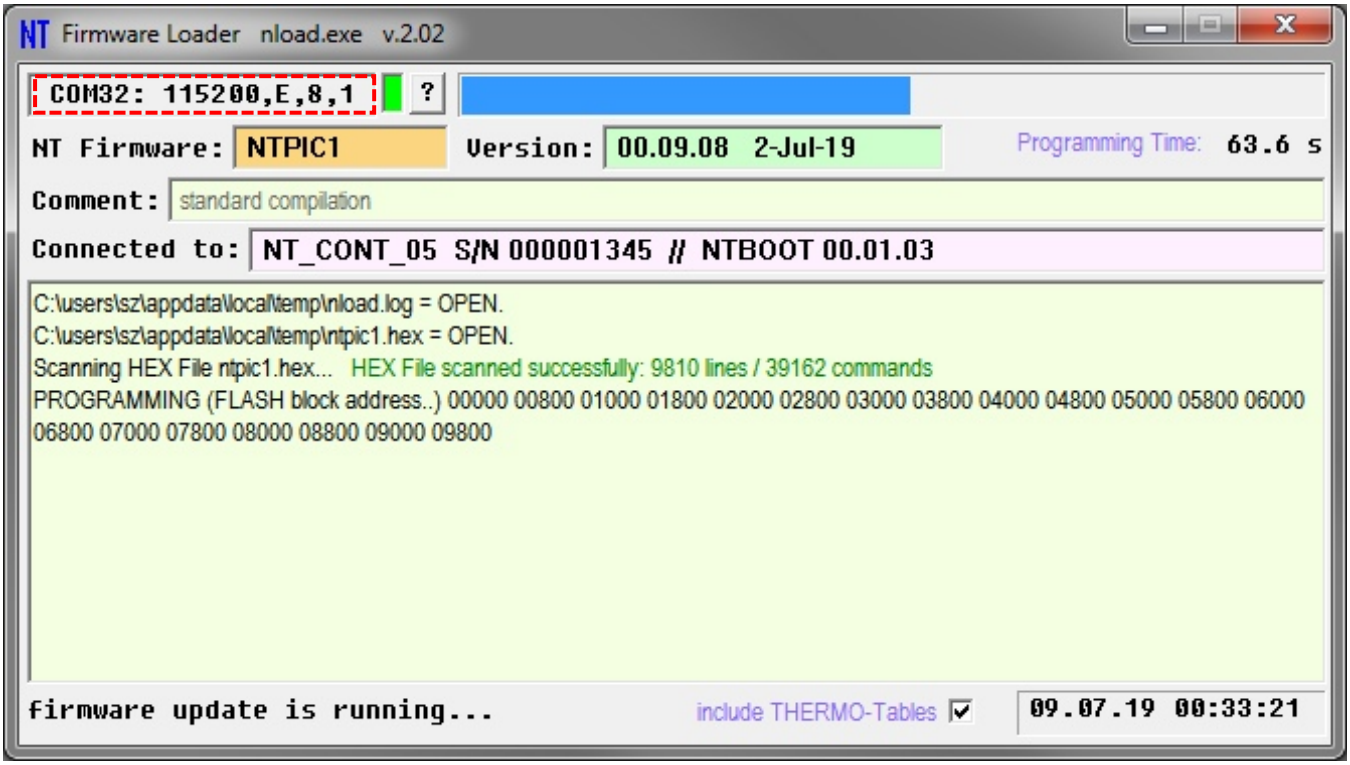
NT Module Firmware:

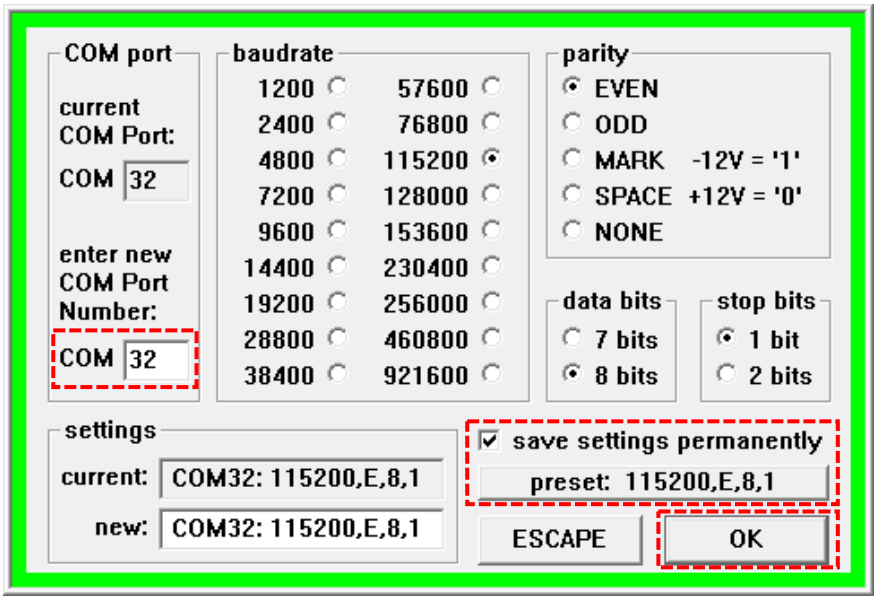
Go to the official NT support site (https://www.kmt-telemetry.com/support/mtp-nt/) and download the firmware setup file **nt_update.exe** as shown in the below figure.





This is always the latest firmware for all MTP-NT systems. All MTP-NT modules (no matter what function they have) work with the same firmware. Therefore, with a single operation a complete MTP-NT system can be updated to the latest firmware version. Just double-click **nt_update.exe** and the update will start.





