CT16-Wheel

User manual

- STG offset via potentiometer or optional Auto Zero calibration
- 12 bit ADC resolution, simultaneous sampling of all channels
- 16 x 0-375 Hz with 320kbit Transceiver
  16 x 0-750 Hz with 640kbit Transceiver
  16 x 0-1500 Hz with 1280kbit Transceiver
- Water waterproofed housing (IP65)
- Output analog (+/- 5V) and digital for PC interface at the receiver side
- Universal mounting adapter for fast and exactly montage on the wheel
- 4x different carrier frequencies enable measurements at four Wheels at one car or truck
- Accumulator powered (up to 8h)

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General functions:

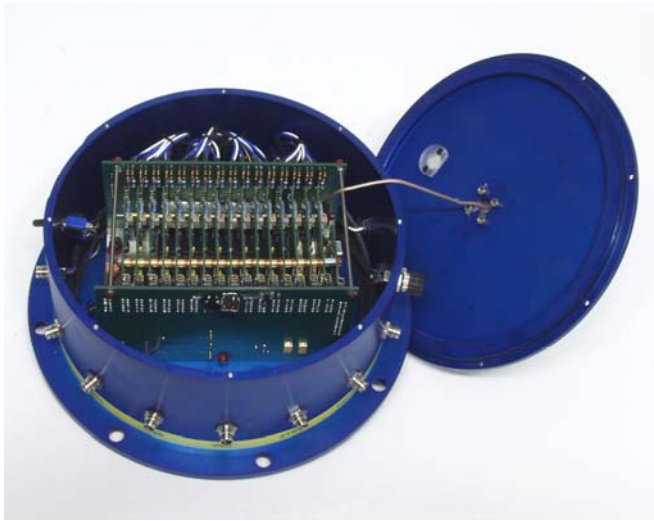
CT16-Wheel is an telemetry system designed for easy mounting onto rotating Wheels to provide non-contact transmission of measured parameters such as pressure, force, temperature, acceleration and voltage. Sensors inputs are connected via screw on, waterproof connectors. Measured values are prepared in analog format, digitized and transmitted via radio frequencies. Four different carrier frequencies are provided, this allows up to four systems (e.g. for four wheels) to operate in parallel. The complete transmitter assembly is waterproofed to IP65 specifications.
The following sensors can be connected to the system: (STG) Strain gages sensors in full-, half- and quarter-bridge configuration (350 ohm or greater), Type K Thermocouples -50 to 1000°C **(full galvanic isolated)**, ICP and capacitive sensors. Voltage inputs of +/-5V and +/-10V are available. The measured values are processed and output as +/-5V analog signals at the BNC sockets (optional digital output for special PCM interface into a PC) on the stationary receiver located in a vehicle.
Resolution of 12 bits is standard; this enables an amplitude dynamic of 72 dB. The analog signal bandwidth is 0-1500 Hz (-3dB) when configured with a scanning bit rate of 1280 kbit/s. The measurement accuracy is +/-0.25 % (without sensor). The CT16-Wheel is suited for operation at ambient temperatures of -20 to +70°C. The transmission distance between transmitter and receiving antenna is of the order of 20m (60 feet) - depend of application!

Cut off frequency from anti-aliasing filter (-3dB) and scanning rate (red)

Bit rate	16 Channels
2560 kbit/s	0 - 3000 Hz (13061Hz)
1280 kbit/s	0 - 1500 Hz (6530 Hz)
640 kbit/s	0 - 750 Hz (3265 Hz)
320 kbit/s	0 - 375 Hz (1632 Hz)

CT16-Wheel Transmitting Unit Technical Data (Encoder)

Encoder in IP65 Aluminum housing



Encoder inside

SC Module STG:

Sensor:	strain gage, > 350 Ohms
Bridge completion:	full, half and quarter-bridge (optional quarter-bridge with 120Ohme)
Excitation:	4 VDC (fixed), short-circuit protection up to 20mA
Gain:	200 or 1000 - selectable by solder jumpers (5mV/V or 1mV/V)
Offset	Zero adjustment by potentiometer or optional Auto-zero function (which is not lost by power-off), offset range up to 80% of full scale.

SC Module ICP:

Constant current:	1, 4, or 10mA
Gain:	2x, 4x, 8x, 16x or 32x

SC Module POT:

Sensor:	Potentiometer Sensor >350 Ohms
Excitation:	4 VDC (fixed)

SC Module TH-K:

Sensor:	thermo-couple, type K (with cold junction compensation) **Inputs full galvanic isolated!**
Temperature measuring range:	-50°C to +1000°C (other on request)

SC Module VOLT:

