

## User Manual

# CTP-NT32-Rotate

**32 channel telemetry for rotating applications like wheels or rotors, high signal bandwidth, 18bit, software programmable**



### INSTRUCTIONS FOR QUALIFIED PERSONNEL ONLY!

- Inputs: STG, POT, IEPE, VOLT, LVDT/RVDT, TH-K-J-S, RTD
- Simultaneous sampling
- 18bit resolution
- Software programmable
- Signal bandwidth: 32 x 0-3000Hz
- Battery power up to 3-4h with remote to switch ON/OFF battery
- Radio telemetry transmission
- Output analog +/- 10V
- Digital data interface to PC (option)
- Waterproofed ENC housing (IP65)

## General functions:



The CTP-NT32-Rotate is a 32-channel telemetry system for rotating applications with integrated signal conditioning for sensor signals, wireless digital transmission and analog or digital reproduction.

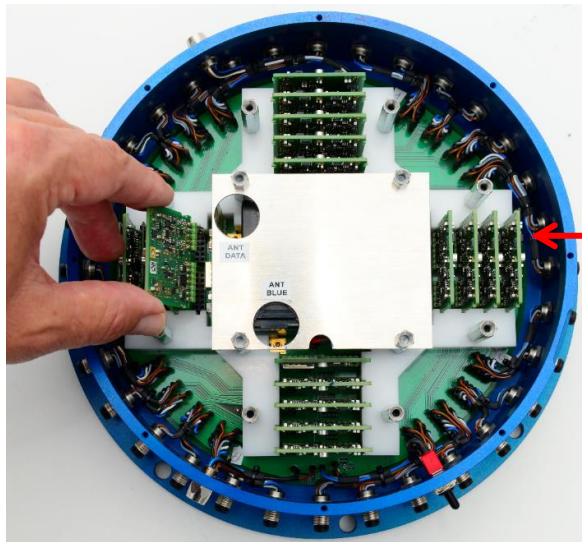
In the encoder/transmitter unit the sensor signals are conditioned, filtered (anti-aliasing) and digitized (18-bit). Simultaneous sampling is provided for all channels. Finally, the PCM encoded data is transmitted via radio frequencies to the receiver.

Various configurations of different sensor modules are available incl. signal conditioning for strain gages (STG), thermocouples type K (TH-K), ICP sensors, potentiometer sensors (POT) and also voltage inputs. Mixed configuration available (2-CH-steps).

All sensor modules are software programmable via RS232 or Bluetooth.

The stationary receiver provides 32 +/-10V analog outputs via Sub-D male socket (option: ethernet interface).

The analog signal bandwidth is 0-190 Hz (320kbit) and up to 0-3000Hz (5000kbit) for 32 channels. The measurement accuracy is  $\pm 0.1\%$  (without sensor). The CTP-NT32-Rotate is specified for operational temperatures from  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ . The maximum distance between transmitter and receiving antenna is approx. 10-20 m (30-60 feet) – depending on the application! Mixed configuration available (2-CH-steps).



Specify CTP-NT acquisition modules at order!!

CAR wheel

Truck wheel

Helicopter rotor





## CTP-NT32-Rotate Transmitting Unit Technical Data (Encoder)



Encoder in IP65 Aluminum housing



Encoder inside

### System Parameters ENCODER:

|                          |   |
|--------------------------|---|
| Channels:                | 32  |
| Resolution:              | 18 bit A/D converter with anti-aliasing filter, simultaneous sampling of all channels |
| Line-of-sight distance:  | up to 20m (depends of application, receiving antennas and bit rate)                   |
| Powering:                | Li Ion Accumulator 7.4V, 7800mA capacity up to 3-4 hours (20°C)                       |
| Power consumption:       | about 2000mA using 32x STG full bridge sensors 350 Ohms                               |
| Analog signal bandwidth: | See table   |
| Transmission:            | Digital PCM format  |
| Transmission Power:      | 10mW  |
| Dimensions:              | Diameter 220mm, bottom plate diameter 250mm, height 70mm (without antenna)            |
| Weight:                  | 2.75 kg incl. battery (without sensor cables and antenna)                             |
| Operating temperature:   | - 40 ... +70°C  |
| Housing:                 | Aluminum anodized, waterproofed (IP65)  |
| Humidity:                | 20 ... 80% no condensing  |
| Vibration:               | 5g Mil Standard 810C, Curve C   |
| Static acceleration:     | 100g in all directions, <b>2000 RPM</b>   |
| Shock:                   | 200g in all directions  |

| Frequency table  | Cutoff frequency of anti-aliasing filter (-3dB) and sampling rate (red) |
|------------------|---|
| <b>Bit rate</b>  | <b>32 CH.</b>   |
| <b>5000kbit</b>  | 3000 Hz ( <b>7812.50Hz</b> )  |
| <b>2500kbit</b>  | 1500 Hz ( <b>3906.25 Hz</b> )   |
| <b>1250kbit</b>  | 750 Hz ( <b>1953.125 Hz</b> )   |
| <b>625kbit</b>   | 375 Hz ( <b>976.56 Hz</b> )   |
| <b>312.5kbit</b> | 190 Hz ( <b>488.28 Hz</b> )   |

## CTP-NT acquisition modules (rotor side)



**CTP-NT-STG2**  
 Acquisition module for 2 strain gauges  
 Full or half bridge ( $\geq 120 \Omega$ )  
 Quarter bridge (120  $\Omega$  or 350  $\Omega$ )  
 Fixed excitation voltage: 4.0 Vdc  
 Offset compensation by auto zero  
 Manual offset shifting after auto zero  
 Input ranges  $\pm 40$  to  $\pm 0.3$  mV/V  
 Shunt-calibration 75(25.5) k $\Omega$  0.1%  
 Signal bandwidth 0 Hz to 24000 Hz\*  
 (\*see table of max. cut-off-frequencies)  
 ADC Resolution: 18 bit  
 Measurement uncertainty < 0.1%  
 Power supply (VBB): 6 to 9 Vdc  
 Current consumption: 100mA  
 (with two full bridges 350  $\Omega$ )



**CTP-NT-IEPE2**  
 Acquisition module for 2x  
 IEPE/ICP® sensors  
 Excitation current: 4.0 mA  
 Input ranges:  $\pm 20$  to  $\pm 0.3$  Vpp  
 Signal bandwidth 3 Hz to 24000 Hz\*  
 (\*see table of max. cut-off-frequency)  
 ADC Resolution: 18 bit  
 Measurement uncertainty < 0.1%  
 Power supply (VBB): 6 to 9 Vdc  
 Current consumption: 140 mA



**CTP-NT-VOLT2**  
 Acquisition module for 2x  
 high level voltage inputs  
 Input ranges  $\pm 10$  to  $\pm 0.08$  V  
 Signal bandwidth 0 Hz to 24000 Hz\*  
 (\*see table of max. cut-off-frequencies)  
 +4 V sensor excitation max. **33 mA**  
 ADC Resolution: 18 bit  
 Measurement uncertainty < 0.1%  
 Power supply (VBB): 6 to 9 Vdc  
 Current consumption: 80 mA



**CTP-NT-XVDT2**  
 Acquisition module for 2x  
 LVDT/RVDT sensors  
 Excitation voltage = 4.096 Vpp,  
 rounded rectangle  
 Excitation frequency = 8 kHz  
 (changeable by software)  
 Sensor impedance  $\geq 100 \Omega$  (@ 8 kHz)  
 Signal bandwidth 0 Hz to **200 Hz**  
 Programmable lowpass filter  
 Power supply (VBB): 6 to 9 Vdc  
 Current consumption: 130 mA  
 (with 2x MHR500)



**CTP-NT-POT2**  
 Acquisition module for 2x  
 potentiometer sensors  
 Potentiometer resistance  $\geq 150 \Omega$   
 Fixed excitation voltage: 4.0 Vdc  
 Input resistance: 667 k $\Omega$   
 Signal bandwidth 0 Hz to 24000 Hz\*  
 (\*see table of max. cut-off-frequencies)  
 ADC Resolution: 18 bit  
 Measurement uncertainty < 0.1%  
 Power supply (VBB): 6 to 9 Vdc  
 Current consumption: 90 mA  
 (with two 1 k $\Omega$  potentiometers)



**Universal module for thermo:**  
**CTP-NT-THERMO2**  
 Acquisition module for 2x  
 Temperature Sensor  
 Inputs galvanically isolated  
 (max. potential difference 32 Vdc)  
 Lowpass filter: 1 Hz to 32 Hz  
 (programmable)  
 Sensor types:  
 RTD, Thermocouple, NTC,  
 (& customer-specific types)  
 Measuring range :  
 -273.15 °C to +1635.2 °C  
 Power supply (VBB): 6 to 9 Vdc  
 Current consumption: 85 mA



**Universal module analog:**  
**CTP-NT-ANALOG**  
 Two Channel Acquisition Module for  
 strain gauges\*,  
 high level voltage signals\*,  
 potentiometer sensors\*,  
 IEPE/ICP® sensors\*,  
 ext. Sensor supply (12 Volt typ.) \*  
 \* the functionality is programmable by  
 control software ntconfig.exe.  
 Power supply (VBB): 5 to 9 Vdc  
 Current consumption: <140 mA (TBD)



**CTP-NT-BLUE**  
 Bluetooth module to transfer RS232  
 wirelessly\*  
 Remote On/Off\* (concerns battery  
 powered versions)  
 Range 5 to 20 m, depends on  
 application and antenna  
 Power supply (VBB): 6 to 9 Vdc  
 Current consumption: 30 mA  
 (average)  
 \* Required is the  
 KMT COMMUNICATOR  
 handheld remote control Blue-  
 tooth device with USB connector)



**CTP-NT-CONTROLLER**  
 Controller for 1 to 128  
 acquisition modules  
 Output: PCM  
 built-in inductive transmitter  
 Programmable via RS232/USB  
 adapter and remote software  
 Power supply (VBB): 6 to 9 Vdc  
 Current consumption: 100 mA

# CTP-NT-DEC32 Receiver unit for max 32 Channels output via 37 pol. Sub D (radio transmission version via quad receiver 1250 and 5000kbit)

## Front side view

Female 37 pole Sub-D for analog signal output, CH 1 to 32



## Rear side view

CTP - DEC32

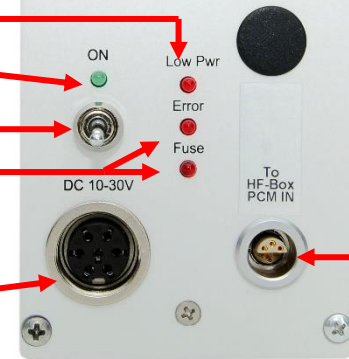
Low Pwr LED ON = BATT empty!

Power ON LED

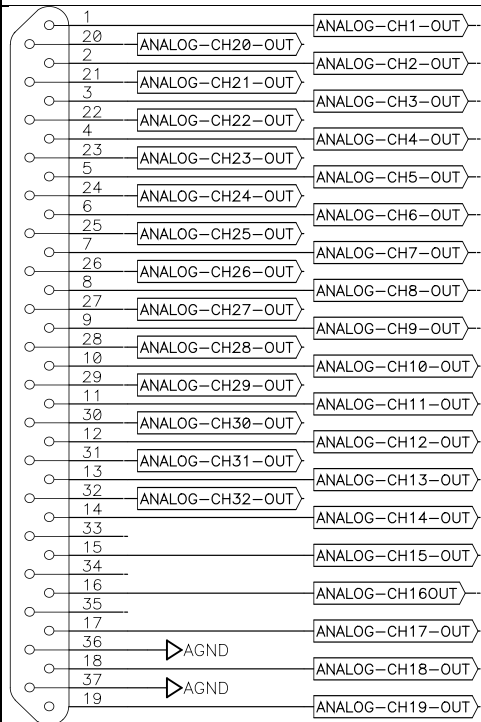
Power Switch

Transmission error LED  
Fuse of powering defect LED

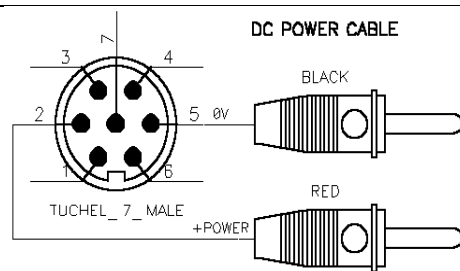
7-pole female TUCHEL connector for power supply input (10-30V DC)