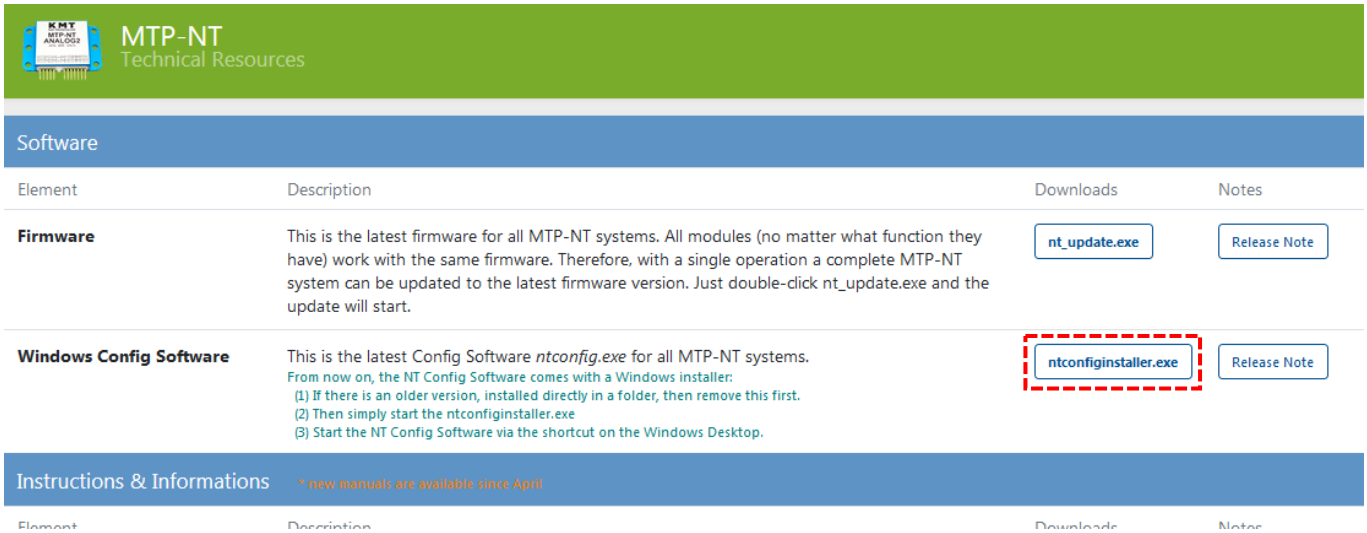
To change the COM port click on the *COM port settings* box that is located on the top left corner (marked in red).

In the COM port settings window you can change the COM port number. The default communication setting for all MTP-NT systems is 115200,E,8,1 (this setting never has to be changed, but you must be sure that this setting is correct).

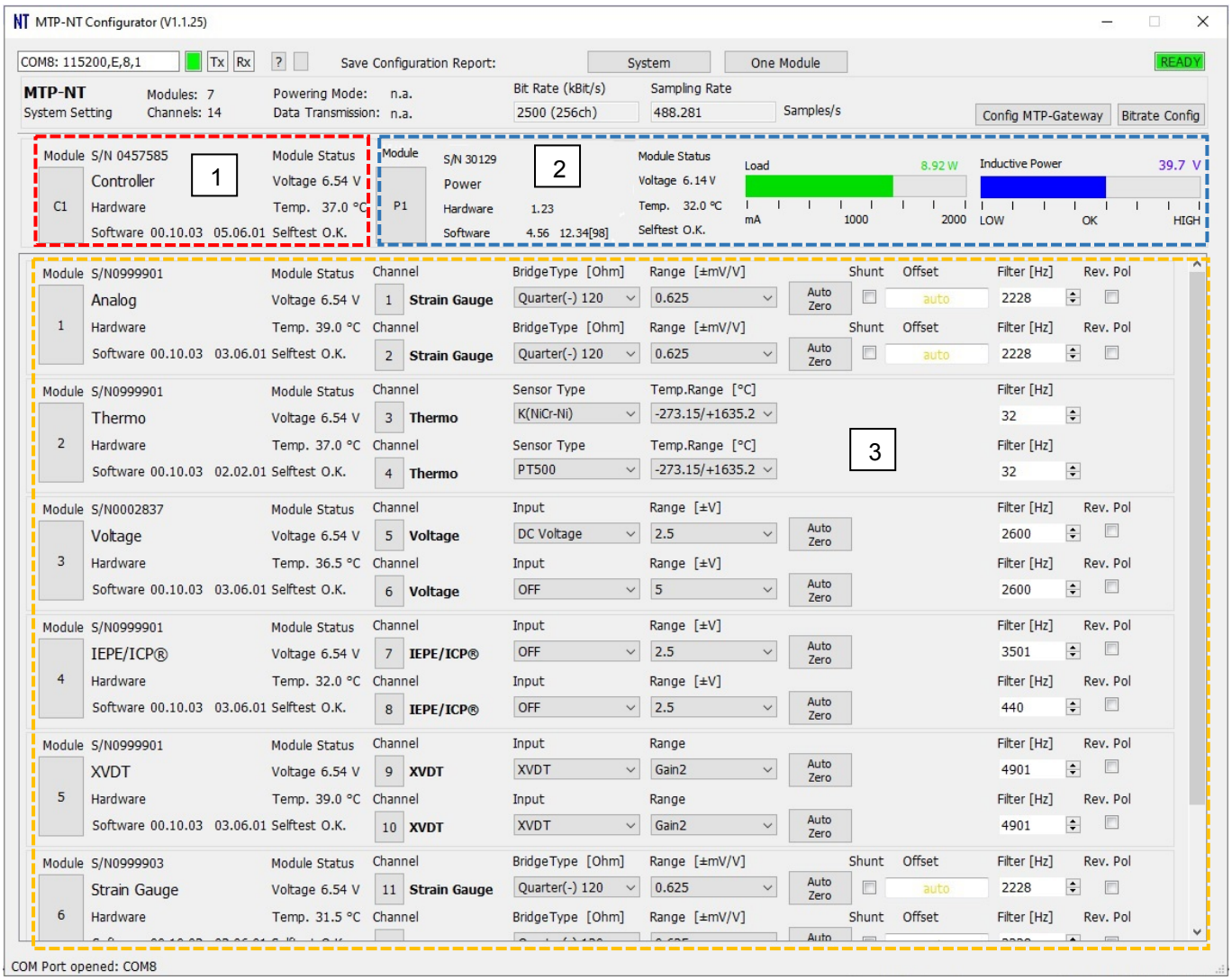
Note: In the case of connection problems, you should check the Device Manager to see if the COM port used is available.