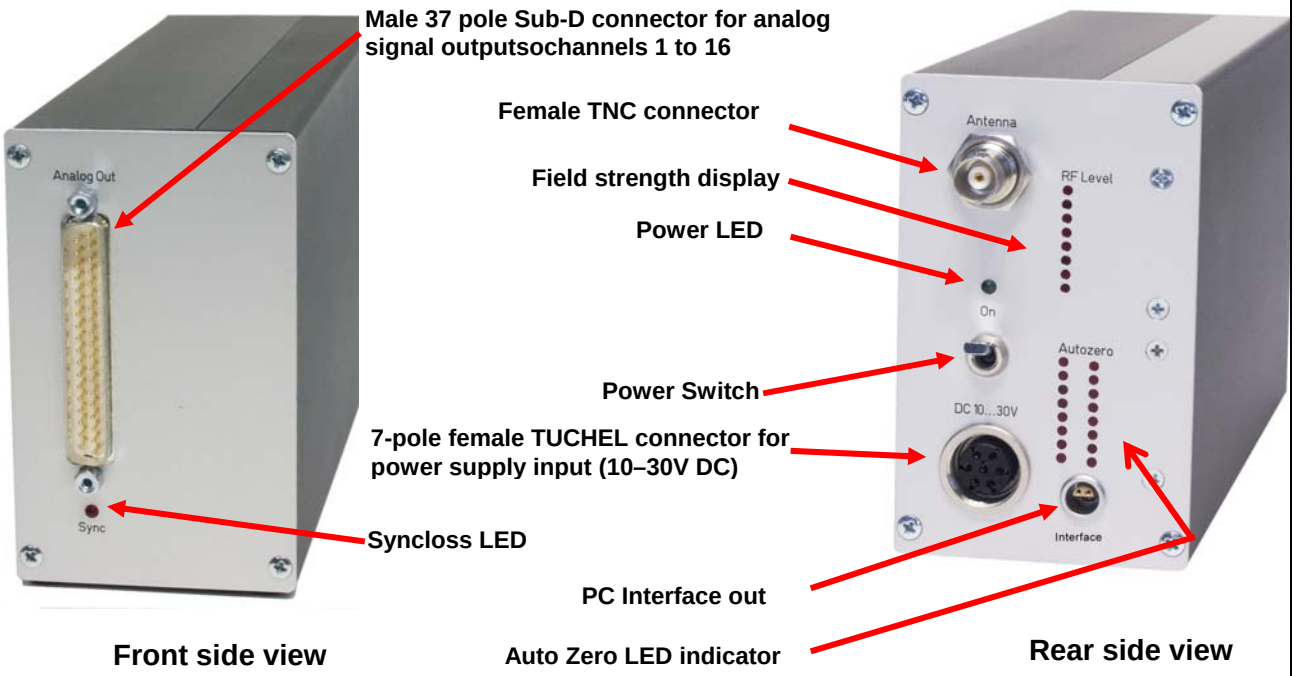
High-level inputs:	+/- 5 Volt or +/- 10 Volt

System Parameters:

Channels:	16 (may be configured using 1 to 16 channels)
Resolution:	12 bit A/D converter with anti aliasing filter, simultaneous sampling of all channels
Line-of-sight distance:	20m with 10mW transmitting power, (433MHz Band, FSK modulation)
Powering:	Li Ion Accumulator 7.2V, 2000mA, capacity for 6-8 hours.
Power consumption:	350 mA using 16x STG full bridge sensors 350 Ohms
Analog signal bandwidth:	16 x 0…1500Hz (scanning rate 6530Hz) with 1280kbit/s transmitter (-3dB)
Transmitter carrier frequency:	ISM-Band, 1 x 433,3 MHz with 320kbit/s
Transmission:	Digital PCM Miller format - FSK
Transmission Power:	10mW
Weight:	2.1 kg without cables
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
Shock:	200g in all directions

Technical data:

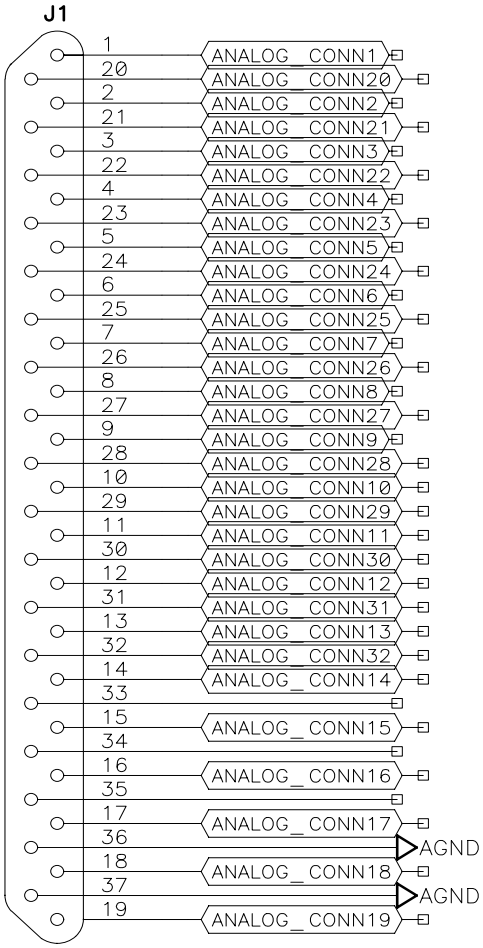
Receiving Unit CT16-Wheel DEC with analoge and digital out (Decoder)

