KMT - Kraus Messtechnik GmbH

Gewerbering 9, D-83624 Otterfing, Germany, ☎ 08024-48737, Fax. 08024-5532
Home Page: http://www.kmt-telemetry.com, Email: info@kmt-telemetry.com

KMT
TELEMETRY

CT16-Rotate

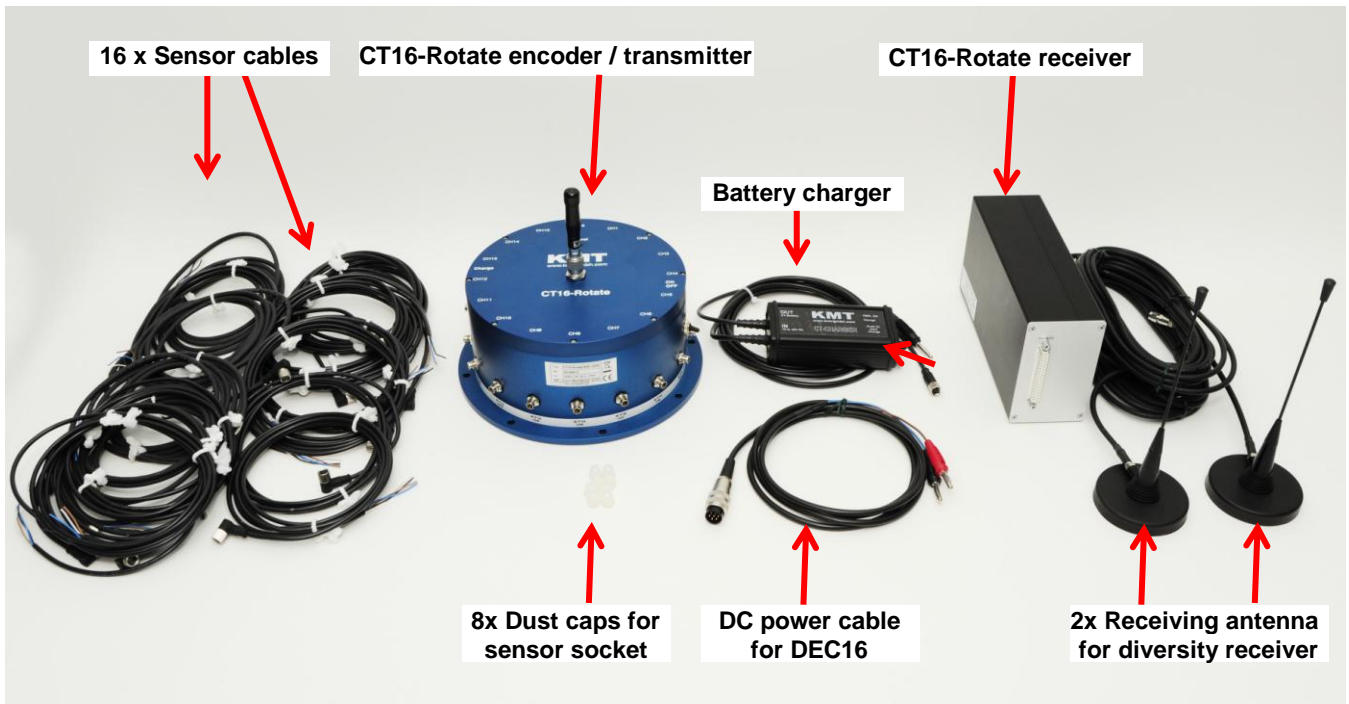**Including signal conditioning for strain gage, thermo couples, Pt100, ICP, POT and high-level inputs**

User manual

with diversity receiver unit

General functions:

16 x Sensor cables

CT16-Rotate encoder / transmitter

CT16-Rotate receiver

Battery charger

8x Dust caps for sensor socket

DC power cable for DEC16

2x Receiving antenna for diversity receiver

The CT16-Rotate is a 16-channel telemetry system for rotating application with integrated signal conditioning for sensors, wireless digital transmission and analog reproduction.

The conditioned measured values are routed via anti-aliasing filter to a 12-bit A/D converter, simulate sampling of all channels, encoded in PCM format and transferred to the HF transmitter as modulation variables. Dynamic range is 72dB with a signal-to-noise ratio of approximately 70dB. Different carrier frequencies available with the Various configurations of different sensor modules are possible like signal conditioning for strain gages (STG), thermocouples type K (Th-K), thermo sensors Pt100, ICP sensors, potentiometer sensors (POT) and also Voltage inputs (+/-5 or +/-10V). Mixed configuration available.

Specify CT-xx modules at order!!

Frequency table	Cut off frequency from anit-aliasing filter (-3dB) and scanning rate (see red)
Bit rate	**16 CH.**
1280kbit	1500Hz (6530Hz)
640kibt	750Hz (3265Hz)
320kbit	375Hz (1632Hz)

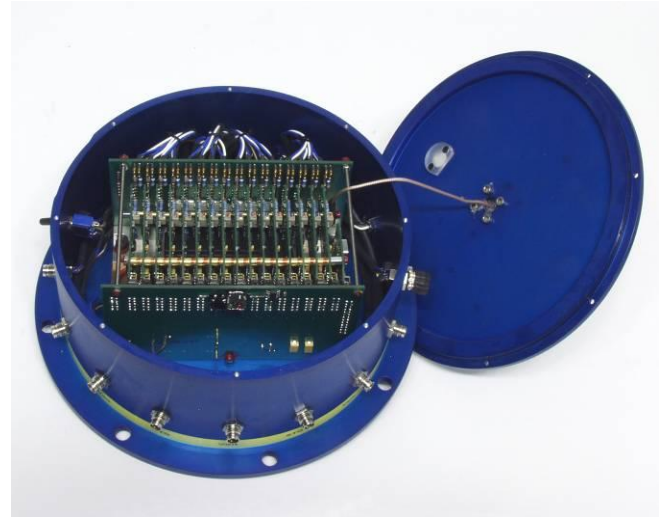### Different applications:

CT16-Rotate Transmitting Unit Technical Data (Encoder)

Encoder in IP65 Aluminum housing	Encoder inside

CT-STG V1:

Sensor:	strain gage, $\geq$ 350 Ohms
Bridge completion:	full, half and quarter-bridge competition 350Ohm
Excitation:	4 VDC (fixed), short-circuit protection up to 20mA
Gain:	200 or 1000 - selectable by solder jumpers
	Optional Gain: 250-500-1000-2000 with new **CT-STG V2** module
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.

CT-TH-K-ISO:

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

CT-PT100:

Sensor:	resistance temperature detectors (RTDs) with resistance of 100 ohm
Temperature measuring range:	-100°C to +500°C

CT-VOLT:

High-level inputs:	+/- 5 Volt or +/- 10 Volt (other ranges on request)

CT-ICP:

Sensor:	For ICP® sensor inputs, Current exc. 4mA fixed
	Signal gain x 2, 4, 8, 16, 32 - Signal bandwidth 3 Hz up to 1500Hz (depended of transmitter)

CT-POT:

Sensor:	Potentiometer Sensor >350 Ohms to 10kOhm
Excitation:	4 VDC (fixed)

System Parameters:

Channels:	16
Resolution:	12 bit A/D converter with anti aliasing filter, simultaneous sampling of all channels
Line-of-sight distance:	5-100m (depends of application and bit rate)
Powering:	Li Ion Accumulator 7.2V, 4000mA, capacity for 12 hours.
Power consumption:	400 mA using 16x STG full bridge sensors 350 Ohms
Analog signal bandwidth:	See table
Transmission:	Digital PCM Miller format - FSK
Transmission Power:	10mW!
Weight:	2.5 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 specifications are subject to change without notice!

CT-DEC16   Receiver unit for max 16 Channels output via 37 pol. Sub D

Front side view

Female 37 pole Sub-D for analog signal output, CH 1 to 16

Analog Out

Rear side view

Auto Zero LED Bright on, if analog output is over 60mV (Opt. AZ)

AZ   1-8   9-16

Out of function!

Power Switch

Transmission error LED

Fuse of powering defect LED

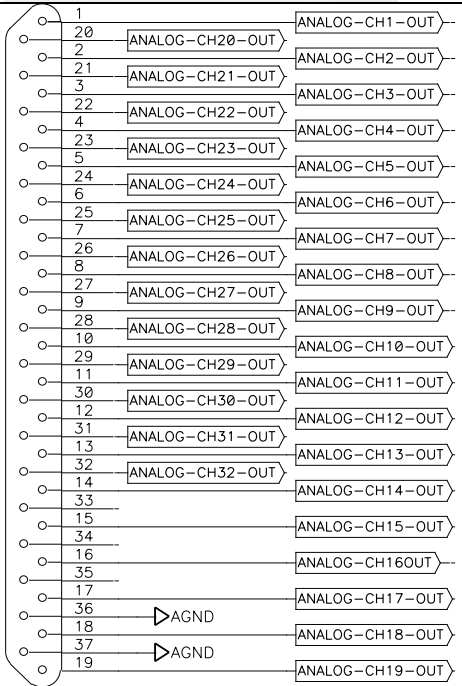**7-pole female TUCHEL connector for power supply input (10–30V DC)**

PCM out for IP-LAN-Interface (Opt.)

ON   Low Pwr   Error   Fuse

Level

DC 10–30V

Antenna   1   2

HF –Field strength display

SMA antenna connector with active LED of antenna (diversity)

Plug-side

Pin	Signal		Signal
1			ANALOG-CH1-OUT
20	ANALOG-CH20-OUT		
2			ANALOG-CH2-OUT
21	ANALOG-CH21-OUT		
3			ANALOG-CH3-OUT
22	ANALOG-CH22-OUT		
4			ANALOG-CH4-OUT
23	ANALOG-CH23-OUT		
5			ANALOG-CH5-OUT
24	ANALOG-CH24-OUT		
6			ANALOG-CH6-OUT
25	ANALOG-CH25-OUT		
7			ANALOG-CH7-OUT
26	ANALOG-CH26-OUT		
8			ANALOG-CH8-OUT
27	ANALOG-CH27-OUT		
9			ANALOG-CH9-OUT
28	ANALOG-CH28-OUT		
10			ANALOG-CH10-OUT
29	ANALOG-CH29-OUT		
11			ANALOG-CH11-OUT
30	ANALOG-CH30-OUT		
12			ANALOG-CH12-OUT
31	ANALOG-CH31-OUT		
13			ANALOG-CH13-OUT
32	ANALOG-CH32-OUT		
14			ANALOG-CH14-OUT
33			
15			ANALOG-CH15-OUT
34			
16			ANALOG-CH16OUT
35			
17			ANALOG-CH17-OUT
36	AGND		
18			ANALOG-CH18-OUT
37	AGND		
19			ANALOG-CH19-OUT