NT Configuration Software (Windows):

Go to the official NT support site (https://www.kmt-telemetry.com/support/mtp-nt/) and download the **ntconfig.zip** file as shown in the below figure. You need to extract the zip file. Any extractor tool can be used to get the contents.



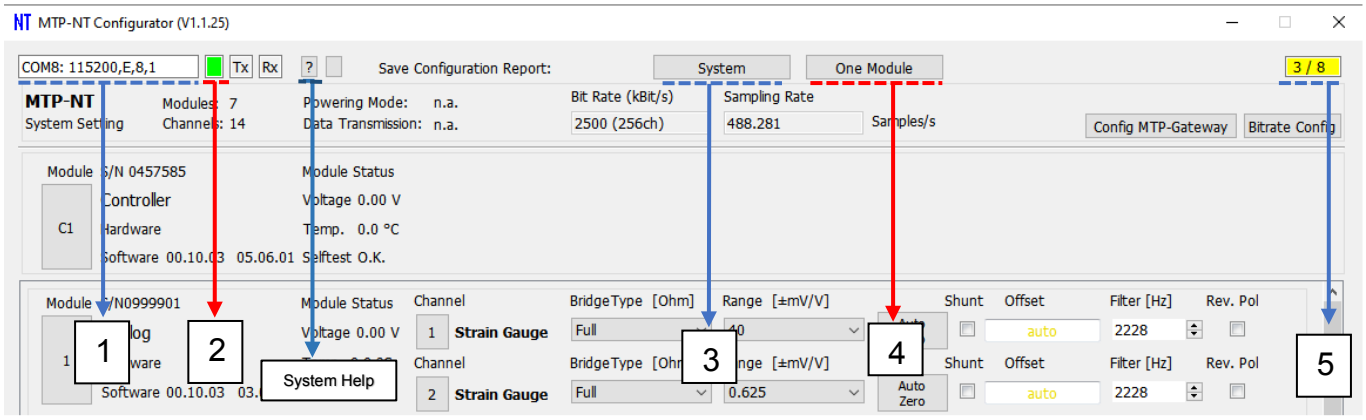
This will be described in more detail soon ...



1. **Controller Module:** The red marked box indicates the controller module present in the system. All information regarding this module is described here.

2. **Power Module*:** The blue marked box indicates the Power module present in the system. Information regarding different parameters are mentioned in this box. (* omitted when no power module is present)

3. **Measurement Modules:** This area contains the information and settings of all the modules connected to the controller module. All the different types of modules like Strain Gauge, Analog, Thermo, IEPE/ICP, Voltage, Potentiometer etc. are listed here. Module specific setup operations can be performed, like Range Setting, Bridge Type, send AutoZero, set/reset shunt, reverse polarity, change filter frequency, etc. On performing these operations, the "*Connection Status Indicator*" could change its status to busy (Yellow/Orange blinking) since it may need some time to dispatch commands and waiting for response. It is advisable to wait till this *Connection Status Indicator* turns green again before taking any new action.



1. **COM port Settings:** This box is responsible for the COM port settings. Click on this box that opens another dialog to configure the settings. See the next pages for changing the settings.

2. **Serial port LED:** There are three colors that explains state of serial communication in the application.

   Gray: This color means that there is no serial port with given settings.

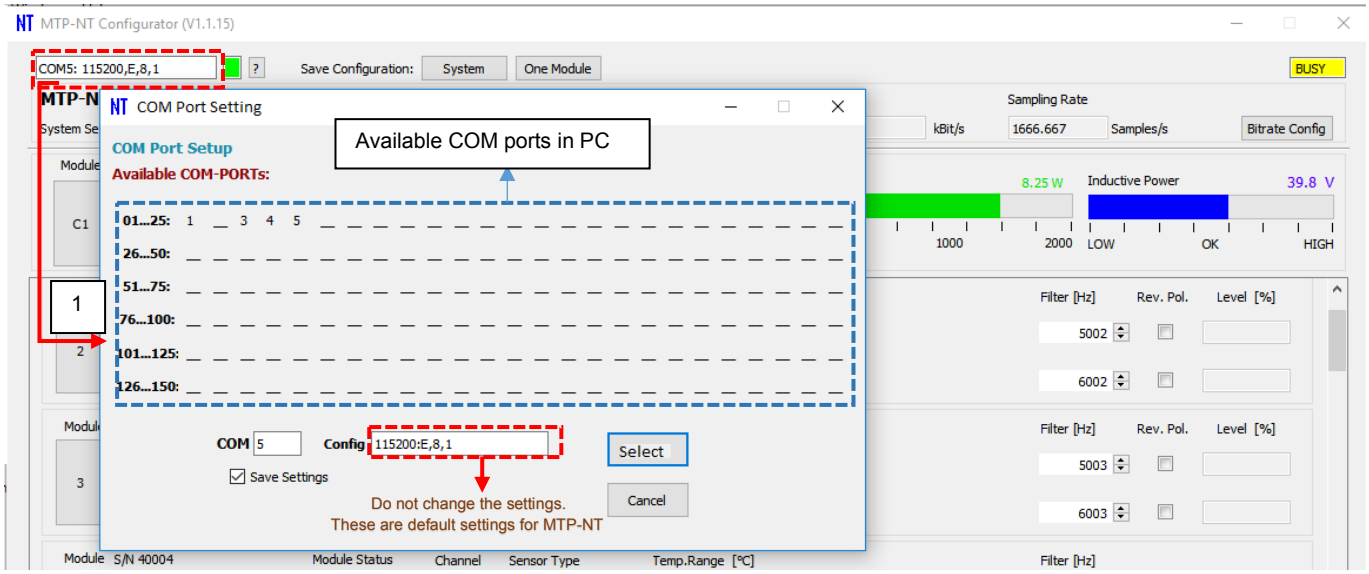
   Yellow: This color means that serial port is available but unable to contact or communicate with MTP_NT system.