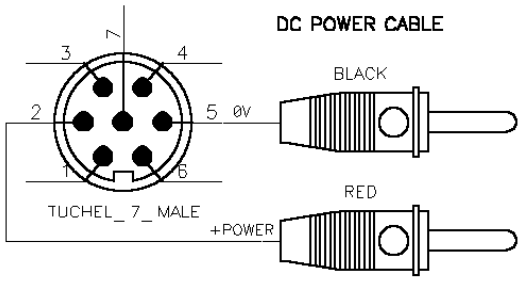


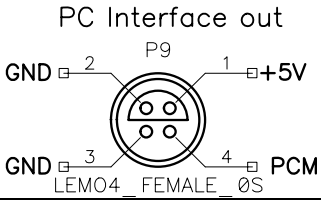
Front side view

Rear side view

Pin connection 37pol Sub-D male







Optional BNC16 Box. Connect on 37pol Sub-D

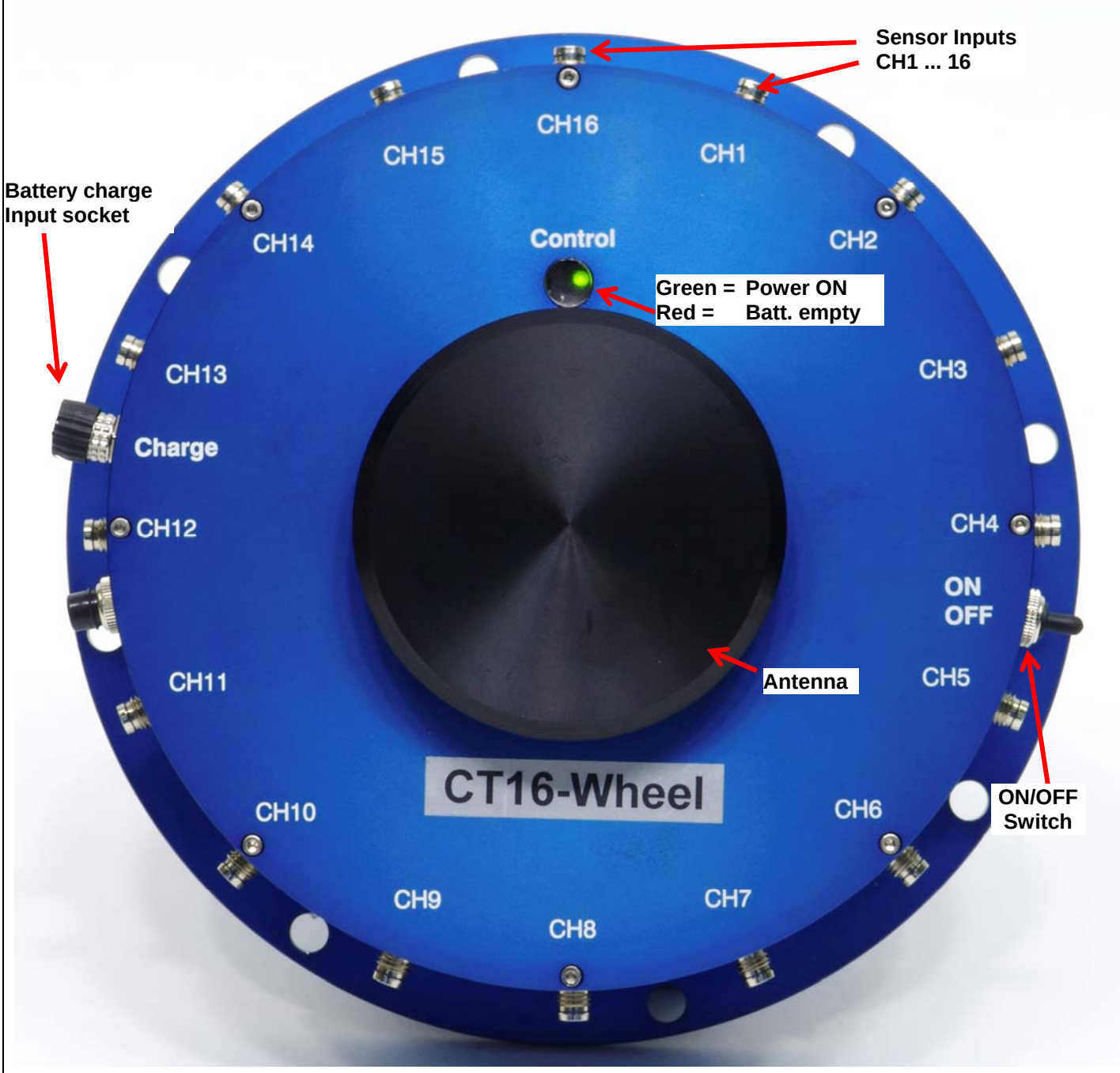
System Parameters:

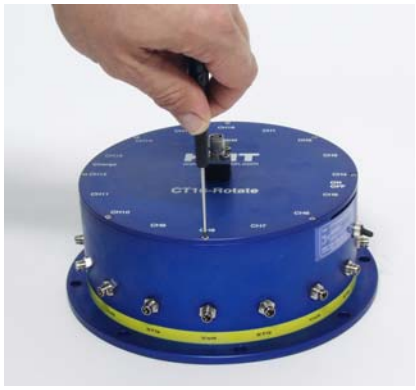
Channel:	16 +/-5V analog outputs via Sub-D male socket
Resolution:	12 bit D/A converter, with smoothing filter
Dynamic:	72dB
Power supply input:	10-30 VDC, power consumption 3 Watt
Current consumption:	300mA at 10V, 100mA at 30V
Transmitter carrier frequency:	ISM-Band, 433,3 MHz with 320kbit/s
Transmission:	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 Mil Standard 810C, Curve C
Static acceleration:	10g in all directions
Shock:	100g in all directions

Technical specifications are subject to change without notice!

