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CTP16-Rotate

16 channel telemetry for rotating applications like wheels or rotors, high signal bandwidth, 16bit, software programmable

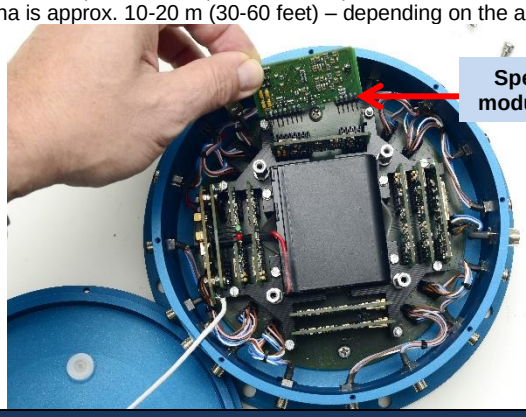
User Manual

INSTRUCTIONS FOR QUALIFIED PERSONNEL ONLY!

- Inputs for STG, TH-K, ICP, VOLT …
- Simultaneous sampling
- 16 bit resolution
- Software programmable
- Signal bandwidth: 16 x 0-6000Hz
- Battery power up to 8-10h
- Radio telemetry transmission
- Output analog +/- 10V
- Digital data interface to PC (option)
- Waterproofed ENC housing (IP65)

General functions:

The CTP16-Rotate is a 16-channel telemetry system for rotating applications with integrated signal conditioning for sensor signals, wireless digital transmission and analog reproduction.
In the encoder/transmitter unit the sensor signals are conditioned, filtered (anti-aliasing) and digitized (16-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), Pt100/1000, ICP sensors, potentiometer sensors (POT) and also voltage inputs. Mixed configuration available (2-CH-steps).
All sensor modules are software programmable via LAN-Adapter. The LAN-Adapter has an integrated web interface and enables easy access to modules!
The stationary receiver provides 16 +/-10V analog outputs via Sub-D male socket (option: digital PC interface).
The analog signal bandwidth is 0-375 Hz (320kbit) and up to 0-6000Hz (5000kbit) for 16 channels. The measurement accuracy is <±0.2 % (without sensor). The CTP16-Rotate is specified for operational temperatures from -20° 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).



Frequency table	Cut off frequency from anti-aliasing filter (-3dB) and sampling rate (see red)
Bit rate	**16 CH.**
5000kbit	6000Hz (15625Hz)
2500kbit	3000Hz (7812.50Hz)
1250kbit	1500Hz (3906.25Hz)
625kibt	750Hz (1953.125Hz)
312.5kbit	375Hz (976.56Hz)

CAR wheel	Truck wheel	Helicopter rotor
		

CTP16-Rotate Transmitting Unit Technical Data (Encoder)

Encoder in IP65 Aluminum housing | Encoder inside

System Parameters ENCODER:

Channels:	16
Resolution:	16 bit A/D converter with anti-aliasing filter, simultaneous sampling of all channels
Line-of-sight distance:	up to 20m (depends of application and bit rate)
Powering:	Li Ion Accumulator 7.2V, 7800mAh, capacity up to 8-10 hours
Power consumption:	700 mA using 16x STG full bridge sensors 350 Ohms
Analog signal bandwidth:	See table
Transmission:	Digital PCM Miller format - FSK
Transmission Power:	10mW!
Dimensions:	Diameter 190mm, bottom plate diameter 220mm, height 70mm (without antenna)
Weight:	2.00kg without sensor cables and antenna
Operating temperature:	- 20 … +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, 2000 RPM
Shock:	200g in all directions

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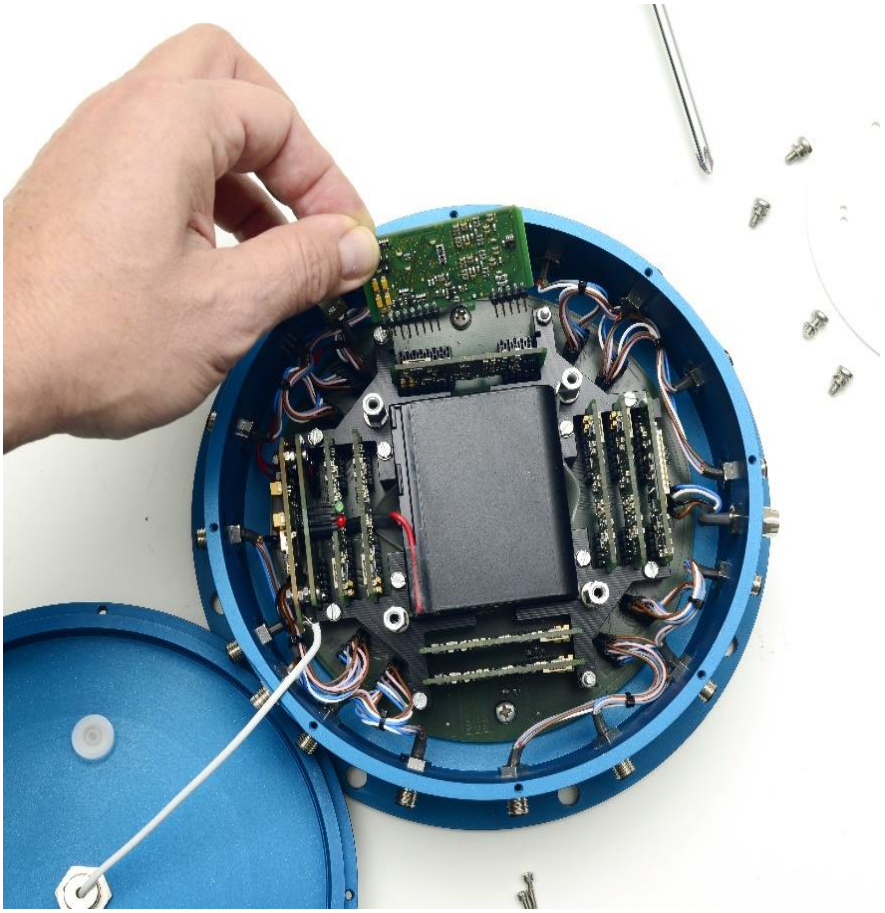
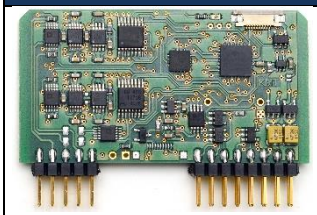
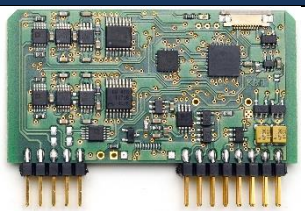
CTP16-Rotate Transmitting Unit Technical Data (Encoder)



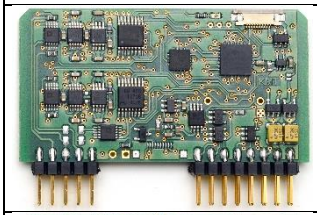
CTP acquisition modules (rotor side)



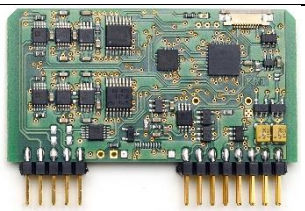
CTP-STG-V3
Acquisition module for 2 strain gages
Full, half and quarter bridge (≥350Ω)
Fixed excitation 4V DC
Offset calibration by auto zero
Manual offset shifting after auto zero
Gain: 125-250-500-1000-2000
Test shunt-cal step
Signal bandwidth 0Hz to 6000Hz*
(*see table of cut-off-frequency)
Resolution 16bit
Accuracy <0.2%
Current consumption with full bridge 350 ohm 75mA



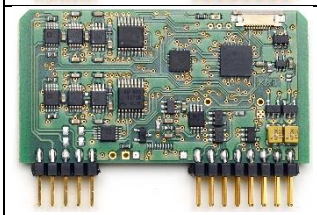
CTP-VOLT-V3
Acquisition module for 2x high level inputs
Range: ±0,625V, ± 1,25V, ±2,5V, ± 5V, ±10V
Signal bandwidth 0Hz to 6000Hz*
(*see table of cut-off-frequency)
Resolution 16bit
Accuracy <0.2%
Current consumption 60mA



CTP-ICP®-V3
Acquisition module for 2 ICP sensors
Current EXC. 4mA, 28V
Gain: 1-2-4-8-16-32
Signal bandwidth 3 Hz to 6000Hz*
(*see table of cut-off-frequency)
Resolution 16bit
Accuracy <0.2%
Current consumption 100mA

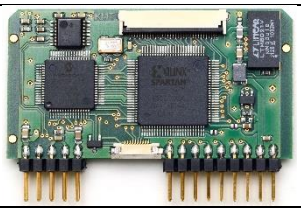


CTP-TH-K-V3
Acquisition module for 2x TH-K
Inputs galvanic isolated
Range -50 to 1000°C, -50 to 500°C
or -50 to 250°C
Cut-off filter 30Hz (more on request)
Resolution 16bit
Accuracy: 0.2% at 1000°C range
Current consumption 110mA



CTP-Pt100/1000 (RTD) V3
Acq. module for 2 RTD sensors
Range -100 to 600°C, -50 to 300°C
or -25 to 150°C
Type Pt100 or Pt1000
Current EXC. 1mA
Connection: 4-, 3- and 2 wire
Sensor break detection
Signal bandwidth 6Hz
Resolution 16bit
Accuracy <0.2%
Current consumption 60mA

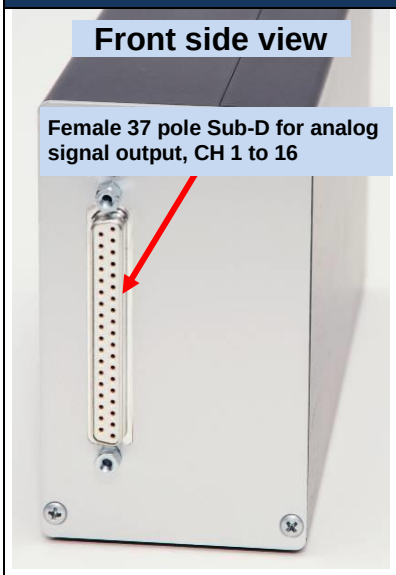
CTP-LVDT-RVDT V3
Acquisition module for 2 LVDT
Fixed excitation 3Veff
Signal bandwidth 0Hz to 20Hz*
Resolution 16bit
Accuracy <0.2%
Powering: 6.5-9V DC
Current consumption 70mA
Vibration: 5g
Static acceleration: 3000g
Shock: 10000g



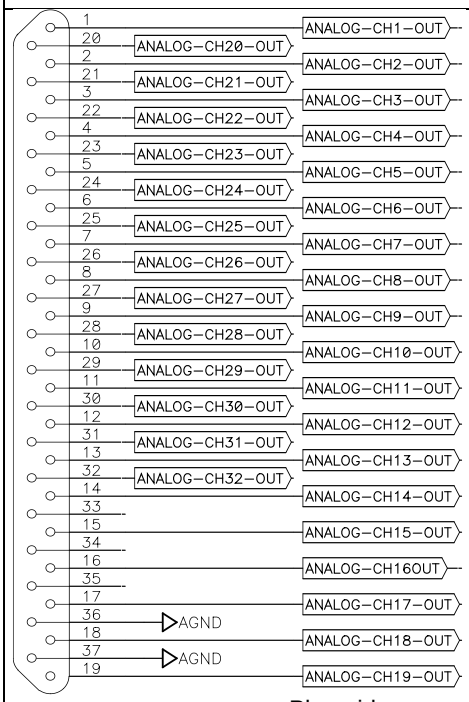
CTP-CONTROL-V3
Controller 1- 32 acquisition modules
Output: PCM
Programmable via LAN adapter
Current consumption 40mA, with LAN-adapter 140mA