   Green: This color means that the application is able to communicate with MTP_NT with given serial port settings.

3. **System Report**: Click this button to store the whole system report in to two available formats in PDF or in excel sheet. See next page for detailed information.

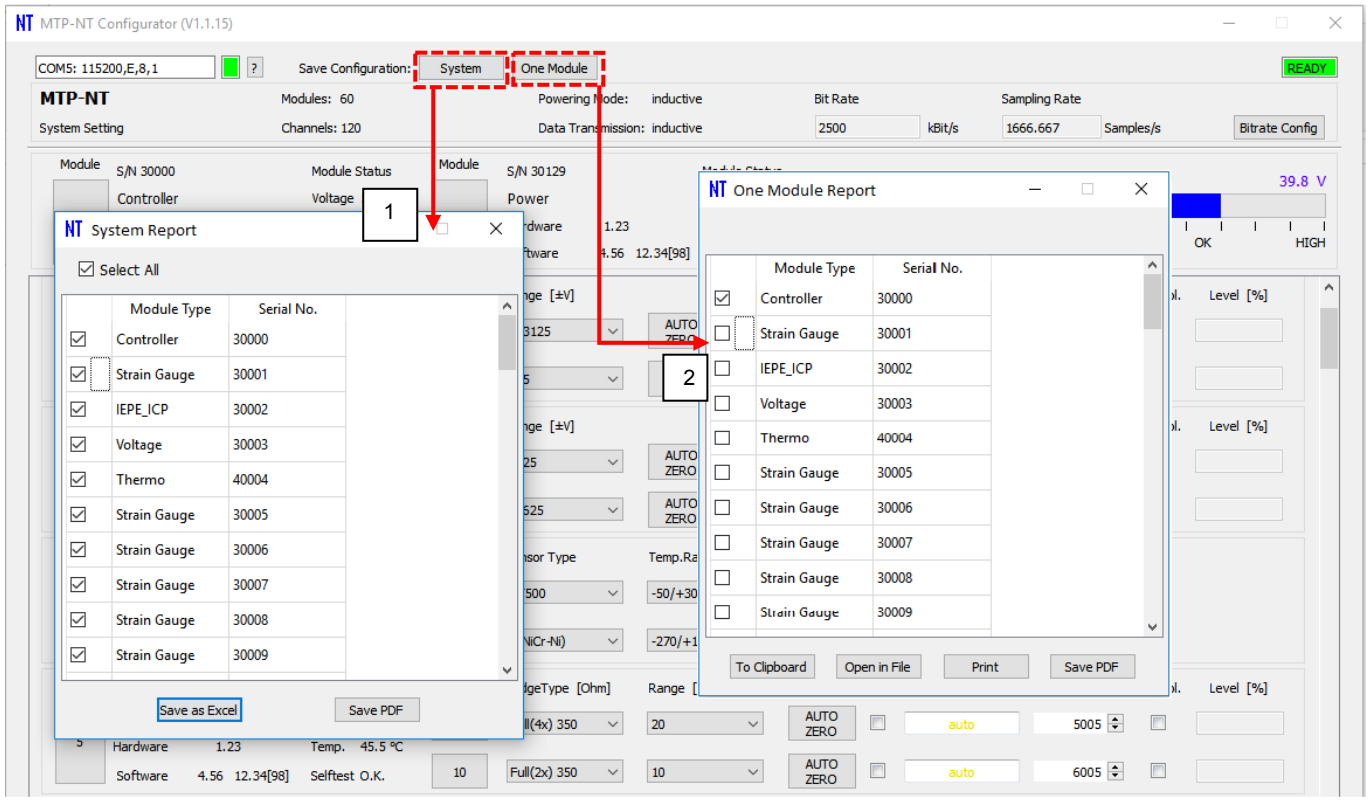
4. **Single Module Report:** Click this button to save the single module report among available options. This section is described in the next page.

5. **Connection Status Indicator:** There are two phases as mentioned below. It is advisable to wait till Ready (Green) and then give the next command.
   (a) Busy (Yellow): In the initial stage of application start it shows the number of modules to be fetched like in the above picture. Upon issuing a group command it displays the number of seconds till the operation completes.
   (b) Ready (Green): This indicates that all pending messages are sent and the user can send additional operations.