PCM IN coming from HF-BOX



Plug-side



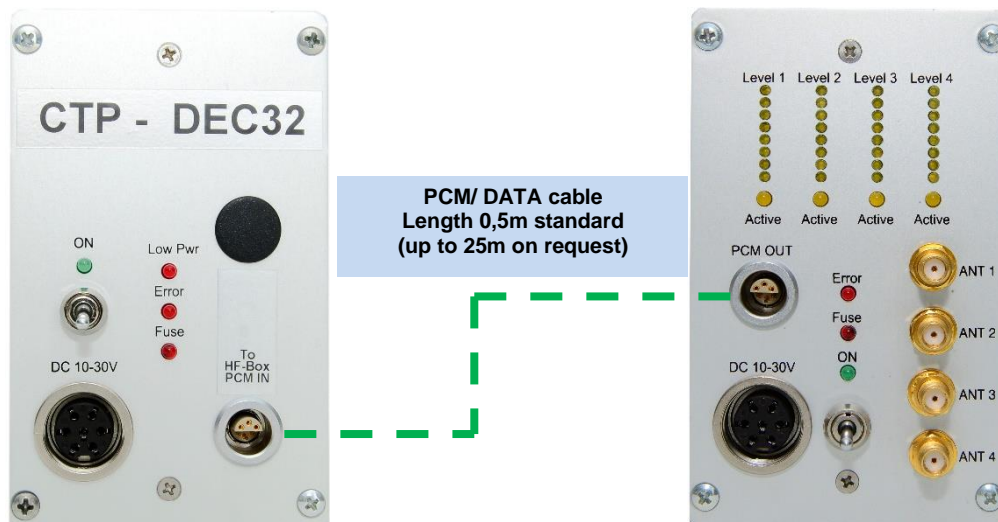
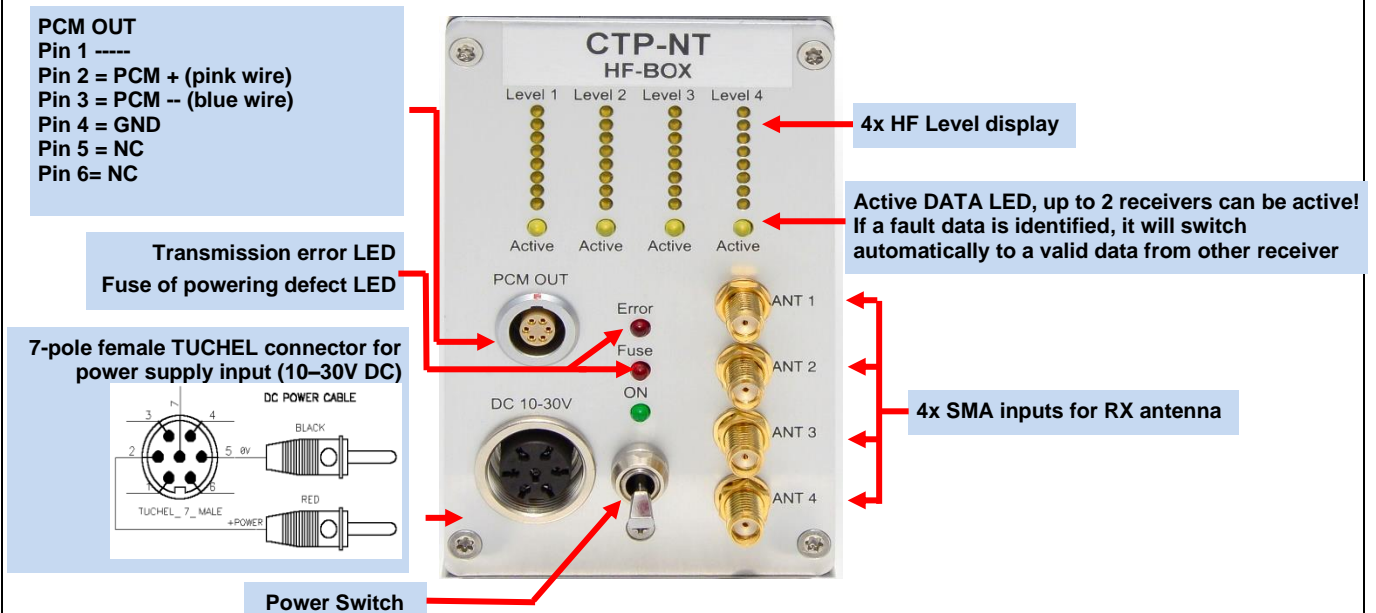
Optional BNC32Box. Connect on 37pol Sub-D

## CTP-NT-DEC32 System Parameters:

|   |   |
|---|---|
| Channels:   | 32 x +/-10V analog outputs via Sub-D male socket, single-ended! |
| Resolution:   | 16 bit D/A converter, with smoothing filter                     |
| Power supply input:   | 10-30 VDC, power consumption <24 Watt                           |
| Analog signal bandwidth:  | see frequency table   |
| Transmission:   | Digital PCM Format  |
| Dimensions:   | 205 x 105 x 65mm  |
| Weight:   | 1.00kg without cables and antenna                               |
| Overall system accuracy between encoder input and decoder output: | +/-0.2% without sensor influences                               |
| <b>Environmental</b>  |   |
| Operating:  | -40 ... +70°C   |
| Humidity:   | 20 ... 80% not condensing                                       |
| Vibration:  | 5g  |
| Static acceleration:  | 10g in all directions   |
| Shock:  | 100g in all directions  |



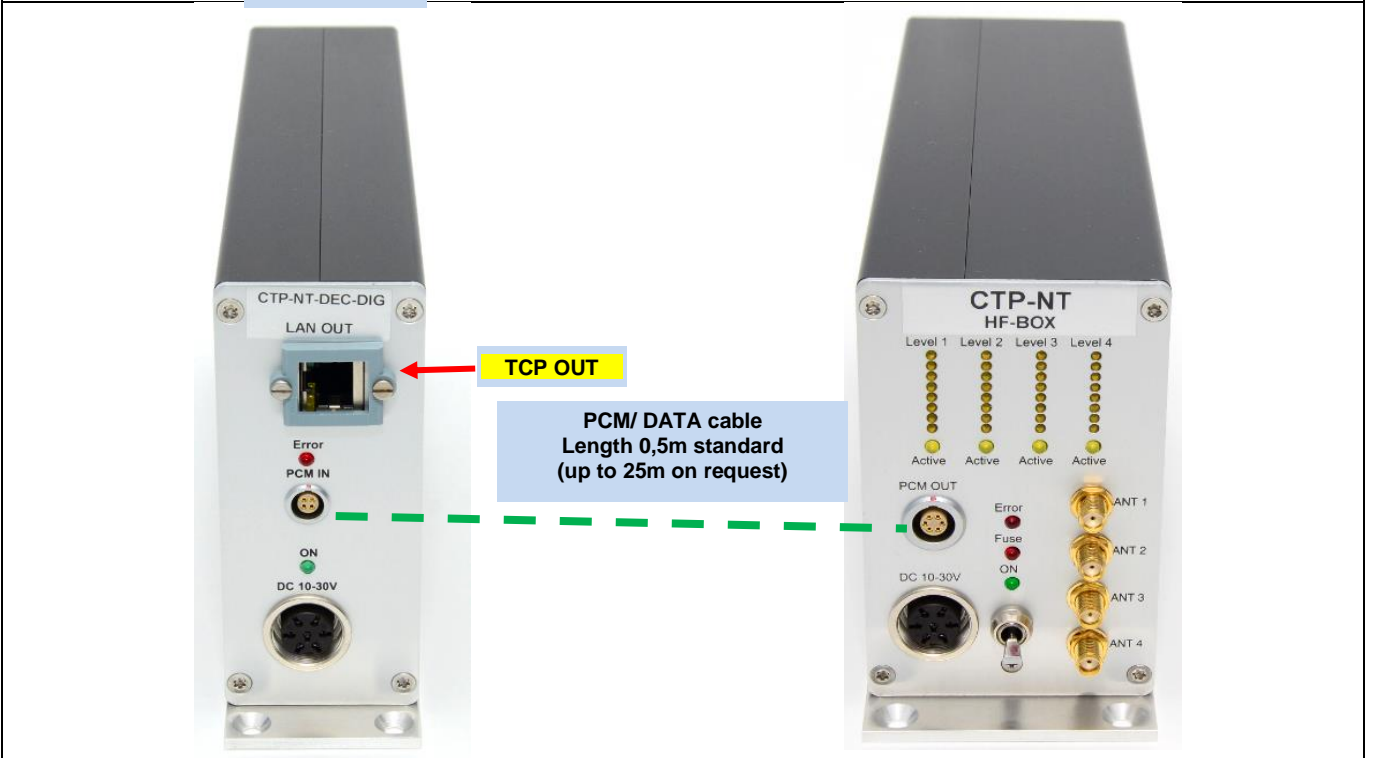
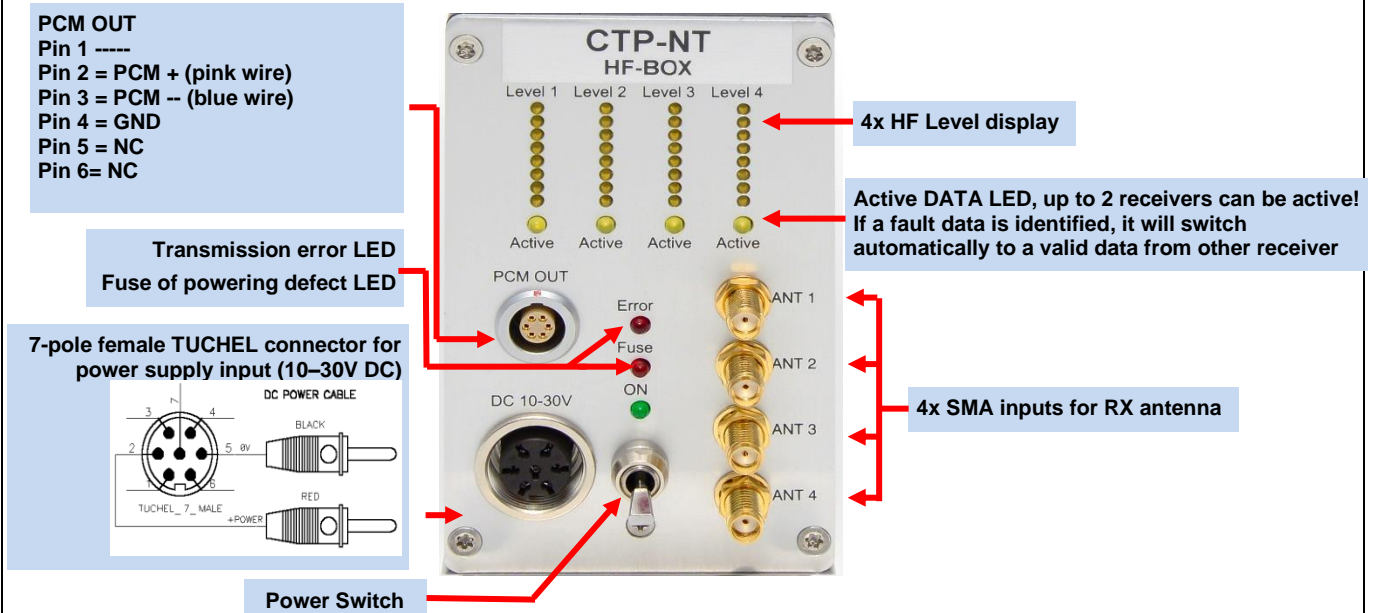
# CTP-NT-DEC32 Receiver unit for max 32 Channels output via 37 pol. Sub D (radio transmission version with HF BOX Quad with 4 receiver 1250-5000kbit)



## HF BOX Quad System Parameters:

|                      |                                       |
|----------------------|---------------------------------------|
| HF receivers         | 4                                     |
| Antenna connection   | SMA                                   |
| Output               | PCM                                   |
| Power supply input:  | 10-30 VDC, power consumption <24 Watt |
| Dimensions:          | 205 x 105 x 65mm                      |
| Weight:              | 1.050 kg without cables and antenna   |
| Environmental        |                                       |
| Operating:           | -40 ... +70°C                         |
| Humidity:            | 20 ... 80% not condensing             |
| Vibration:           | 5g                                    |
| Static acceleration: | 10g in all directions                 |
| Shock:               | 100g in all directions                |

**HF-Box with CTP-NT-DIG-DEC-IP-LAN Receiver unit with PCM to Ethernet converter- TCP out (radio transmission version with HF BOX Quad with 4 receiver 1250-5000kbit)**

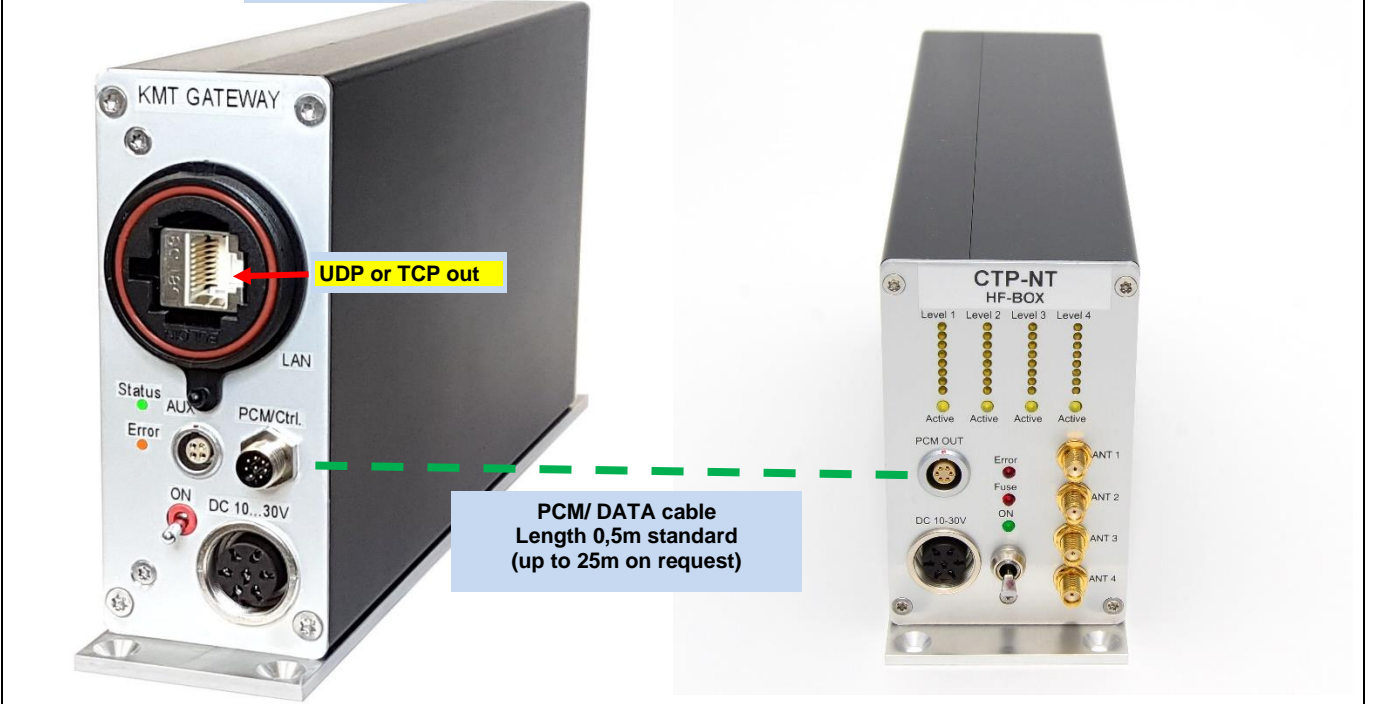
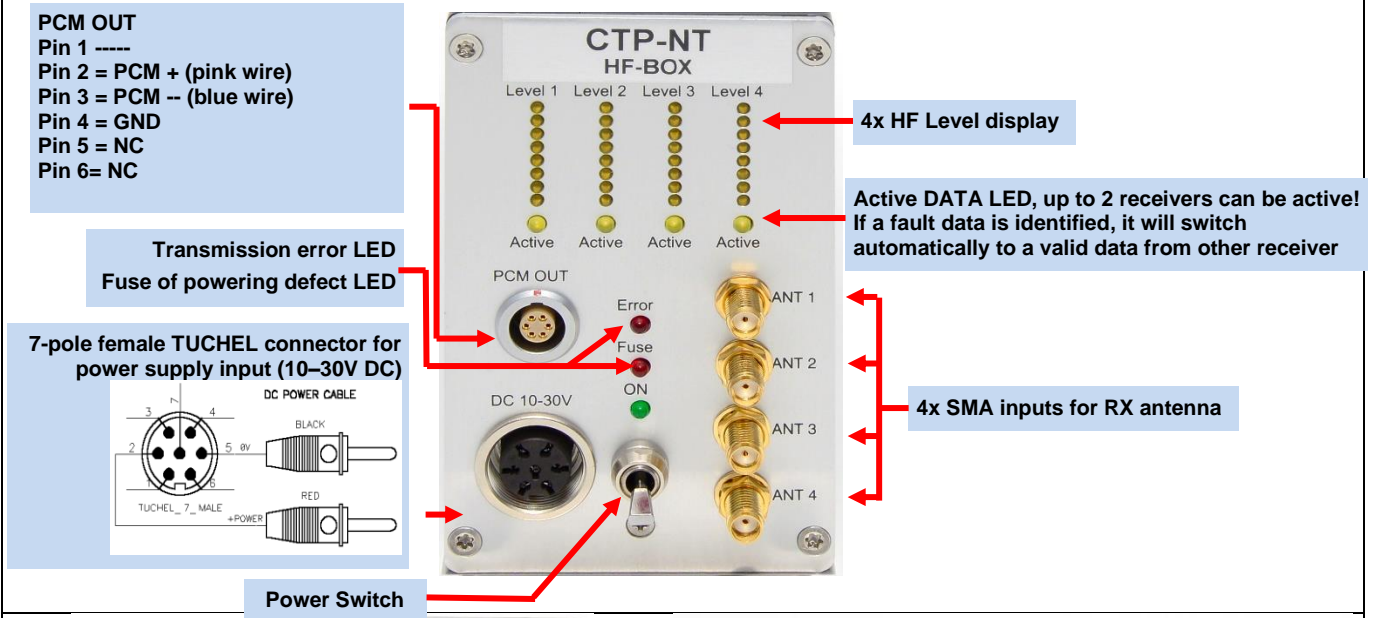