DC POWER CABLE

TUCHEL_7_MALE

BLACK   0V
RED   +POWER

PC Interface out

P9

GND 2   1 +5V
GND 3   4 PCM

LEMO4_FEMALE_0S

Optional BNC16 Box. Connect on 37pol Sub-D

KMT   BNC BOX

CT16- -DEC16 System Parameters:

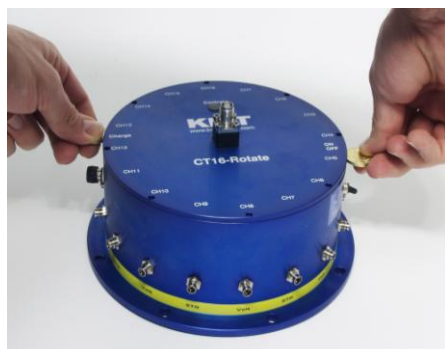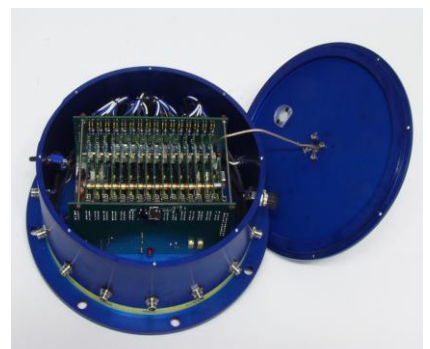|	
Channel:	16x +/-5V (+/-10V Option) analog outputs via Sub-D male socket
Resolution:	12 bit D/A converter, with smoothing filter
Dynamic:	72dB
Power supply input:	10-30 VDC, power consumption 10 Watt
Current consumption:	300mA at 10V, 100mA at 30V
Transmission:	Digital PCM Miller Format – FSK, diversity receiver
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

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

Sensor Inputs CH1 ... 16

STG - AZ button

Battery charge Input socket

CH16
CH15
CH14
CH13
CH12
CH11
CH10
CH9
CH8
CH7
CH6
CH5
CH4
CH3
CH2
CH1

Control

Charge

Green = Power ON
Red = Batt. empty

KMT
www.kmt-gmbh.com

Antenna socket TNC

ON OFF

ON/OFF Switch
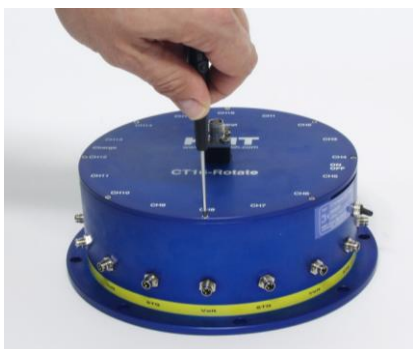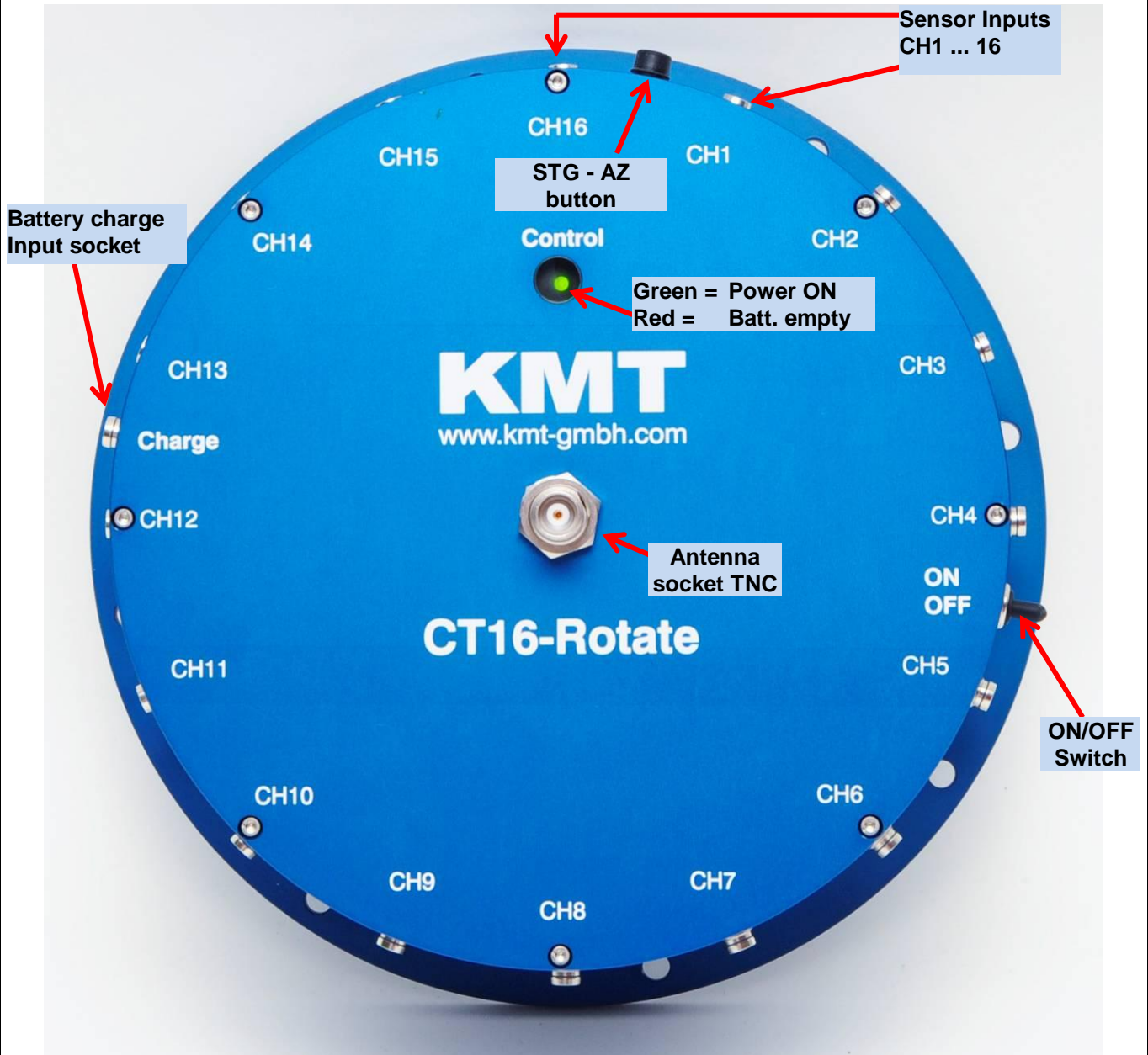
CT16-Rotate