CTP-DEC16 Receiver unit for max 16 Channels output via 37 pol. Sub D (radio transmission version with diversity receiver 312.5 … 1250kbit)

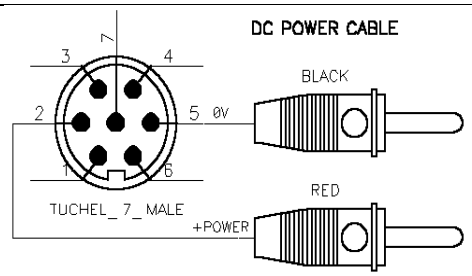
Front side view



Rear side view



Plug-side

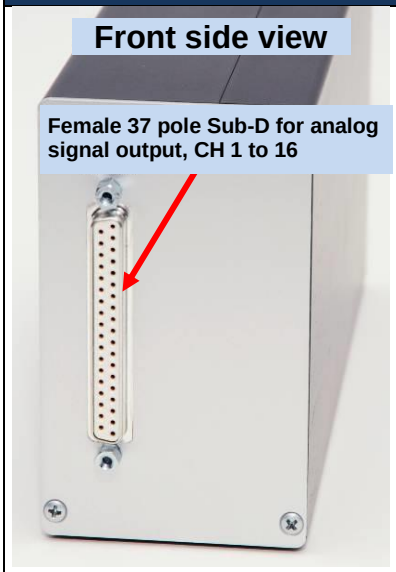


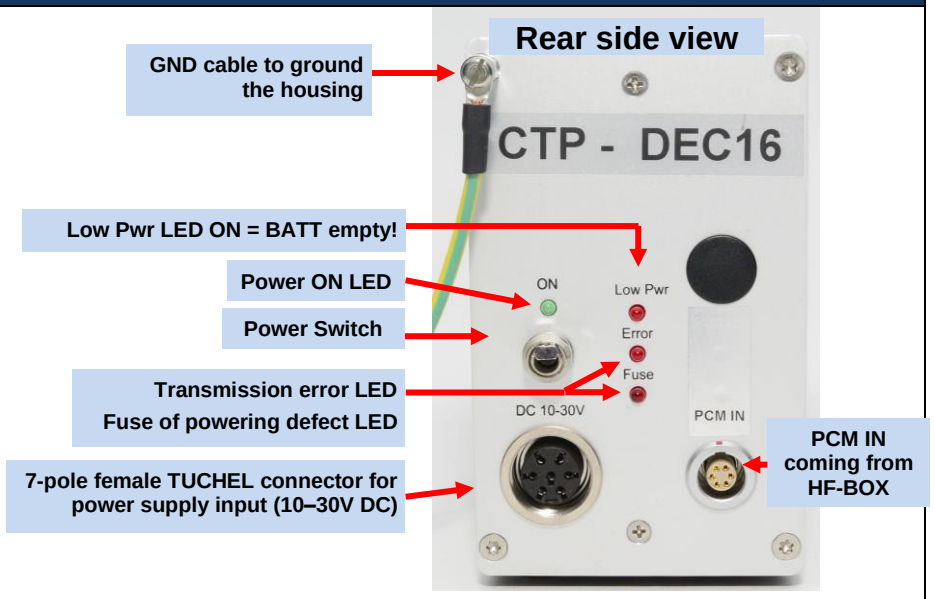
Optional BNC16 Box. Connect on 37pol Sub-D

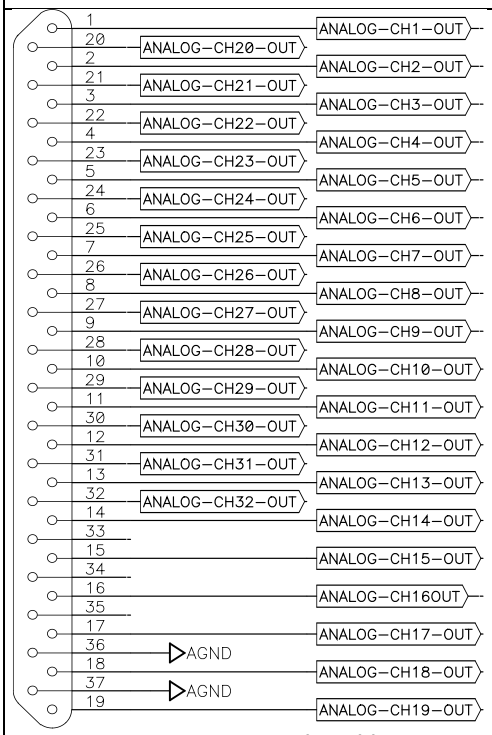
CTP –DEC16 System Parameters:

Channel:	16 x +/-10V analog outputs via Sub-D male socket
Resolution:	16 bit D/A converter, with smoothing filter
Power supply input:	10-30 VDC, power consumption <24 Watt
Transmission:	Digital PCM Miller Format – FSK,
Dimensions:	205 x 105 x 65mm
Weight:	1.25 kg without cables and antenna
Overall system accuracy between encoder input and decoder output:	+/-0.25% without sensor influences
Environmental	
Operating:	-20 … +70°C
Humidity:	20 ... 80% not condensing
Vibration:	5g
Static acceleration:	10g in all directions
Shock:	100g in all directions

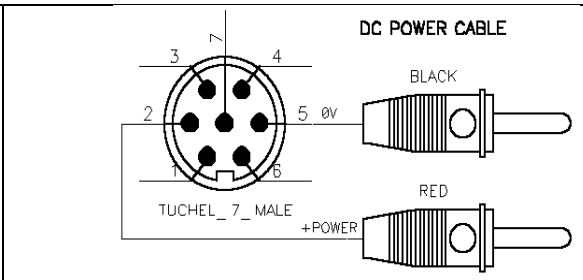
CTP-DEC16 Receiver unit for max 16 Channels output via 37 pol. Sub D (radio transmission version via quad receiver for 2500kbit and 5000kbit)







Plug-side



Optional BNC16 Box. Connect on 37pol Sub-D

CTP - DEC16 System Parameters:

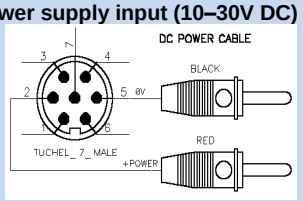
Channels:	16 x +/-10V analog outputs via Sub-D male socket
Resolution:	16 bit D/A converter, with smoothing filter
Power supply input:	10-30 VDC, power consumption <24 Watt
Analog signal bandwidth:	see frequency table
Transmission:	Digital PCM Format
Dimension:	205 x 105 x 65mm
Weight:	1.00kg without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

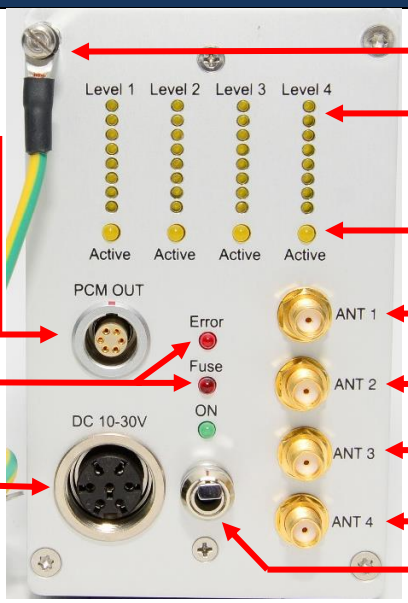
CTP-DEC16 Receiver unit for max 16 Channels output via 37 pol. Sub D (radio transmission version via quad receiver for 2500kbit and 5000kbit)

PCM OUT
Pin 1 -----
Pin 2 = PCM + (pink wire)
Pin 3 = PCM -- (blue wire)
Pin 4/5 = common GND & shield (black/green)
Pin 6 -----

Transmission error LED
Fuse of powering defect LED

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





GND cable to ground the housing

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

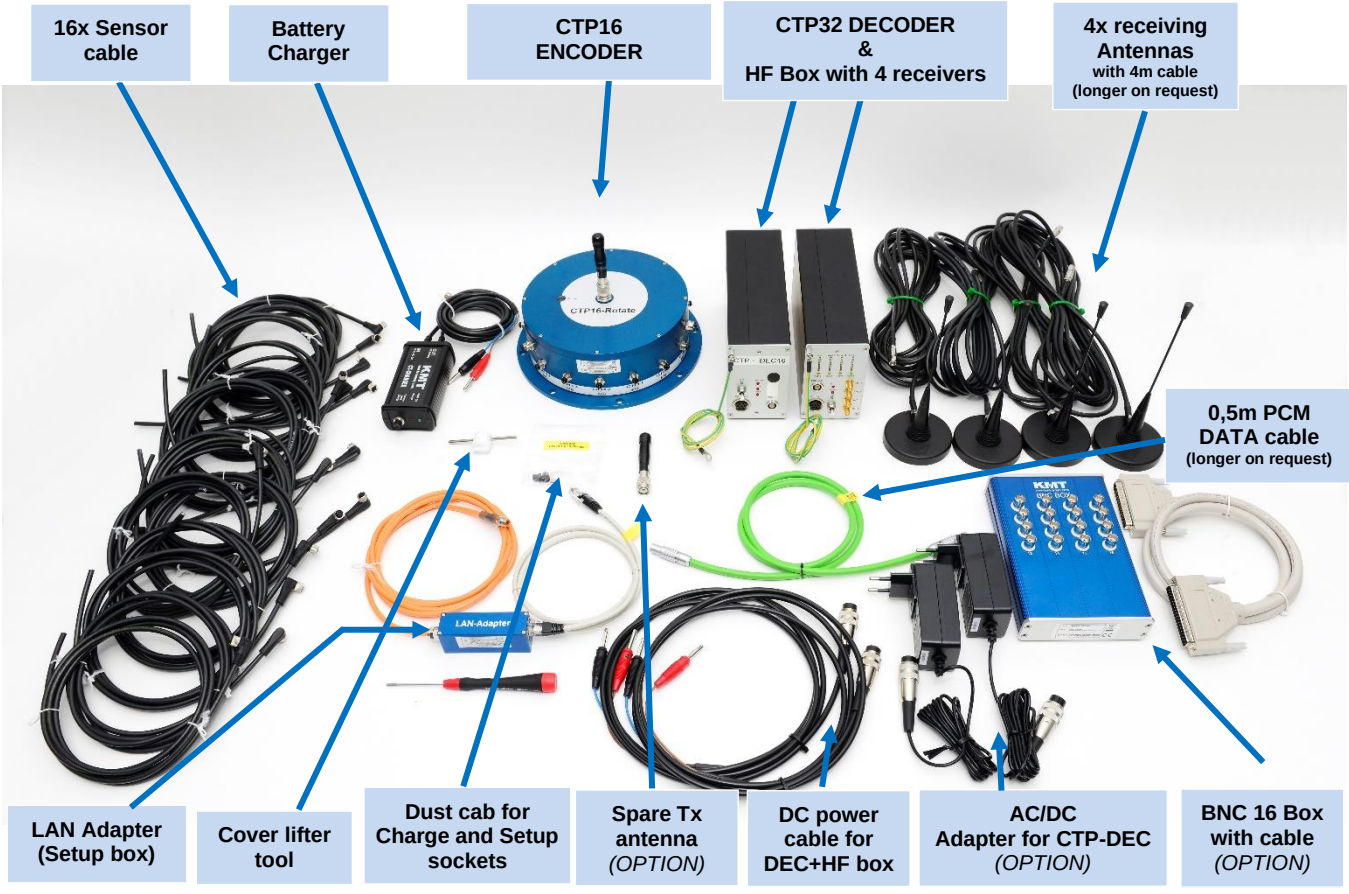
PCM/ DATA cable
Length 0.5m standard
(up to 25m on request)

HF BOX Quad System Parameters:

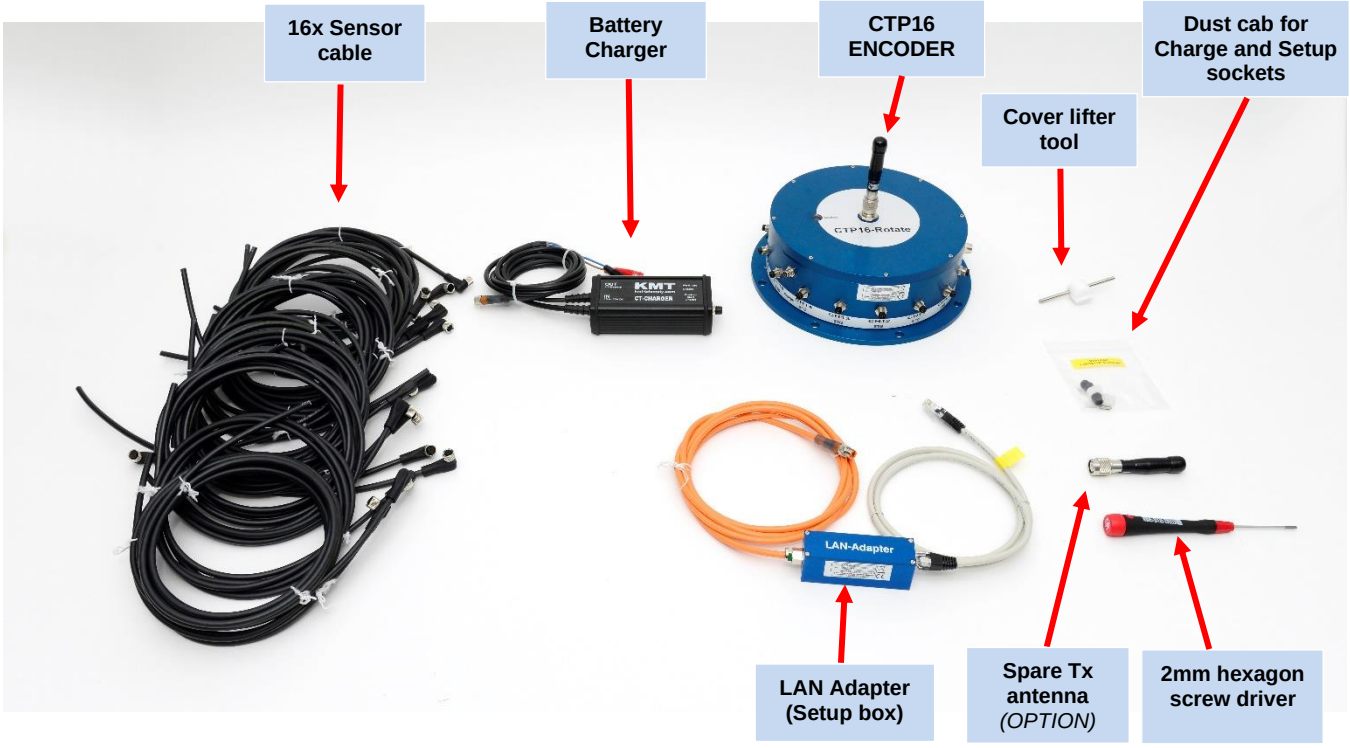
HF receivers	4
Antenna connection	SMA
Output	PCM
Power supply input:	10-30 VDC, power consumption <24 Watt
Dimensions:	205 x 105 x 65mm
Weight:	1.05 kg without cables and antenna
Environmental	
Operating:	-20 … +70°C
Humidity:	20 ... 80% not condensing
Vibration:	5g
Static acceleration:	10g in all directions
Shock:	100g in all directions

SET of CTP16-Rotate with diversity receiver (two receiver)
315.5k…1250kibt telemetry

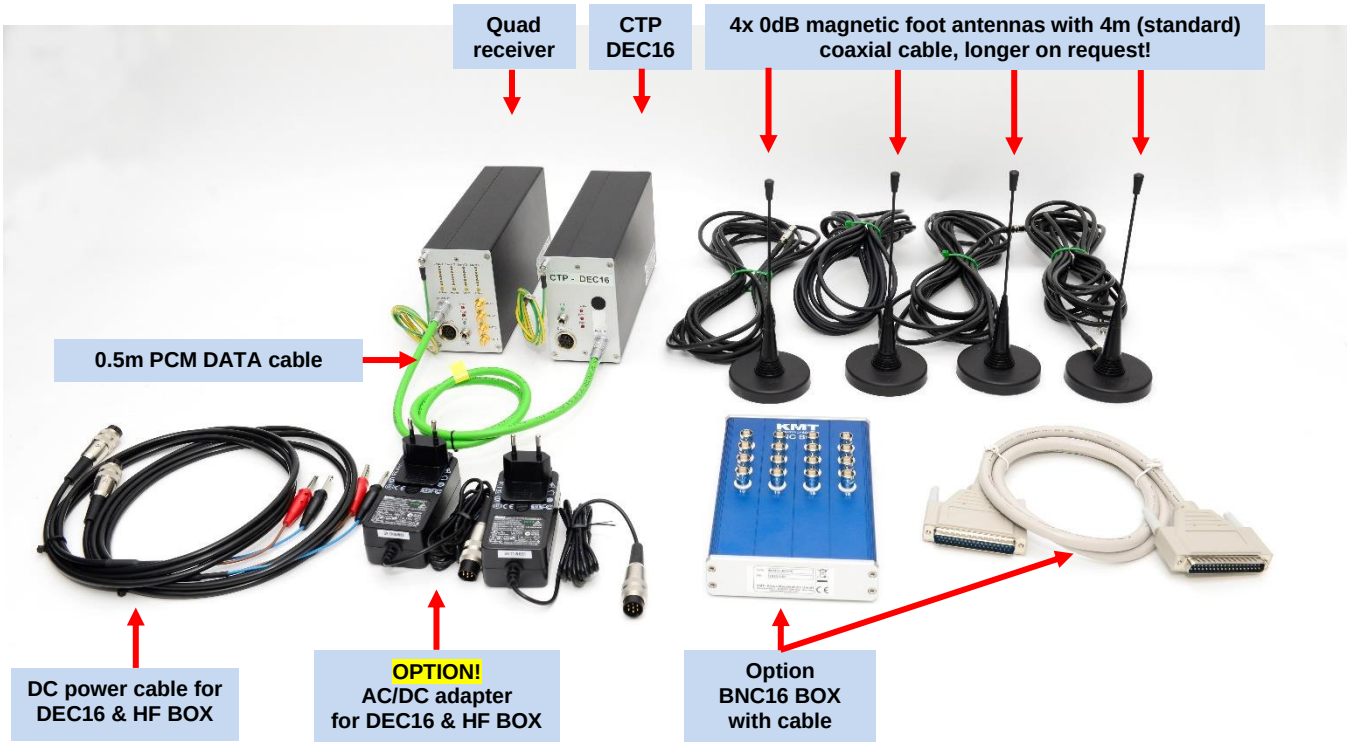
SET of CTP16-Rotate with diversity receiver (four receiver)
2500…5000kibt telemetry



Set of CTP-Encoder (rotating part)



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



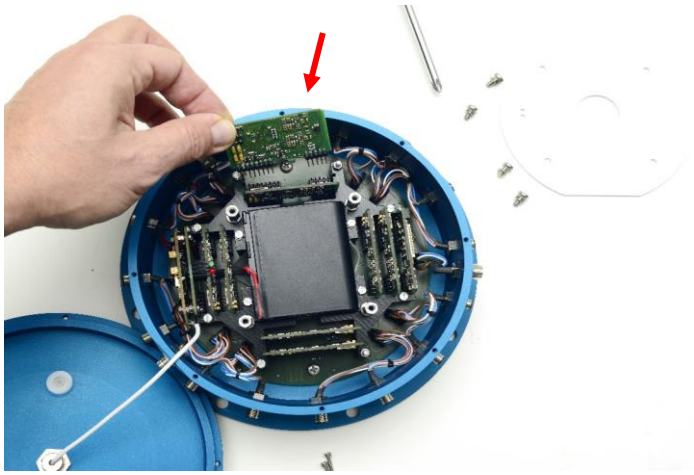
CTP16-Rotate Encoder – How to open device – Normal not necessary, only if you must change modules!

