KMT - Kraus Messtechnik GmbH

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User Manual

CTP-NT64-Rotate

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

INSTRUCTIONS FOR QUALIFIED PERSONNEL ONLY!

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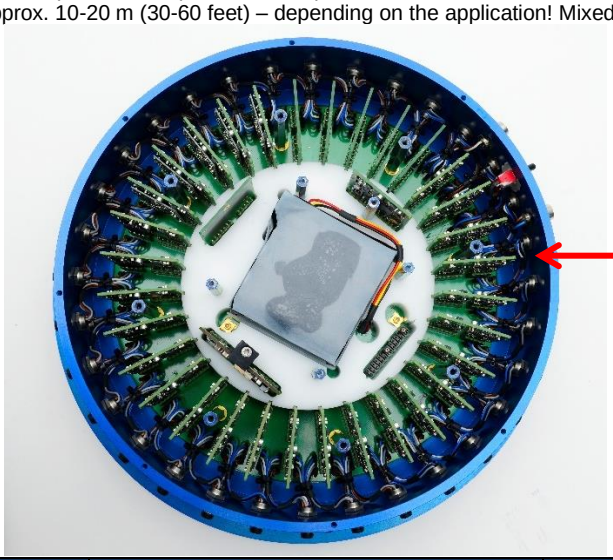
- Inputs: STG, POT, IEPE, VOLT, LVDT/RVDT, TH-K, RTD
- Simultaneous sampling
- 18bit resolution
- Software programmable
- Signal bandwidth: 64 x 0-1500Hz
- Battery power up to 3-4h with remote to switch ON/OFF battery
- Radio telemetry transmission
- Output analog +/- 10V
- Digital data interface to PC (option)
- Waterproofed ENC housing (IP65)

General functions:

Example of rotor part only!

The CTP-NT64-Rotate is a 64-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 64 +/-10V analog outputs via Sub-D male socket (option: ethernet interface).
The analog signal bandwidth is 0-95 Hz (320kbit) and up to 0-1500Hz (5000kbit) for 64 channels. The measurement accuracy is <±0.1 % (without sensor). The CTP-NT64-Rotate is specified for operational temperatures from -40° C to +70° 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-NT64-Rotate Transmitting Unit Technical Data (Encoder)

Encoder in IP65 Aluminum housing

Encoder inside

System Parameters ENCODER:

Channels:	64
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, 13400mA capacity up to 3-4 hours (20°C)
Power consumption:	about 3600mA using 64x STG full bridge sensors 350 Ohms
Analog signal bandwidth:	See table
Transmission:	Digital PCM format
Transmission Power:	10mW
Dimensions:	Diameter 260mm, bottom plate diameter 300mm, height 77mm (without antenna),
Weight:	3,70 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, **1500 RPM**
Shock:	200g in all directions

Frequency table	**Cutoff frequency of anti-aliasing filter (-3dB) and sampling rate (red)**
Bit rate	**64 CH.**
5000kbit	1500 Hz (3906.25 Hz)
2500kbit	750 Hz (1953.125 Hz)
1250kbit	375 Hz (976.56 Hz)
625kibt	190 Hz (488.28 Hz)
312.5kbit	95 Hz (244.14 Hz)

CTP-NT acquisition modules (rotor side)

CTP-NT-STG2
Acquisition module for 2 strain gauges
Full or half bridge (≥ 120 Ω)
Quarter bridge (120 Ω or 350 Ω)
Fixed excitation voltage: 4.0 Vdc
Offset compensation by auto zero
Manual offset shifting after auto zero
Input ranges ±40 to ±0.3 mV/V
Shunt-calibration 75(25.5) kΩ 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 Ω)

CTP-NT-IEPE2
Acquisition module for 2x
IEPE/ICP® sensors
Excitation current: 4.0 mA
Input ranges: ±20 to ±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 ±10 to ±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 ≥ 100 Ω (@ 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 ≥ 150 Ω
Fixed excitation voltage: 4.0 Vdc
Input resistance: 667 kΩ
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 kΩ 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:

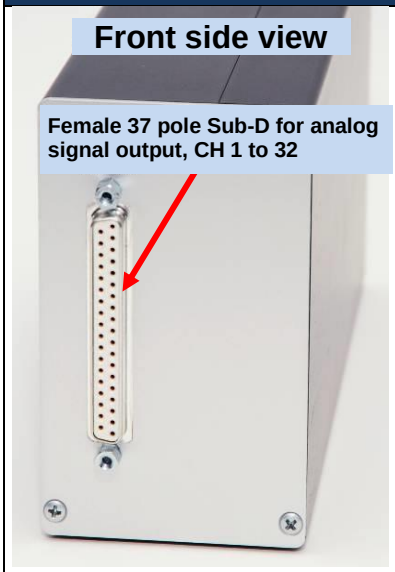
CTP-NT-ANALOG
Two Channel Acquisition Module for
strain gauges*,
high level voltage signals*,
potentiometer sensors*,
IEPE/ICP® sensors*,
ext.Sensor supply (12 Volt typ.) *
* the functionality is programmable by
control software ntconfig.exe.
Power supply (VBB): 5 to 9 Vdc
Current consumption: <140 mA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

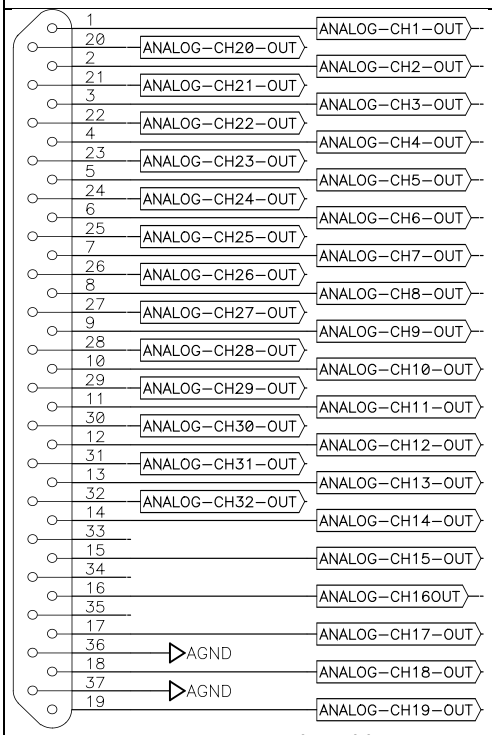
CTP-NT-BLUE
Bluetooth module to transfer RS232
wirelessly*
Remote On/Off* (concerns battery
powered versions)
Range 5 to 20 m, depends on
application and antenna
Power supply (VBB): 6 to 9 Vdc
Current consumption: 30 mA
(average)

* Required is the
KMT COMMUNICATOR
handheld remote control Blue-
tooth device with USB connector)

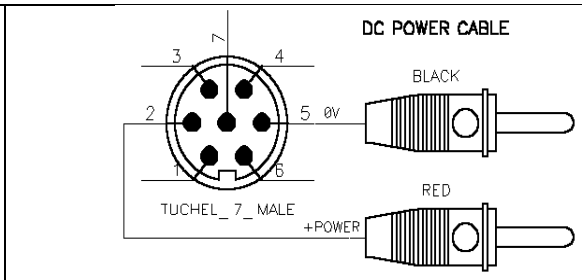
CTP-NT-CONTROLLER
Controller for 1 to128
acquisition modules
Output: PCM
built-in inductive transmitter
Programmable via RS232/USB
adapter and remote software
Power supply (VBB): 6 to 9 Vdc
Current consumption: 100 mA

2x CTP-NT-DEC32 Receiver unit for max 32 Channels output via 37 pol. Sub D (radio transmission version via quad receiver 1250 and 5000kbit)





Plug-side



Optional BNC32Box. Connect on 37pol Sub-D

CTP-NT-DEC32 System Parameters: (for 64 channels you need 2x DEC32 – Master / Slave)

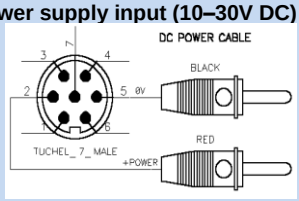
Channels:	32 x +/-10V analog outputs via Sub-D male socket, single-ended!
Resolution:	16 bit D/A converter, with smoothing filter
Power supply input:	10-30 VDC, power consumption <24 Watt
Analog signal bandwidth:	see frequency table
Transmission:	Digital PCM Format
Dimensions:	205 x 105 x 65mm
Weight: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

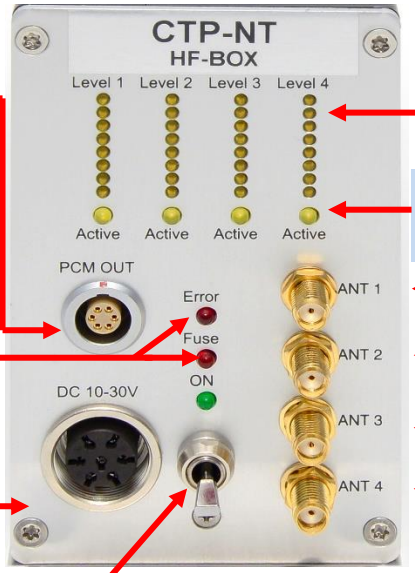
2x CTP-NT-DEC32 Receiver unit for max 32 Channels output via 37 pol. Sub D (radio transmission version with HF BOX Quad with 4 receiver 1250-5000kbit) (for 64 channels you need 2x DEC32 – Master / Slave)

PCM OUT
Pin 1 -----
Pin 2 = PCM + (pink wire)
Pin 3 = PCM -- (blue wire)
Pin 4 = GND
Pin 5 = NC
Pin 6= NC

Transmission error LED
Fuse of powering defect LED

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





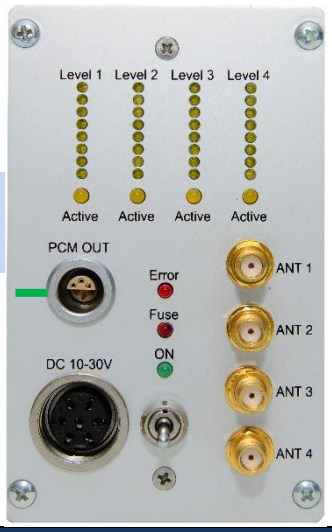
4x HF Level display

Active DATA LED, up to 2 receivers can be active! If a fault data is identified, it will switch automatically to a valid data from other receiver

4x SMA inputs for RX antenna

Power Switch

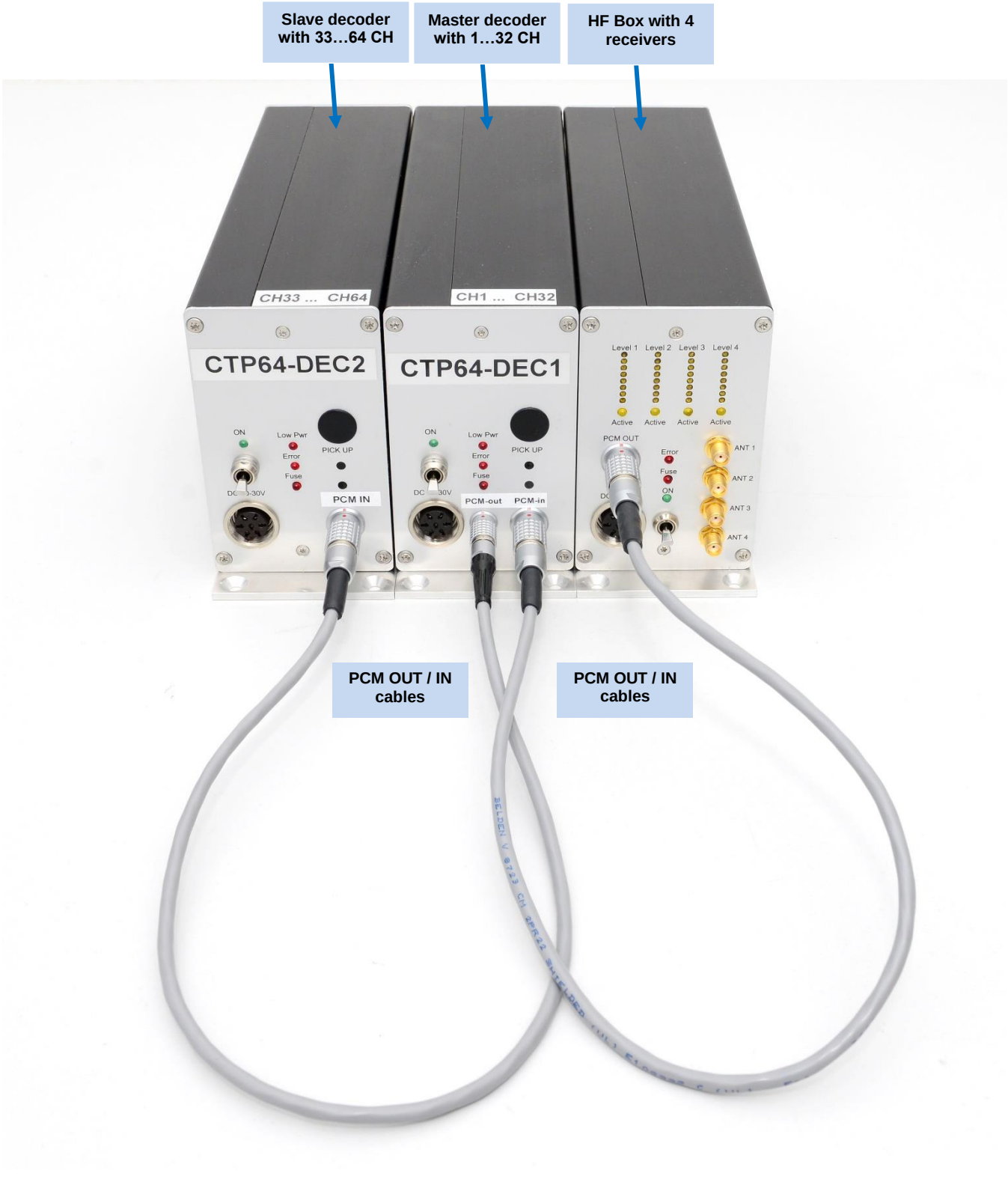
PCM/ DATA cable Length 0,5m standard (up to 25m on request)