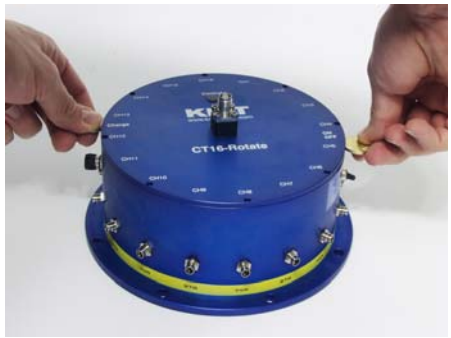
Cut off frequency from anti-aliasing filter (-3dB) and scanning rate (red)	
Bit rate	**16 Channels**
2560 kbit/s	0 - 3000 Hz (13061Hz)
1280 kbit/s	0 - 1500 Hz (6530 Hz)
640 kbit/s	0 - 750 Hz (3265 Hz)
320 kbit/s	0 - 375 Hz (1632 Hz)

Functions:
16 Channel CT16-Wheel ENC (encoder/transmitter)



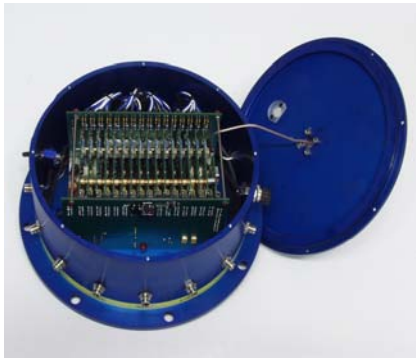


Untwist to open the housing with hexagon screw driver 2mm



To lift the cover, use the slot!

Picture shows the CT16-Rotate as example!



Take care with the O-ring seal, it is lubricated with silicone grease!

Connection, STG bridge configuration:
CT16-Wheel ENC (encoder)