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

2. Use cover lifter to open the cover carefully

3. Open 4 screws from modules holder ring **(screw with spring washer!)**

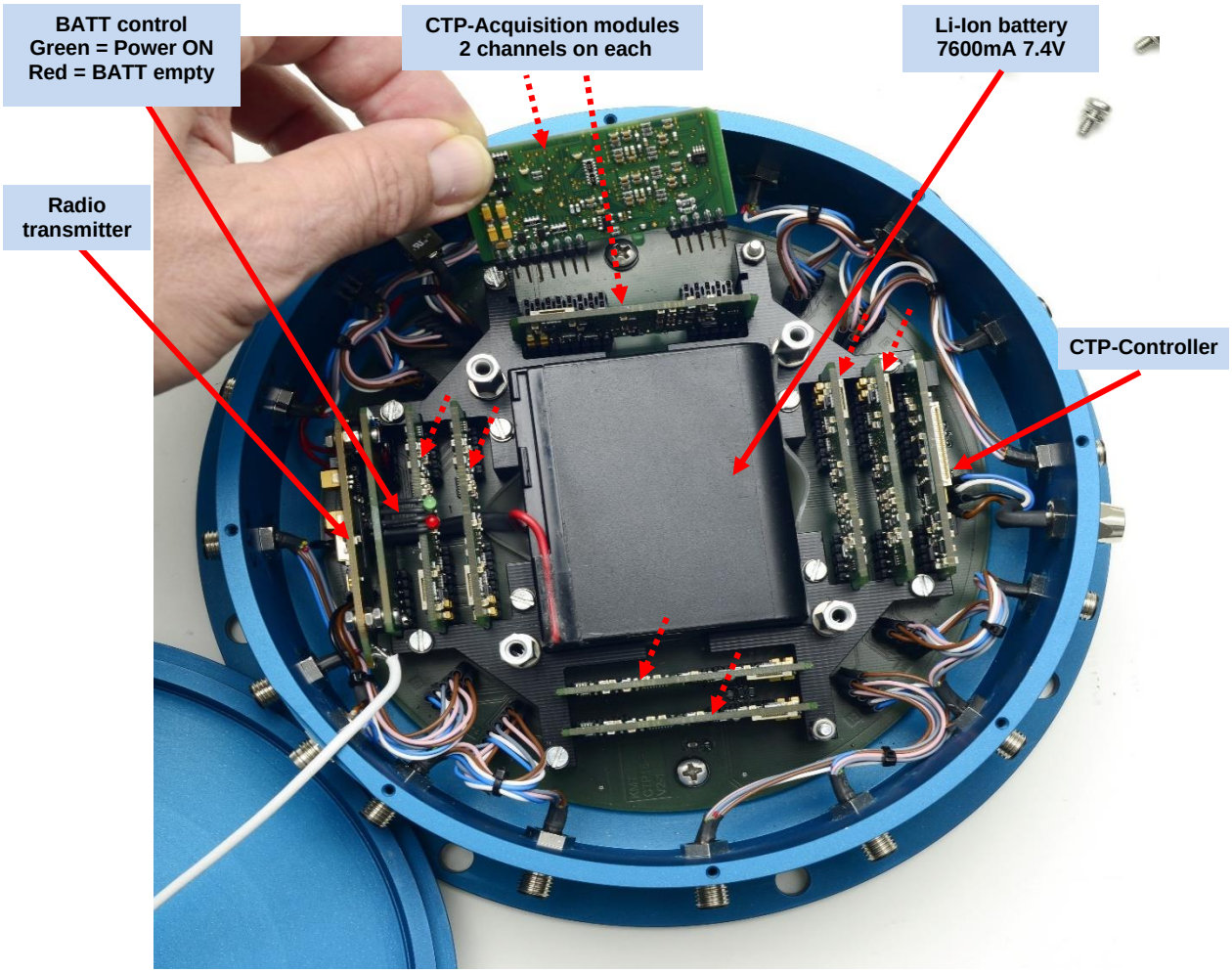
4. Remove the holder ring

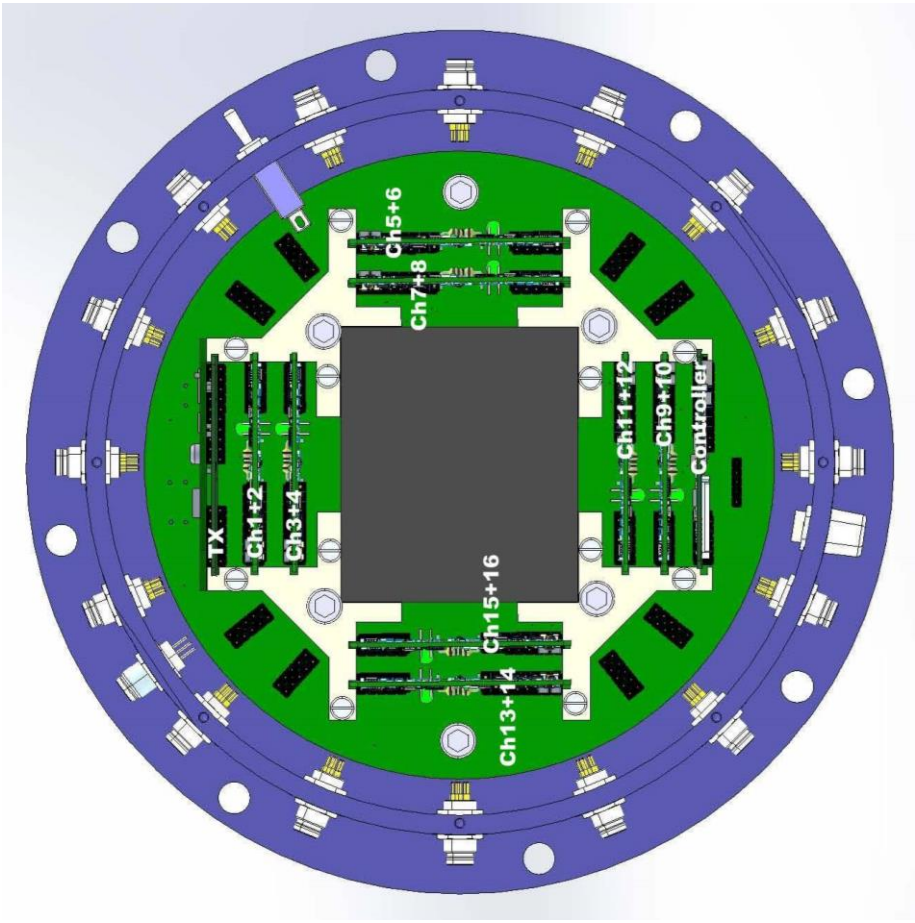


5. Now you can change CTP-Acquisition modules

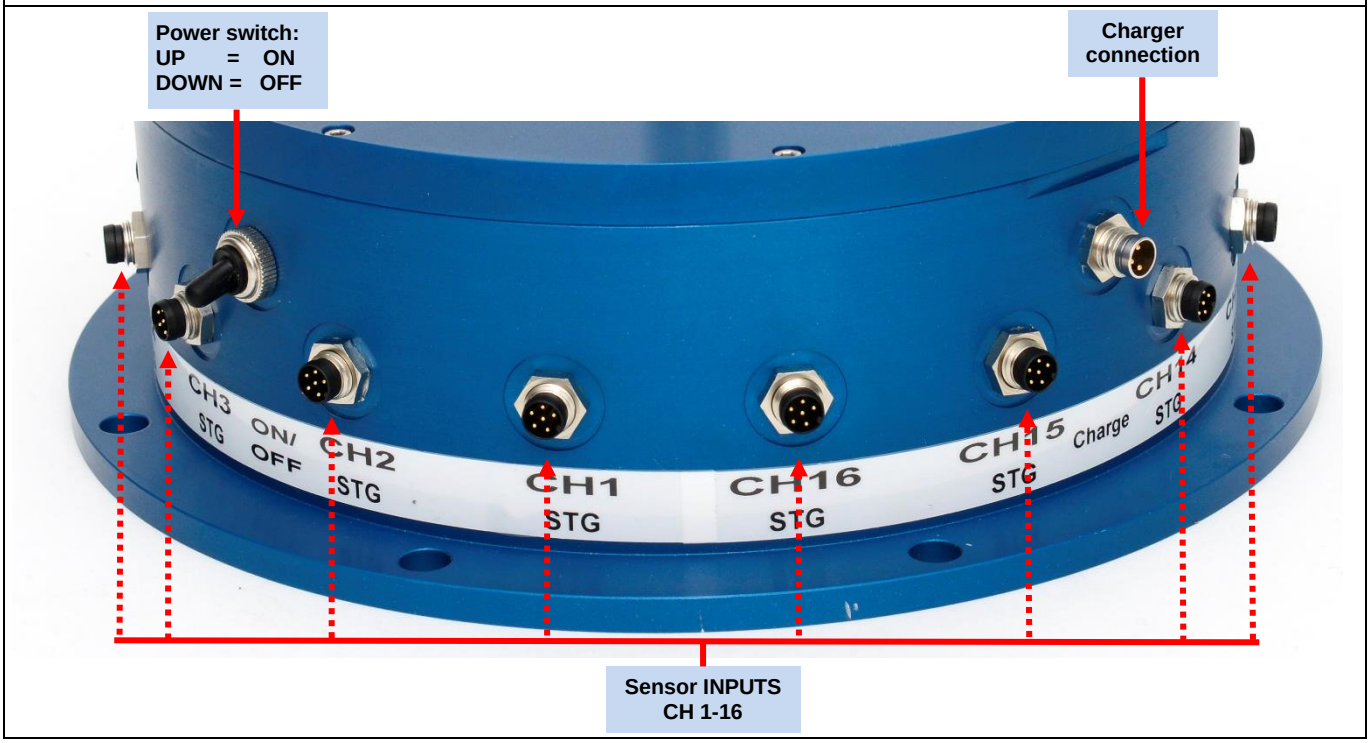
Take care with connectors of modules. Be sure that all pins are in right connection!

CTP16-Rotate Encoder – Modules



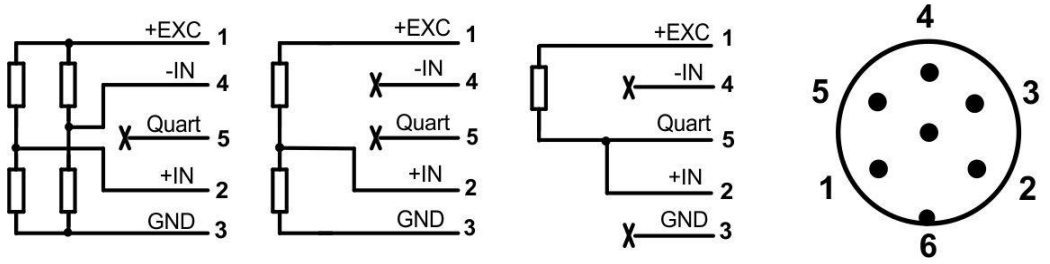


CTP16-Rotate Encoder – Pin connection



CTP16-Rotate Encoder – Pin connection

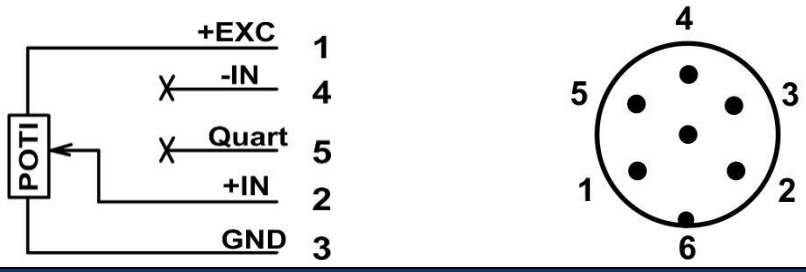
Strain gage connection



Cable colors:

1= brown / +EXC
2= white / +IN
3= blue / -EXC
4= black / -IN
5= grey / Quart
6= pink / -----

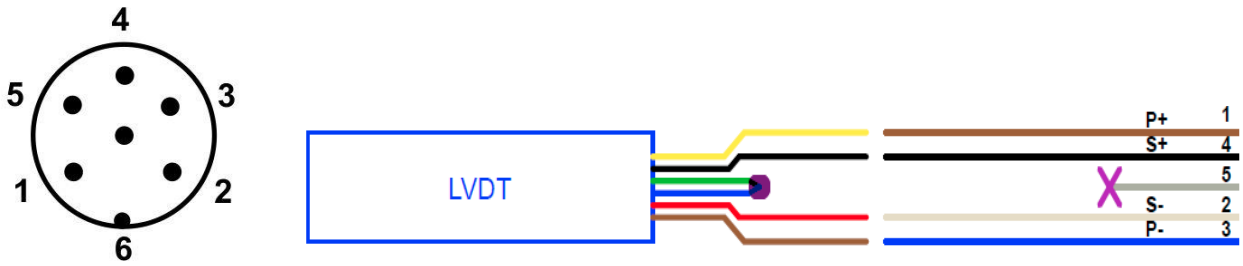
Potentiometer



Cable colors:

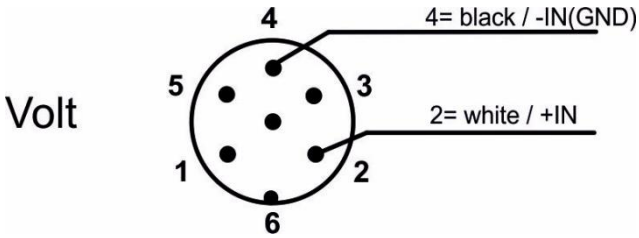
1= brown / +EXC
2= white / +IN
3= blue / -EXC
4= black / -IN
5= grey / Quart
6= pink / -----

LVDT / RVDT

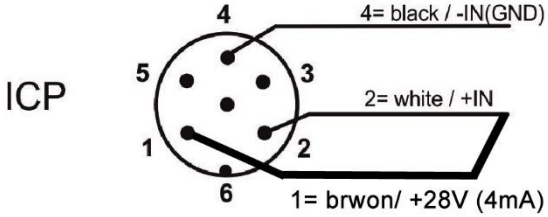


Yellow -> Brown	(P+) 1
Black ->Black	(S+) 4
Green+Blue	(shortcut)
Red ->White	(S-) 2
Brown -> Blue	(P-) 3

VOLT connection

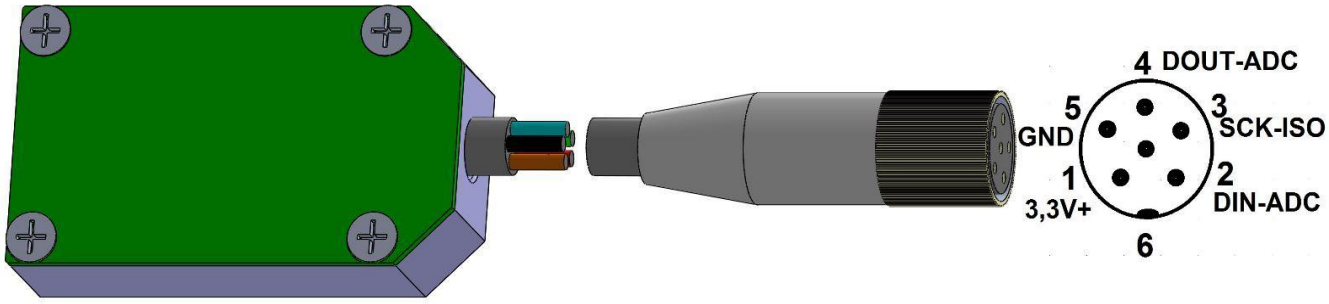


ICP connection



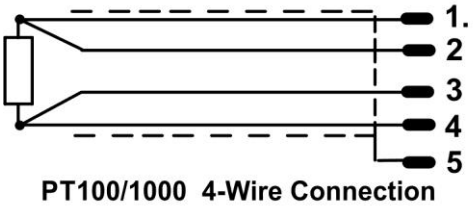
Pin 1+2 must connect together for ICP powering!