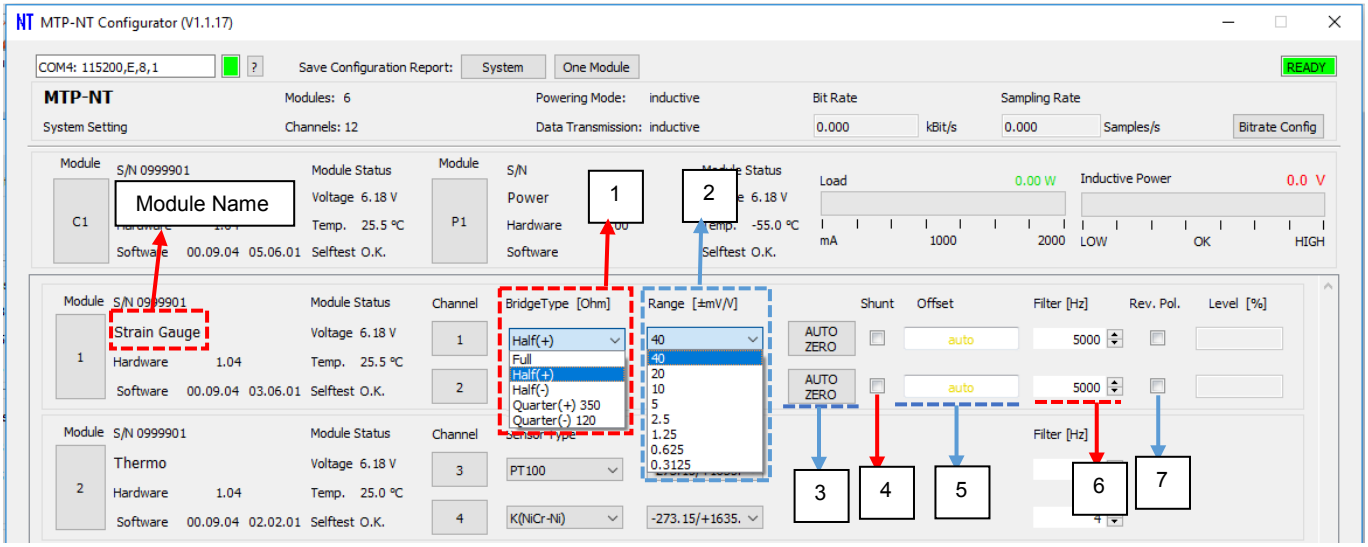


To change the COM port, click on the *COM port settings* box that is located on the top left corner (marked in red).

1. **COM Port Setting Screen**: This screen allows you to enter the used COM Port number. (Hint: in the above blue marked area there's a list of the currently available COM ports). Click on "*select"* to open the used COM port with given settings



1. **System Report Screen:** When clicking on the *System* button on the top, a new screen appears with a list of all modules in the connected NT System. The checkboxes of all modules that should be included in the system report must be selected. The system report could be either saved as an Excel file or a PDF file by clicking on the desired *Save* button below.
2. **One Module Report Screen:** This function is used to collect the status report of a single module, for printing, writing it to a Text or PDF file, or simply copying it to the clipboard.



Strain Gauge

The configuration parameters of the strain gauge could be altered. In the above picture for MTP-NT Configurator the markings along with numbers indicate each different parameter that could be altered from application, below is information about them. A group command can be issued for some features denoted by “SC (Shift Click)” and “SE” (Shift Enter).

1. **Bridge Type (SC)**: The drop box below “Bridge Type” label could be clicked to display a list of valid options. Depending on the required type the user can make his selection and the specific channel is set the value.

2. **Range (SC)**: Click on the drop box below the label “Range “. This will display a list of items that user could select to set the range.

3. **Autozero (SC):** Click on the Autozero button to send the command to the corresponding channel. The button text changes to red (Time in red color is the approx. time for autozero to take effect in the module).
   Holding Shift key while clicking will apply the AZ command to all similar channels at once.
   Alternatively, on Long press of this button Autozero Reset command is sent to the particular channel of the module.

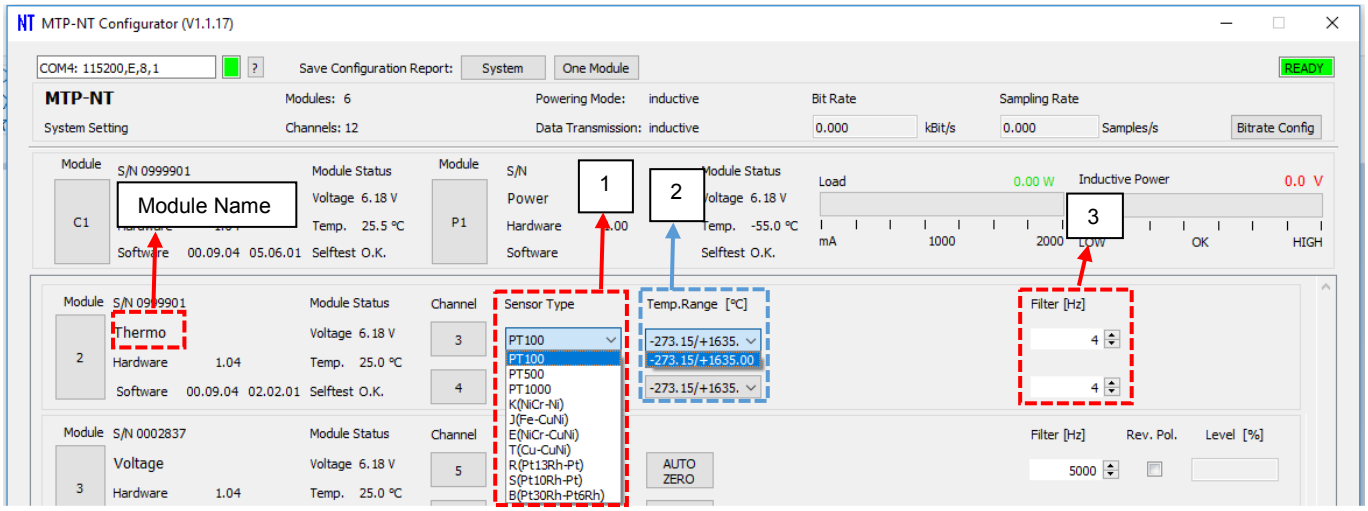
4. **Shunt :** Clicking this option enables the shunt for the specific channel in the module.

5. **Offset:** Clicking this box displays a new screen where user can set it to auto or manual for the offset value in the corresponding channel.

6. **Filter (SE):** The filter value could be set in this box, upon setting the text changes to blue and command is sent for the specific channel in the module.

7. **Rev. Pol.:** This box could be clicked to reverse the polarity of the specific channel for the module.