**HF BOX Quad System Parameters:**

|                      |                                       |
|----------------------|---------------------------------------|
| HF receivers         | 4                                     |
| Antenna connection   | SMA                                   |
| Output               | PCM                                   |
| Power supply input:  | 10-30 VDC, power consumption <24 Watt |
| Dimensions:          | 205 x 105 x 65mm                      |
| Weight:              | 1.050 kg without cables and antenna   |
| Environmental        |                                       |
| Operating:           | -40 ... +70°C                         |
| Humidity:            | 20 ... 80% not condensing             |
| Vibration:           | 5g                                    |
| Static acceleration: | 10g in all directions                 |
| Shock:               | 100g in all directions                |

# HF-Box with CTP-NT-DIG-DEC-IP-LAN Receiver unit with PCM to Ethernet converter- UDP out via new KMT GATWAY

(radio transmission version with HF BOX Quad with 4 receiver 1250-5000kbit)



## HF BOX Quad System Parameters:

|                      |                                       |
|----------------------|---------------------------------------|
| HF receivers         | 4                                     |
| Antenna connection   | SMA                                   |
| Output               | PCM                                   |
| Power supply input:  | 10-30 VDC, power consumption <24 Watt |
| Dimensions:          | 205 x 105 x 65mm                      |
| Weight:              | 1.050 kg without cables and antenna   |
| Environmental        |                                       |
| Operating:           | -40 ... +70°C                         |
| Humidity:            | 20 ... 80% not condensing             |
| Vibration:           | 5g                                    |
| Static acceleration: | 10g in all directions                 |
| Shock:               | 100g in all directions                |





- PCM Input from all KMT Systems
- Data Rate up to 10000 kBit/s
- PTPv2 Time Synchronization
- KMT Encoder Setup via Bluetooth
- Gigabit Ethernet Interface
- TCP & UDP Data Format
- Several Protocols (incl. IENA)
- Data Logger Function

### Short description:

The KMT GATEWAY decodes incoming PCM data streams and transmits the decoded measurement data over Ethernet. Various data formats (including Airbus IENA) are possible; customer-specific formats can be optionally integrated.

The data blocks sent contain a timestamp in the header; if a PTP Server is found, this timestamp is set to the realtime sample time. But even without a network time source, several KMT systems can be synchronized with one another by setting one of the GATEWAYS as PTP server.

Complete setup of the KMT MTP-NT systems is possible over Ethernet ("just-one-cable" solution).

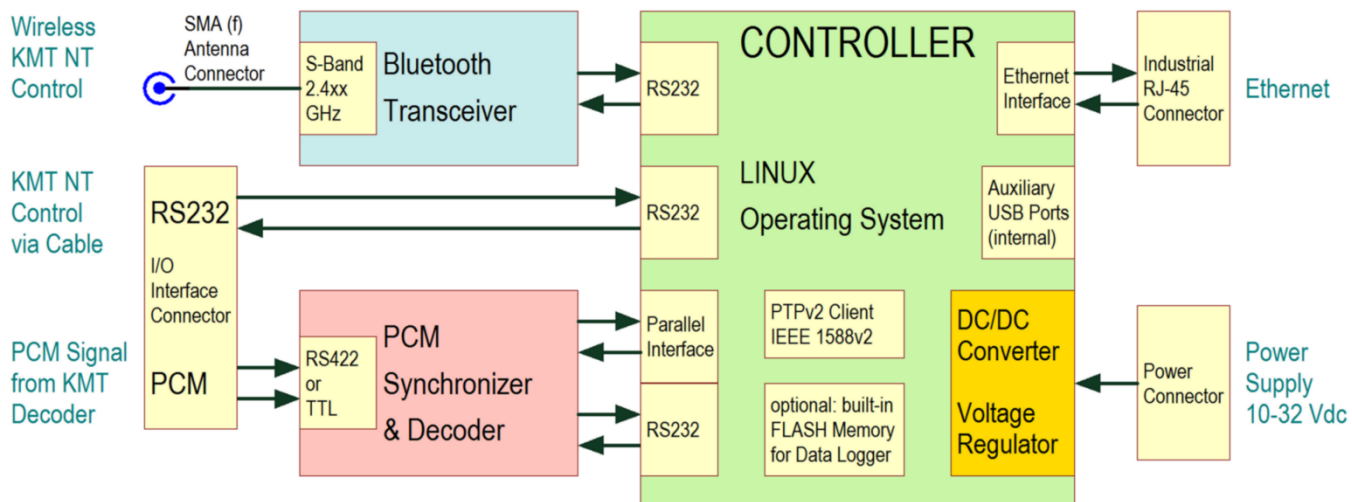
The Device has a data logging function (file size is only limited by the USB stick used).

### System Parameters:

|                             |   |
|-----------------------------|---|
| PCM input:                  | RS422 or TTL                                    |
| PCM data format:            | KMT 320 Bit, NRZ                                |
| PCM bit rates:              | 312.5 / 625 / 1250 /2500 / 5000 / 10000 kBit/s  |
| KMT MTP-NT Setup & Control: | RS232 or Bluetooth                              |
| Ethernet interface:         | Gigabit (1000Base-T)                            |
| Protocol format:            | IPv4, TCP or UDP                                |
| Destination IP addresses:   | unicast, multicast, or broadcast                |
| Packet protocols:           | KMT (32 byte header), CAEMAX, IENA (and others) |
| Time Synchronization:       | IEEE 1588v2 (PTPv2)                             |
| Data Logger:                | internal USB FLASH Disc                         |
| Power supply input:         | 10-30 Vdc, power consumption < 24 Watt          |
| Dimensions:                 | 44 x 105 x 200 mm                               |
| Weight:                     | TBD kg without cables and data pickup head      |
| Environmental               |   |
| Operating:                  | -20°C to +70°C                                  |
| Humidity:                   | +80% not condensing (@ +20°C)                   |
| Vibration:                  | 5g (TBD)  |
| Static acceleration:        | 10g in all directions                           |
| Shock:                      | 100g in all directions                          |

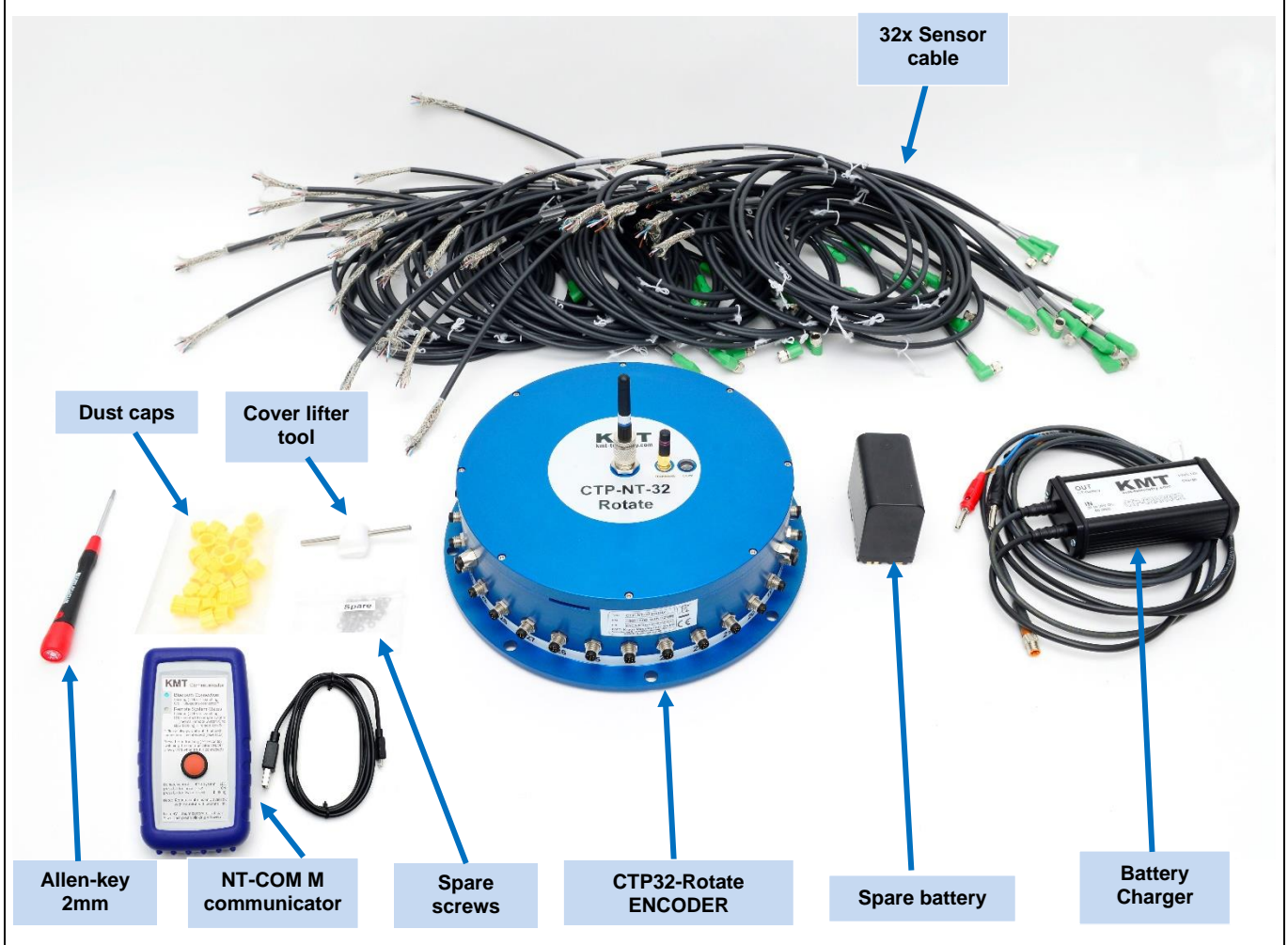
# Block diagram

## KMT GATEWAY Block Diagram





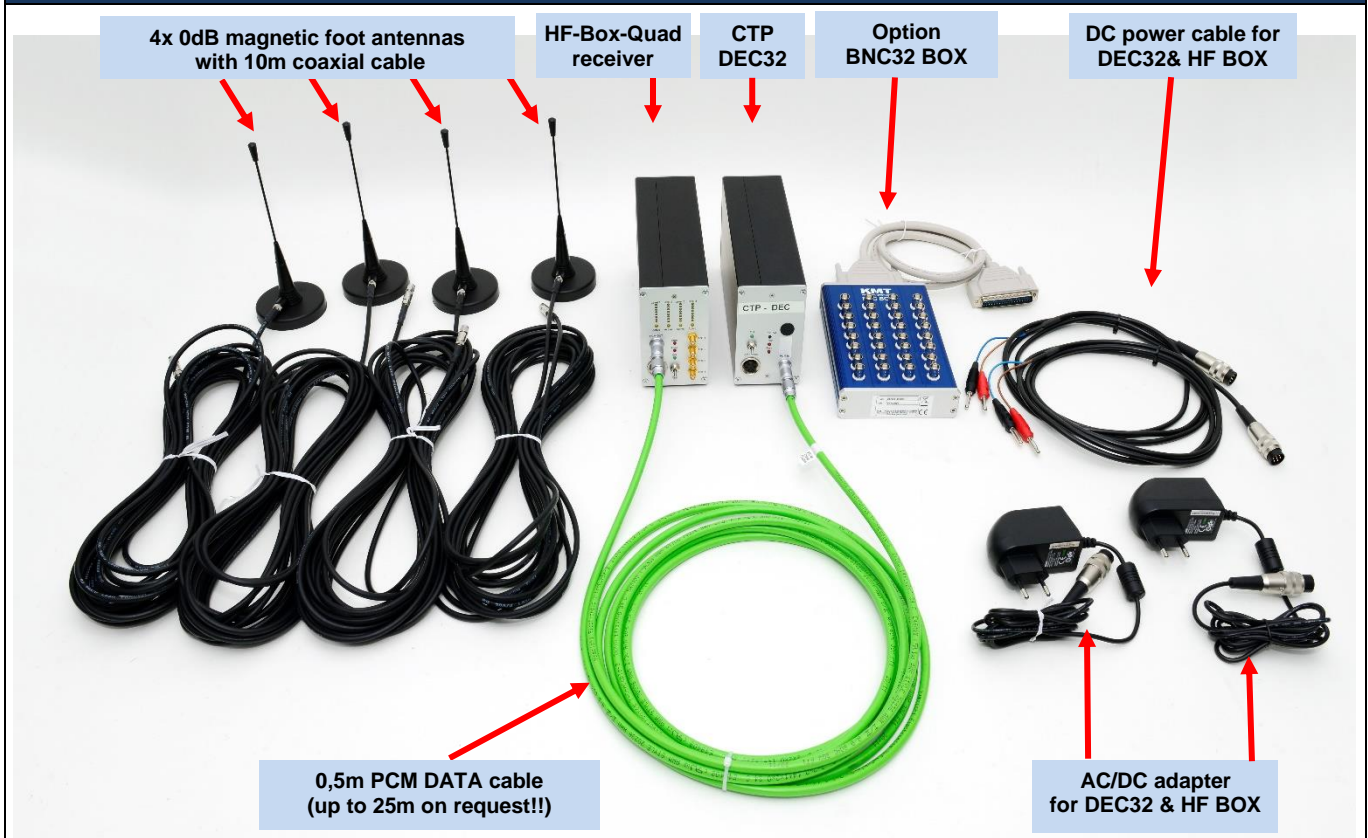
**SET of CTP-NT32-Rotate**  
**Rotating part**  
"pictures show only an example of a delivery set"