Untwist to open the housing with hexagon screw driver 2mm

To lift the cover, use the slot!

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

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

|			
Sensor cable	Black = IN - White = IN + Brown = EXC + Blue = EXC -	Sensor socket	**CT-STG V1 module** Type: Strain gage >350 Ohms Excitation: 4 VDC (fixed) Gain: 200 or 1000
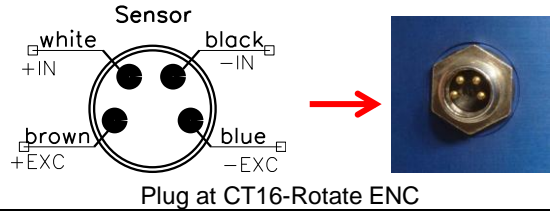
Sensor
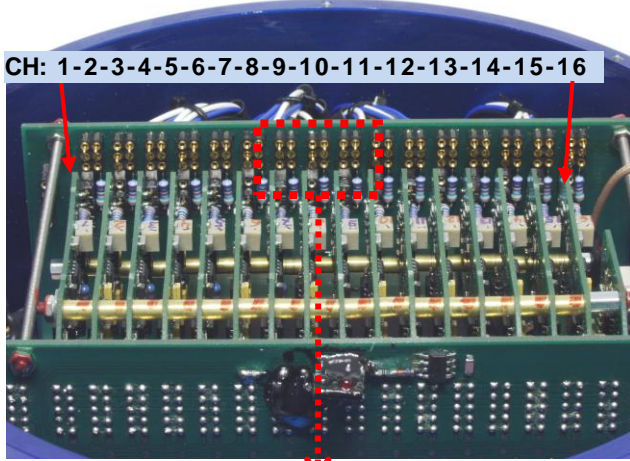
white +IN   black −IN

brown +EXC   blue −EXC

Plug at CT16-Rotate ENC

Sensor modules

CH: 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16

Plug bridge configuration at STG e.g.:

Full Bridge   Full Bridge   Half Bridge   Quarter Bridge

Offset Potentiometer

Gain   Gain 1000 *factory setting*

1/1 Bridge   1/4   1/2
- −EXC blue
- +IN white
- −IN black
- +EXC brown
FULL STG

Offset

1/2 Bridge   1/4   1/2
- −EXC blue
- +IN white
- −IN black
- +EXC brown
HALF STG
350R

1/4 Bridge   1/4   1/2
- −EXC blue
- +IN white
- −IN black
- +EXC brown
QUARTER STG
350R
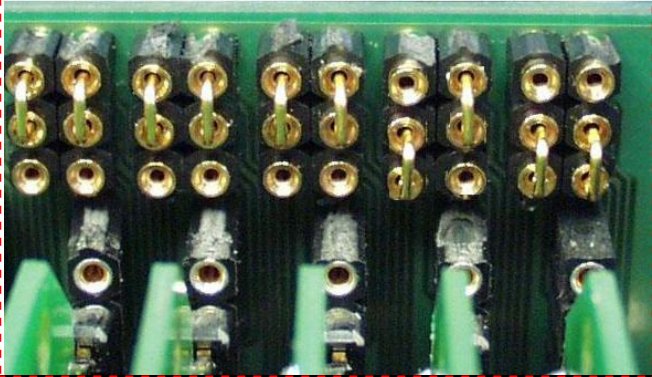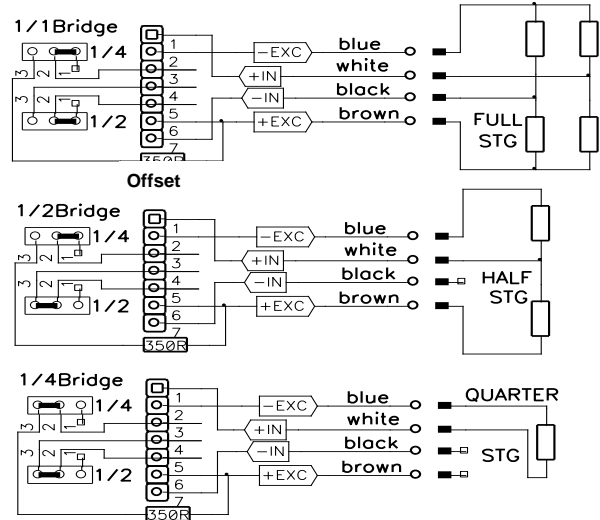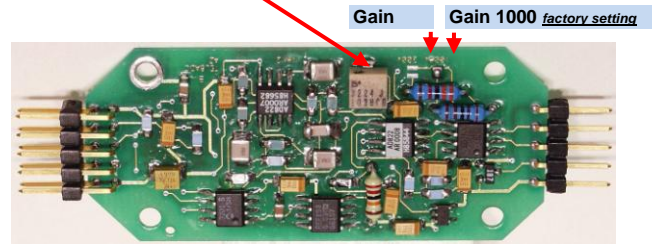
Offset calibration and Gain setting:

Offset potentiometers

Gain 200 or 1000 by solder bridge

Auto Zero calibration Optional!