Th-K connection

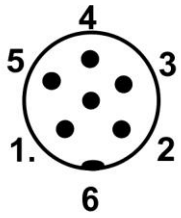


CTP16-Rotate Encoder – Pin connection

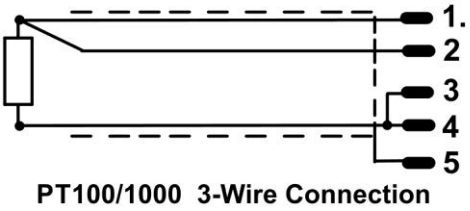
Pt100/1000



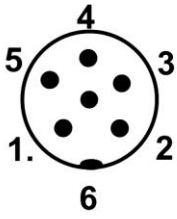
PT100/1000 4-Wire Connection



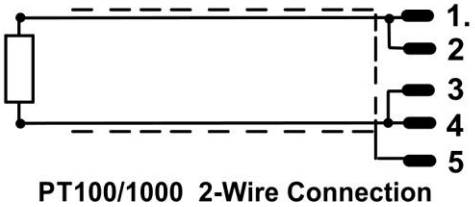
1= brown / +EXC
2= white / +IN
3= blue / -EXC
4= black / -IN
5= grey / Shield
6= pink / NU



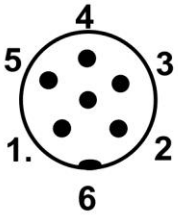
PT100/1000 3-Wire Connection



1= brown / +EXC
2= white / +IN
3= blue / -EXC
4= black / -IN
5= grey / Shield
6= pink / NU

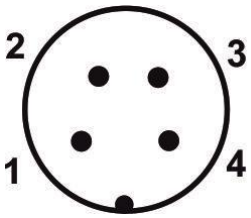


PT100/1000 2-Wire Connection



1= brown / +EXC
2= white / +IN
3= blue / -EXC
4= black / -IN
5= grey / Shield
6= pink / NU

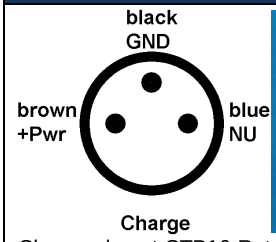
Setup LAN connection



Cable colors:

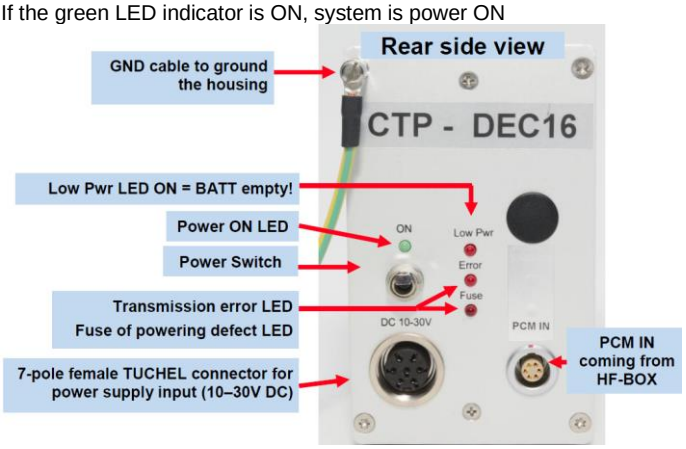
1= brown / +6,5V
2= black / RX
3= white / TX
4= blue / -----

Li Ion re-chargeable battery with charger unit for CTP16-Rotate – Version 2018



Charge plug at CTP16-Rotate ENC

Attention:
Li Ion Accumulator 7.2V 7800mAh has a capacity for about 8-10h.
If the green LED indicator is ON, system is power ON

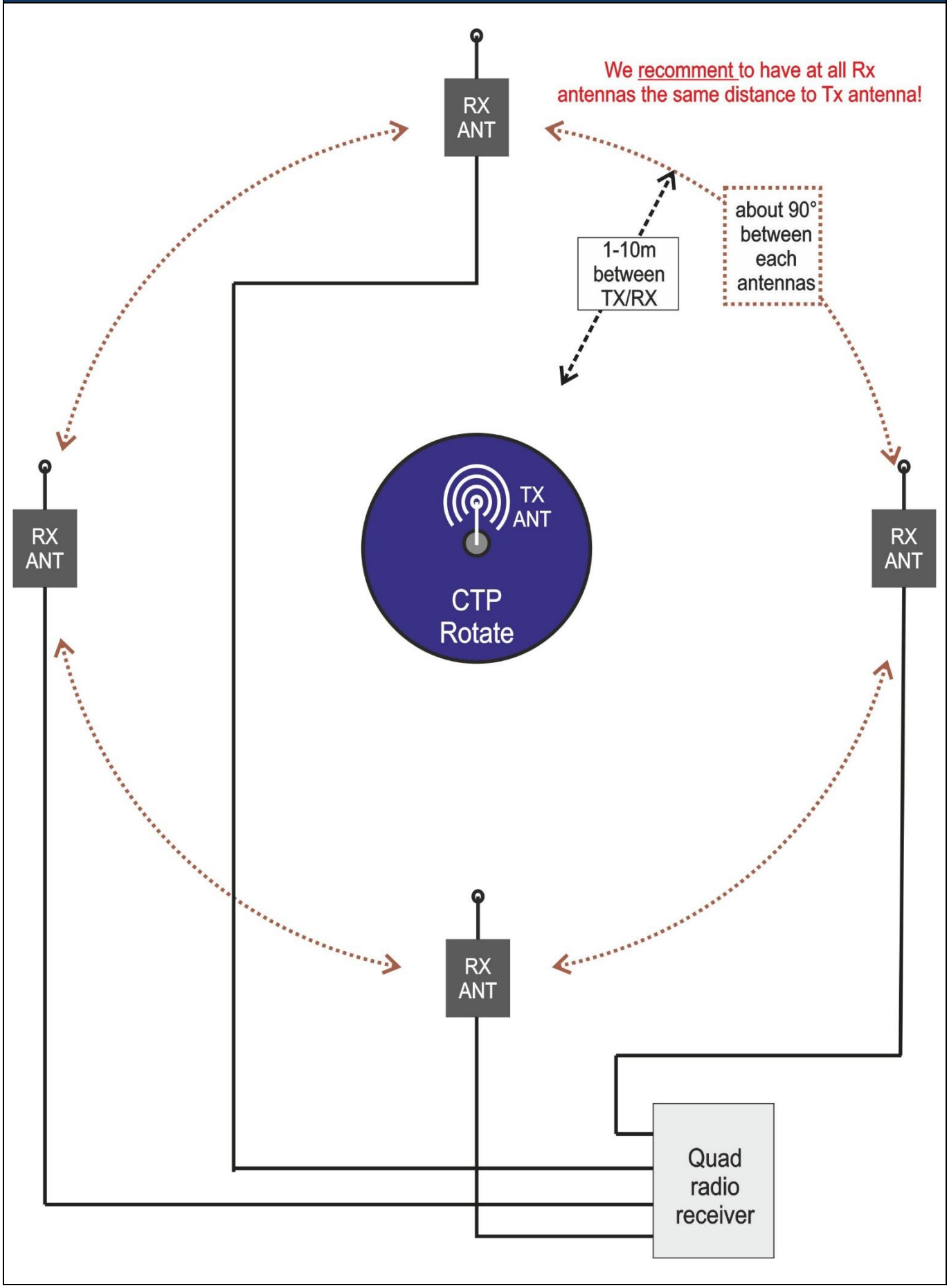


If the red LED indicator is ON, battery is about 90% discharged and the device will switch off after 20-30 minutes!

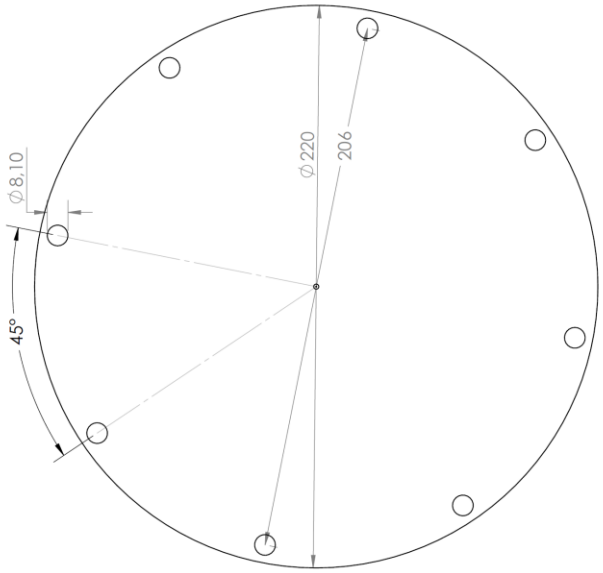
CT-CHARGER XL for CTP-Rotate

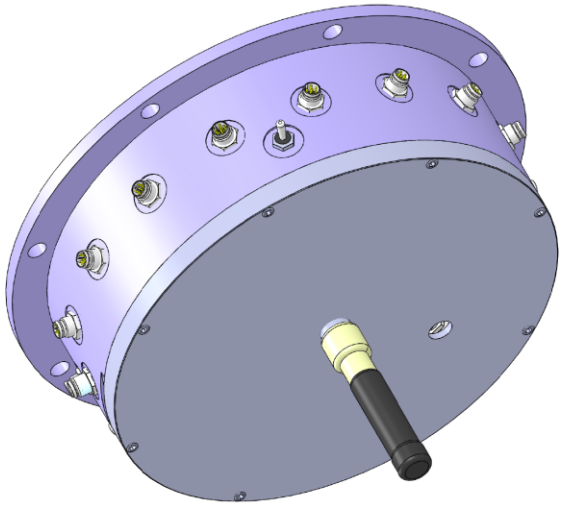
1. Plug the 3-pole socket (charger) in to the CTP-Rotate encoder.
2. Plug banana plugs on to a battery or AC/DC power supply with a voltage range of **20-30V, 50 WATT**
3. Battery begins to charge until the red LED of OFF

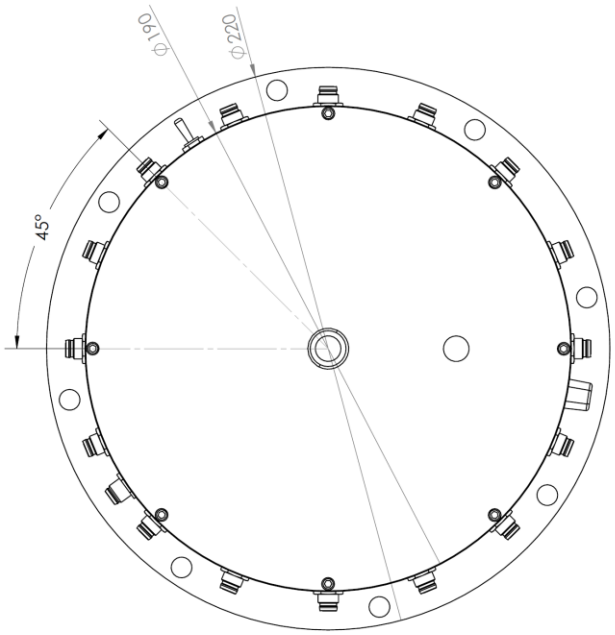
Recommend position of receiving antennas