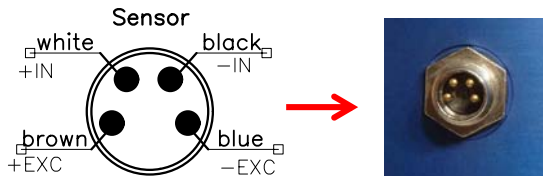
Sensor cable

Black = IN -
White = IN +
Brown = EXC +
Blue = EXC -

Sensor socket

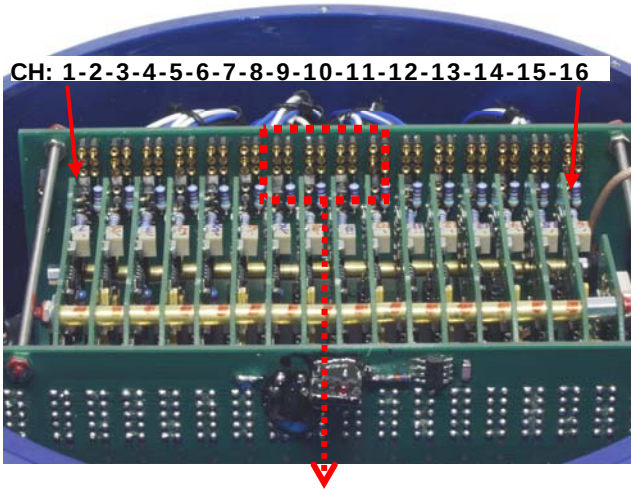
STG module

Type: Strain gage >350 Ohms
Excitation: 4 VDC (fixed)
Gain: 200 or 1000

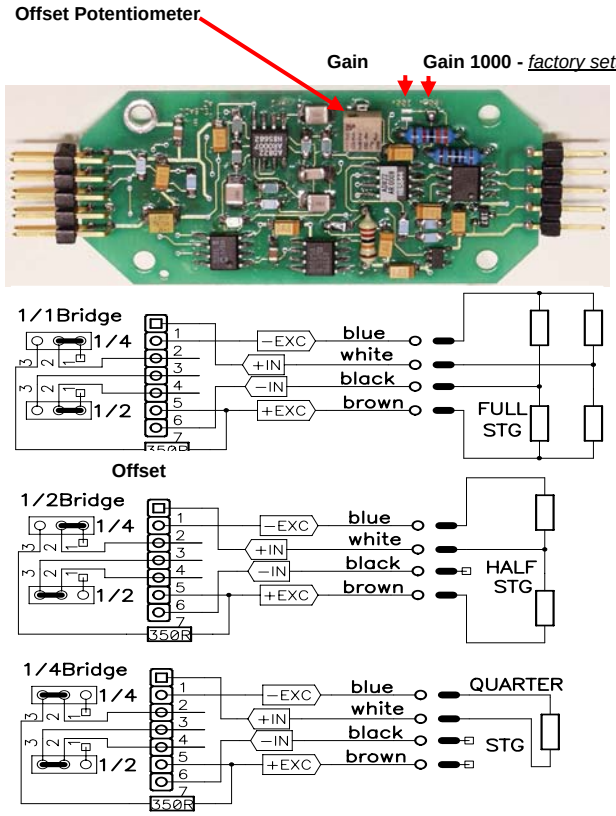


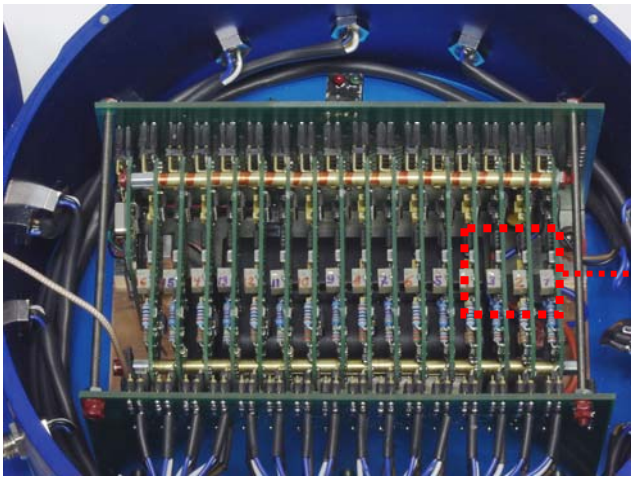
Plug at CT16-Wheel ENC

Sensor modules



Plug bridge configuration at STG e.g.:

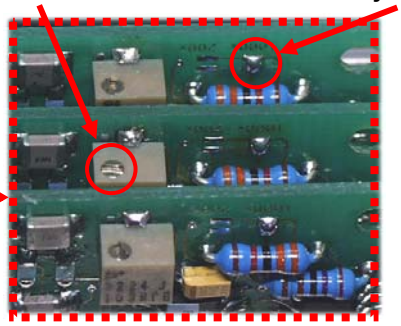




Offset calibration and Gain setting:

Offset potentiometers

Gain 200 or 1000 by solder bridge



Auto Zero calibration Optional!

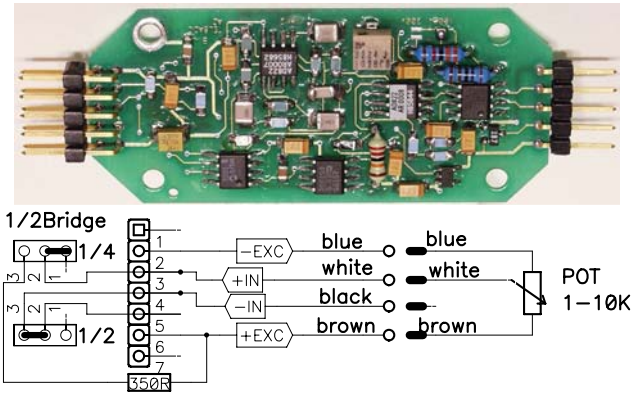
Connection POT:

POT module

Type: Potentiometer >350 Ohms
Excitation: 4 VDC (fixed)

Attention:
The POT modules must be configured as a **Half Bridge Unit.**

Don't change offset and gain!!



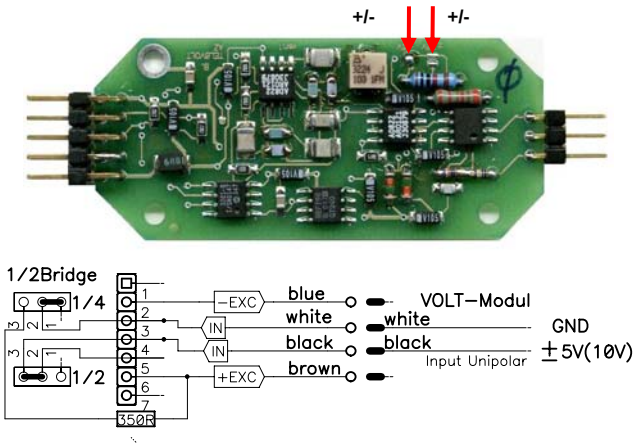
Connection Volt

Volt module

Type: Volt
Range: +/-5 or +/-10V

Attentions:
At **Volt modules** must plug the plug bridge on **Half Bridge Unit.**

Don't change offset!!

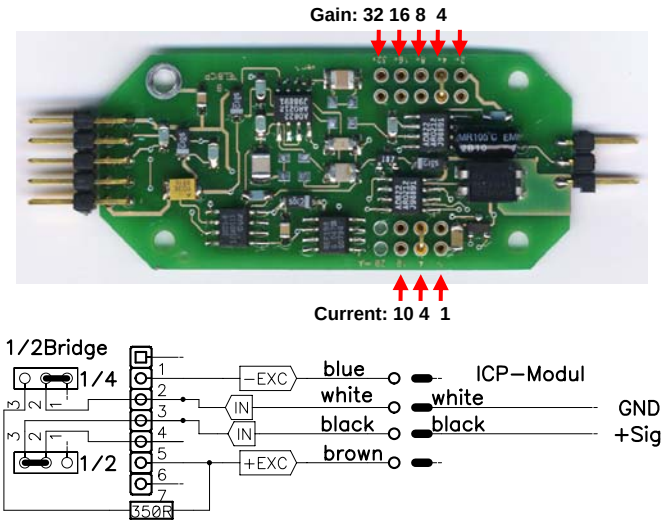


Connection ICP

ICP module

Type: ICP
Gain: 2x, 4x, 8x, 16x or 32x
Constant current: 1, 4 or 10mA

Attentions:
At **Volt modules** must plug the plug bridge on **Half Bridge Unit.**



Connection Th K (without galvanic isolation!)