## Set of CTP analog-decoder with external HF-Box (static part)

with standard magnetic foot antennas and analog output decoders

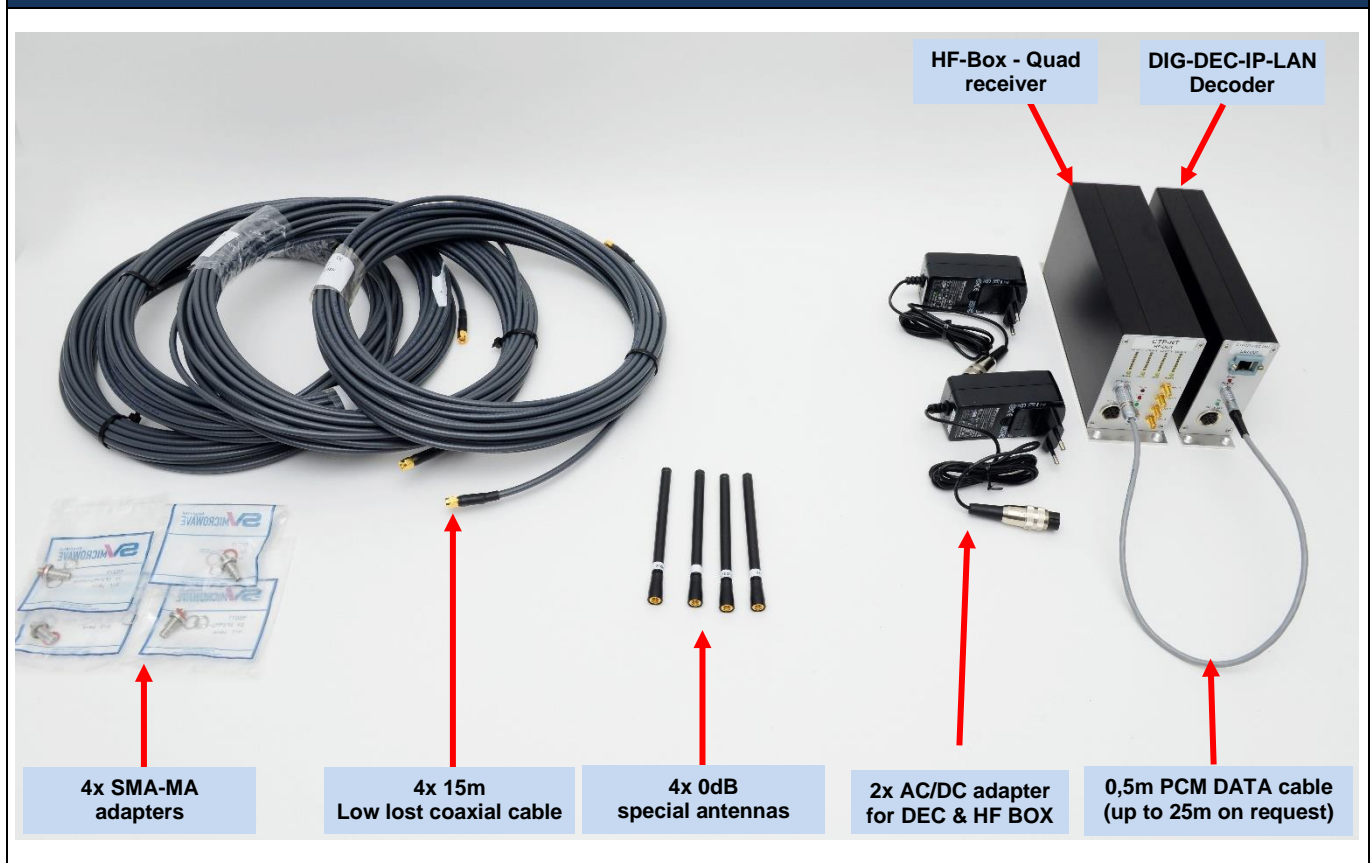
“pictures show only an example of a delivery set”



## Set of CTP-digital-decoder with external HF-Box (static part)

with special antennas, antenna cables and digital output decoders

“pictures show only an example of a delivery set”



**CTP-NT32-Rotate ENCODER (rotating part)**





## CTP-NT32-Rotate Encoder – How to open device

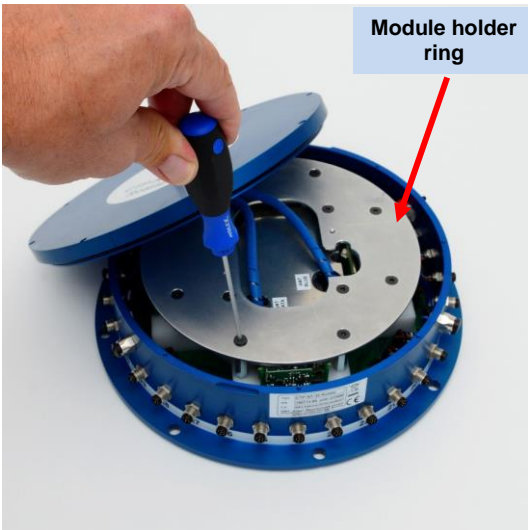
**Normal not necessary, only if you must change modules!**



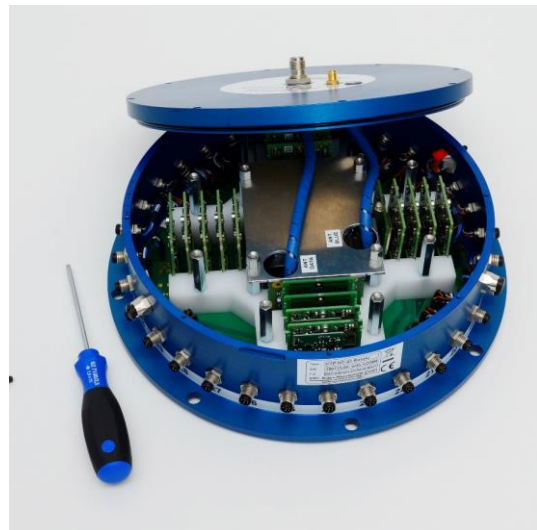
1. Open 8x hexagon screw (2.5mm) with 2mm screw driver



2. Use cover lifter to open the cover carefully



3. Open 8 screws from modules holder ring



4. Move the modules holder ring to the rear (it is not necessary to disconnect the antenna blue cables)



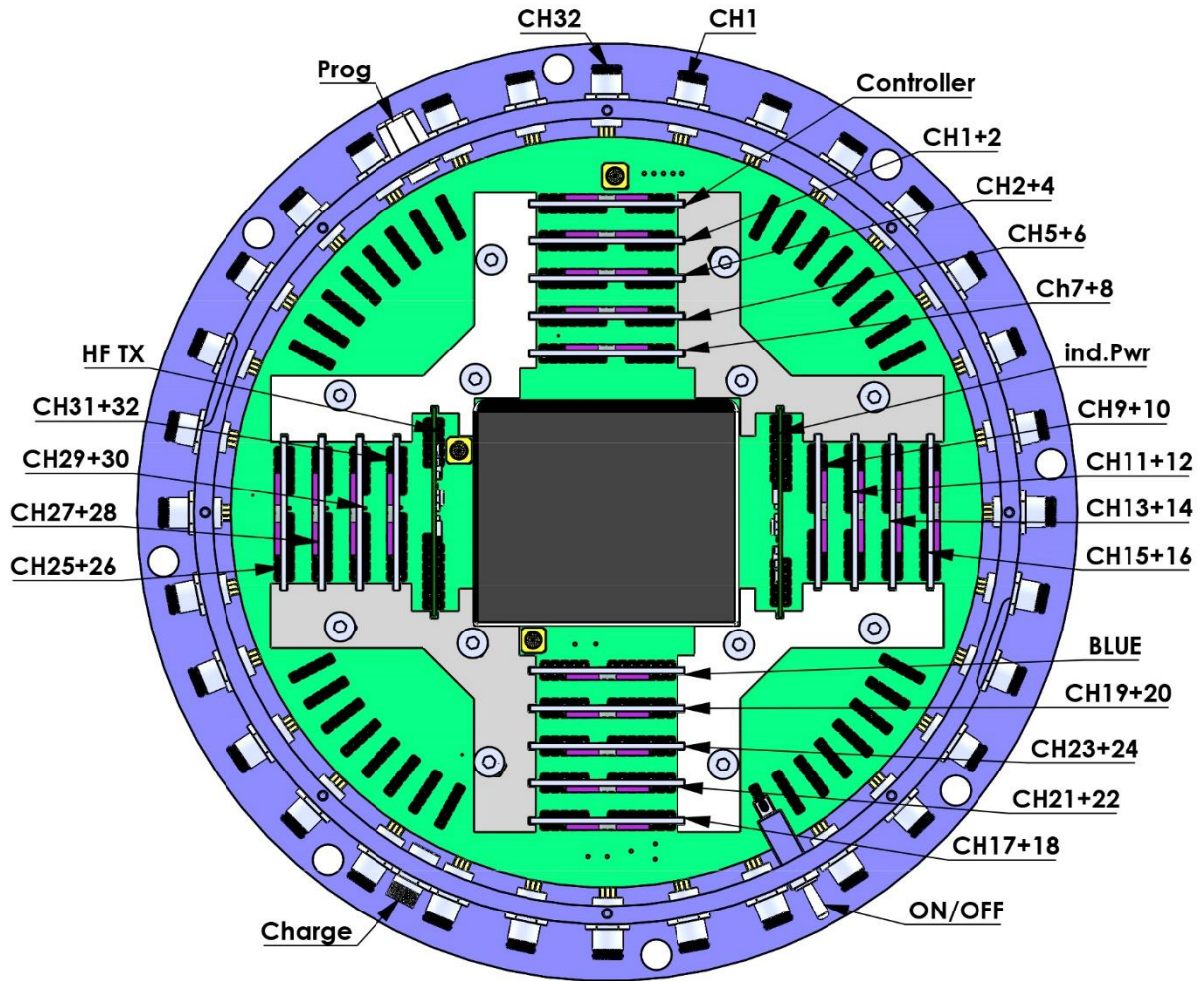
5. Now you can change CTP-NT-Acquisition modules

**Take care with connectors of modules. Be sure that all pins are in right in the connection!**





CTP-NT32-Rotate Encoder – Modules - Draw





## CTP-NT32-Rotate Encoder – Pin connection

Setup connection RS232 as standard.

**Caution: With option "BLUE" (wireless setup connection via Bluetooth) is this connection out of function!!**



Charger connection

DATA transmitting antenna

BLUE transceiver antenna for RS232 setup

Optional Remote for BATT ON/OFF, range about 10m (free view)

Power switch must UP position :

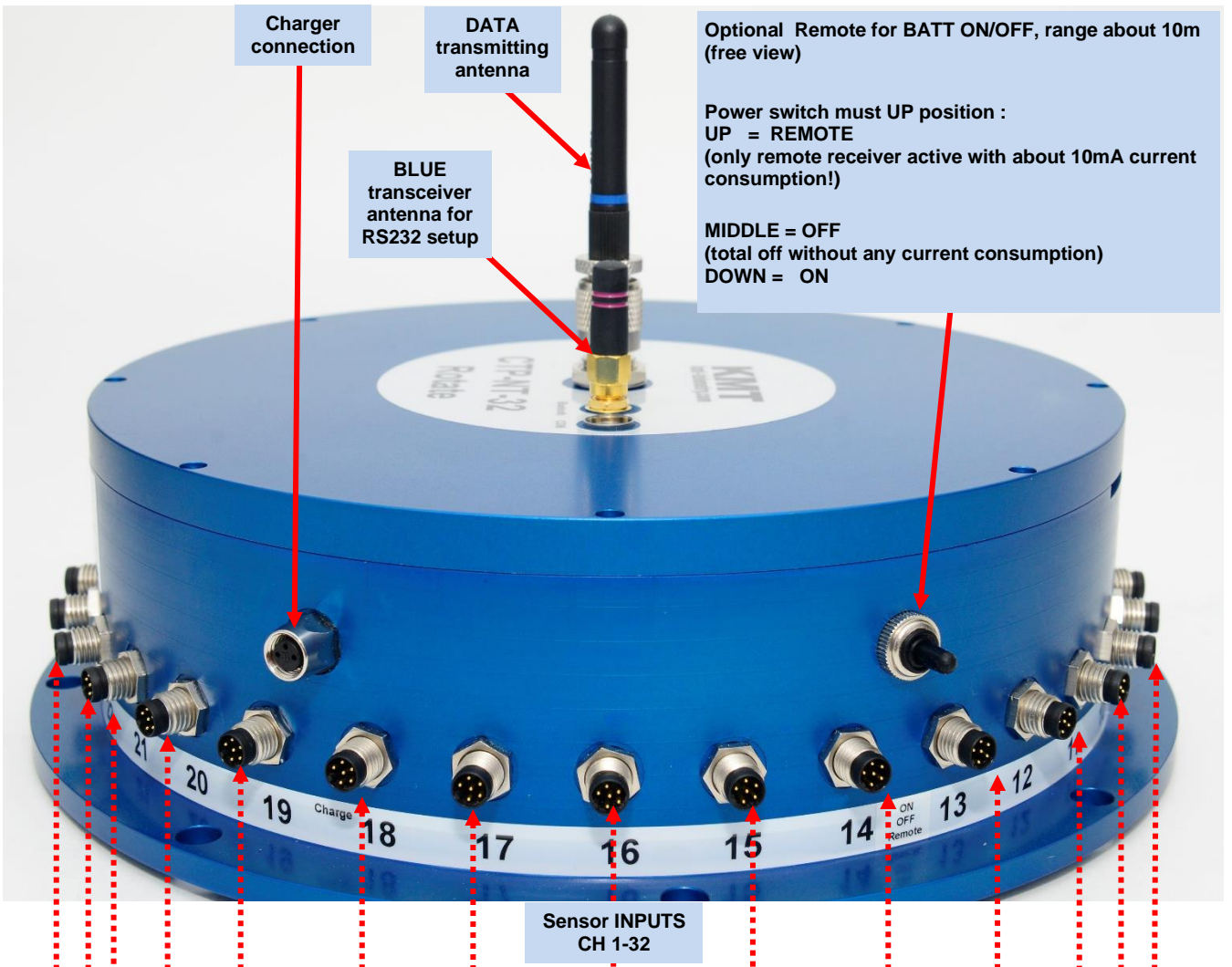
UP = REMOTE

(only remote receiver active with about 10mA current consumption!)