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

Set of CTP-NT-64 channels analog-decoder with HF-Box (static part)

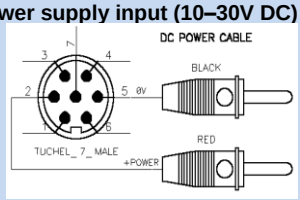


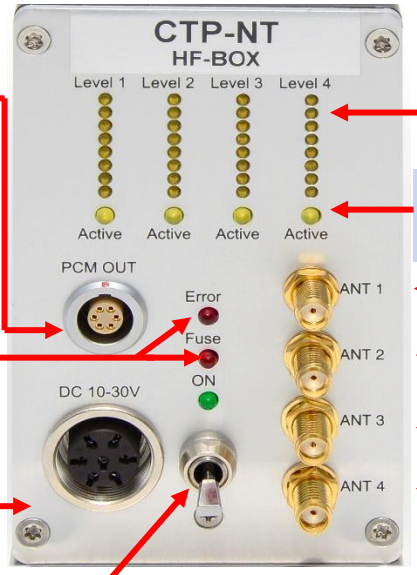
HF-Box with CTP-NT-DIG-DEC-IP-LAN Receiver unit with PCM to Ethernet converter- TCP out (radio transmission version with HF BOX Quad with 4 receiver 1250-5000kbit)

PCM OUT
Pin 1 -----
Pin 2 = PCM + (pink wire)
Pin 3 = PCM -- (blue wire)
Pin 4 = GND
Pin 5 = NC
Pin 6= NC

Transmission error LED
Fuse of powering defect LED

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





4x HF Level display

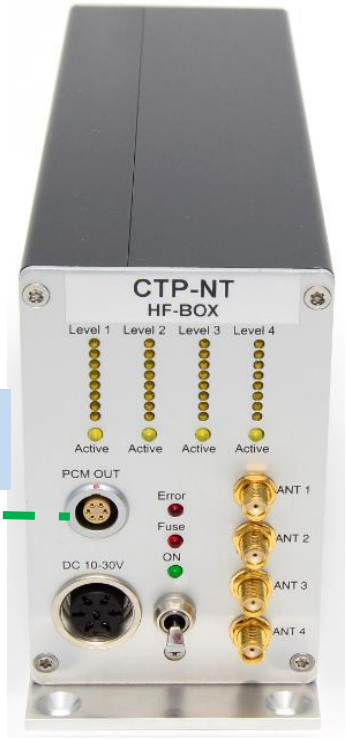
Active DATA LED, up to 2 receivers can be active! If a fault data is identified, it will switch automatically to a valid data from other receiver

4x SMA inputs for RX antenna

Power Switch

TCP OUT

PCM/ DATA cable
Length 0,5m standard
(up to 25m on request)



HF BOX Quad System Parameters:

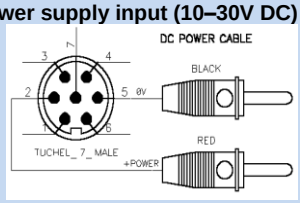
HF receivers	4
Antenna connection	SMA
Output	PCM
Power supply input:	10-30 VDC, power consumption <24 Watt
Dimensions:	205 x 105 x 65mm
Weight:	1.050 kg without cables and antenna
Environmental	
Operating:	-40 … +70°C
Humidity:	20 ... 80% not condensing
Vibration:	5g
Static acceleration:	10g in all directions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

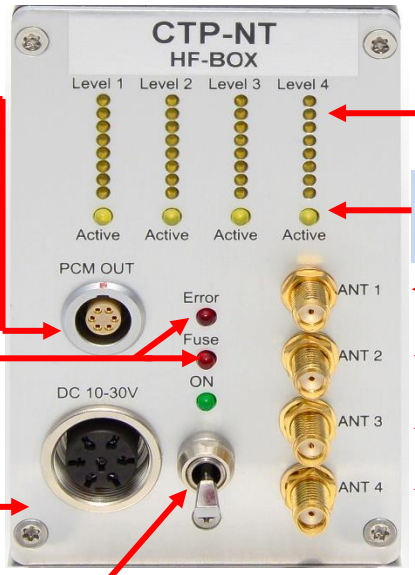
HF-Box with CTP-NT-DIG-DEC-IP-LAN Receiver unit with PCM to Ethernet converter- UDP out (radio transmission version with HF BOX Quad with 4 receiver 1250-5000kbit)

PCM OUT
Pin 1 -----
Pin 2 = PCM + (pink wire)
Pin 3 = PCM -- (blue wire)
Pin 4 = GND
Pin 5 = NC
Pin 6= NC

Transmission error LED
Fuse of powering defect LED

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



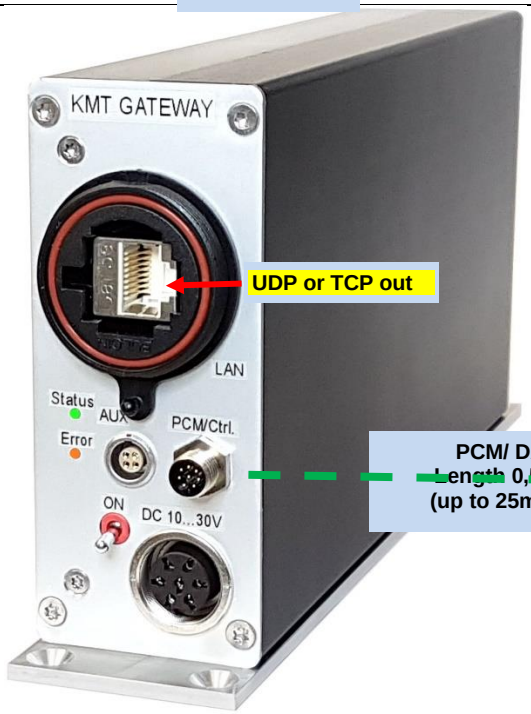


4x HF Level display

Active DATA LED, up to 2 receivers can be active! If a fault data is identified, it will switch automatically to a valid data from other receiver

4x SMA inputs for RX antenna

Power Switch



UDP or TCP out

PCM/ DATA cable
Length 0,5m standard
(up to 25m on request)

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.

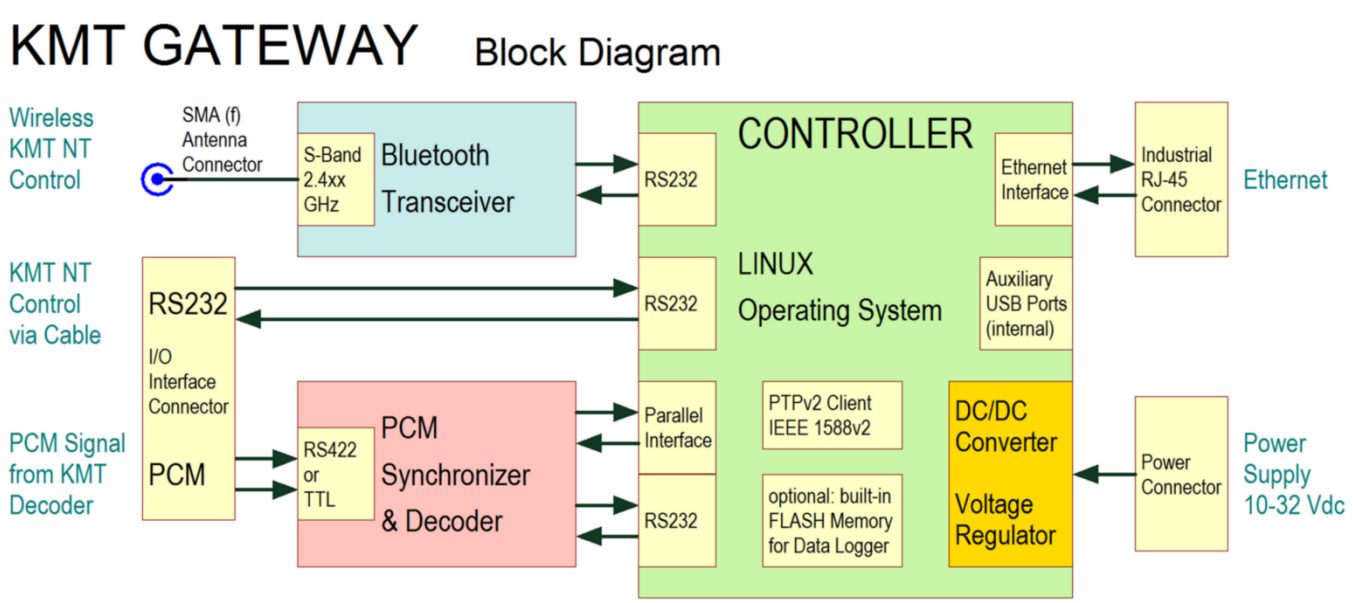
Complete setup of the KMT MTP-NT systems is possible over Ethernet ("just-one-cable" solution).

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

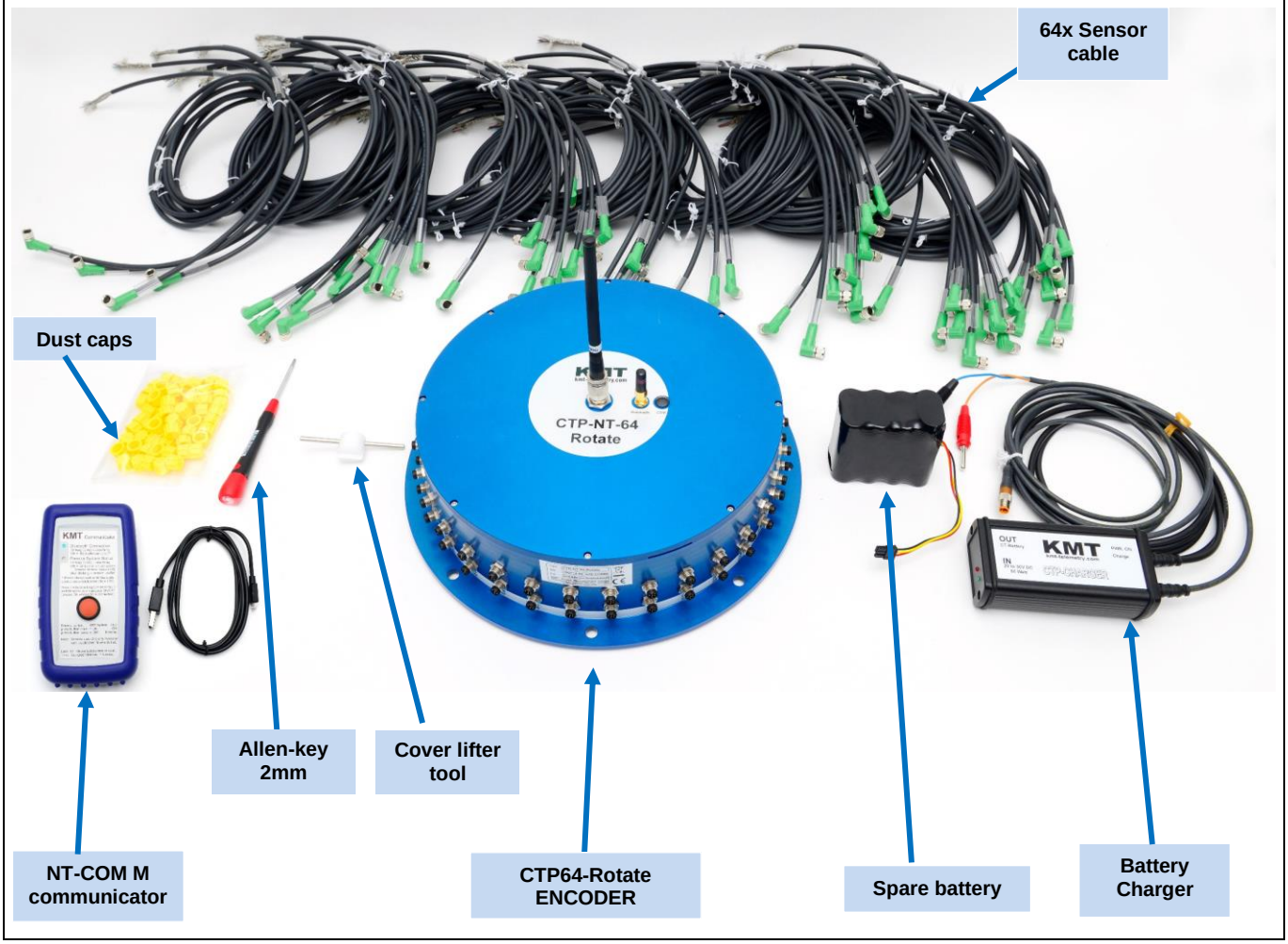
System Parameters:

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

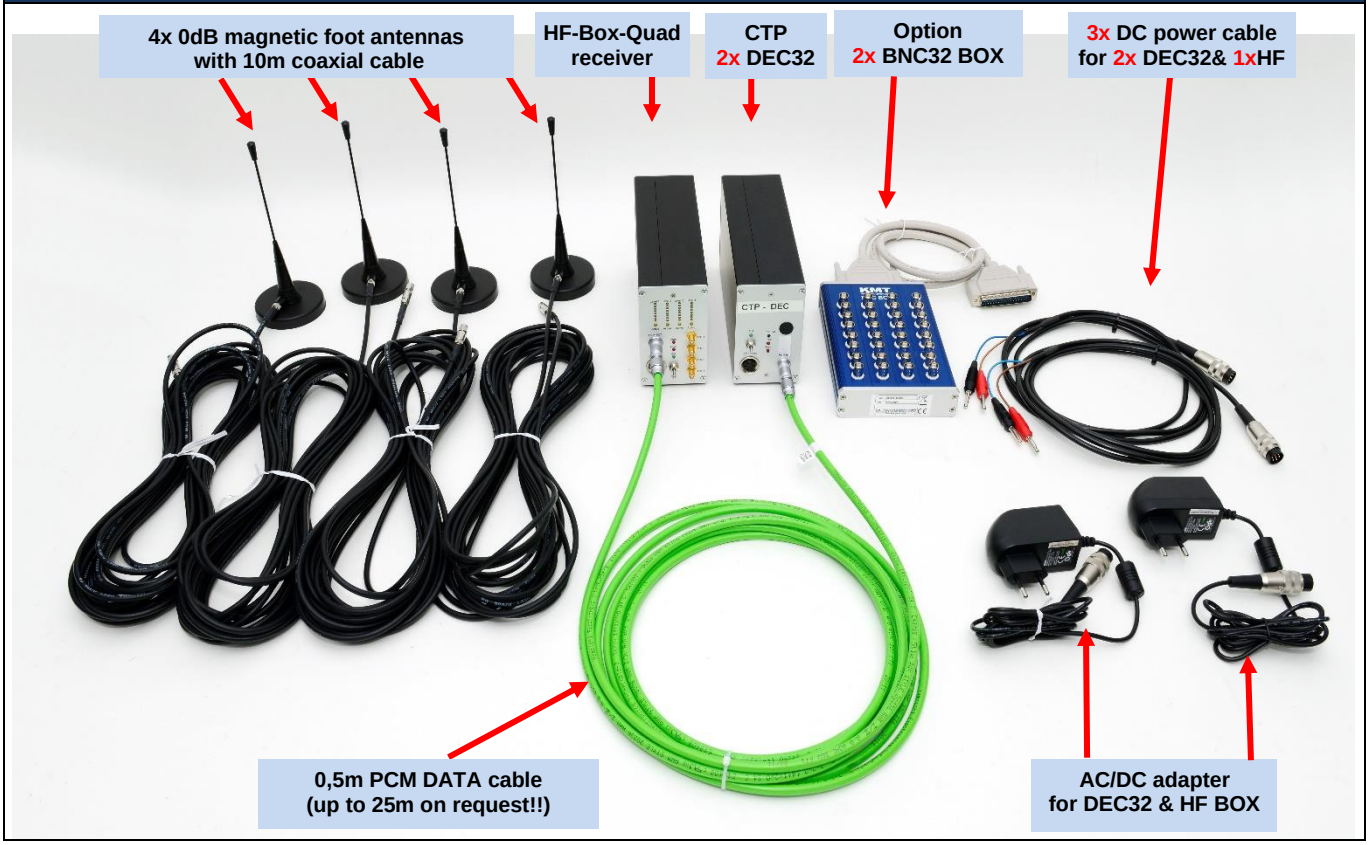


SET of CTP-NT64-Rotate
Rotating part
“pictures show only an example of a delivery set”



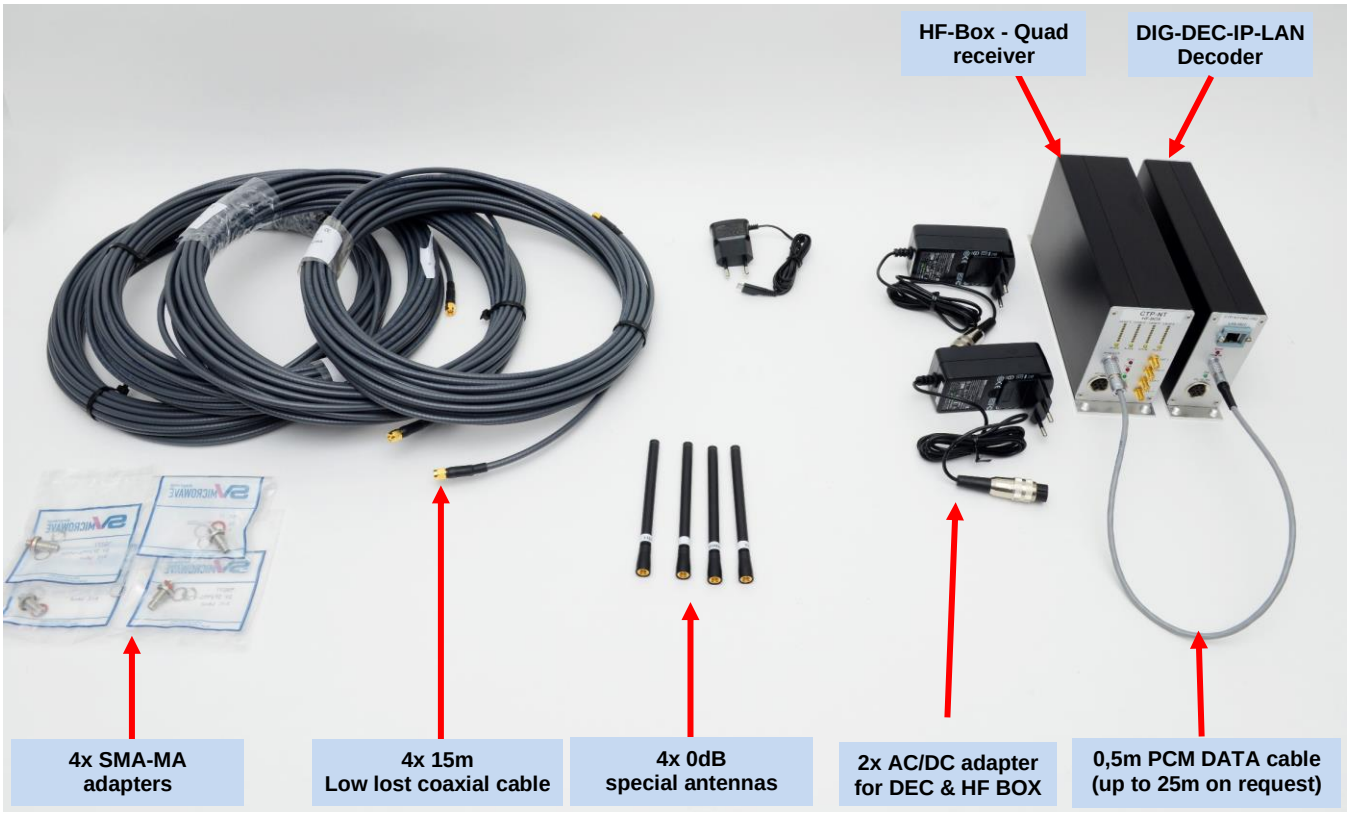
Set of CTP analog-decoder with external HF-Box (static part)

with standard magnetic foot antennas and analog output decoders
“pictures show only an example of a delivery set”

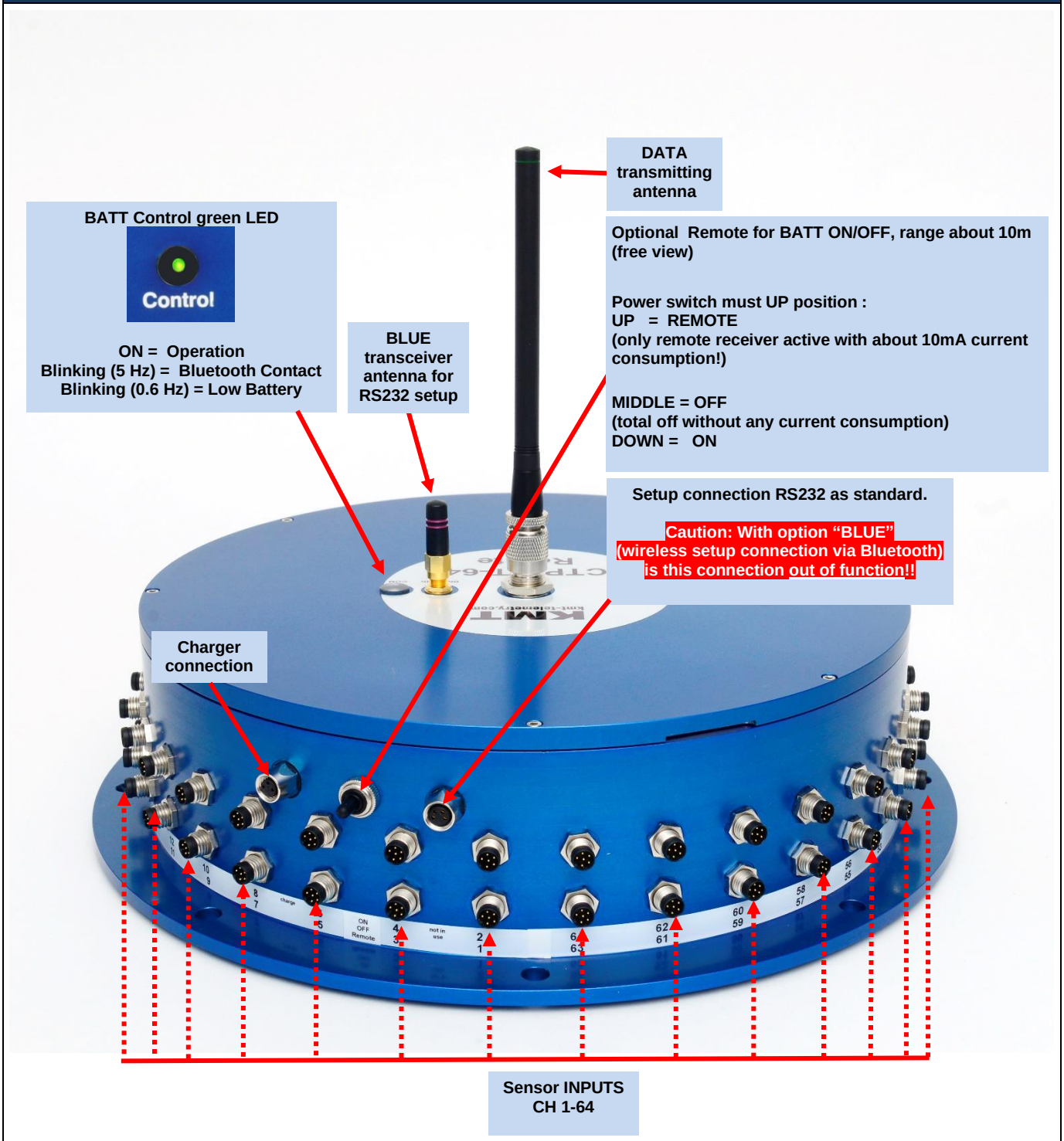


Set of CTP-digital-decoder with external HF-Box (static part)

with special antennas, antenna cables and digital output decoders
“pictures show only an example of a delivery set”



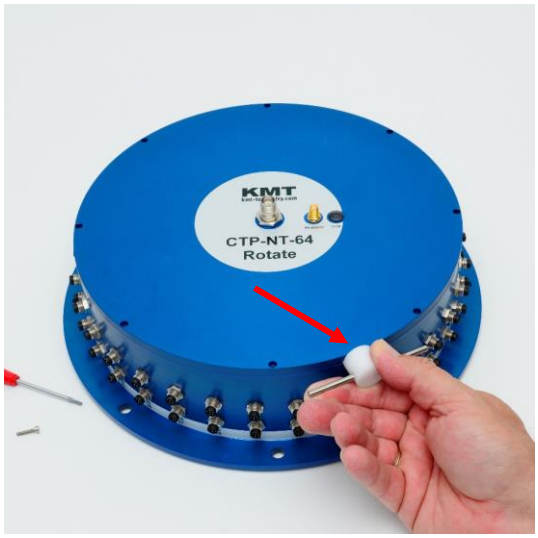
CTP-NT64-Rotate Encoder – Pin connection