(SE) and **(SC)** denotes that this feature is eligible to be used in combination with Shift + Enter (SE) and Shift + Click (SC) that sets the current selected setting to all modules of similar type. Simply click on the dropdown of eligible types then by holding shift and click on the setting to apply on all similar modules.



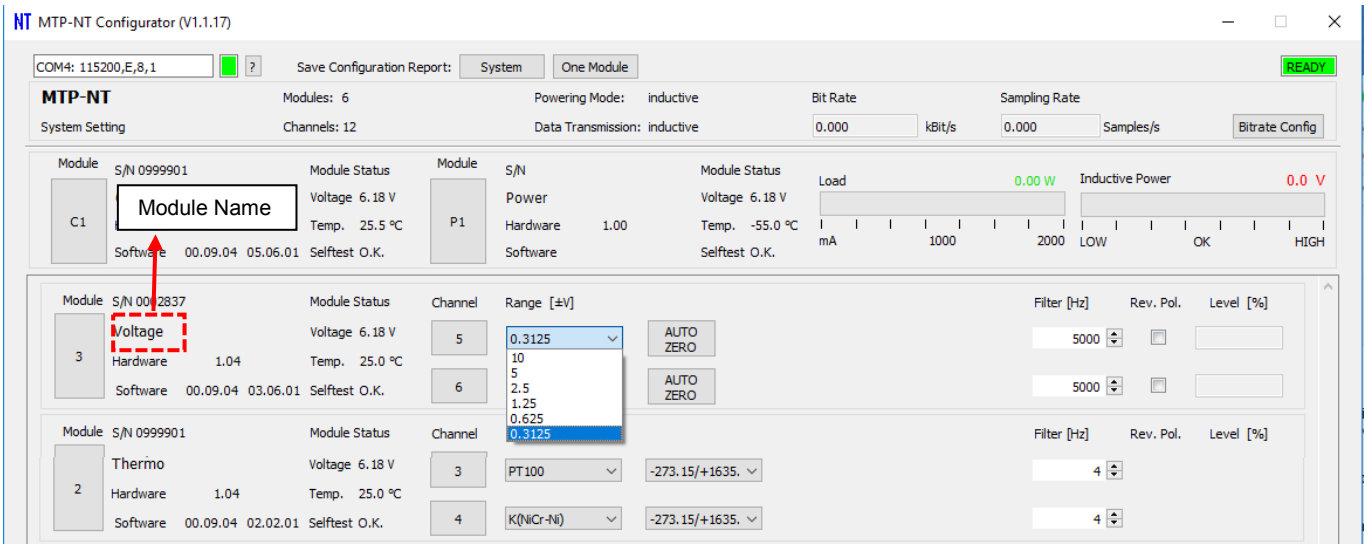
Thermo Module

The thermo module has only three parameters that could be modified by the user

1. **Sensor Type:** - There are a list of sensors that could be configured with the Thermo modules. The user can click on the drop box below the Sensor Type and choose desired sensor

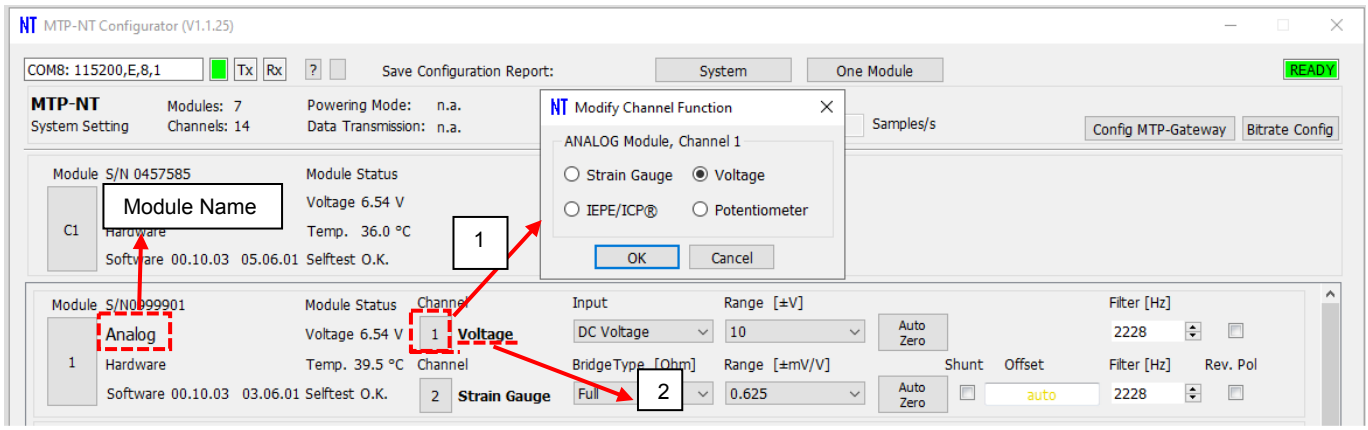
2. **Temperature range: -** The temperature range could be modified by selecting the drop box by the user.

3. **Filter: -** The filter value could be set in this box, upon setting the text changes to blue and command is sent for the specific channel in the module.



IEPE / Voltage / Potentiometer Module

Modules such as IEPE, Voltage, Potentiometer etc. have the same set of user interface elements such as the “Range”, “Autozero”, “Filter” and “Reverse Polarity etc. look in to Strain Gauge section as setting these features are already discussed there.