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

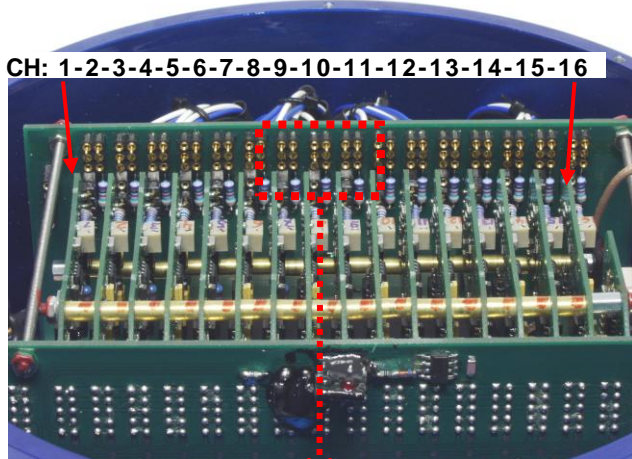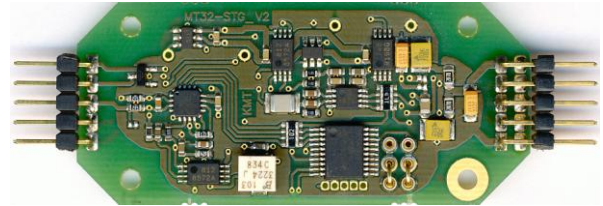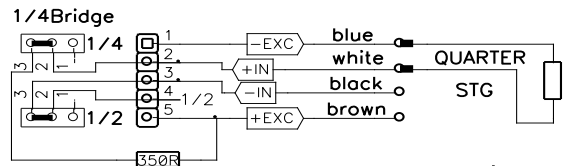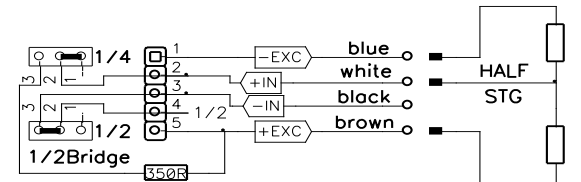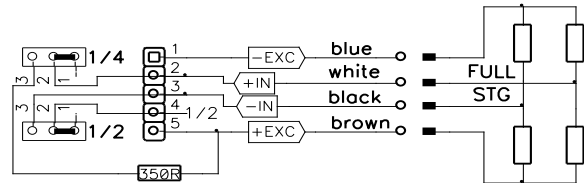|			**CT-STG-V2 module**
	Black = IN - White = IN + Brown = EXC + Blue = EXC -		Type: Strain gage >350 Ohms Excitation: 4 VDC (fixed) Gain: 250-500-1000-2000 or on request 1000-2000-4000-8000
Sensor cable		Sensor socket	Sensor white +IN · black -IN brown +EXC · blue -EXC Plug at CT16-Rotate ENC
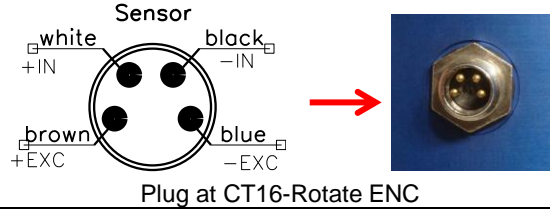
Sensor modules

CH: 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16

Plug bridge configuration at STG e.g.:

Full Bridge   **Full Bridge**   **Half Bridge**   **Quarter Bridge**

Offset Potentiometer

Gain 250 (Gain 1000)   Gain 1000 (Gain 4000)

Gain 500 (Gain 2000)   Gain 2000 (Gain 8000)

1/4   1/2   -EXC blue / +IN white / -IN black / +EXC brown   FULL STG   350R

1/4   1/2   1/2Bridge   -EXC blue / +IN white / -IN black / +EXC brown   HALF STG   350R

1/4Bridge   1/4   1/2   -EXC blue / +IN white / black / +EXC brown   QUARTER STG   350R
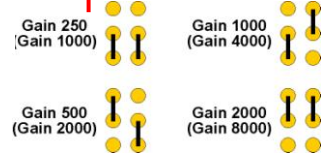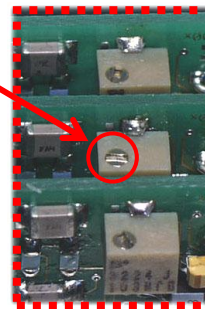
Offset calibration:

Offset potentiometer

Auto Zero calibration Optional!
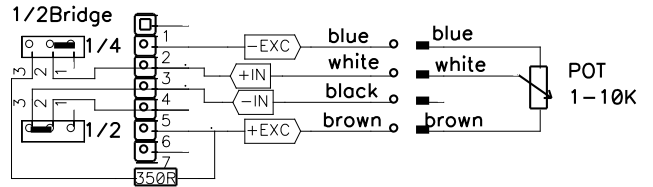
Connection POT:

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!!

Half Bridge

1/2Bridge

1/4
1/2
350R

−EXC blue   blue
+IN   white   white   POT
      black   black   1−10K
−IN
+EXC brown   brown

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!!