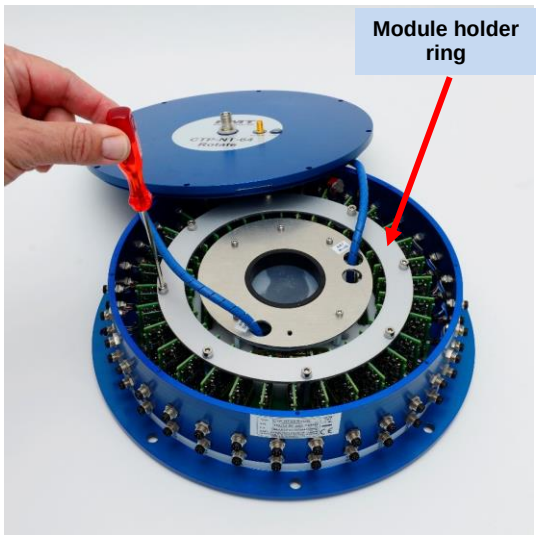
CTP-NT64-Rotate Encoder – How to open device

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



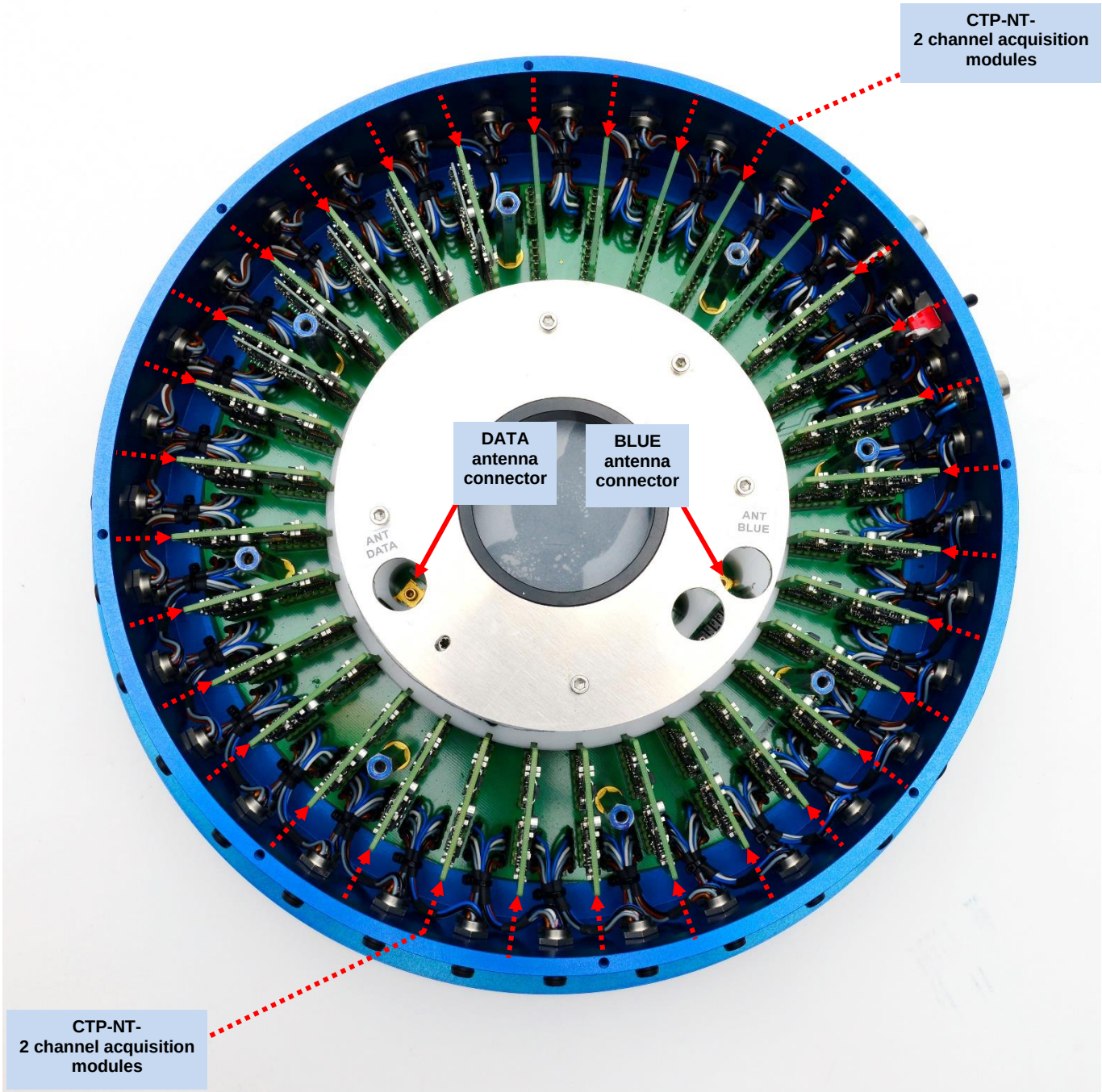
3. Open 8 screws from modules holder ring

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

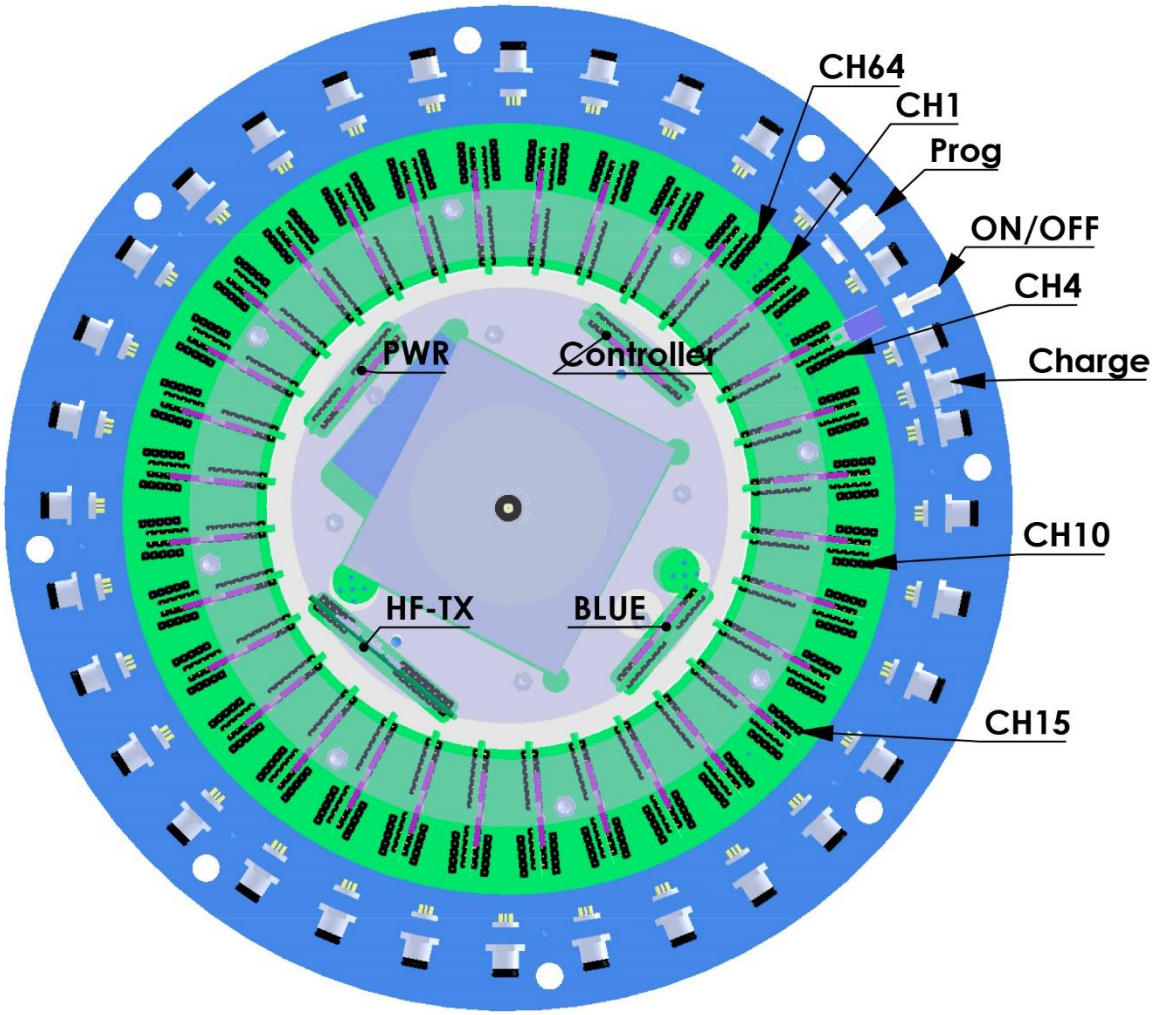
5. Now you can change CTP-NT-Acquisition modules