Analog Module

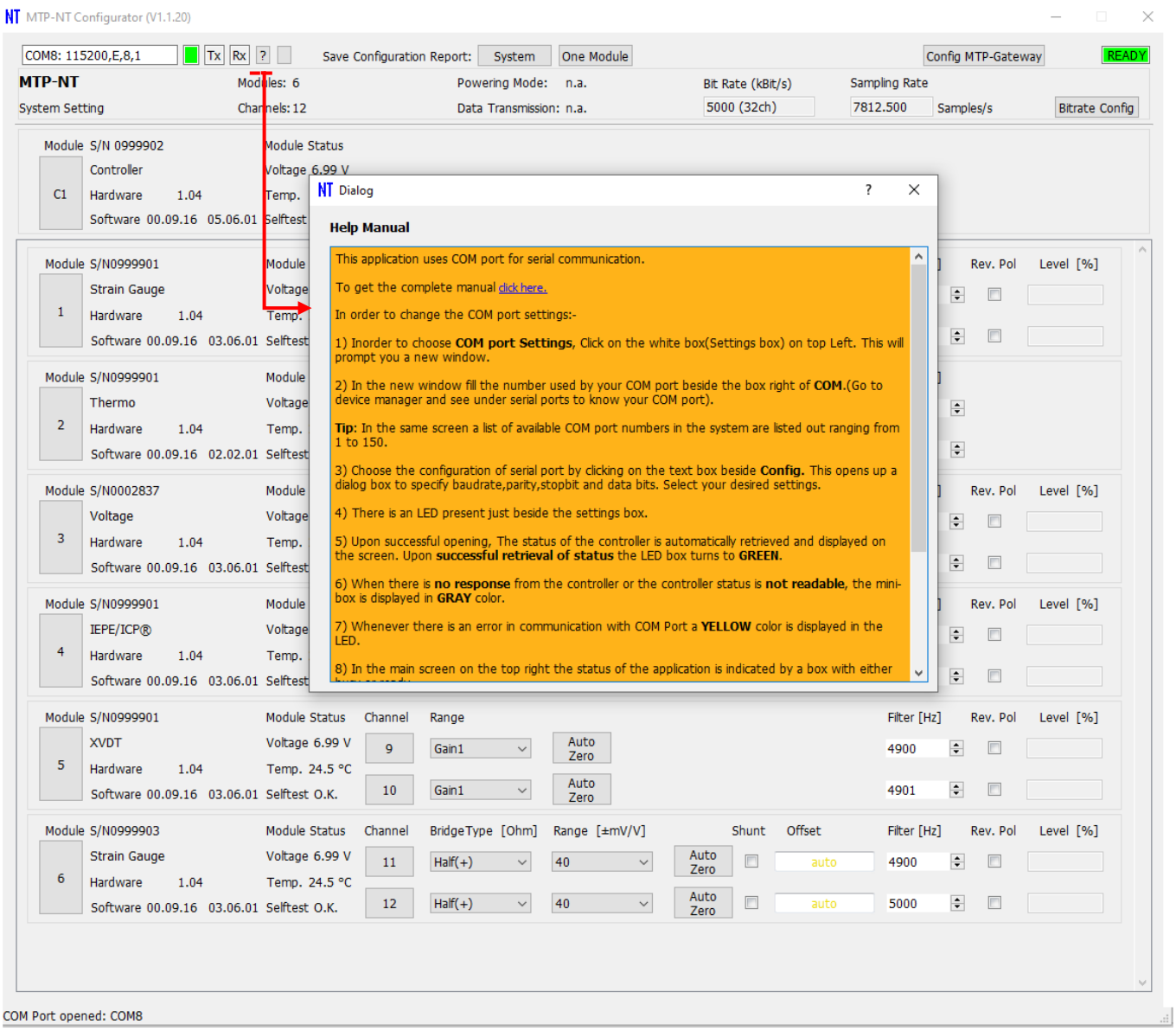
The Analog module channels can be configured to a different channel function type such as Strain Gauge, Voltage, IEPE/ICP and Potentiometer.

1. **Modify Channel Function:** - Click on the channel number button below “Channel”, this brings a new dialog where a different channel function can be selected. The available channel functions are Strain Gauge, Voltage, IEPE/ICP and Potentiometer.

2. **Channel Function name: -** Upon successful change in the channel function, the name and features available for the channel are displayed

The selected channel function behaves exactly like the same way as its chosen type, for example if the channel function is chosen as Strain Gauge all the features for the channel are identical as Strain gauge. This behavior is same when Voltage, Potentiometer and IEPE are selected.

This will be described in more detail soon ...



Help Manual

If for future references on quickly going through the basic operations of NTConfig, a help manual is present that opens by clicking on the “?” button as given in the above picture. A brief overview is provided in this dialog and for a detailed information there is also a link provided that redirects to this document again.

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05.06.16 Version 002

KMT IP LAN Interface TCP Settings

1. TCP Block Format

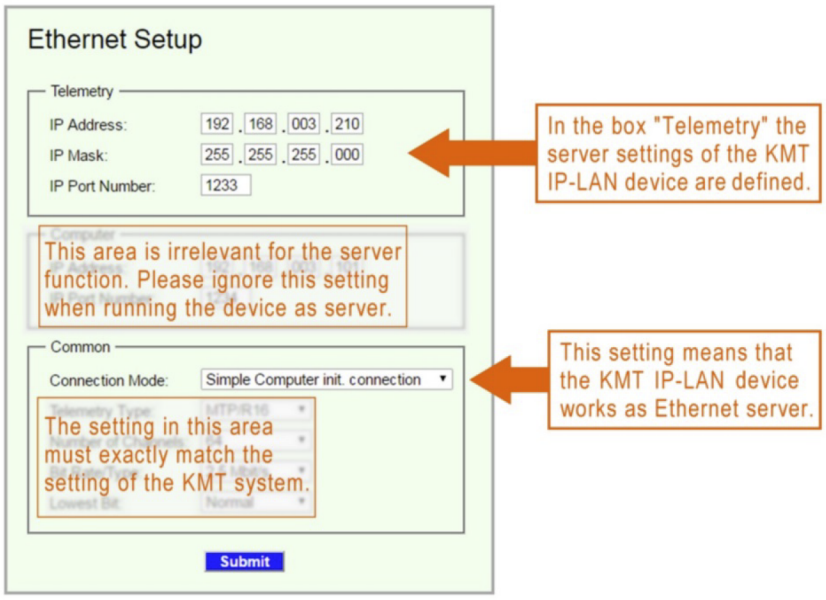
Index	Name	Size / Format	Example	Comment
0	frame_size	2 Byte unsigned int	00000000 00001000 Frame Size = 8 Bytes	Frame Size in Bytes
2	number_of_frames	2 Byte unsigned int	00000000 00001010 10 Frames	Number of Frames
4		frame_size (Bytes)		first Frame
...	...	...	...	...
n		frame_size (Bytes)		last Frame

blue = Data Section

n = ((4 + (frame_size * number_of_frames)) - frame_size)