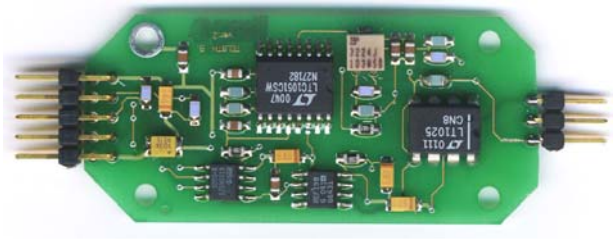
Thermo couple

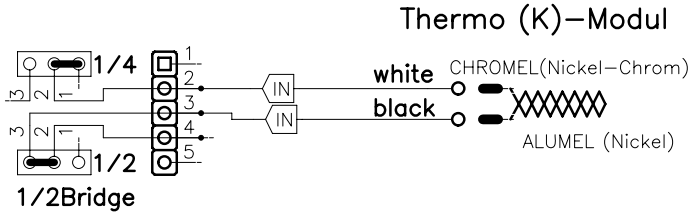
Type: K
Range: 0 – 1000°C
Bandwidth: 0-20Hz (more on request)

Not galvanic isolated!

Attentions:
At **Thermo couple** must plug the plug bridge on **Half Bridge Unit.**

Don't change offset!!





Temperature [°C]	Output [V]	Temperature [°C]	Output [V]	Temperature [°C]	Output [V]	Temperature [°C]	Output [V]
0	-5,003	250	-2,546	500	0,002	750	2,558
50	-4,515	300	-2,044	550	0,515	800	3,061
100	-4,009	350	-1,538	600	1,031	850	3,550
150	-3,516	400	-1,029	650	1,542	900	4,035
200	-3,031	450	-0,515	700	2,052	1000	5,000

Connection Th K-ISO (with galvanic isolation!)

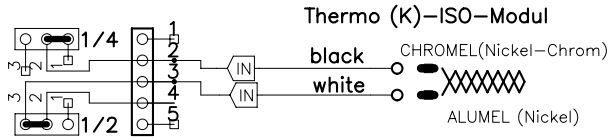
Thermo couple

Type: K
Range: -50°C – 1000°C
Bandwidth: 0-20Hz (more on request)

Galvanic isolated!

Attentions:
At **Thermo couple** must plug the plug bridge on **Half Bridge Unit.**

Don't change offset!!