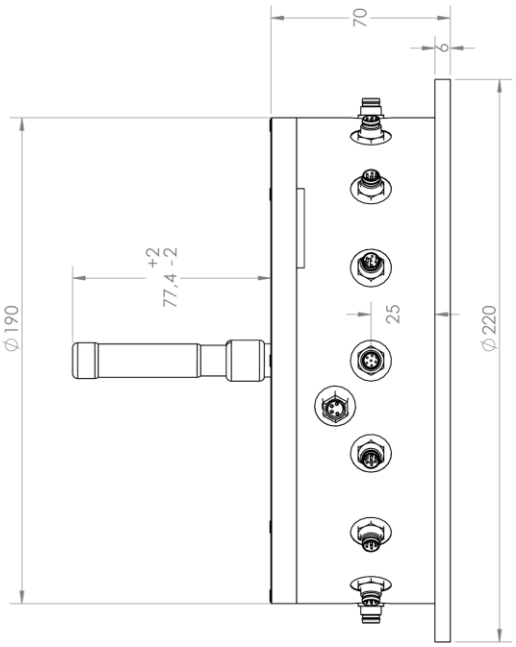


Dimensions CTP16-Rotate-ENC

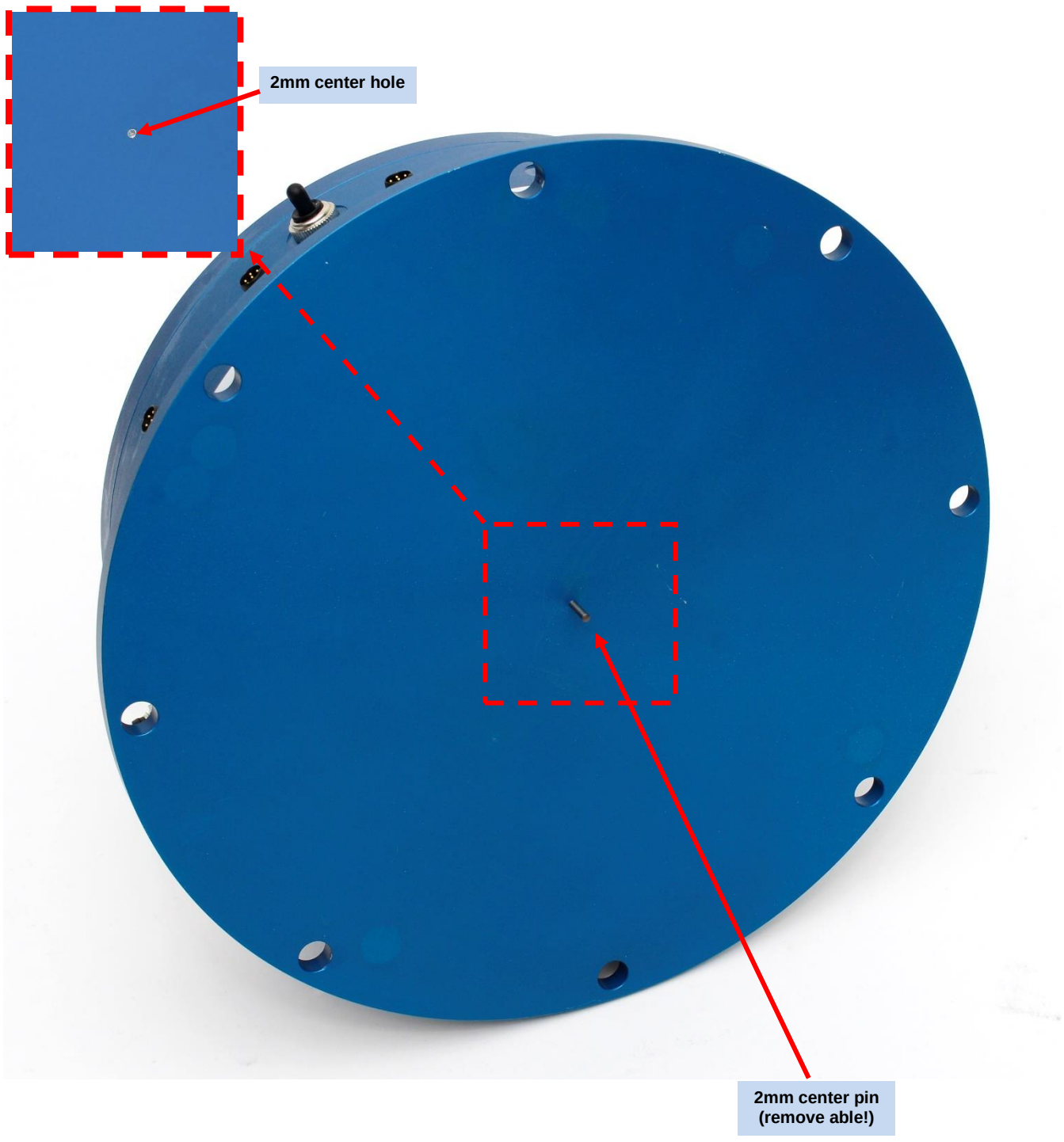




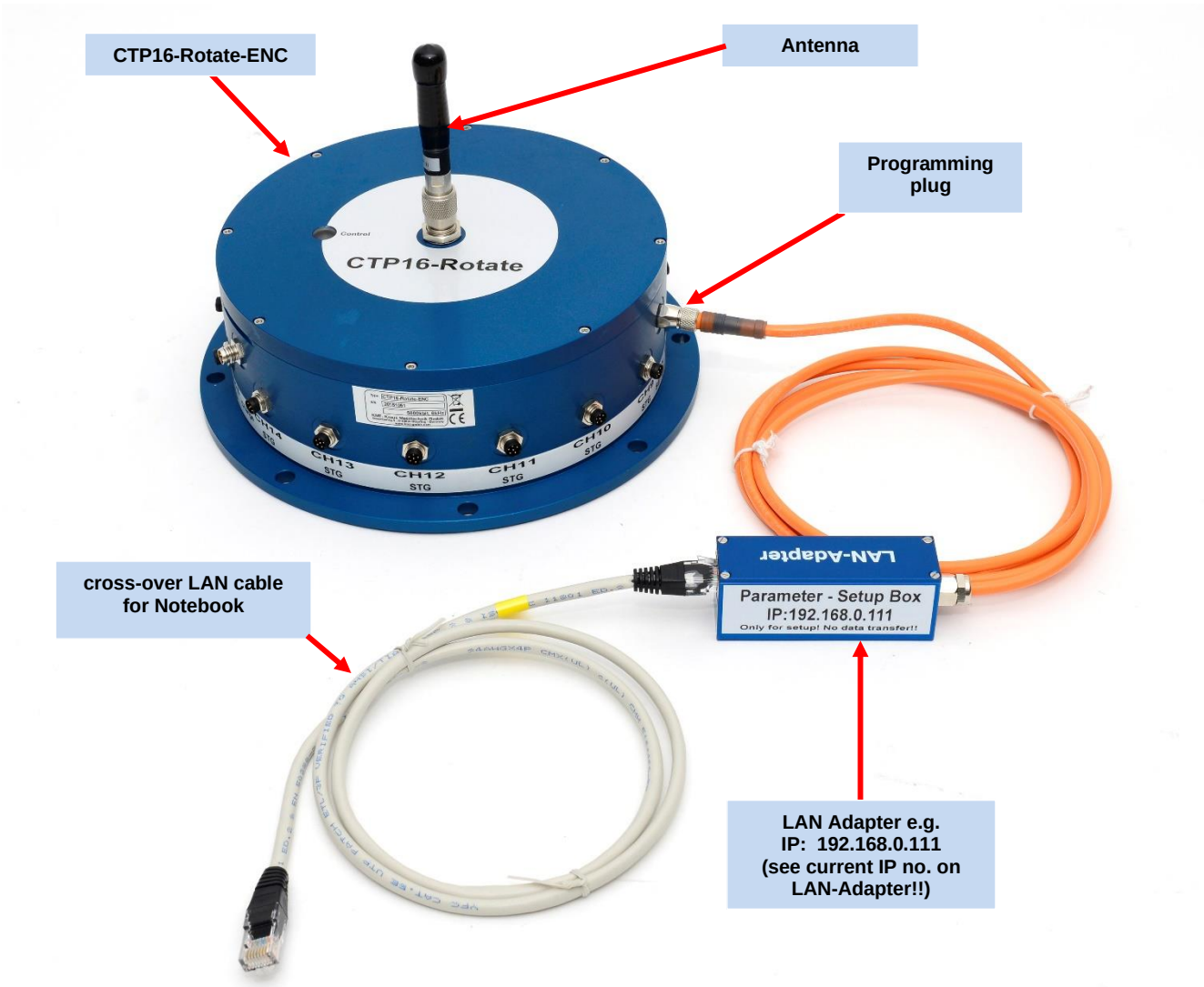




CTP16-Rotate-ENC – bottom side with 2mm center pin



Settings of CTP-Rotate-ENC
Programmable via web interface (standard-LAN adapter)



1) Power ON the CTP-Rotate ENC via IND-PWR of CTP-Rotate-DEC
2) Connect the LAN-Adapter with the CTP-Rotate-Encoder
3) Adjust your notebook to manual on e.g. IP 192.168.0.100
4) Connect LAN-Adapter with your notebook via ***cross-over*** LAN cable
5) Open Microsoft Internet Browser and enter IP address **192.168.0.111** (see current IP no. of LAN-Adapter!!)
6) Now you get access on the web-interface and you can adjust the CTP-Rotate-Encoder

Settings of CTP-Rotate-ENC
Programmable via web interface (COMM box-wireless setup via Bluetooth)

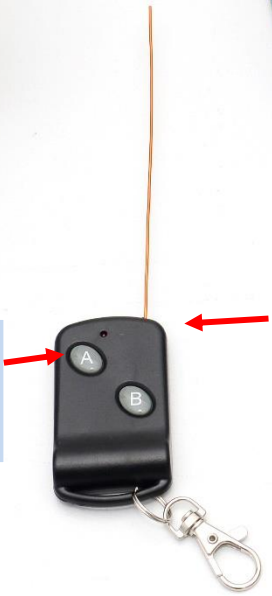
COMM box with integrated LAN Adapter. If the COMM box have an active LINK with the CTP-ENC, the power of the acquisition modules will switch ON. If not, the CTP-ENC is switch in sleep mode and save battery power.

Bluetooth - antenna

cross-over LAN cable for Notebook

Bluetooth antenna

Easy optional remote
A = ON
B = sleep mode
Range 3-5m



Easy remote for power ON/OFF = sleep mode, if the COMM box Bluetooth link is not active.

Switch must standing on COMM!

ON = Permanent power ON
OFF = Permanent power OFF
COMM = 1) power ON, if the Bluetooth LINK (blue LED) is active
2) power ON via Remote (A/B), if the Bluetooth LINK (blue LED is off) is not active. Easy way to power ON or go to sleep-mode if the COMM box is not in range.