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

CTP-NT64-Rotate Encoder – Modules

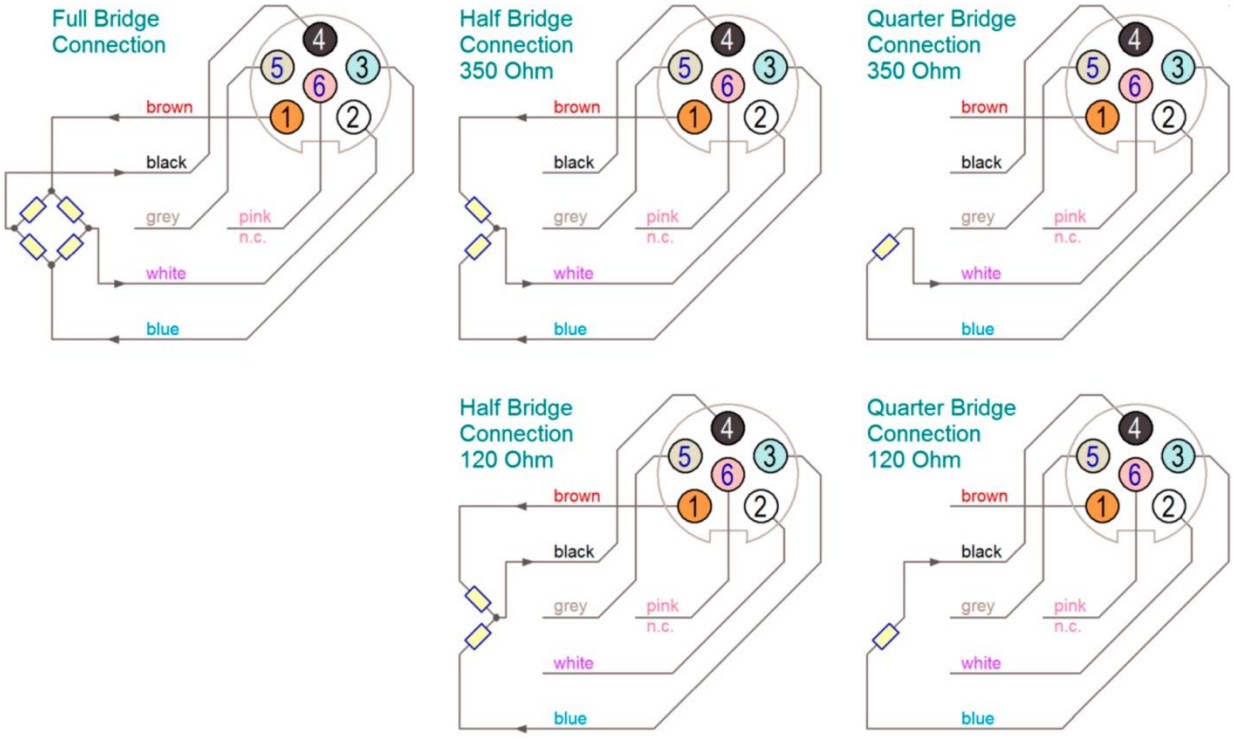


CTP-NT64-Rotate Encoder – Modules - Draw

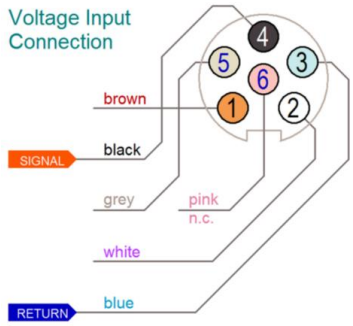


CTP-NT64-Rotate Encoder – Pin connection

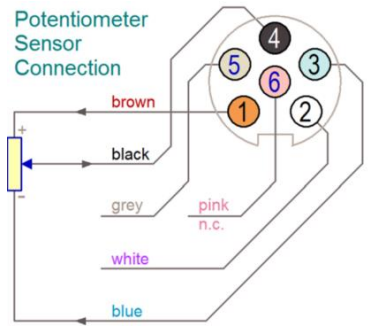
STG-Strain gage connection



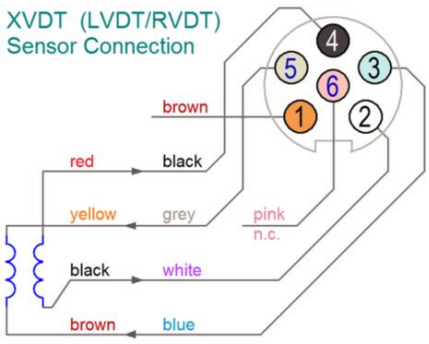
VOLT connection



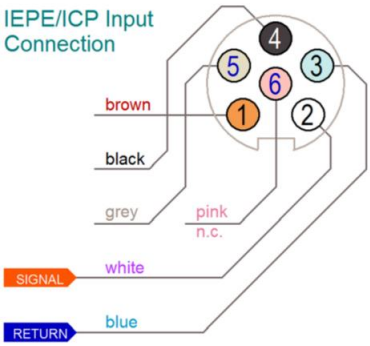
POT connection



XVDT (LVDT or RVDT) connection

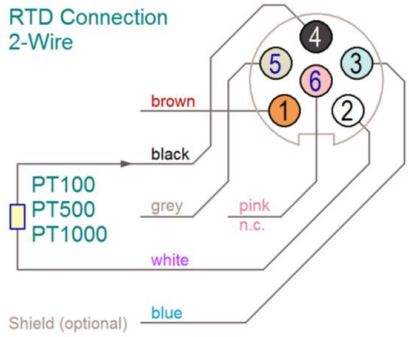


IEPE (ICP) connection

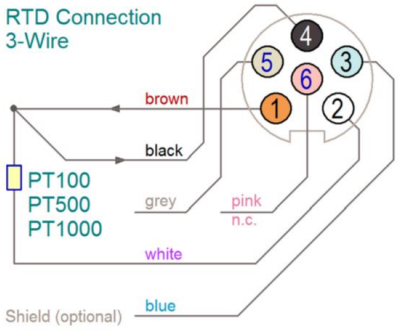


THERMO

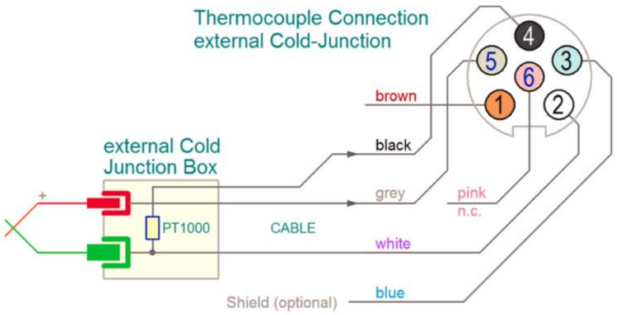
RTD 2-wire connection



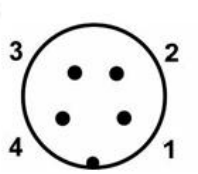
RTD 3-wire connection



Thermocouple connection via cable adapter with integrated Cold-Junction



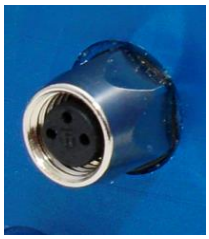
Setup connection RS232 as standard.
Caution: With option "BLUE" (wireless setup connection via Bluetooth) is this connection out of function!!



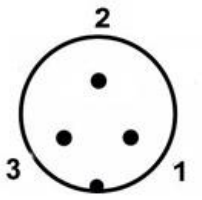
Cable colors:

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

Li Ion re-chargeable battery with charger unit for CTP-NT64-Rotate



Charge plug at CTP-Rotate ENC



Cable colors:

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

BATT Control green LED

BATT Control green LED

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

COMMUNICATOR (handset)

<u>Attention:</u>
Li Ion Accumulator 7.4V 13400mAh has a capacity for about 3-4 hours (20°C)

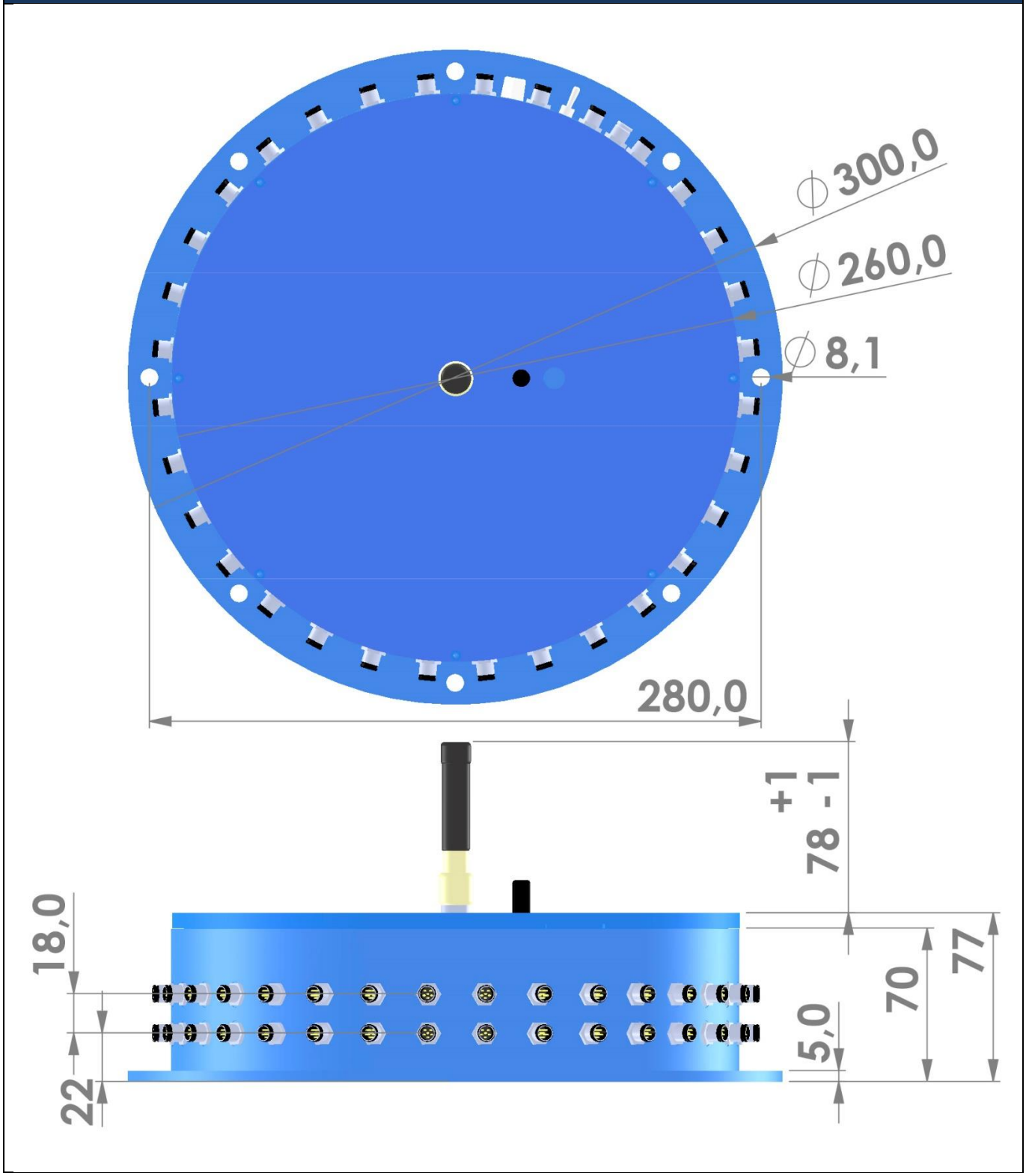
With the option BLUE (rotor side) and COMMUNICATOR (handset) can easy switch ON/OFF the battery power

CT-CHARGER XL

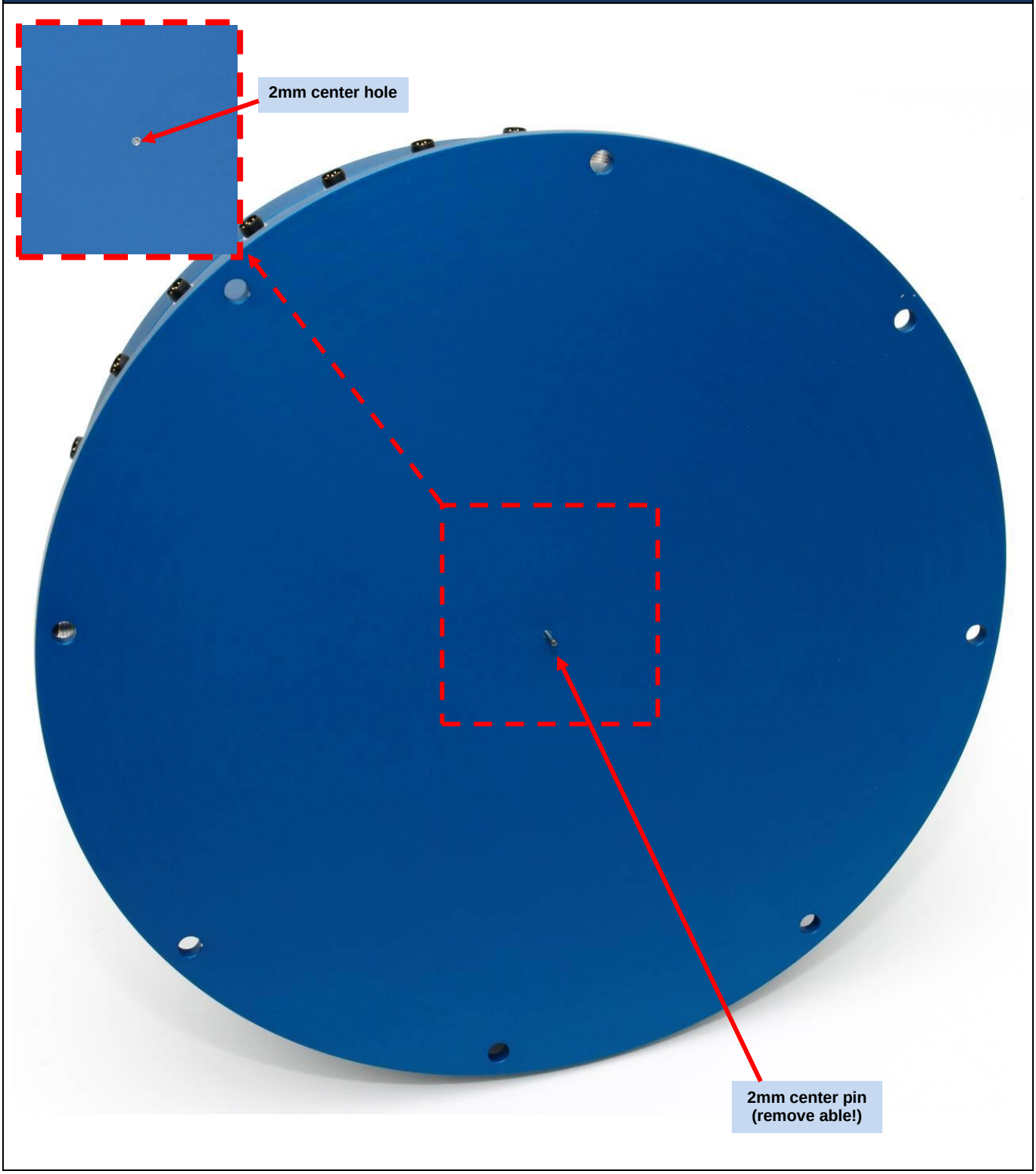
CT-CHARGER XL for CTP-Rotate

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 10 hours!

Dimensions CTP-NT64-Rotate -ENC



CTP-NT64-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!