MIDDLE = OFF

(total off without any current consumption)

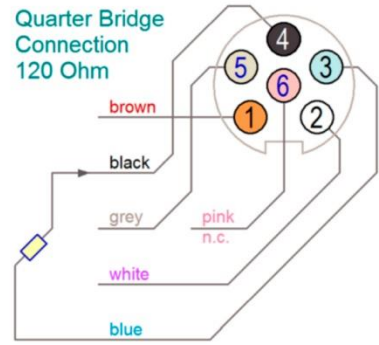
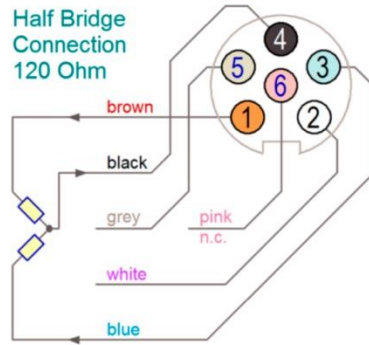
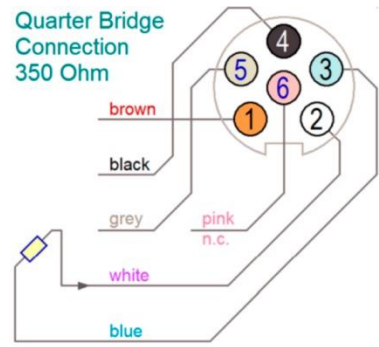
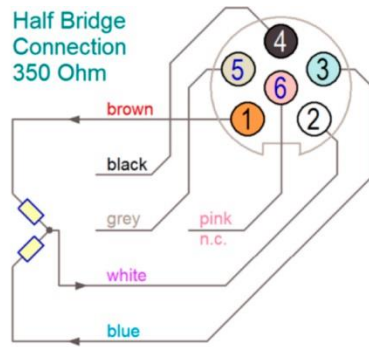
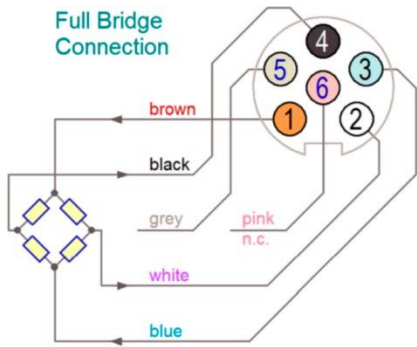
DOWN = ON



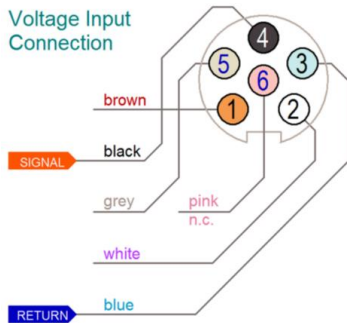


# CTP-NT32-Rotate Encoder – Pin connection

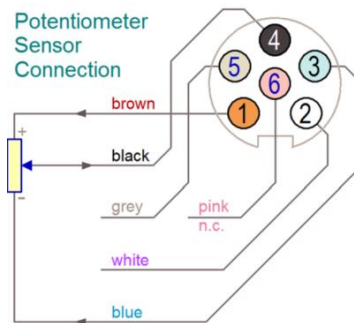
## STG-Strain gage connection



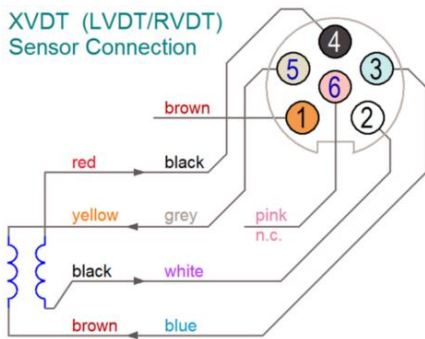
## VOLT connection



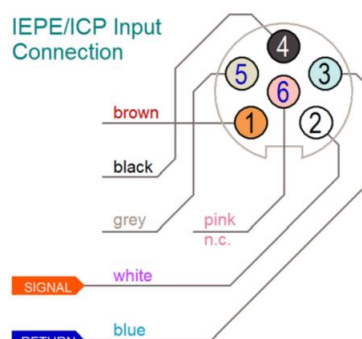
## POT connection



## XVDT (LVDT or RVDT) connection



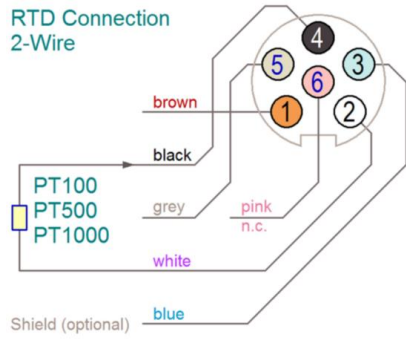
## IEPE (ICP) connection



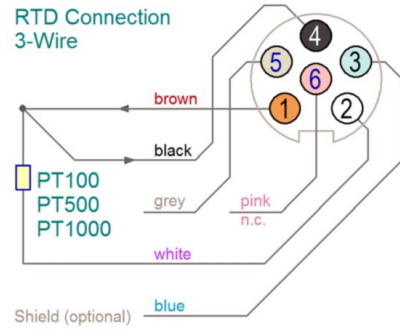


## THERMO

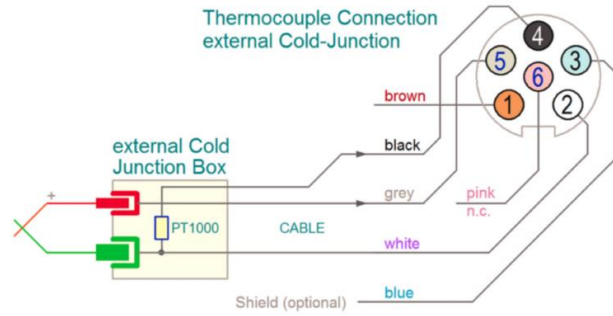
### RTD 2-wire connection



### RTD 3-wire connection

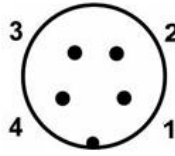


### Thermocouple connection via cable adapter with integrated Cold-Junction



Setup connection RS232 as standard.

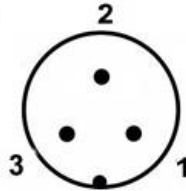
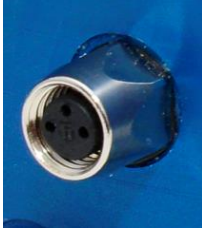
**Caution: With option "BLUE" (wireless setup connection via Bluetooth) is this connection out of function!!**



Cable colors:

- 1= brown +6.5V
- 2= white TxD
- 3= black RxD
- 4= blue GND

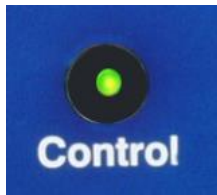
**Li Ion re-chargeable battery with charger unit for CTP-NT32-Rotate**



Cable colors:

- 1= brown +
- 2= black GND
- 3= blue NC

Charge plug at CTP-Rotate ENC



BATT Control green LED

BATT Control green LED

- ON = Operation
- Blinking (5 Hz) = Bluetooth Contact
- Blinking (0.6 Hz) = Low Battery



COMMUNICATOR (handset)

**Attention:**

Li Ion Accumulator 7.4V 7800mAh has a capacity for about 3-4 hours

With the option BLUE (rotor side) and COMMUNICATOR (handset) can easy switch ON/OFF the battery power

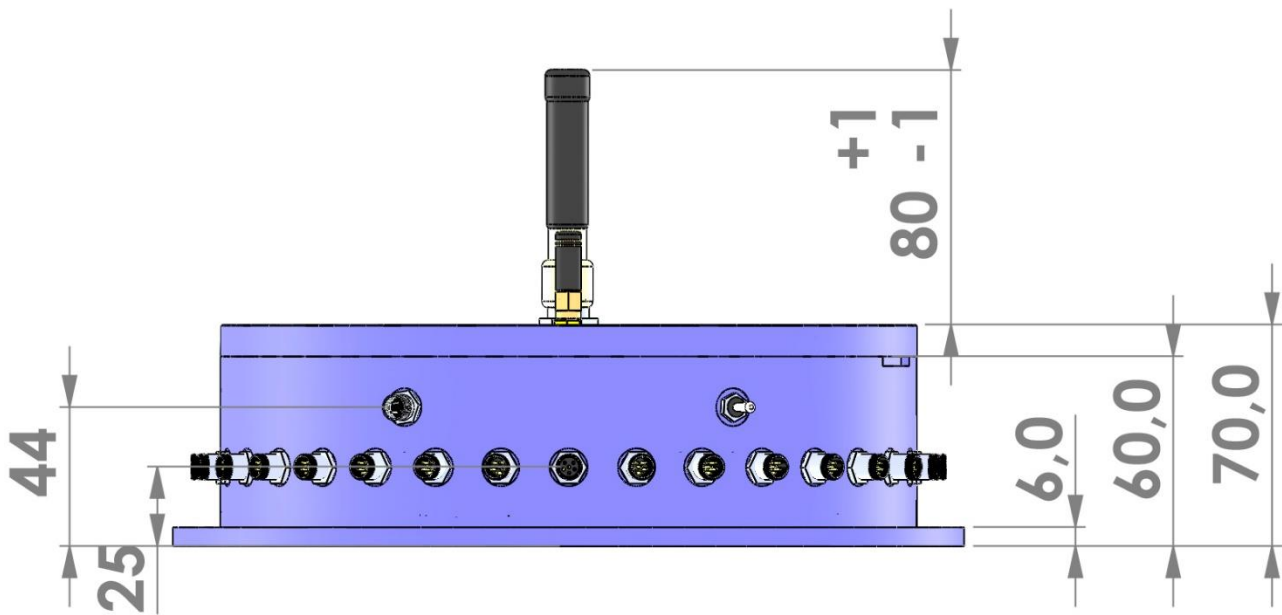
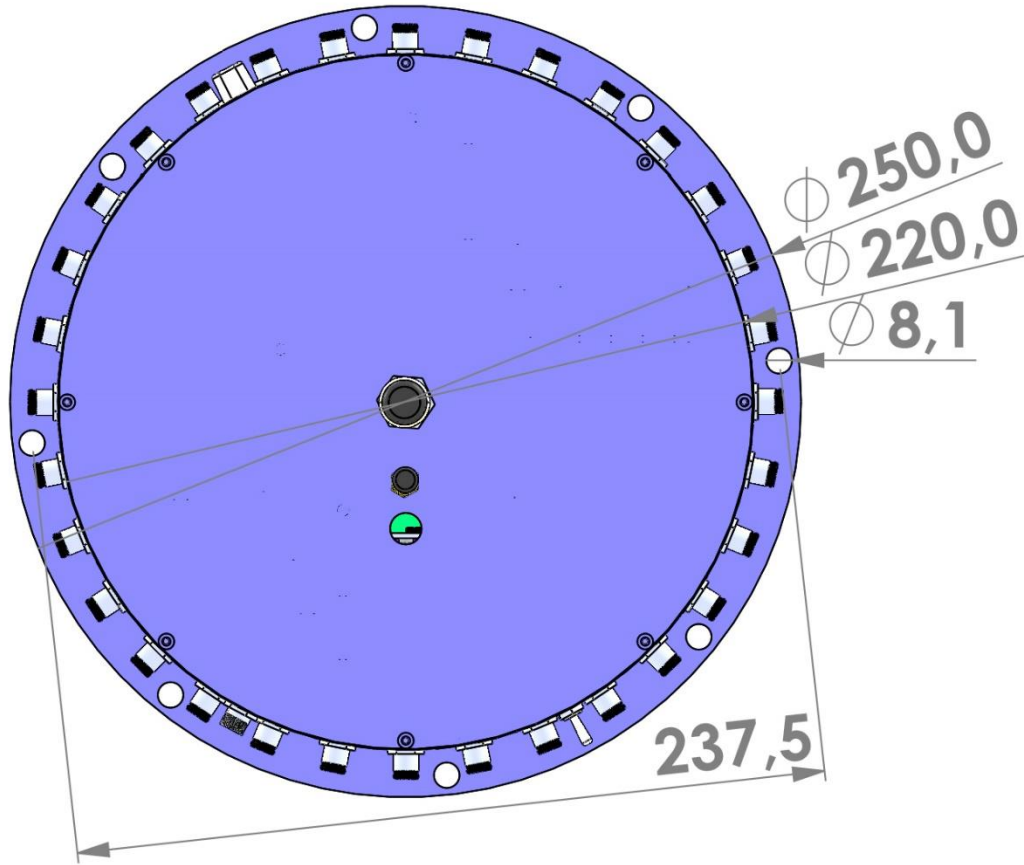