Half Bridge

+/-5V   +/-10V

1/2Bridge

1/4
1/2
350R

−EXC blue   VOLT−Modul
IN   white   white
      black   black   GND
IN   ± 5V(10V)
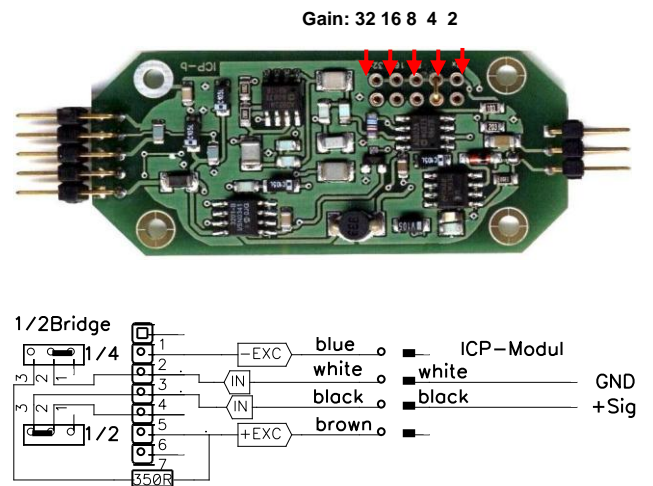+EXC brown   Input Unipolar
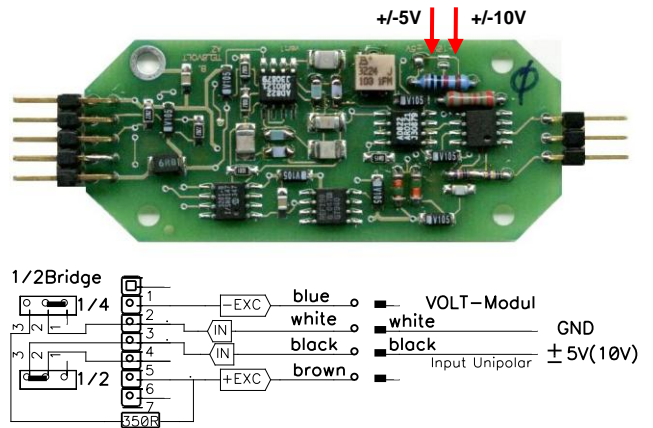
Connection ICP

ICP module

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

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

Half Bridge

Gain: 32 16 8 4 2

1/2Bridge

1/4
1/2
350R

−EXC blue   ICP−Modul
IN   white   white
      black   black   GND
IN   +Sig
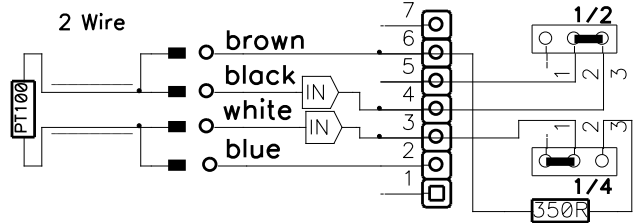+EXC brown

Connection CT-Pt100 module (RTD's)

CT-Pt100

Type: RTD 100 ohm
Range: -100 to 500°C
Accuracy +/- 0.25%

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

Half Bridge

Temperature [°C]	Output [V]	Temperature [°C]	Output [V]	Temperature [°C]	Output [V]
-100	-0,997	150	1,500	400	4,004
-50	-0,497	200	2,001	450	4,498
0	0,001	250	2,501	500	4,999
50	0,499	300	3,001		
100	1,000	350	3,501		

Connection Th K-ISO (with galvanic isolation!)

Thermo couple

Type: K
Range: -50°C – 1000°C
Bandwidth: 0-20Hz
Accuracy +/-1%

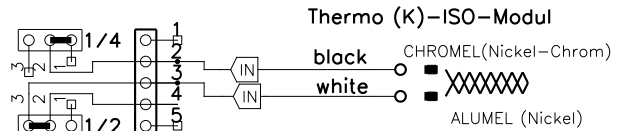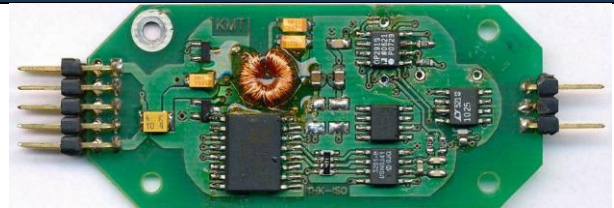**Galvanic isolated!**

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

Don't change offset!!