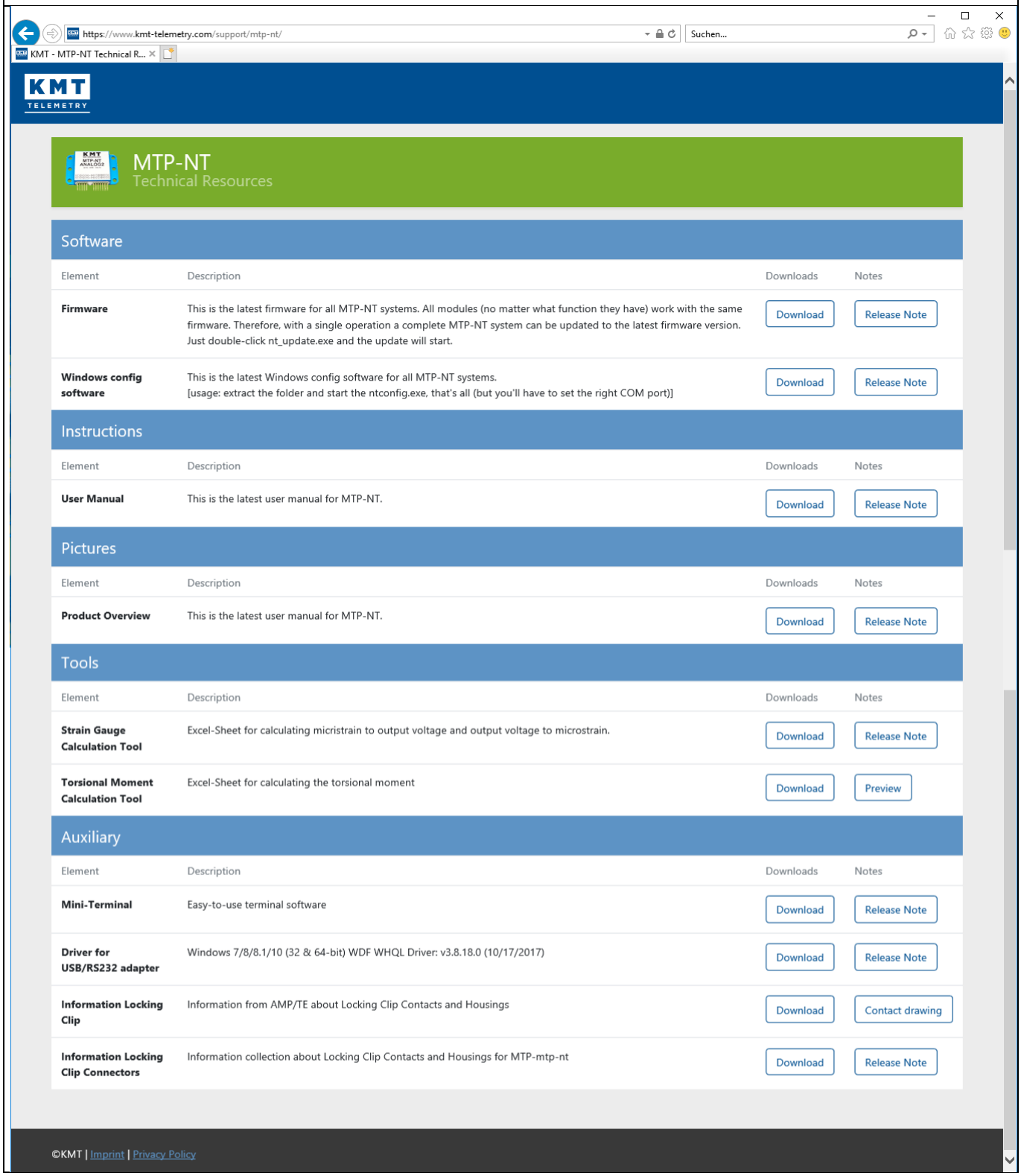
length x width x height : 144 mm x 78 mm x 35 mm
weight: 210 grams

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
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

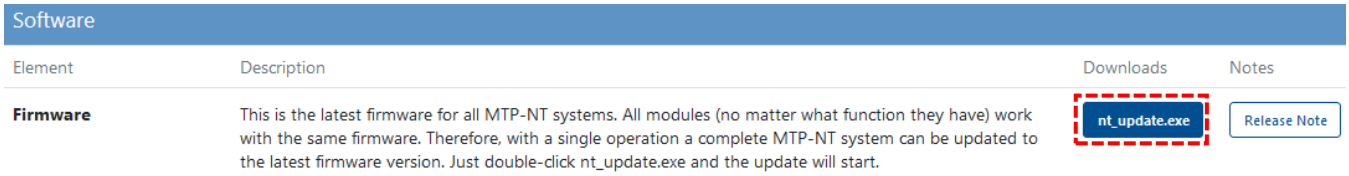
Element	Description	Downloads	Notes
Strain Gauge Calculation Tool	Excel-Sheet for calculating micristrain to output voltage and output voltage to microstrain.	Download	Release Note
Torsional Moment Calculation Tool	Excel-Sheet for calculating the torsional moment	Download	Preview

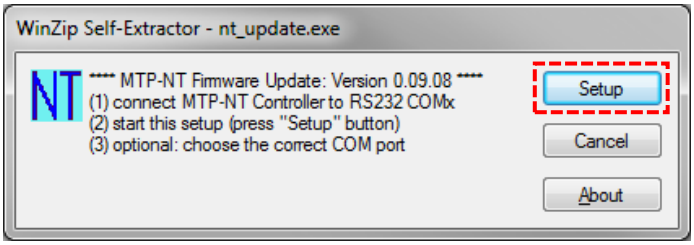
Auxiliary

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

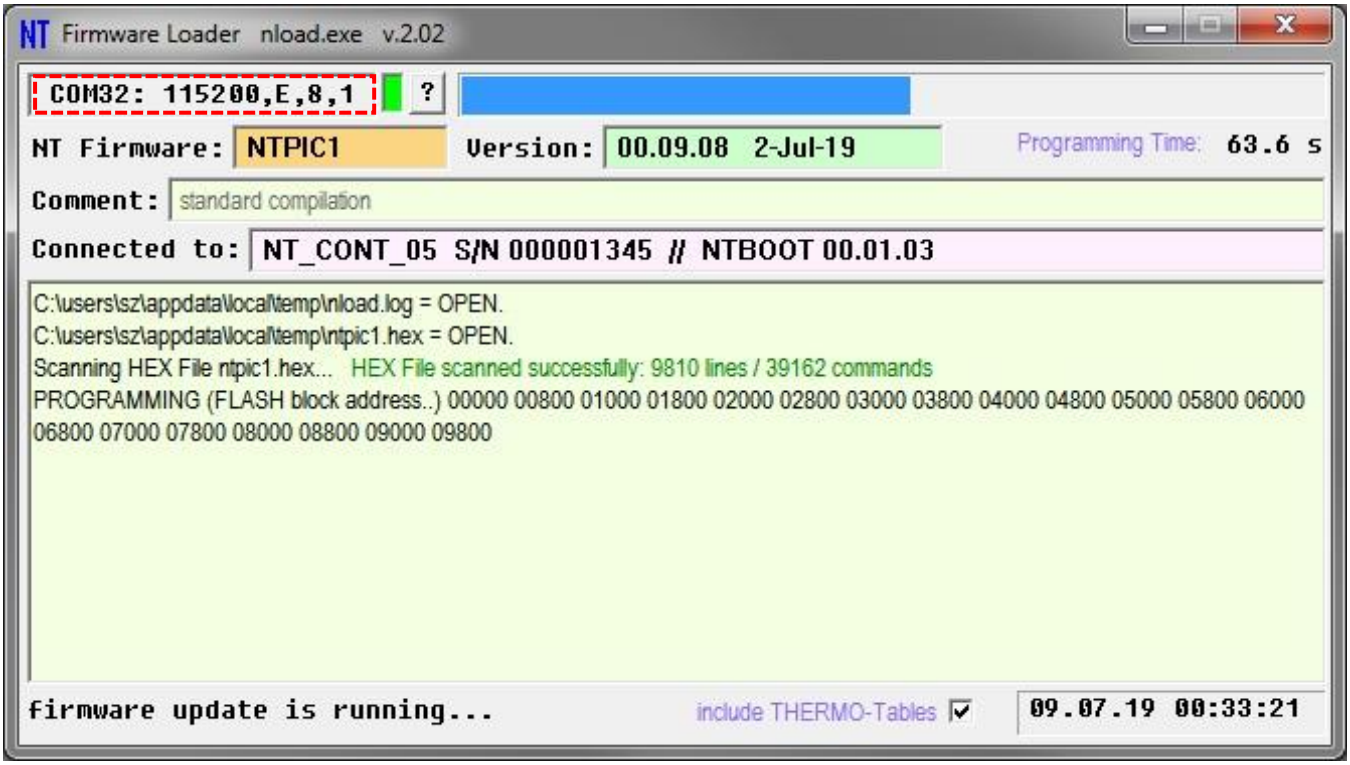
NT Module Firmware:

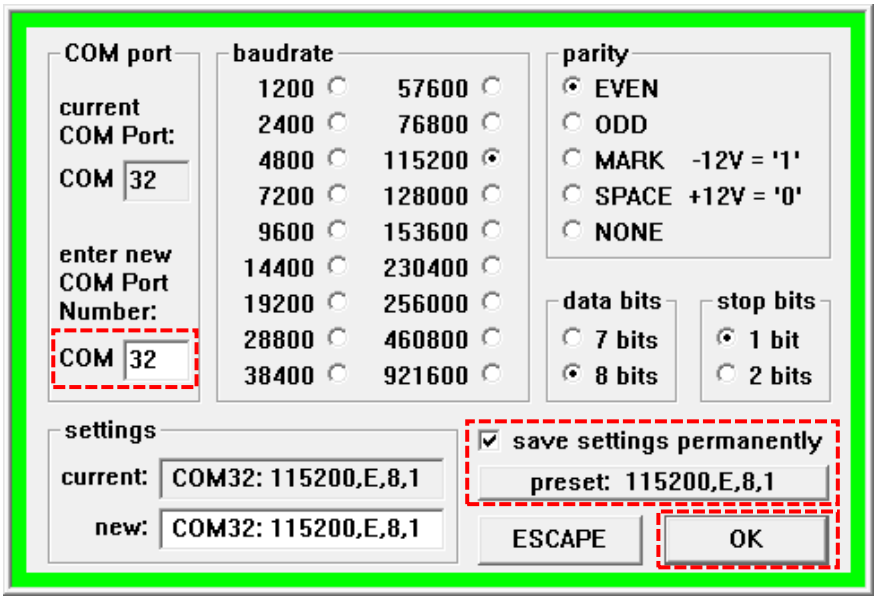
Go to the official NT support site (https://www.kmt-telemetry.com/support/mtp-nt/) and download the firmware setup file **nt_update.exe** as shown in the below figure.





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.





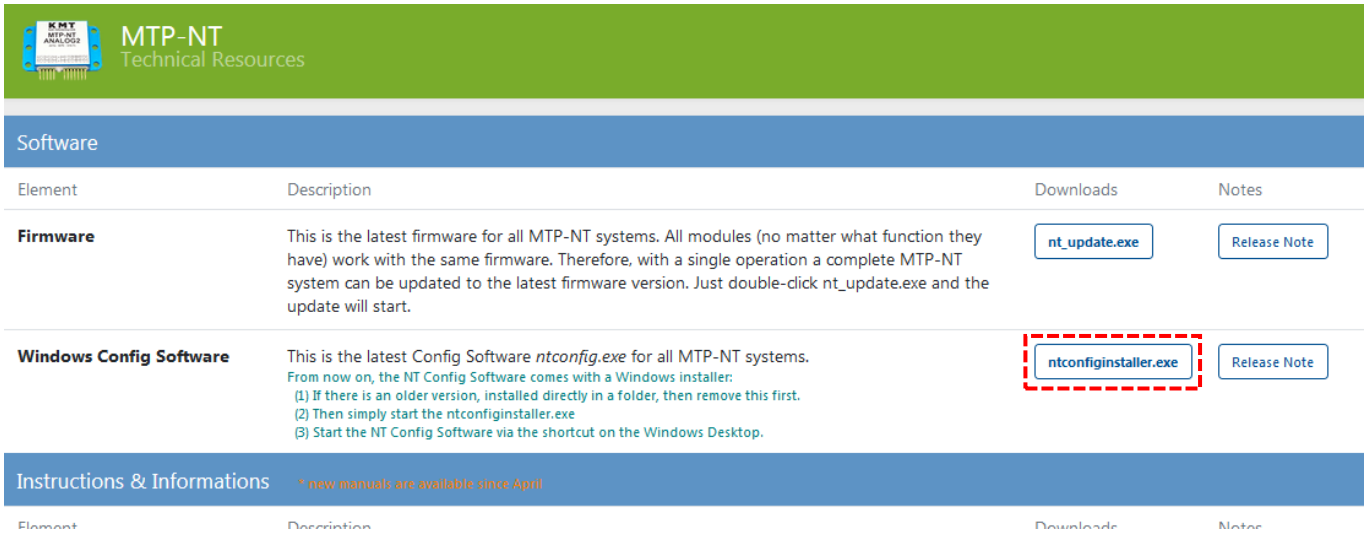
To change the COM port click on the *COM port settings* box that is located on the top left corner (marked in red).

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).