CT-CHARGER XL

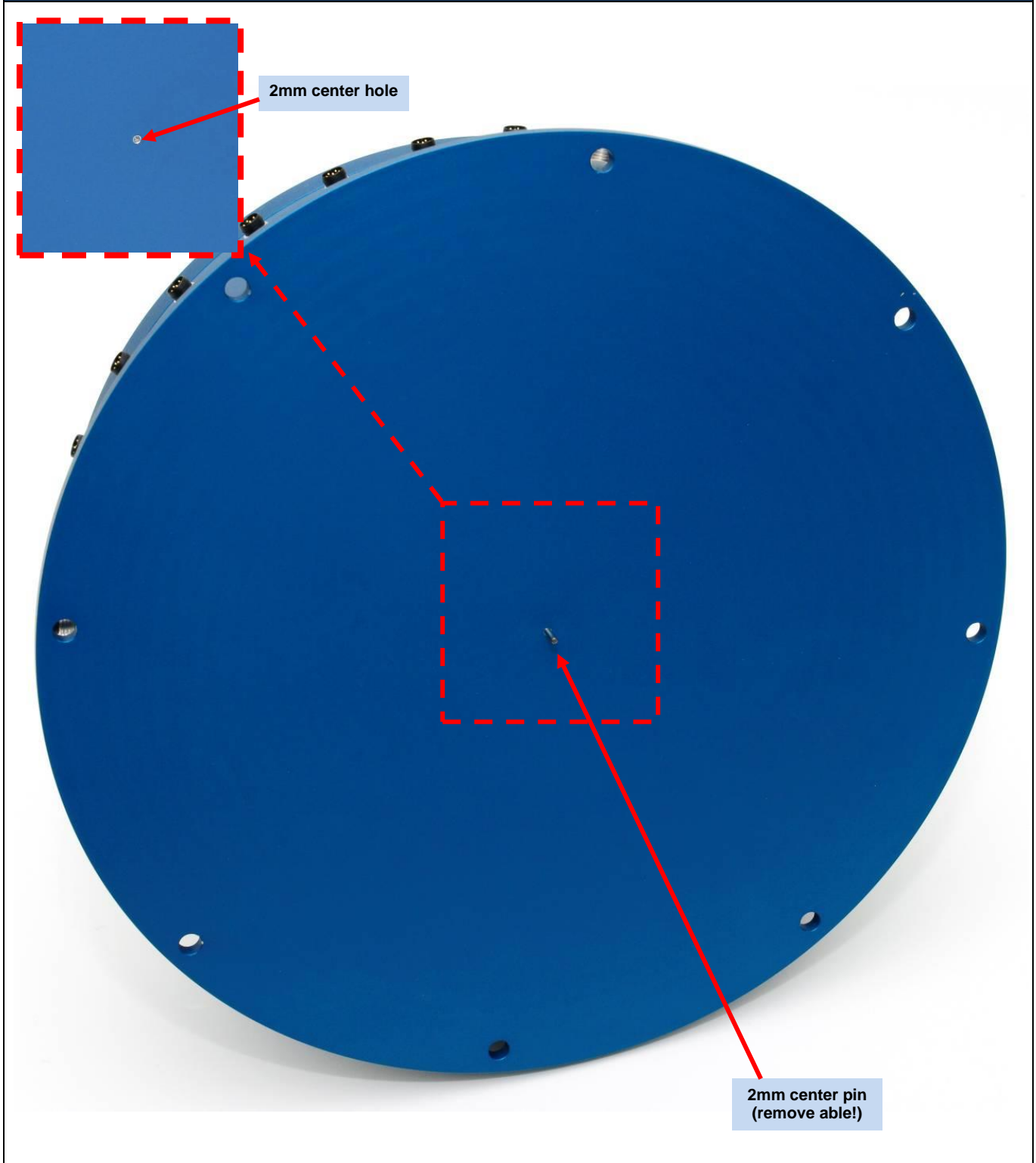
CT-CHARGER XL for CTP-Rotate

1. Plug the 3-pole plug (charger) in to the CTP-Rotate encoder.
2. Plug banana plugs on to a battery or AC/DC power supply with a voltage range of 20-30V, 50 WATT
3. Charge time about 6 hours!

# Dimensions CTP-NT32-Rotate -ENC



CTP-NT32-Rotate -ENC – bottom side with 2mm center pin





**NEW**

# KMT COMMUNICATOR for wireless configuration of a remote MTP-NT system via USB to the Bluetooth module MTP-NT-BLUE (incl. wireless firmware update)



**Blue LED - Bluetooth connection**  
Blinking (2Hz) = searching  
ON = Bluetooth connected (Please wait always until Bluetooth connection is established)

**Green LED - Remote system status**  
Blinking (2Hz) = searching  
ON = contact to remote system (means: remote system power ON)

Slow blinking (0.5 Hz) = Low BATT status at battery on rotating parts

**Switching ON/OFF of KMT communicator:**  
Press button long (>4 seconds) = switching the communicator ON/OFF (powering of communicator with internal 9V Lithium battery)

If the communicator is connected via USB, it is always ON and doesn't use the local Lithium battery at all (battery saving). The battery is a primary cell (9 V / 1.2 Ah, >5 years shelf life) so charging of local battery via USB is not possible.

Remote control for switch ON/OFF battery on rotating part

Press button once (1x) = ON (LED on BLUE module rotor side is ON)  
Press button twice (2x) = OFF (LED on BLUE module rotor side is blinking)

**Test of local 9V Lithium battery of communicator:**  
If the green LED is 3 sec. fast (10 Hz) blinking at start of communicator, the battery is empty and you must exchange the Lithium battery!

length x width x height : 144 mm x 78 mm x 35 mm  
weight: 210 grams



**Micro-AB USB Receptacle for powering and communication to PC**



**Connected to PC or notebook**

# 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                        |
|--------------------------------|--|--------------------------|------------------------------|
| <b>Firmware</b>                | 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. | <a href="#">Download</a> | <a href="#">Release Note</a> |
| <b>Windows config software</b> | 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)]  | <a href="#">Download</a> | <a href="#">Release Note</a> |

### Instructions

| Element            | Description                                | Downloads                | Notes                        |
|--------------------|--|--------------------------|------------------------------|
| <b>User Manual</b> | This is the latest user manual for MTP-NT. | <a href="#">Download</a> | <a href="#">Release Note</a> |

### Pictures

| Element                 | Description                                | Downloads                | Notes                        |
|-------------------------|--|--------------------------|------------------------------|
| <b>Product Overview</b> | This is the latest user manual for MTP-NT. | <a href="#">Download</a> | <a href="#">Release Note</a> |

### Tools

| Element                                  | Description  | Downloads                | Notes                        |
|--|--|--------------------------|------------------------------|
| <b>Strain Gauge Calculation Tool</b>     | Excel-Sheet for calculating microstrain to output voltage and output voltage to microstrain. | <a href="#">Download</a> | <a href="#">Release Note</a> |
| <b>Torsional Moment Calculation Tool</b> | Excel-Sheet for calculating the torsional moment   | <a href="#">Download</a> | <a href="#">Preview</a>      |

### Auxiliary

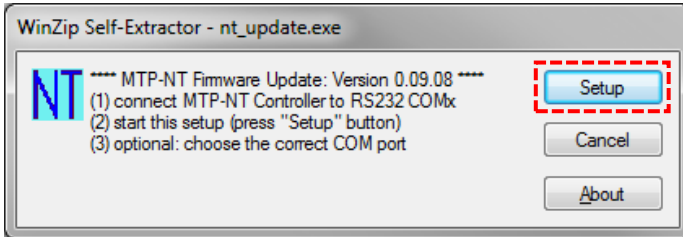
| Element                                    | Description  | Downloads                | Notes                           |
|--|--|--------------------------|---------------------------------|
| <b>Mini-Terminal</b>                       | Easy-to-use terminal software  | <a href="#">Download</a> | <a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

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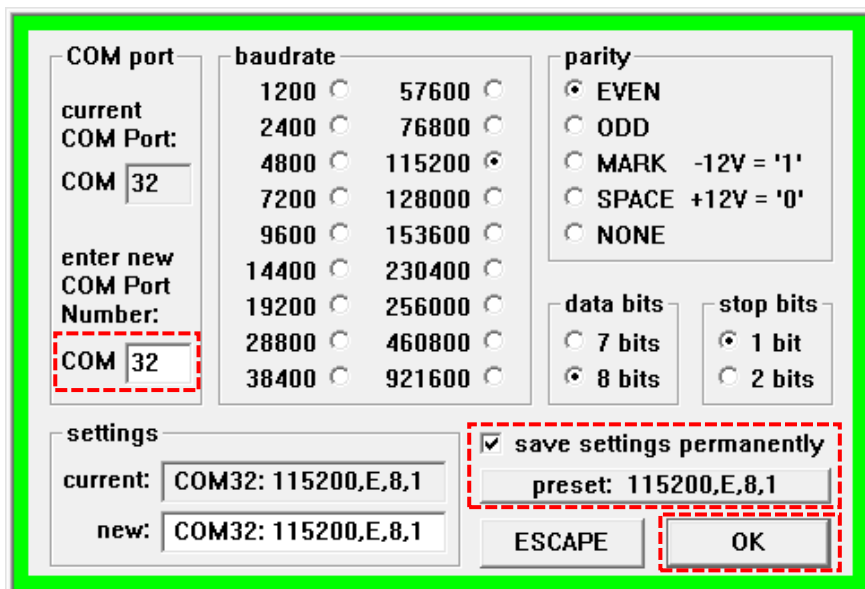
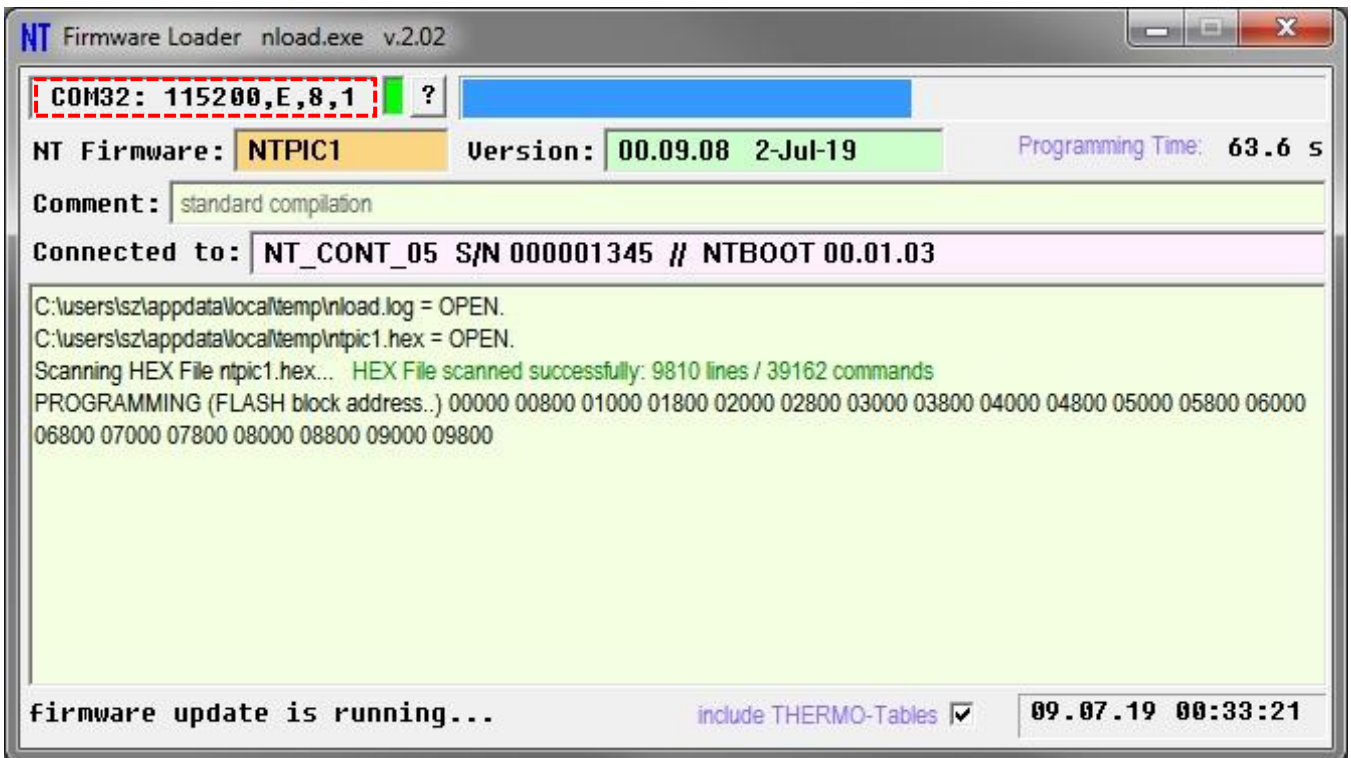
## NT Module Firmware:

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.

| 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. | <a href="#">nt_update.exe</a> | <a href="#">Release Note</a> |



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).

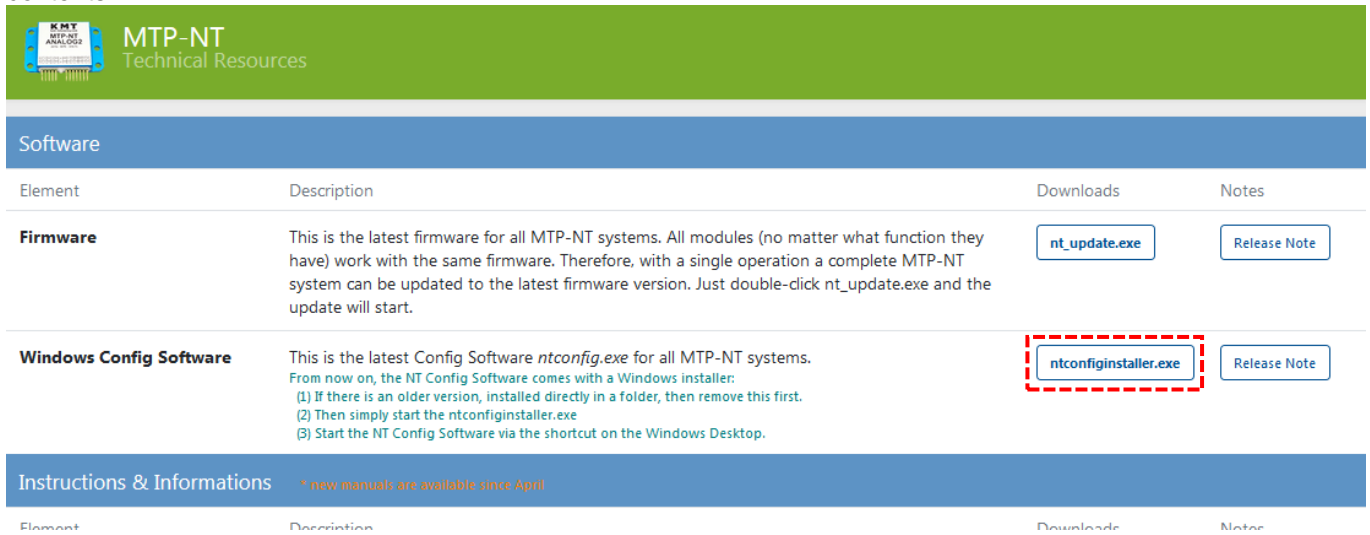
In the COM port settings window you can change the COM port number. The default communication setting for all MTP-NT systems is 115200,E,8,1 (this setting never has to be changed, but you must be sure that this setting is correct).