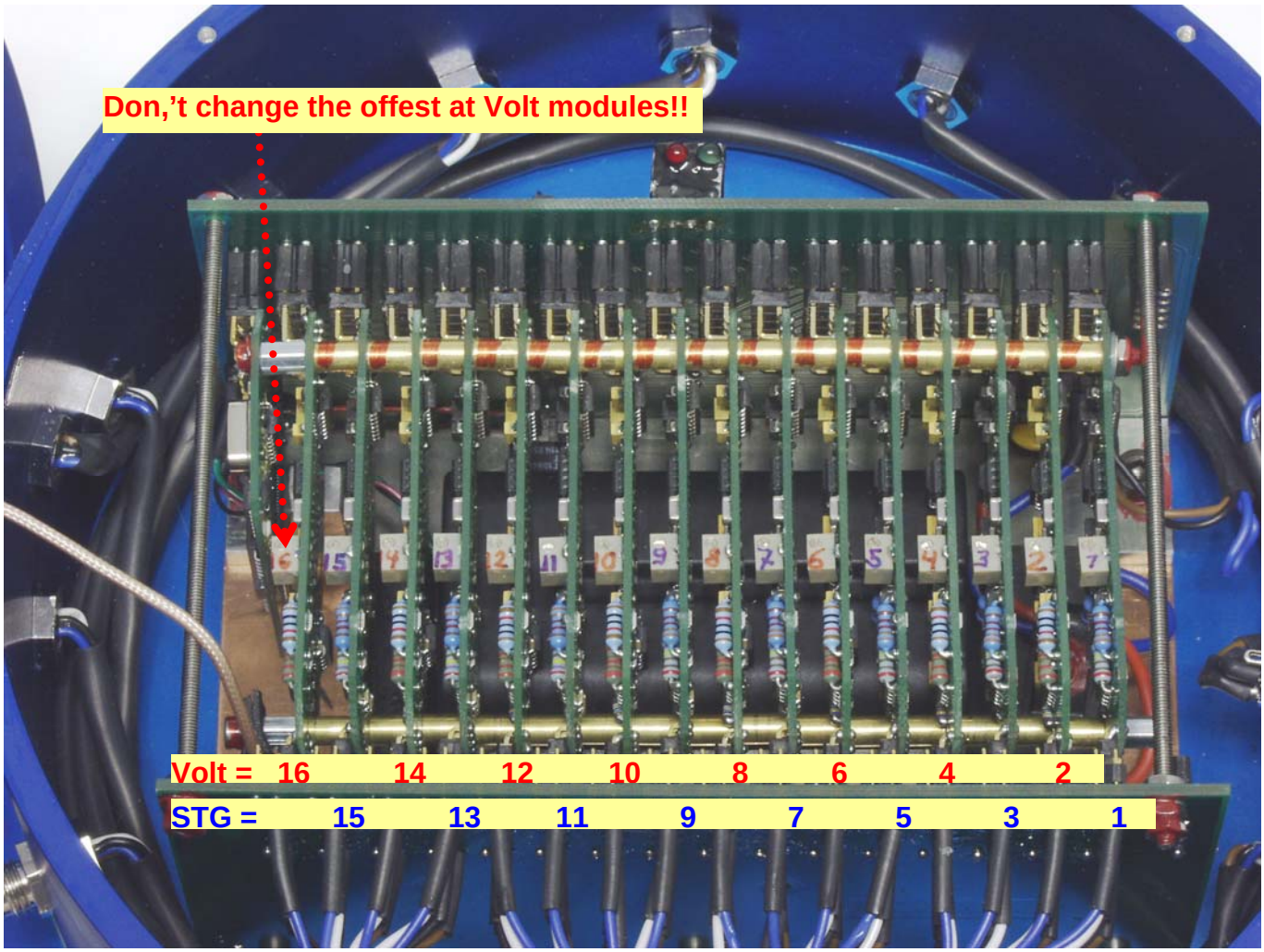


Temperature [°C]	Output [V]	Temperature [°C]	Output [V]	Temperature [°C]	Output [V]	Temperature [°C]	Output [V]
-50	-0.220	250	1.236	550	2.754	850	4.262
0	0.013	300	1.482	600	3.010	900	4.506
50	0.254	350	1.734	650	3.266	950	4.746
100	0.504	400	1.990	700	3.519	1000	4.980
150	0.752	450	2.242	750	3.700		
200	0.992	500	2.498	800	4.015		

With option +/-10V output you must multiply the table value with *2

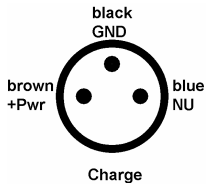
Configuration example:

CH. 1-3-5-7-9-11-13-15 with STG and CH. 2-4-6-8-10-12-16 with+/-5 Volt input modules



Li Ion Re-Chargeable Battery with Charger Unit for CT16-Wheel (CT4-Wheel)