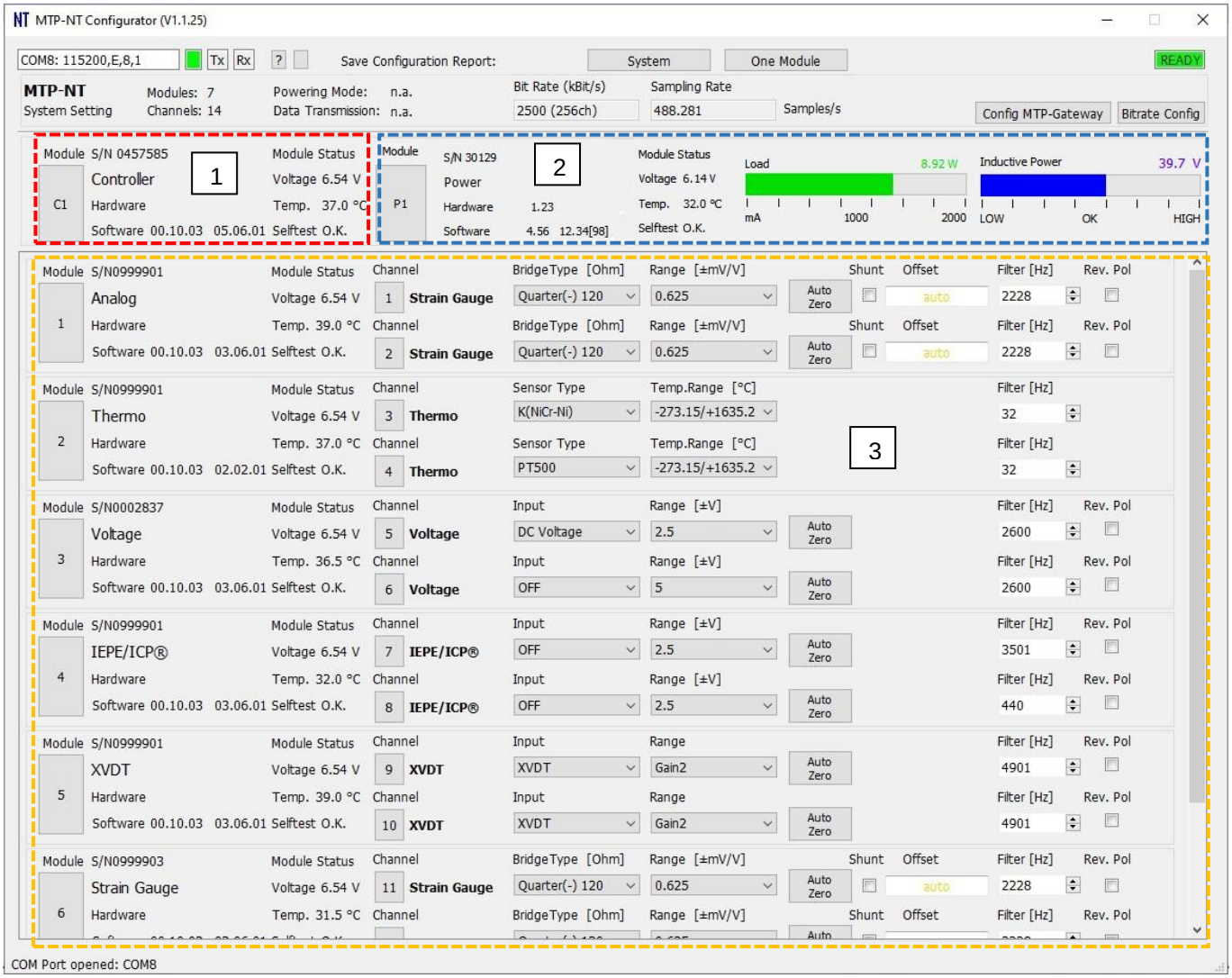
Note: In the case of connection problems, you should check the Device Manager to see if the COM port used is available.

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.



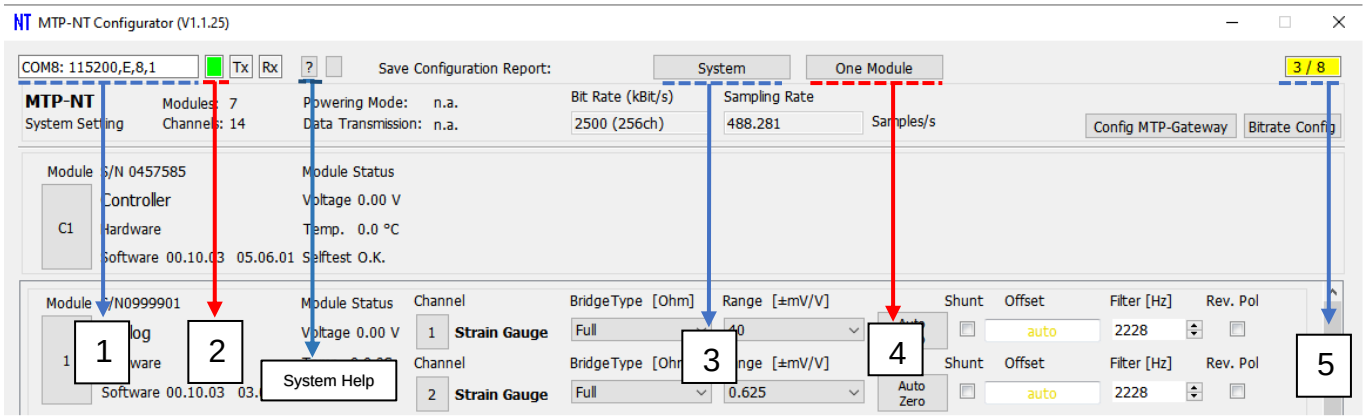
This will be described in more detail soon ...



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.

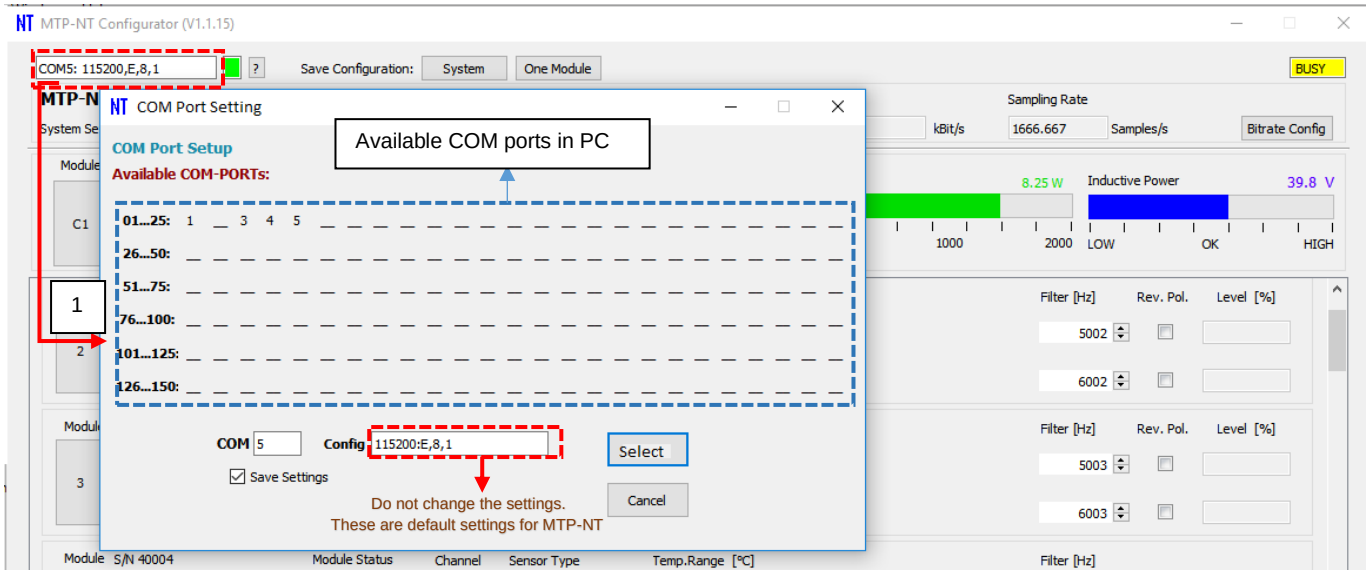
   Yellow: This color means that serial port is available but unable to contact or communicate with MTP_NT system.

   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.

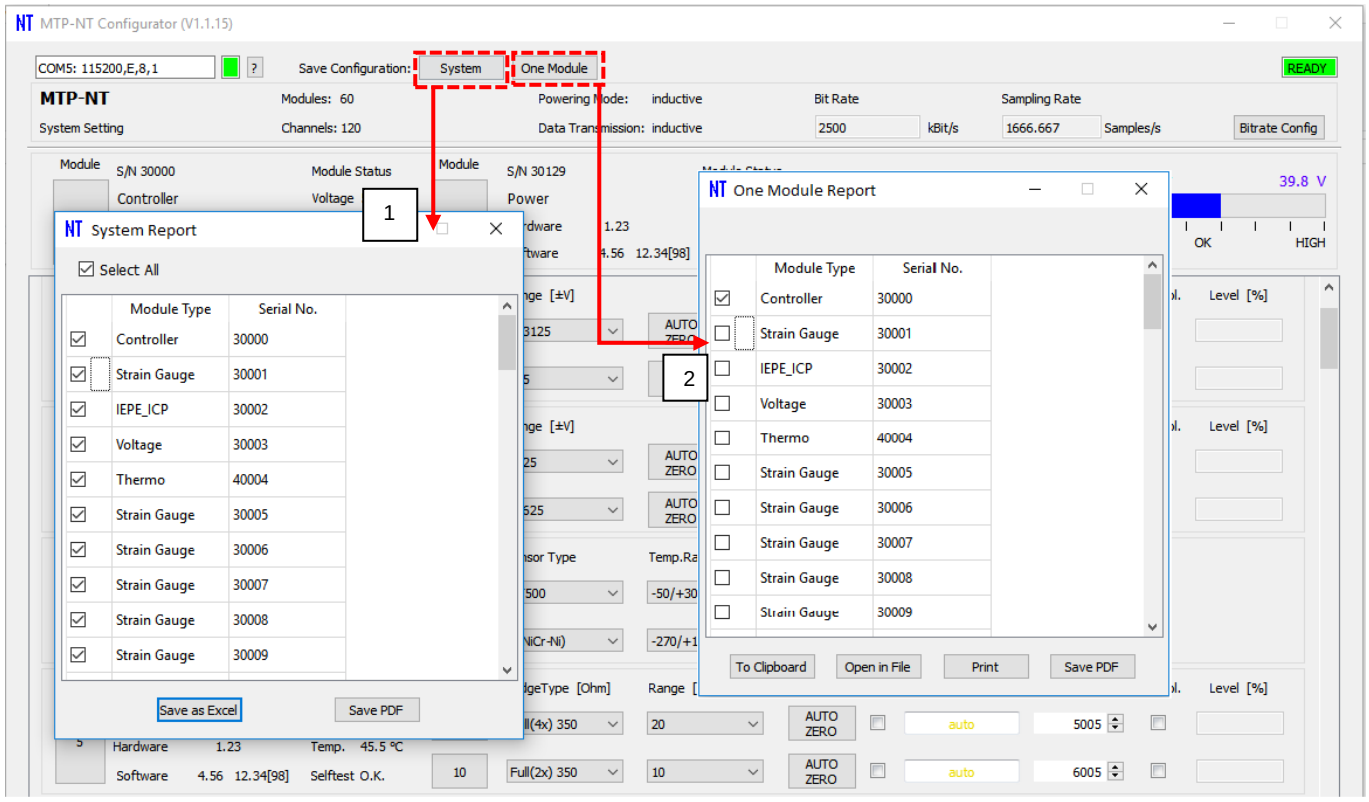
4. **Single Module Report:** Click this button to save the single module report among available options. This section is described in the next page.

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.

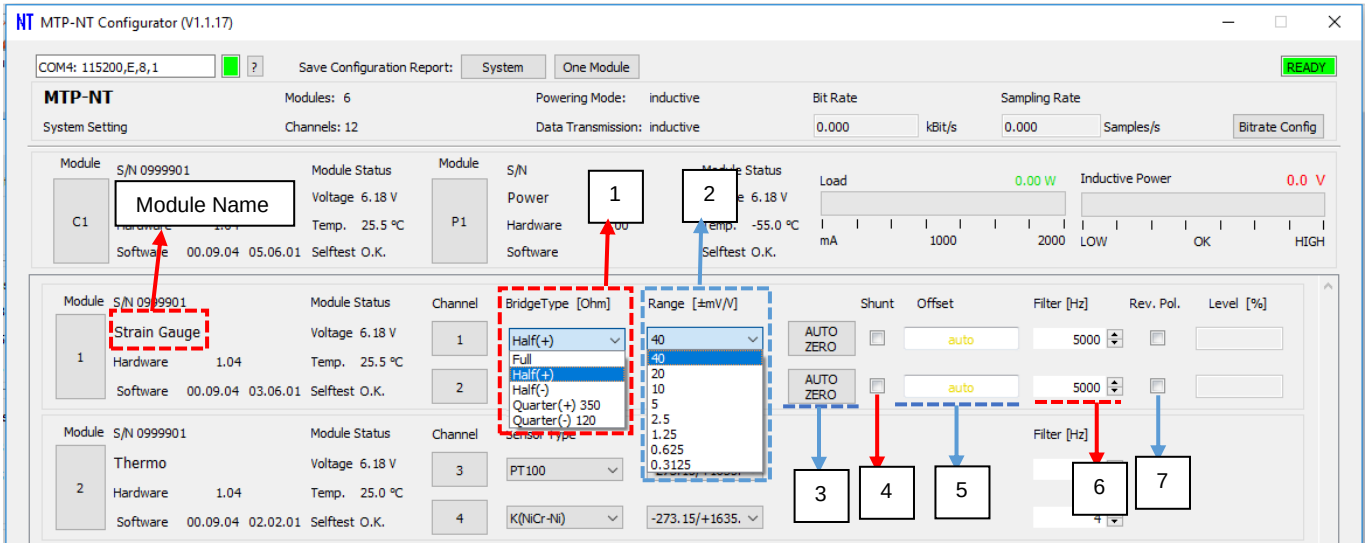


To change the COM port, click on the *COM port settings* box that is located on the top left corner (marked in red).