*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.

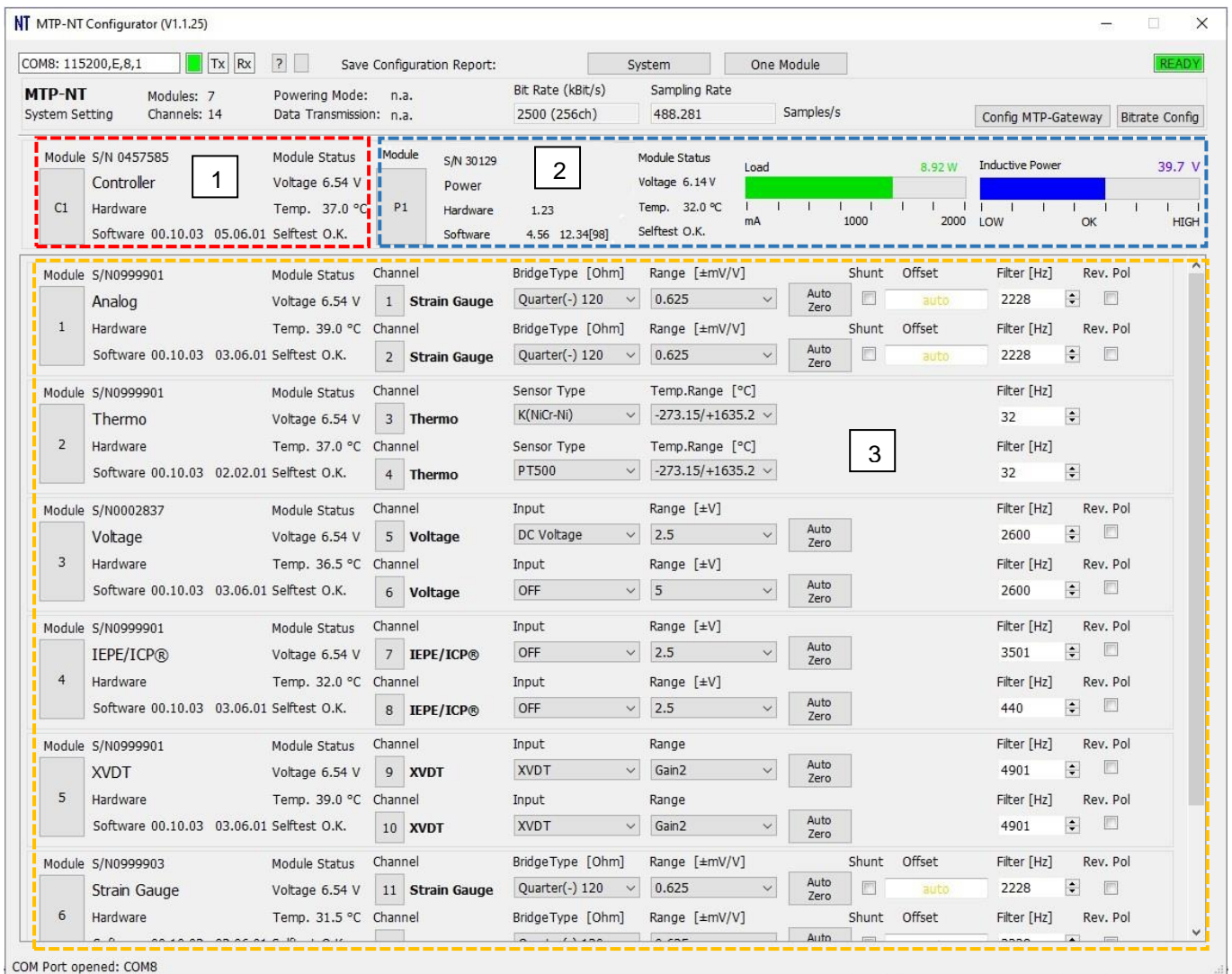


The screenshot shows the 'MTP-NT Technical Resources' website. A 'Software' section contains a table with the following data:

| Element                        | Description  | Downloads                             | Notes                        |
|--------------------------------|--|---------------------------------------|------------------------------|
| <b>Firmware</b>                | 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.   | <a href="#">nt_update.exe</a>         | <a href="#">Release Note</a> |
| <b>Windows Config Software</b> | This is the latest Config Software <i>ntconfig.exe</i> for all MTP-NT systems.<br>From now on, the NT Config Software comes with a Windows installer:<br>(1) If there is an older version, installed directly in a folder, then remove this first.<br>(2) Then simply start the ntconfiginstaller.exe<br>(3) Start the NT Config Software via the shortcut on the Windows Desktop. | <a href="#">ntconfiginstaller.exe</a> | <a href="#">Release Note</a> |

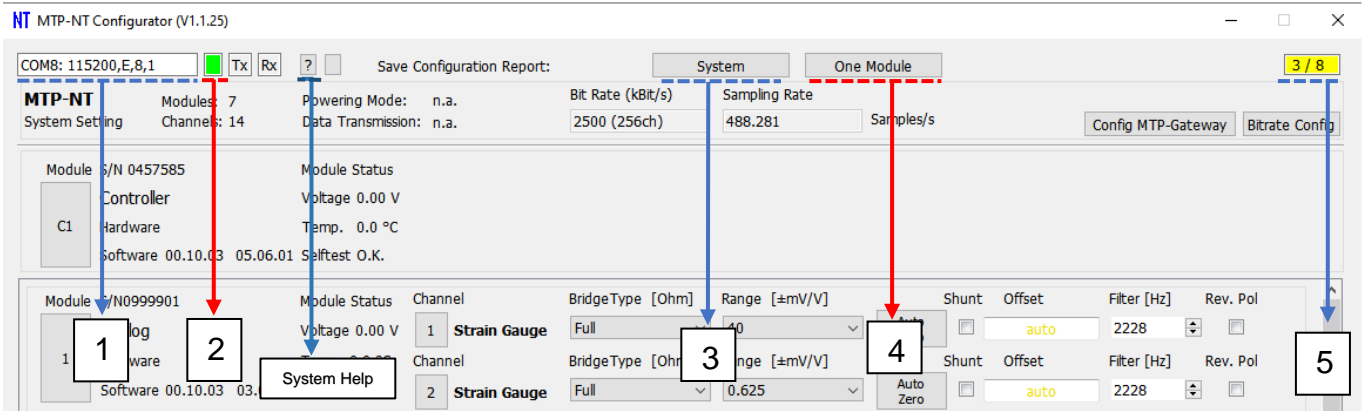
Below the table is an 'Instructions & Informations' section with a note: '\* now manuals are available since April'. Below this is another table header with columns: Element, Description, Downloads, Notes.

This will be described in more detail soon ...



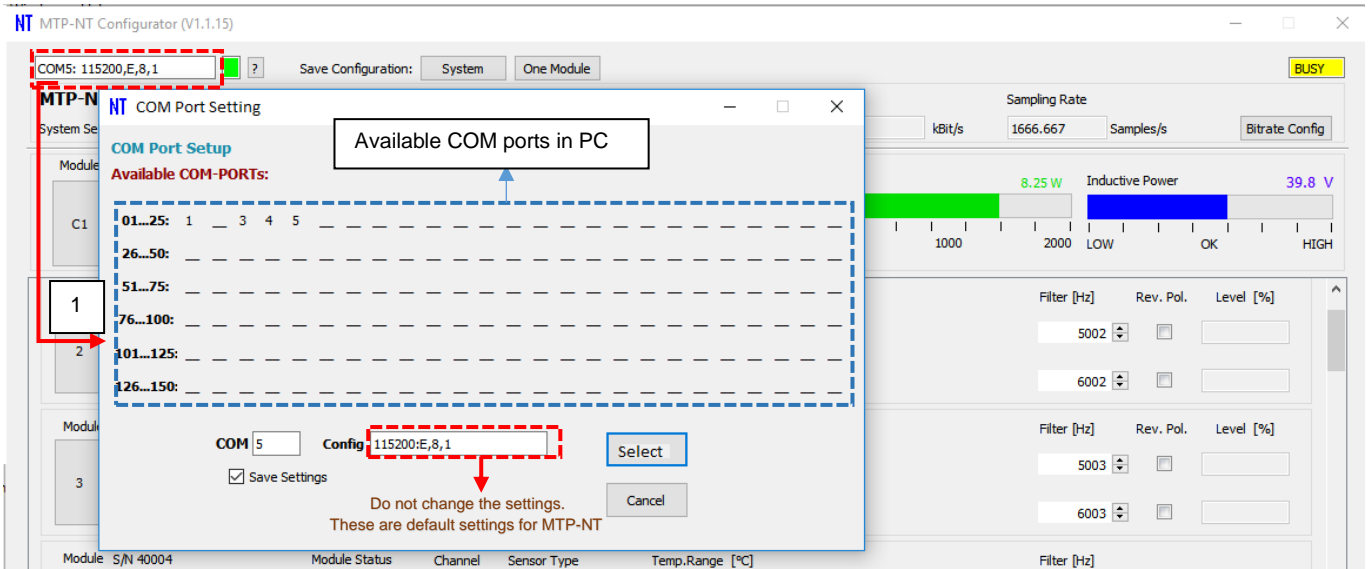
COM Port opened: COM8

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.



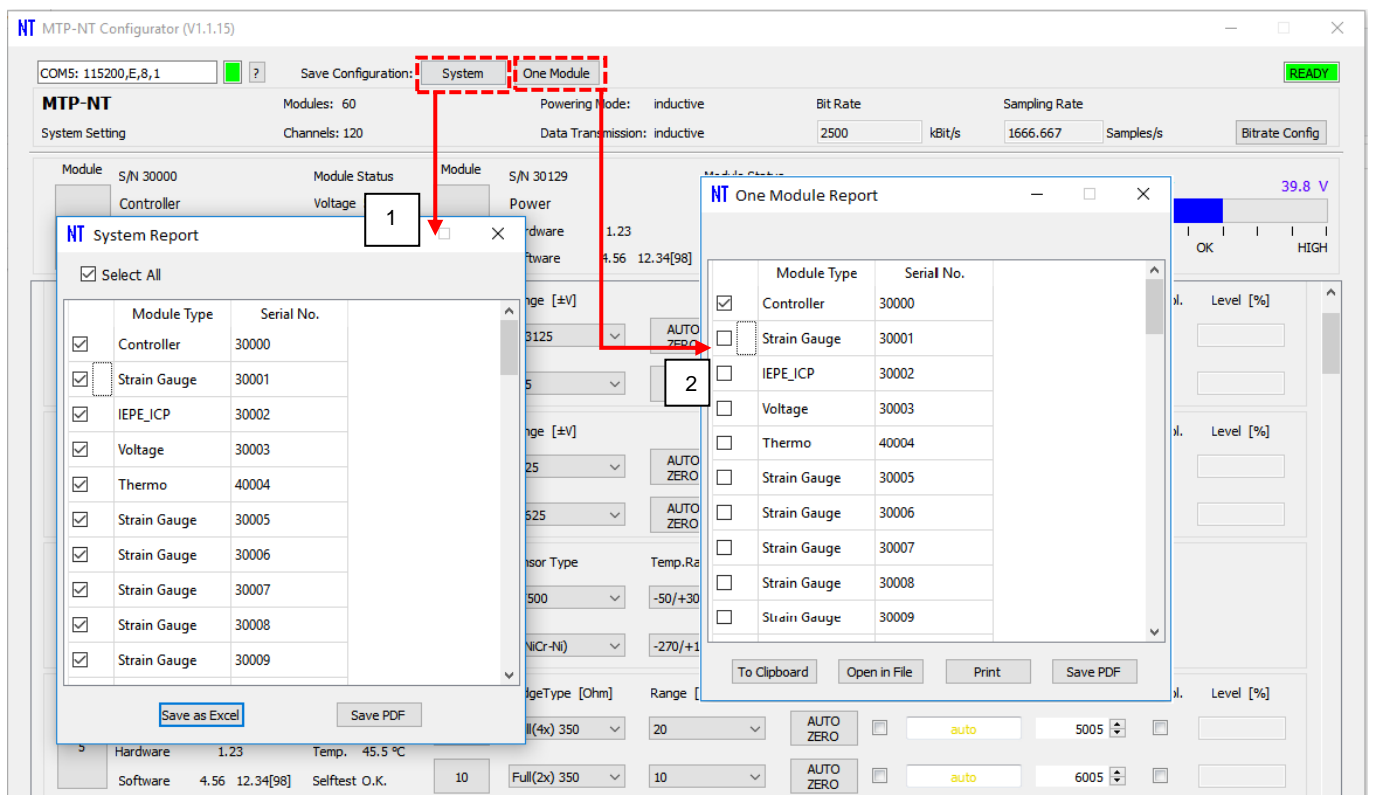
1. **COM port Settings:** This box is responsible for the COM port settings. Click on this box that opens another dialog to configure the settings. See the next pages for changing the settings.
2. **Serial port LED:** There are three colors that explain the state of serial communication in the application.
  - Gray: This color means that there is no serial port with given settings.
  - Yellow: This color means that the serial port is available but unable to contact or communicate with the 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 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.



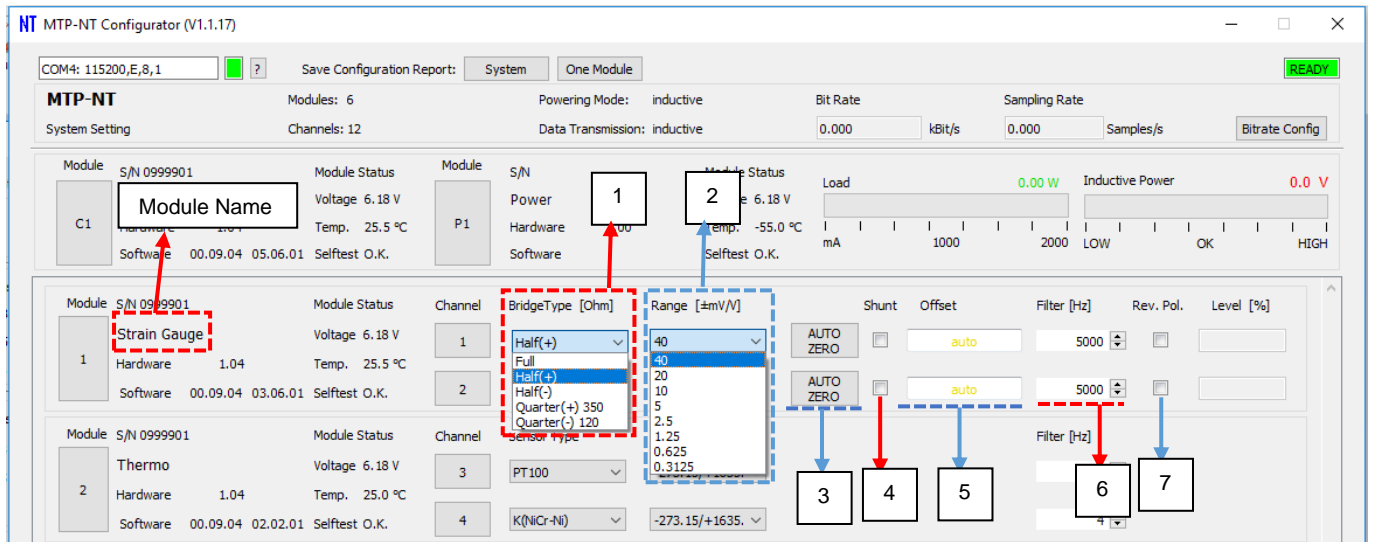


To change the COM port, click on the *COM port settings* box that is located on the top left corner (marked in red).