1) Power ON the CTP-Rotate ENC
2) Connect the COMM box with the CTP-Rotate-Encoder. The Bluetooth link must be active!!
3) Adjust your notebook to manual on e.g. IP 192.168.0.100
4) Connect LAN-Adapter with your notebook via ***cross-over*** LAN cable
5) Open Microsoft Internet Browser and enter IP address **192.168.0.111** (see current IP no. of LAN-Adapter!!)
6) Now you get access on the web-interface and you can adjust the CTP-Rotate-Encoder

Settings CTP-Rotate-ENC	Programmable via web interface

Web interface address LAN adapter:
e.g. IP 192.168.0.110 or 111, 112
(see current IP no. on LAN-Adapter!!)
Settings:

STG
Gain 125-250-500-1000-2000
Half-, full- and quarter bridge
Make Auto Zero YES/NO

ICP
Gain 1-2-4-8-16

VOLT
Range ±0,625V, ± 1,25V, ±2,5V,
± 5V, ±10V

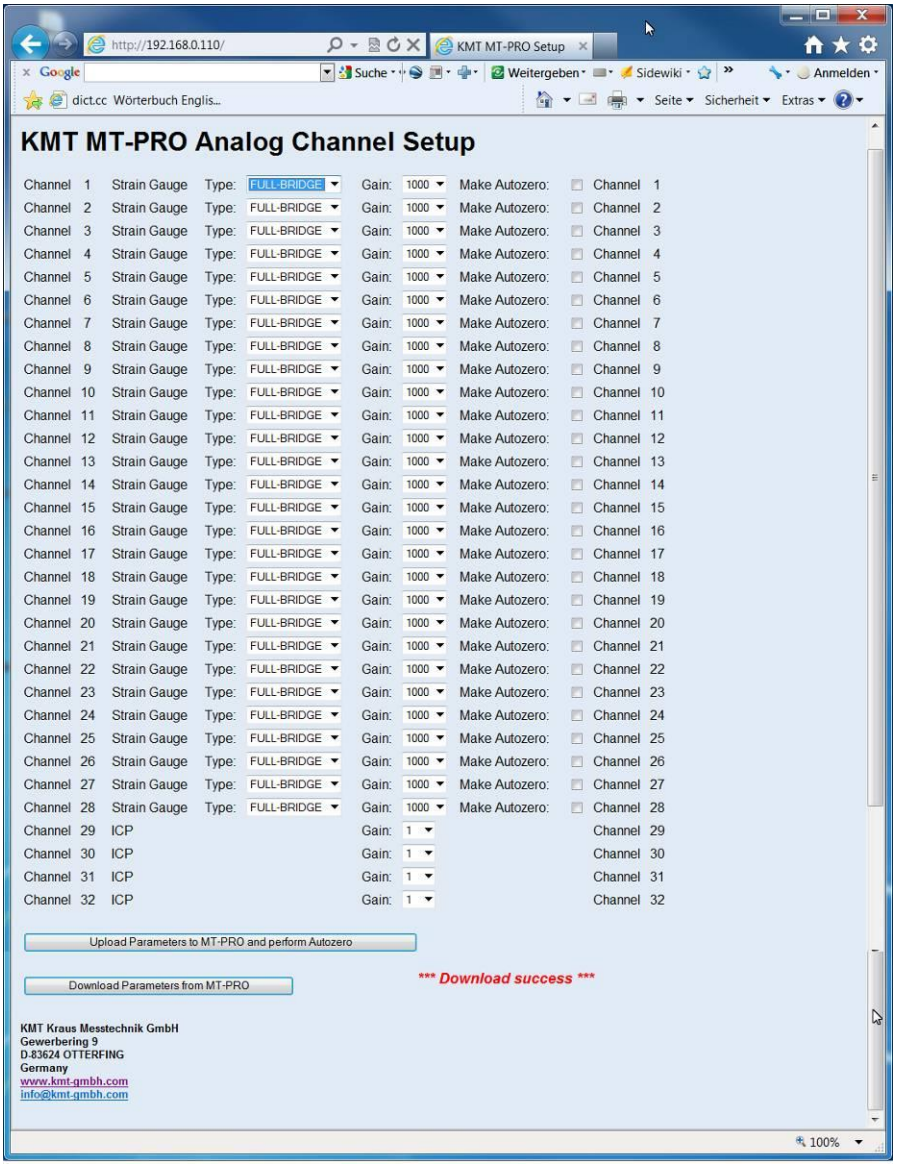
TH-K
Range -50 to 1000°C, -50 to 500°C
or -50 to 250°C

PT100/1000

Type:	PT100	4 Wire
	PT100	3 Wire
	PT100	2 Wire
	PT1000	4 Wire
	PT1000	3 Wire
	PT1000	2 Wire

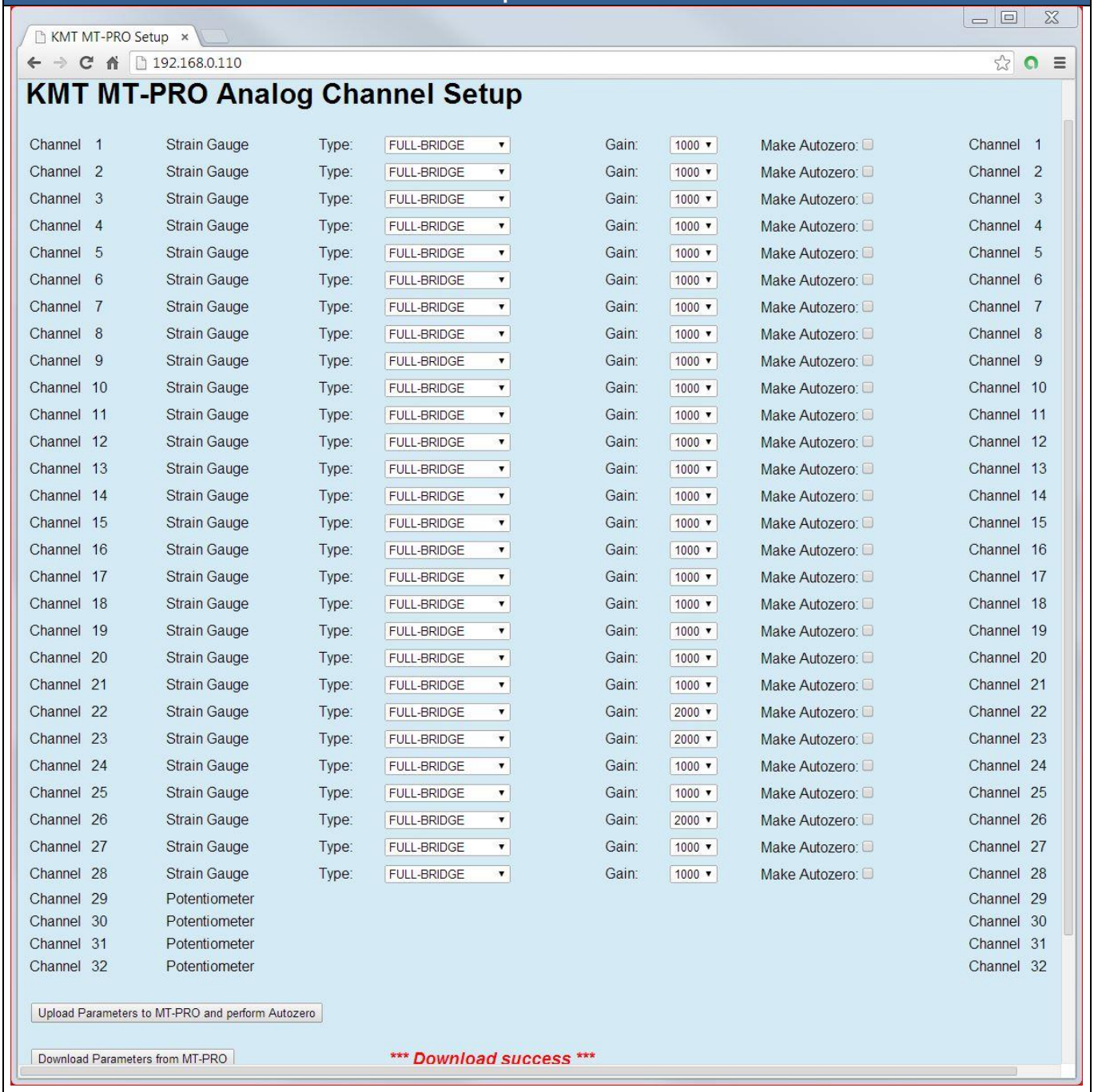
Range: -25..150 °C
-50..300 °C
-100..600 °C

Selectable for each channel!



MTP-CONTROL V1 - Software setup

DOWNLOAD parameters for device

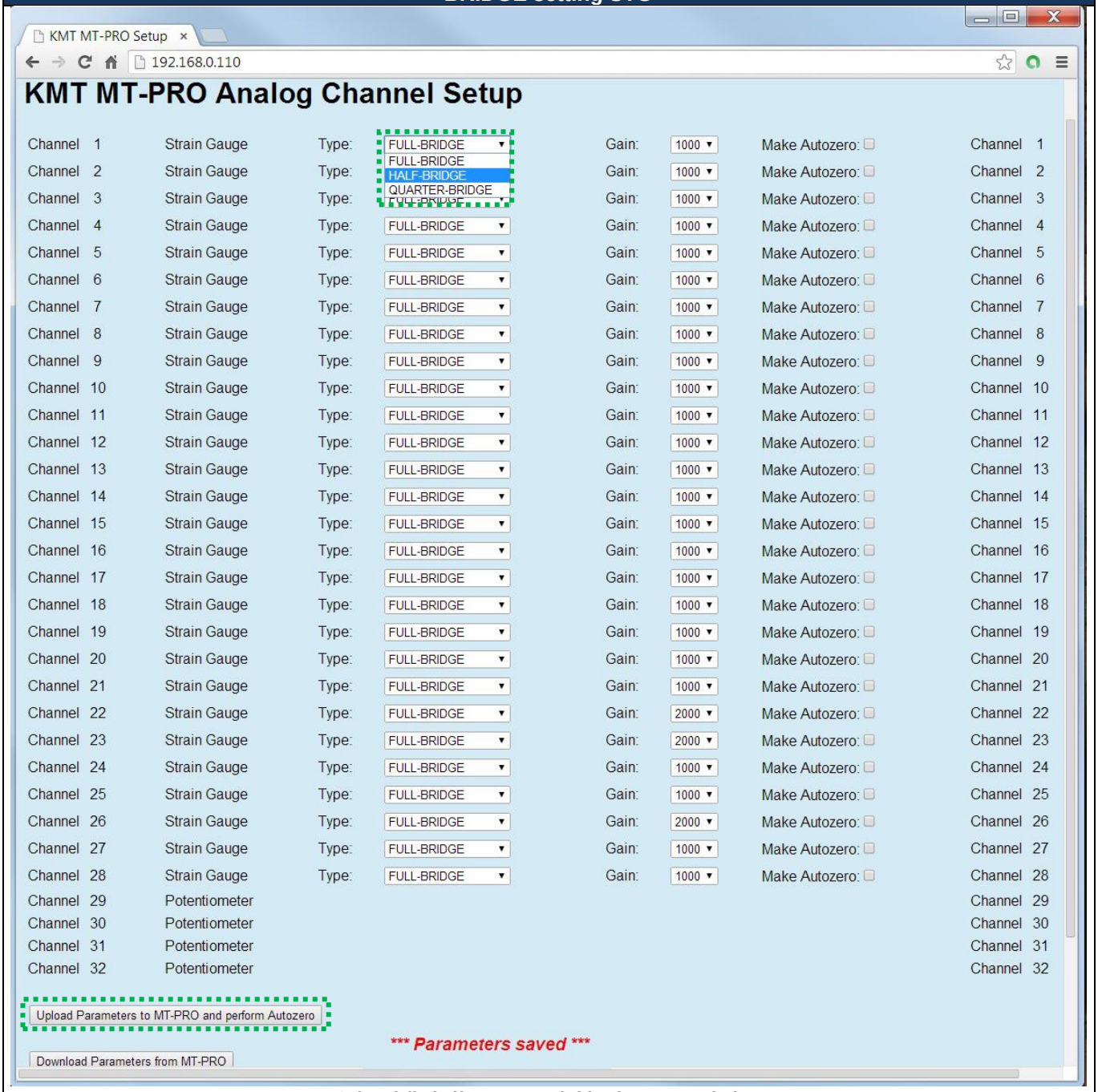


First you can download the stored parameters from the acquisition modules via LAN adapter from the controller module .
All connected acquisition modules will detect!