- The data sample format is 16 Bit unsigned integer, as it comes from the A/D converter.
- The frame size is the data sample size (2 bytes) times number of channels.
- The order of bytes is Little-Endian (Intel).

2. IP-LAN Device Setting (**server mode** for PC client software)



3. Method for transmitting data via TCP

(a) Ensure that a valid PCM data stream is present at the PCM input. Otherwise the device will send nothing over TCP.
(b) Open the socket defined in the box "Telemetry" with your own client software (see paragraph 2).
(c) The IP-LAN device will immediately start to transmit the data stream (see paragraph 1).
(d) Note that your software must be fast enough to prevent an overflow of the TCP buffer. Otherwise you could receive garbage. The only way to check data integrity is to check the plausibility of the header. In particular, the frame size must never change within a session, and the number of frames must not contain idiotic values.

Data frame:

For 4 Channels: 32 bit Barker Synch Code + 4x16 bit Data + 4x16 bit Data + 4x16 bit Data + 4x16 bit Data + 32 bit reserved

For 8 Channels: 32 bit Barker Synch Code + 8x16 bit Data + 8x16 bit Data + 32 bit reserved

For 16 Channels: 32 bit Barker Synch Code + 16x16 bit Data + 32 bit reserved

For 32 Channels: 32 bit Barker Synch Code + 16x16 bit Data + 32 bit reserved (Frame Nr.1 = CH1..Ch16) **+**

32 bit Barker Synch Code + 16x16 bit Data + 32 bit reserved (Frame Nr.2 = CH17..Ch32)

For 64 Channels: 32 bit Barker Synch Code + 16x16 bit Data + 32 bit reserved (Frame Nr.1 = CH1..Ch16) **+**

32 bit Barker Synch Code + 16x16 bit Data + 32 bit reserved (Frame Nr.2 = CH17..Ch32) **+**

32 bit Barker Synch Code + 16x16 bit Data + 32 bit reserved (Frame Nr.3 = CH33..Ch48) **+**

32 bit Barker Synch Code + 16x16 bit Data + 32 bit reserved (Frame Nr.4 = CH49..Ch64)

MTP-NT-DIG-DEC-V2 - Range of digital values in TCP data stream:

This is a table of the whole range of digital values: nt_digital_range.xlsb
The column "decimal" shows the unsigned short value, coming in the TCP data stream.
This values must be converted into signed short (by subtracting 32768).
The column "bipolar" shows the result that represents the measured value.

Calculation of the bipolar value:
[incoming digital value] - 32768 = [bipolar value]
Examples:

```
65535 - 32768 =  32767
32768 - 32768 =      0
    0 - 32768 = -32768
```

Analog measurement (strain gauge, voltage etc.):
The range of bipolar values is -32768 to 32767.
The fullscale signal range is -32704 to 32704.
Example 1 (STG module):
* input range setting = ±5 mV/V
* applied bridge unbalance = +5 mV/V
* digital value (unsigned short) = 65472
* bipolar value = 32704

Example 2 (Volt module):
* input range setting = ±10 Volt
* applied input voltage = +10 Volt
* digital value (unsigned short) = 65472
* bipolar value = 32704

Temperature measurement:
The digital output resolution is 0.05K/step* (20 steps/Kelvin)
This means that the bipolar value must be divided by 20 to get the temperature.
Example:
* sensor temperature = +100°C
* digital value (unsigned short) = 34768
* bipolar value = 2000

sensor fault message (sensor break): Temperature value = -999.0°C
unreasonable value message (overflow): Temperature value = -998.0°C

* This means the mathematically generated output resolution after linearization; the true ADC resolution depends on sensor type and temperature range and may be significantly lower.

Analog Decoder output:
The bipolar fullscale value (±32704) generates an analog output Voltage of ±10.00 Volt.

Analog Decoder output (Temperature Values):
The 10.00 Volts analog fullscale value corresponds to the full-scale temperature of 1635.20 degrees Celsius. Therefore, the factor for obtaining the temperature value from the analog decoder output is **163.52** (example: 1.00 volts analog output voltage multiplied by 163.52 gives the reading 163.52 degrees Celsius).

Data Stream		Analog Out	Temperature (depending on module setting)			
decimal	**bipolar**	(±10V)	-273/+1635	-273/+1000	-273/+500	-250/+250
		Volt	°C	°C	°C	°C
65535	32767	10,019264	1638,35	1001,93	500,96	250,48
65472	32704	10,000000	1635,20	1000,00	500,00	250,00
45850	13082	4,000122	654,10	400,01	200,01	100,00
39309	6541	2,000061	327,05	200,01	100,00	50,00
36039	3271	1,000183	163,55	100,02	50,01	25,00
32768	0	0,000000	0,00	0,00	0,00	0,00
27305	-5463	-1,670438	-273,15	-167,04	-83,52	-41,76
23835	-8933	-2,731470		-273,15	-136,57	-68,29
14902	-17866	-5,462940			-273,15	-136,57
64	-32704	-10,000000				-250,00
0	-32768	-10,019569				-250,49

Version 005