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.

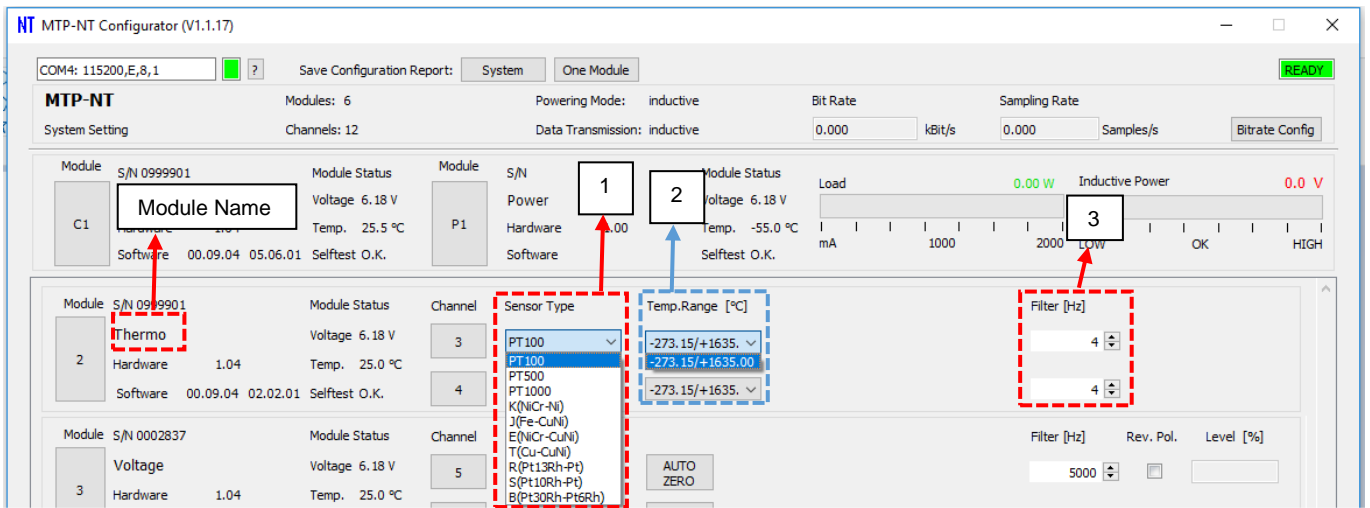


## Strain Gauge

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). Alternatively, on Long press of this button Auto Reset command is sent to the particular channel of the module.
4. **AutoReset:-** Press and hold the Autozero button for 4 to 5 secs until a message pops up near the cursor to tell the user that an Autoreset command has been sent to the specific channel.
5. **Shunt :** - Clicking this option enables the shunt for the specific channel in the module.
6. **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.
7. **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.
8. **Rev. Pol.:** - This box could be clicked to reverse the polarity of the specific channel for the module.

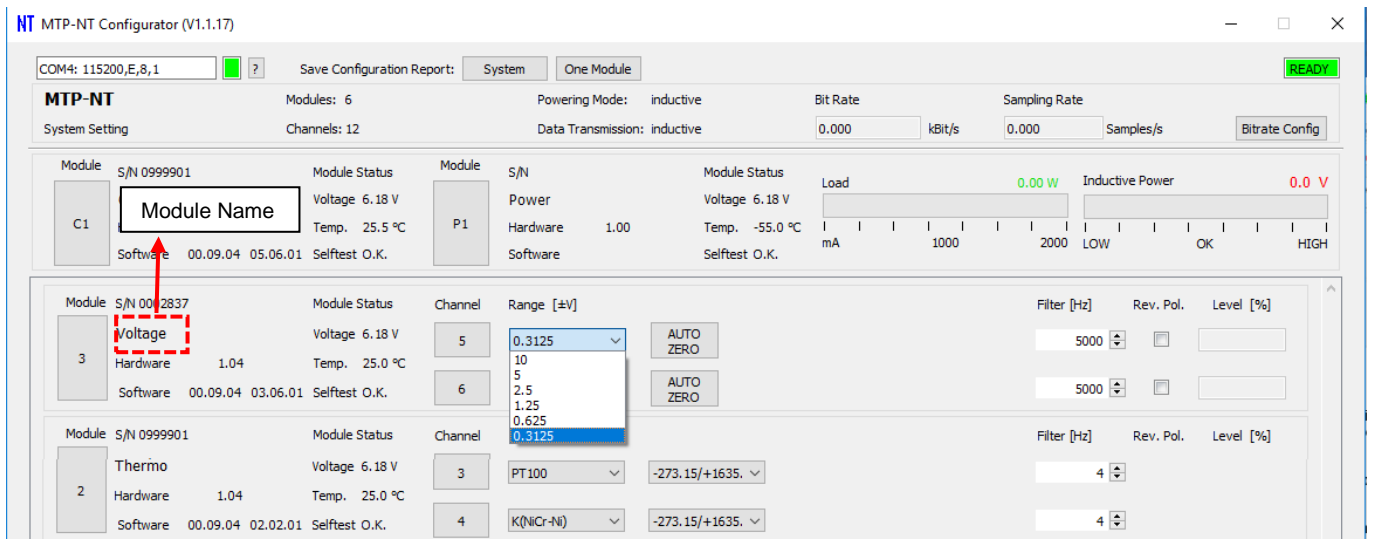
**(SE)** and **(SC)** denotes that this feature is eligible to be used in combination with Shift + Enter (SE) and Shift + Click (SC) that sets the current selected setting to all modules of similar type. Simply click on the dropdown of eligible types then by holding shift and click on the setting to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



## Thermo Module

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

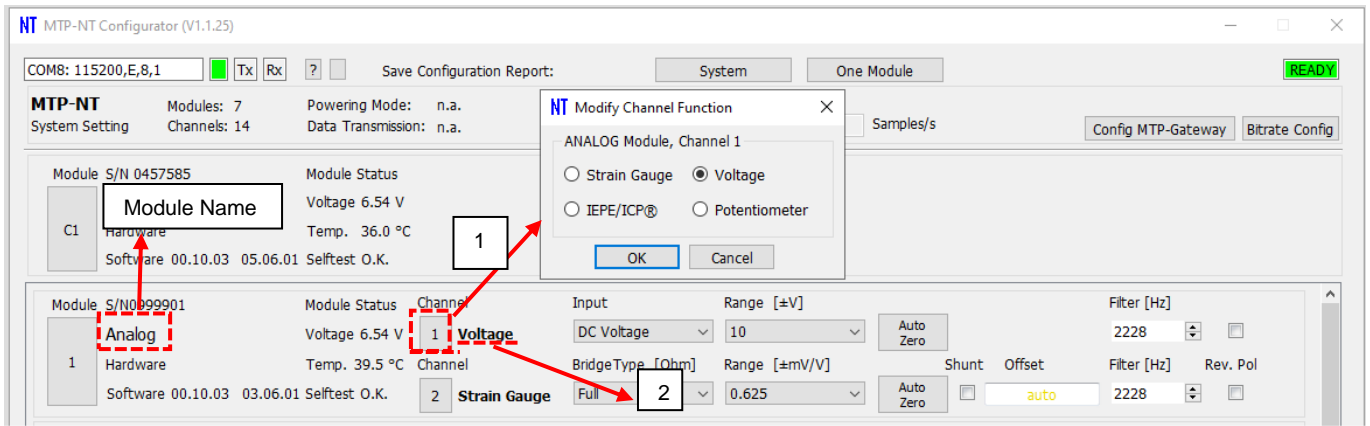
1. **Sensor Type:** - There are a list of sensors that could be configured with the Thermo modules. The user can click on the drop box below the Sensor Type and choose desired sensor
2. **Temperature range:** - The temperature range could be modified by selecting the drop box by the user.
3. **Filter:** - 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.





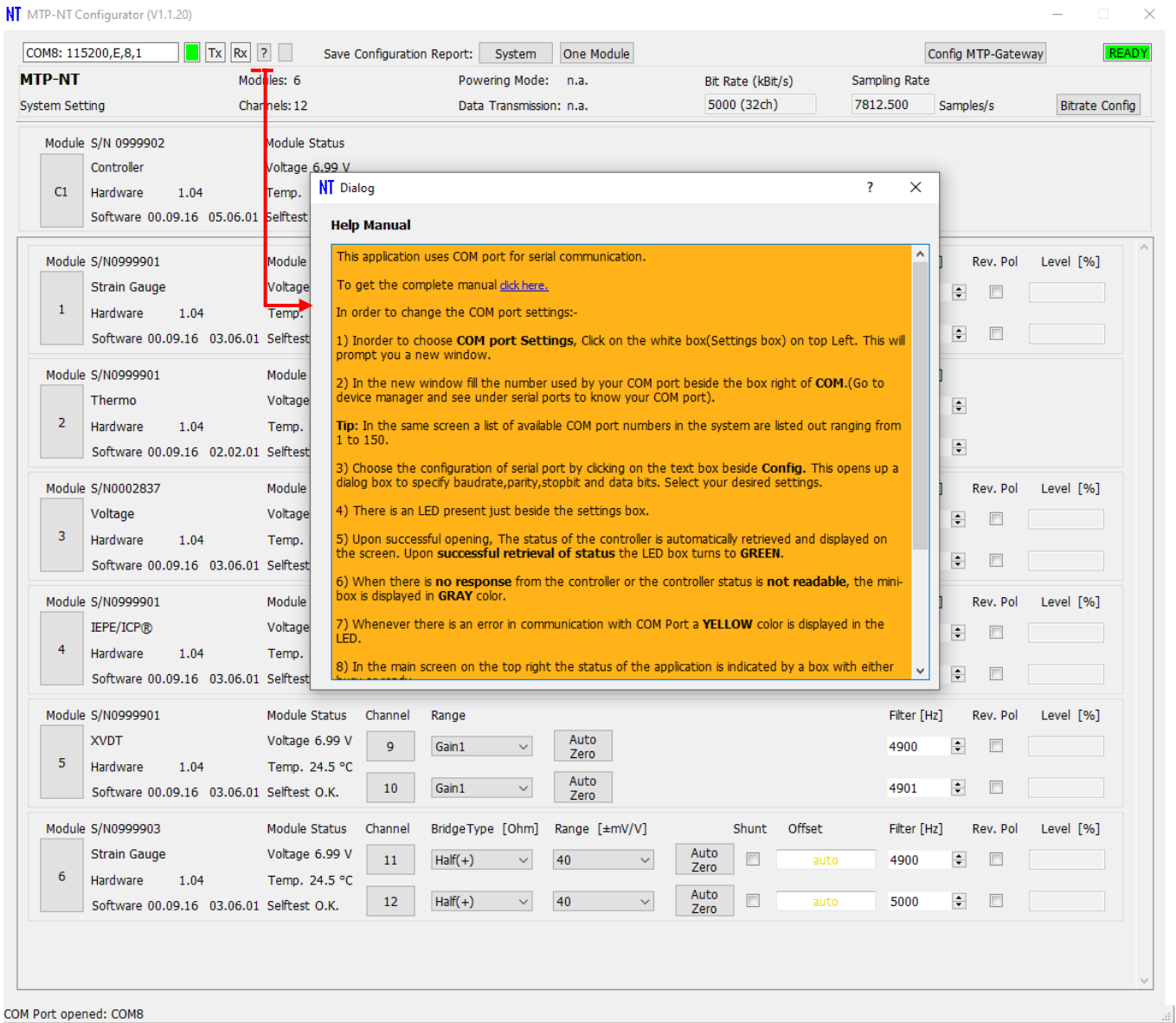
## Analog Module

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.



# 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<br>Frame Size = 8 Bytes | Frame Size in Bytes |
| 2     | number_of_frames | 2 Byte unsigned int | 00000000 00001010<br>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)

The screenshot shows the 'Ethernet Setup' window with three main sections: 'Telemetry', 'Computer', and 'Common'. The 'Telemetry' section contains fields for IP Address (192.168.003.210), IP Mask (255.255.255.000), and IP Port Number (1233). The 'Computer' section has a note: 'This area is irrelevant for the server function. Please ignore this setting when running the device as server.' The 'Common' section has a 'Connection Mode' dropdown set to 'Simple Computer init. connection' and a 'Telemetry Type' dropdown set to 'MTP-16'. A note points to the 'Telemetry Type' dropdown: 'The setting in this area must exactly match the setting of the KMT system.' Another note points to the 'Telemetry' section: 'In the box "Telemetry" the server settings of the KMT IP-LAN device are defined.' A third note points to the 'Connection Mode' dropdown: 'This setting means that the KMT IP-LAN device works as Ethernet server.' A 'Submit' button is at the bottom.

### 3. Method for transmitting data via TCP

- Ensure that a valid PCM data stream is present at the PCM input. Otherwise the device will send nothing over TCP.
- Open the socket defined in the box "Telemetry" with your own client software (see paragraph 2).
- The IP-LAN device will immediately start to transmit the data stream (see paragraph 1).
- 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:

$$[\text{incoming digital value}] - 32768 = [\text{bipolar value}]$$

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 =  $\pm 5$  mV/V

\* applied bridge unbalance = +5 mV/V

\* digital value (unsigned short) = 65472

\* bipolar value = 32704

Example 2 (Volt module):

\* input range setting =  $\pm 10$  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 ( $\pm 32704$ ) generates an analog output Voltage of  $\pm 10.00$  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 | ( $\pm 10V$ ) | -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