Half Bridge

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		

Li Ion Re-Chargeable Battery with Charger Unit for CT16-Rotate

black
GND

brown
+Pwr

blue
NU

Charge

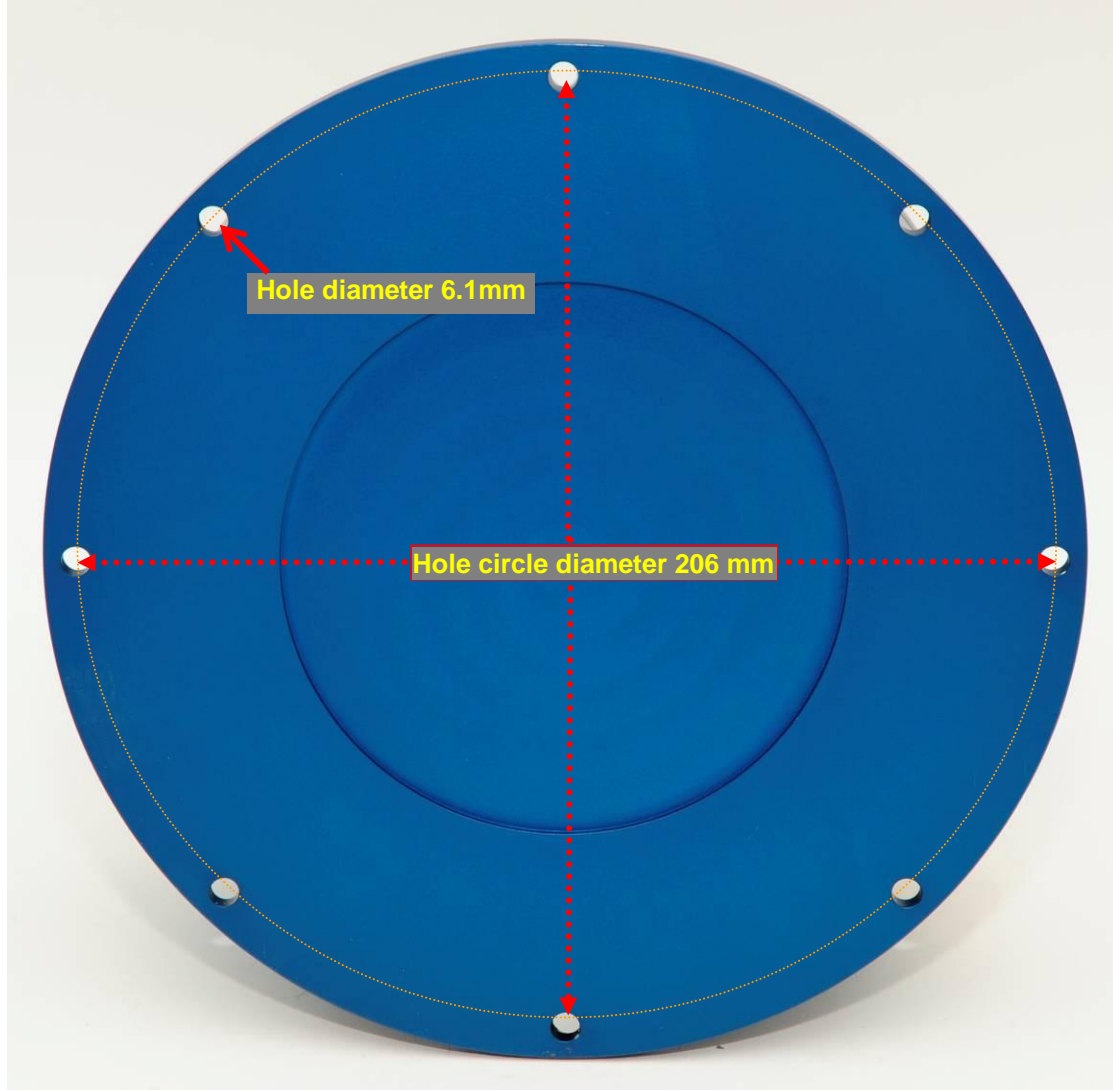Plug at CT16-Rotate ENC

Control
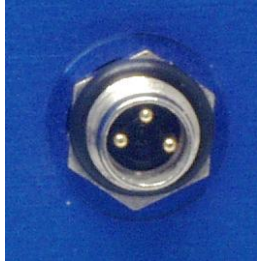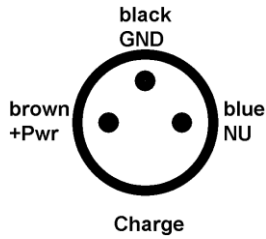
Battery charger CT16-Rotate