Caution:

Never use the refresh button on your browser; otherwise the parameters of you browser cash will upload to the MTP-STG!°

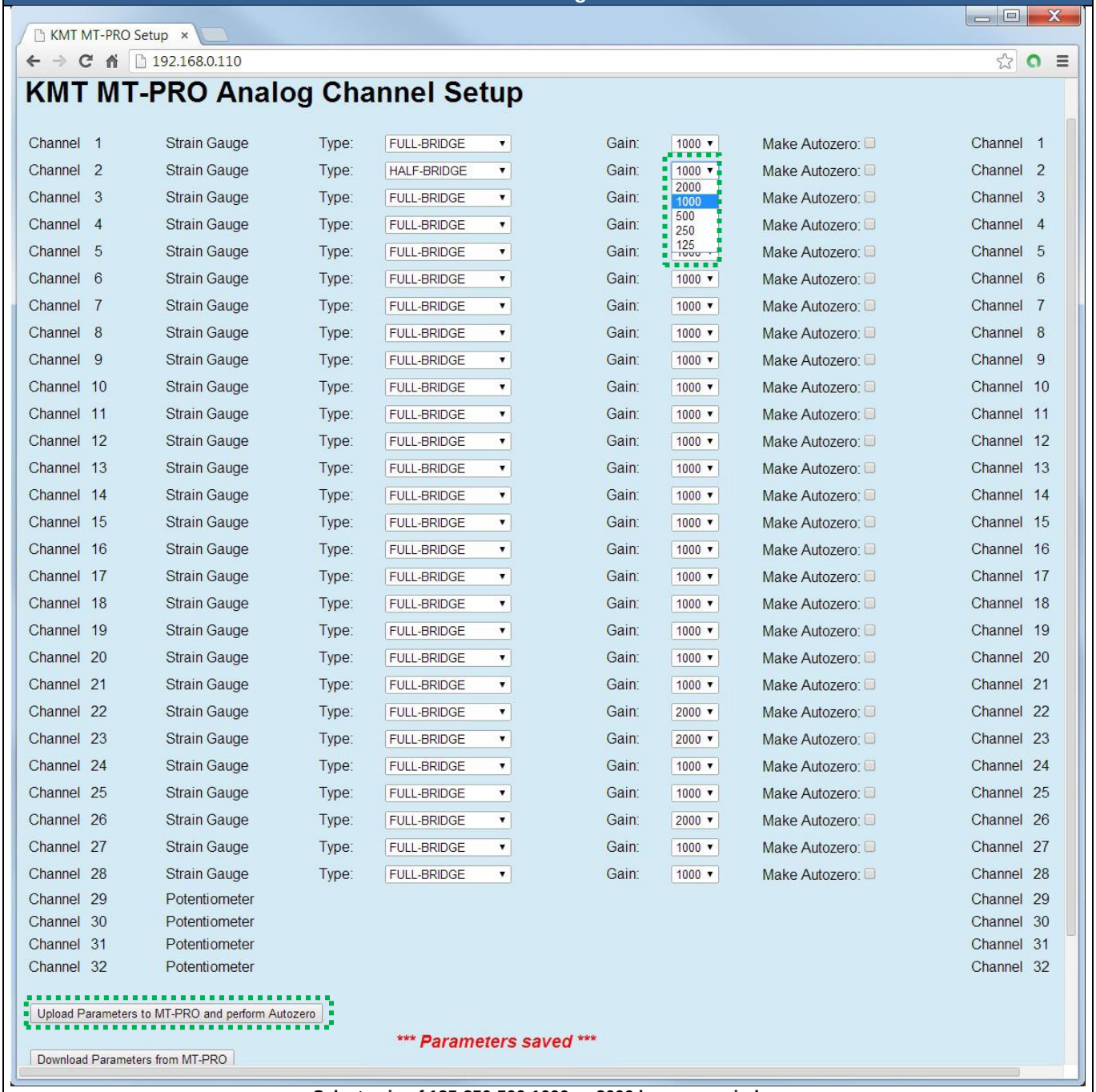
BRIDGE setting STG



Select full-, half- or quarter-bridge by popup window

Execute through "Upload Parameters to MT-PRO and perform Autozero" button

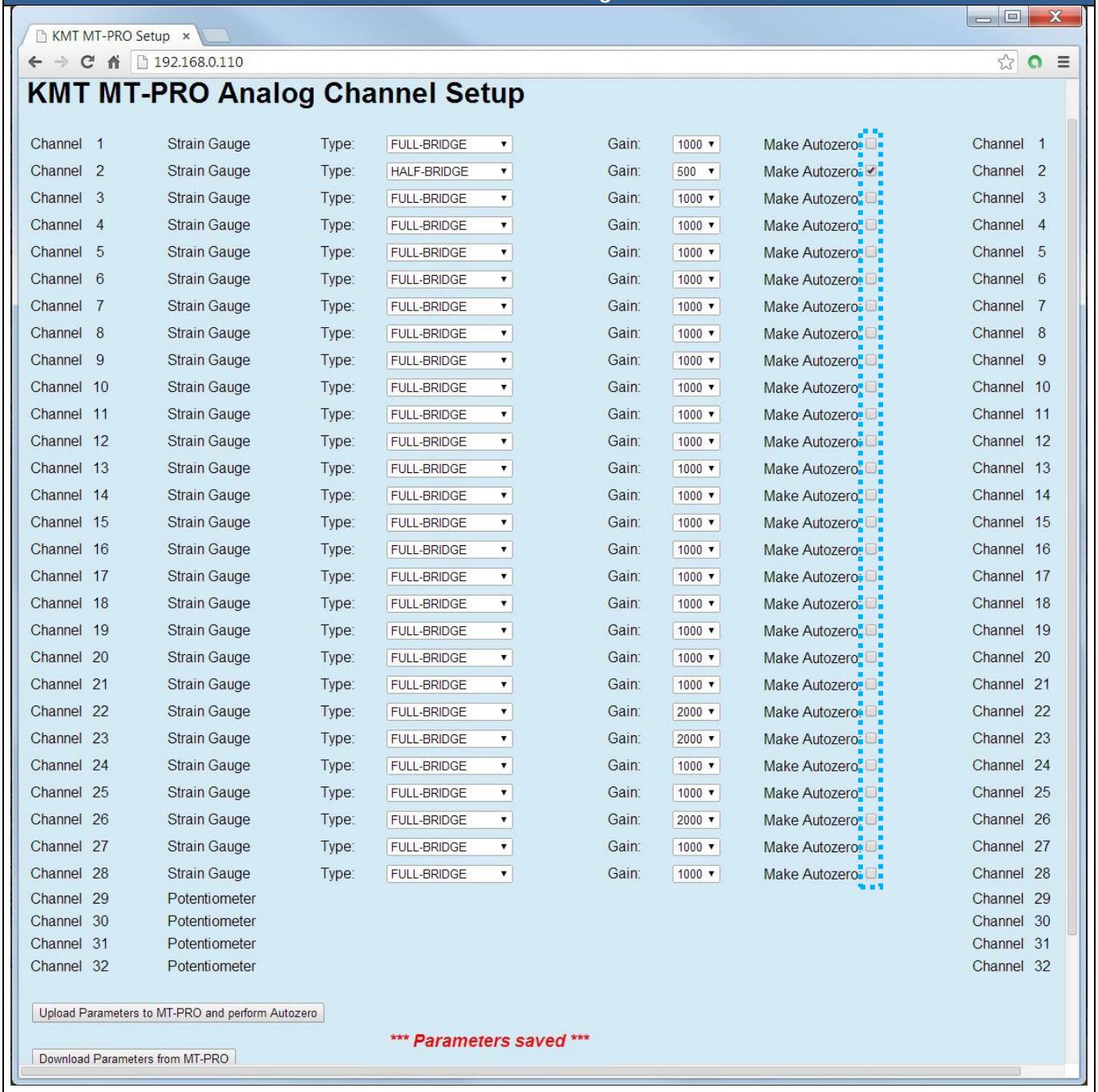
GAIN setting STG



Select gain of 125-250-500-1000 or 2000 by popup window
After change the gain you must make a new autozero!!

Execute through "Upload Parameters to MT-PRO and perform Autozero" button

Auto Zero setting STG



Channel 1	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 1
Channel 2	Strain Gauge	Type:	HALF-BRIDGE	Gain:	500	Make Autozero	Channel 2
Channel 3	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 3
Channel 4	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 4
Channel 5	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 5
Channel 6	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 6
Channel 7	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 7
Channel 8	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 8
Channel 9	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 9
Channel 10	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 10
Channel 11	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 11
Channel 12	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 12
Channel 13	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 13
Channel 14	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 14
Channel 15	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 15
Channel 16	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 16
Channel 17	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 17
Channel 18	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 18
Channel 19	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 19
Channel 20	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 20
Channel 21	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 21
Channel 22	Strain Gauge	Type:	FULL-BRIDGE	Gain:	2000	Make Autozero	Channel 22
Channel 23	Strain Gauge	Type:	FULL-BRIDGE	Gain:	2000	Make Autozero	Channel 23
Channel 24	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 24
Channel 25	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 25
Channel 26	Strain Gauge	Type:	FULL-BRIDGE	Gain:	2000	Make Autozero	Channel 26
Channel 27	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 27
Channel 28	Strain Gauge	Type:	FULL-BRIDGE	Gain:	1000	Make Autozero	Channel 28
Channel 29	Potentiometer						Channel 29
Channel 30	Potentiometer						Channel 30
Channel 31	Potentiometer						Channel 31
Channel 32	Potentiometer						Channel 32

Select Auto-Zero per channel. The Auto-Zero function will be executed only <u>one time</u> per upload the parameters to CTP-STG! It will be stored also after power off in the CTP-STG until you make a <u>new</u> Auto-Zero on this channel!

Execute through "Upload Parameters to MT-PRO and perform Autozero" button

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Konformitätserklärung

Declaration of Conformity
Declaration de Conformité

Wir We Nous	**KMT - Kraus Messtechnik GmbH**
Anschrift Address Adress	**Gewerbering 9, D-83624 Otterfing, Germany**

erklären in alleiniger Verantwortung, daß das Produkt
declare under our sole responsibility, that the product
declarons sous notre seule responsibilité, que le produit

Bezeichnung Name Nom	**Messdatenübertragungssystem**
Typ,Modell,Artikel-Nr., Größe Type,Model, Article No.,Taille Type, Modèle, Mo.d'Article,Taille	**CTP8-Rotate, CTP16-Rotate, CTP32-Rotate, CTP64-Rotate**

mit den Anforderungen der Normen und Richtlinien
fulfills the requirements of the standard and regulations of the Directive
satisfait aux exigences des normes et directives

108/2004/EG	**Elektromagnetische Verträglichkeit EMV / EMC** DIN EN 61000-6-3 Ausgabe 2002-8 Elektromagnetische Verträglichkeit EMV Teil 6-3 Fachgrundnorm Störaussendung DIN EN 61000-6-1 Ausgabe 2002-8 Elektromagnetische Verträglichkeit EMV Teil 6-1 Fachgrundnorm Störfestigkeit

und den angezogenen Prüfberichten übereinstimmt und damit den Bestimmungen entspricht.
and the taken test reports und therefore corresponds to the regulations of the Directive
et les rapports d'essais notifiés et, ainsi, correspond aux règlement de la Directive.

Otterfing, 04.06.2012 **Martin Kraus**

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Ort und Datum der Ausstellung Place and Date of Issua Lieu et date d'établissement	Name und Unterschrift des Befugten Name and Signature of authorized person Nom et signature de la personne autorisée