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). 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.

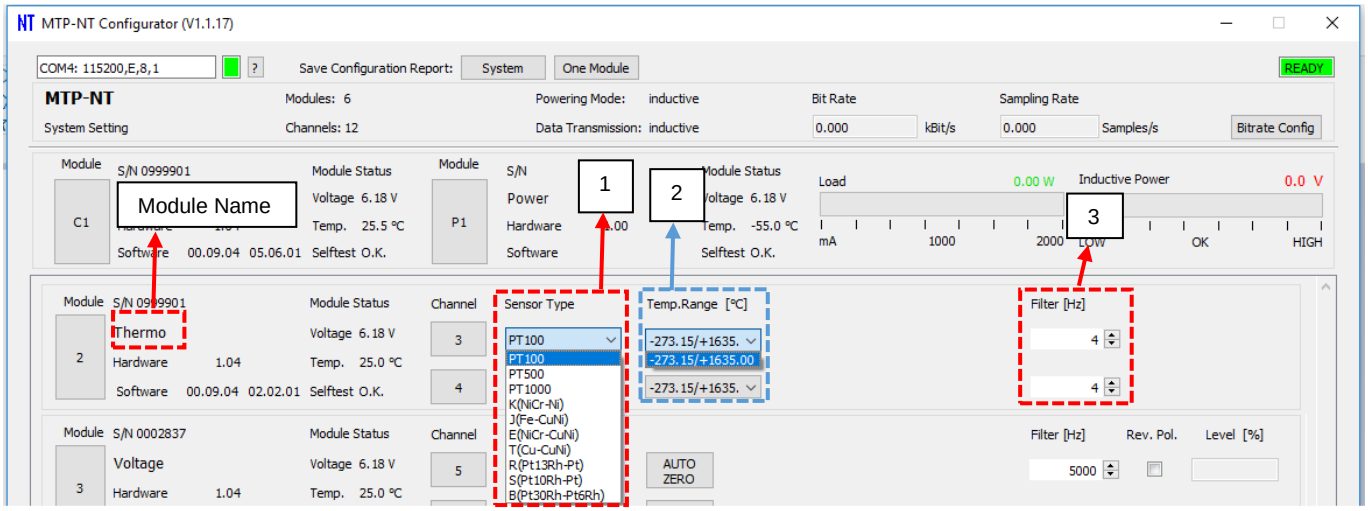
5. **Shunt : -** Clicking this option enables the shunt for the specific channel in the module.

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.



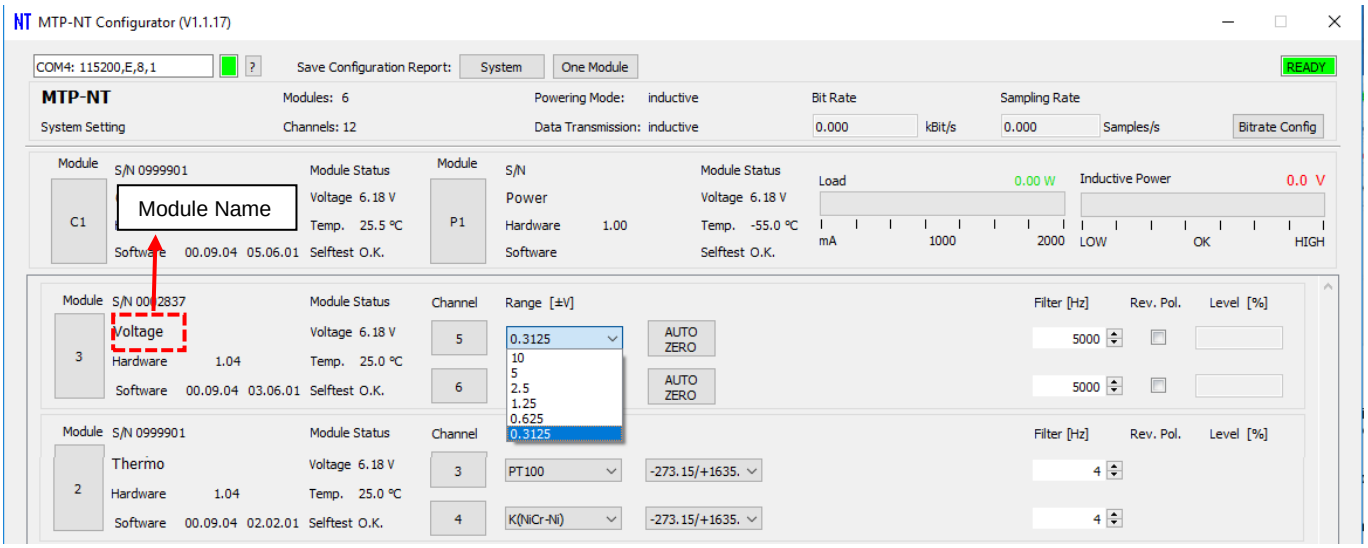
Thermo Module

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

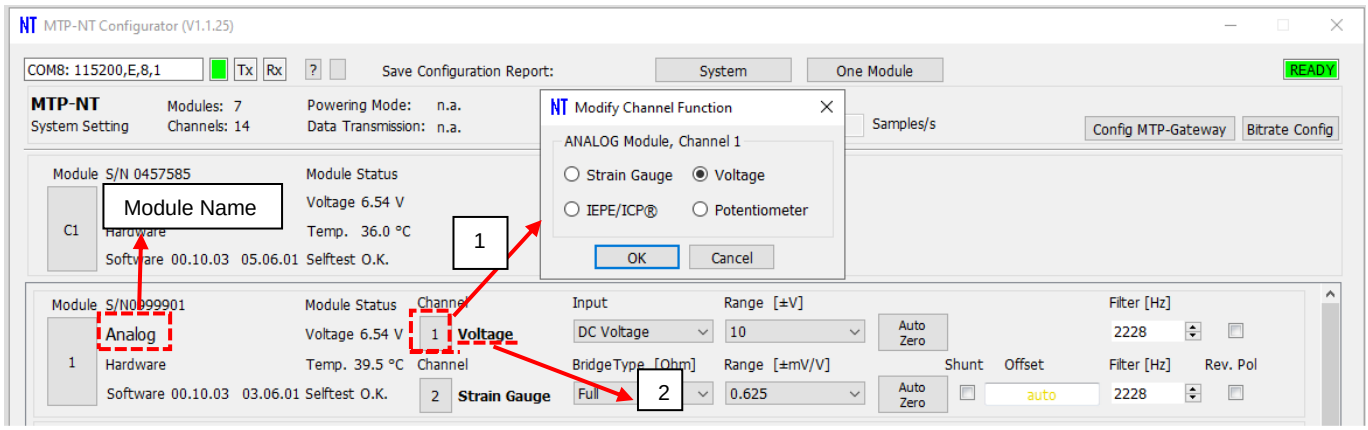
2. **Temperature range: -** The temperature range could be modified by selecting the drop box by the user.

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

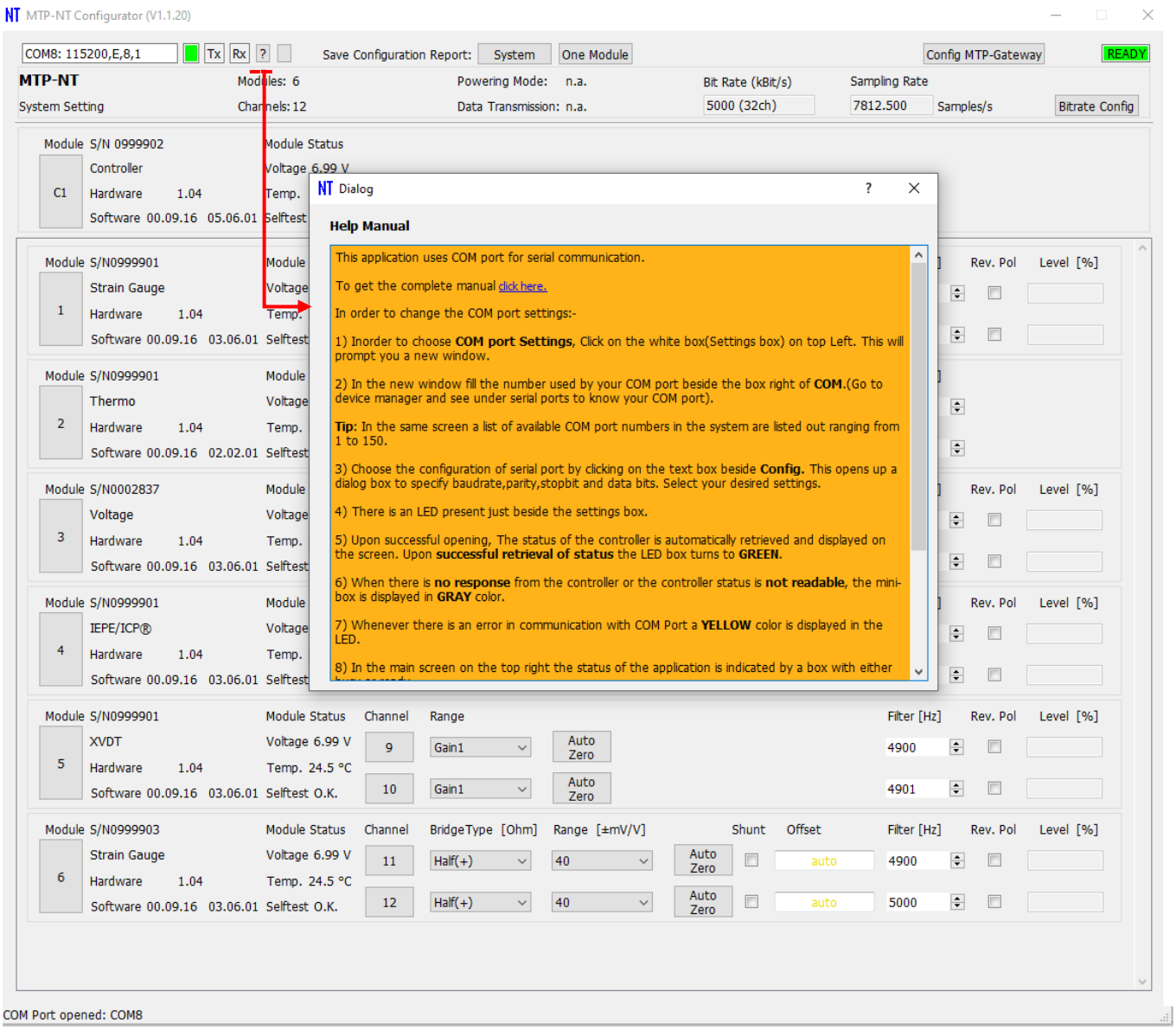
The Analog module channels can be configured to a different channel function type such as Strain Gauge, Voltage, IEPE/ICP and Potentiometer.

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.

05.06.16 Version 002

KMT IP LAN Interface TCP Settings

1. TCP Block Format

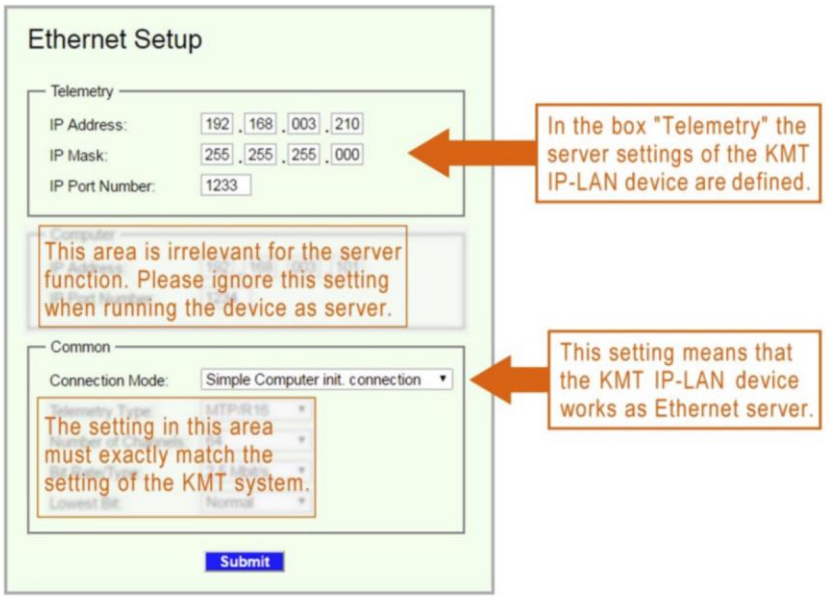
Index	Name	Size / Format	Example	Comment
0	frame_size	2 Byte unsigned int	00000000 00001000 Frame Size = 8 Bytes	Frame Size in Bytes
2	number_of_frames	2 Byte unsigned int	00000000 00001010 10 Frames	Number of Frames
4		frame_size (Bytes)		first Frame
...	...	...	...	...
n		frame_size (Bytes)		last Frame

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