1. **Plug the 3- pole socket (charger) in to the CT16-Rotate 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 8 hours.**
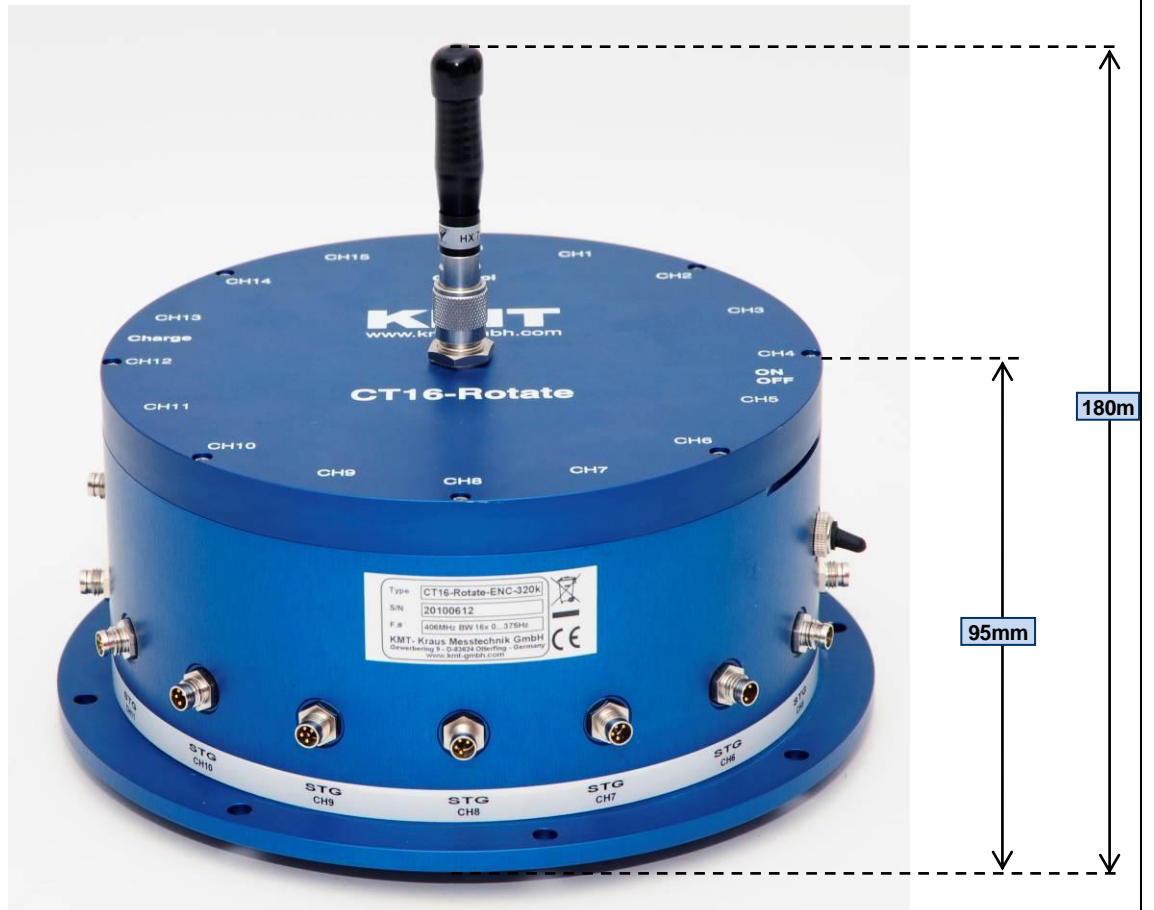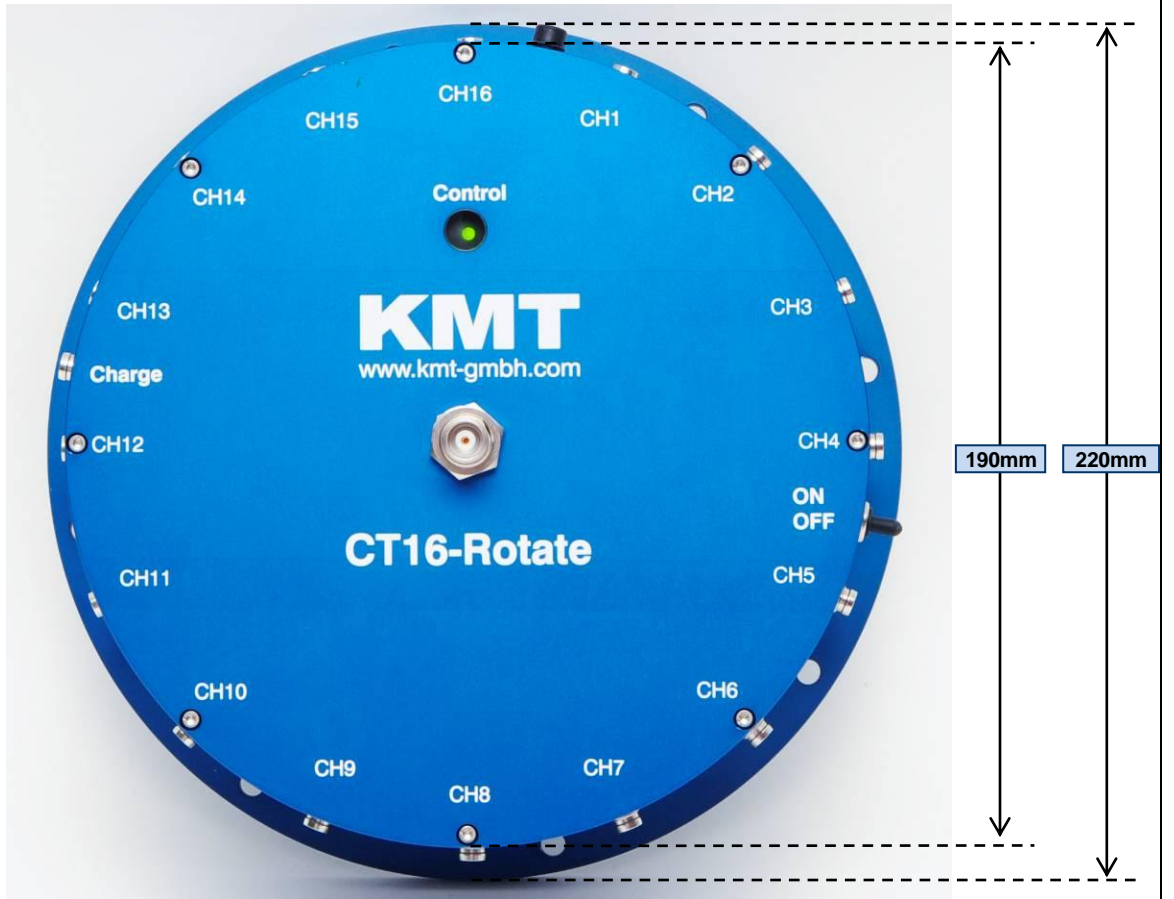
Attention:
Li Ion battery (7.2V, 4000mA) has a capacity for 12 hours. If the red LED indicator (Control) on the CT16-Encoder is ON the battery is 80% discharged and the device will switch off after 20 minutes!

Mounting hole dimensions:

Hole diameter 6.1mm

Hole circle diameter 206 mm

Base plate side

Dimensions:

190mm 220mm

180m

95mm

Total weight 2.5 kg