Pin connection

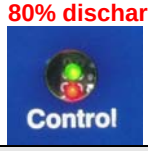


Press to start 1s | Charge Batt. LED | Full status LED

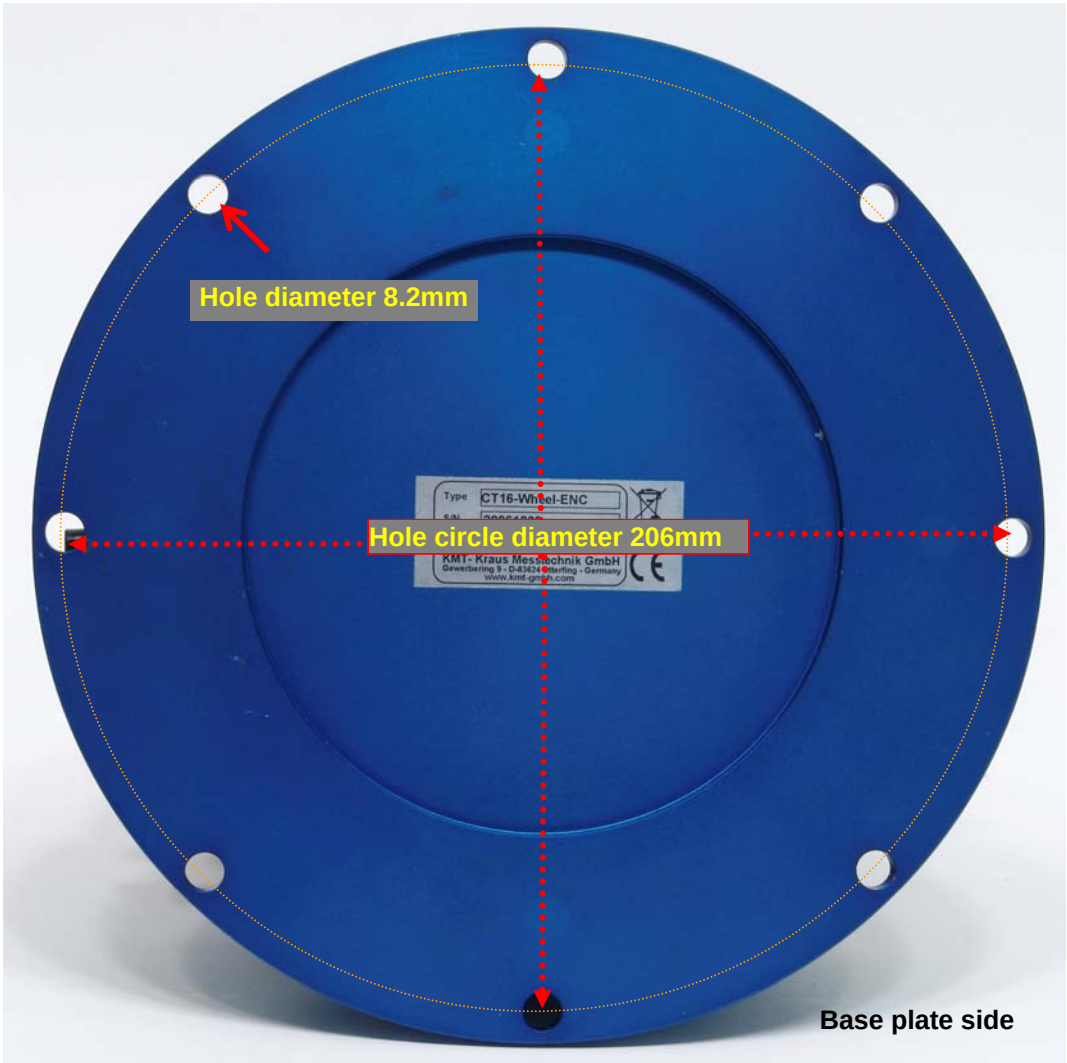
Battery charger CT16-Rotate

1. **Plug the 3- pole socket (charger) in to the CT16-Wheel encoder.**
2. **Plug banana plugs on to a battery or AC/DC power supply with a voltage range of 10-30V DC.**
3. **If charging not begins, press for 1 second the switch to begin charging. The battery will now charge. Charge time 5-6 hours.**

Attention:
Li Ion battery (7.2V, 2000mA) has a capacity for 5 hours. If the red LED indicator (Control) on the CT16-Encoder is ON the battery is 80% discharged and the device will switch off after 20 minutes!

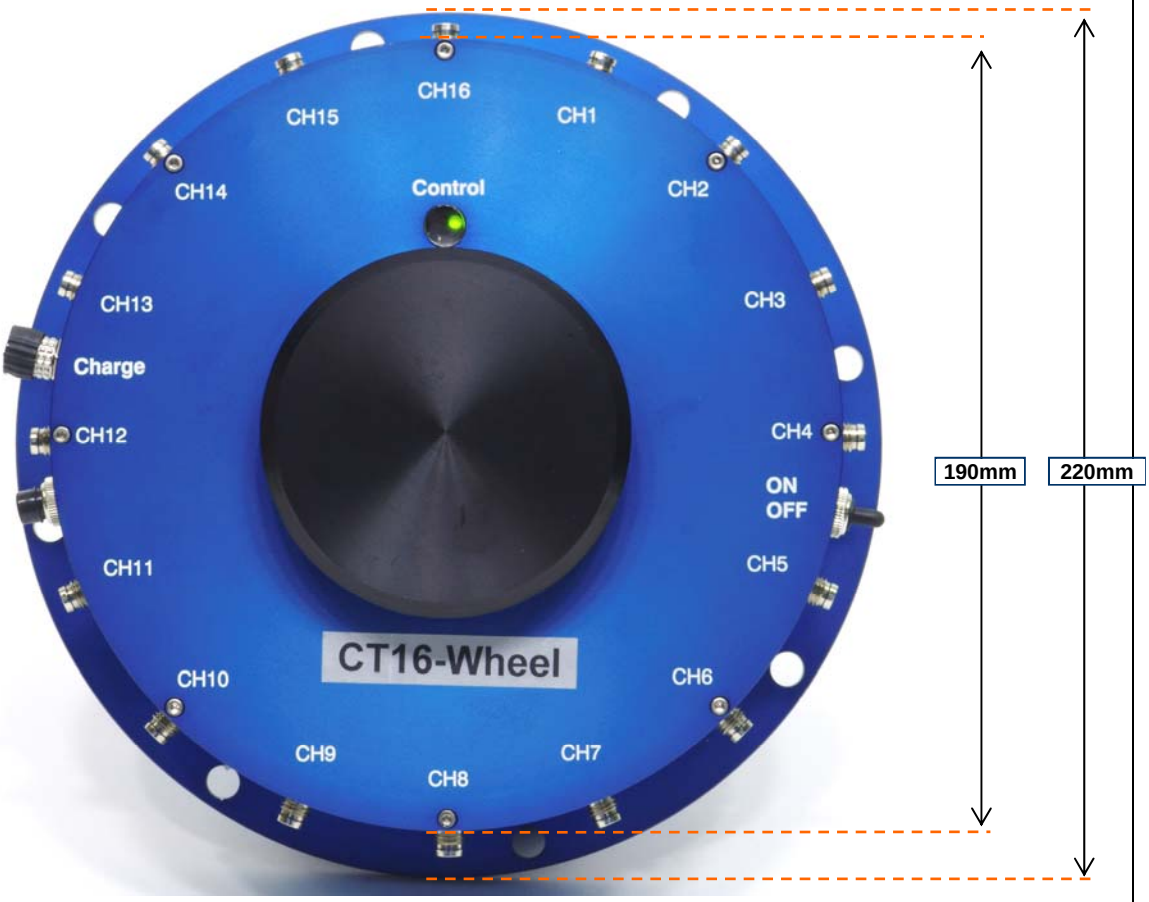


Mounting hole dimensions:



Base plate side

Dimensions:



Total weight 2.1kg