# TEMPTEL 4/8

## 4/8 channel Telemetry System for Thermocouples K or J

### Inductive digital transmission from rotating shafts

# User Manual


**INSTRUCTIONS FOR QUALIFIED PERSONNEL ONLY!**

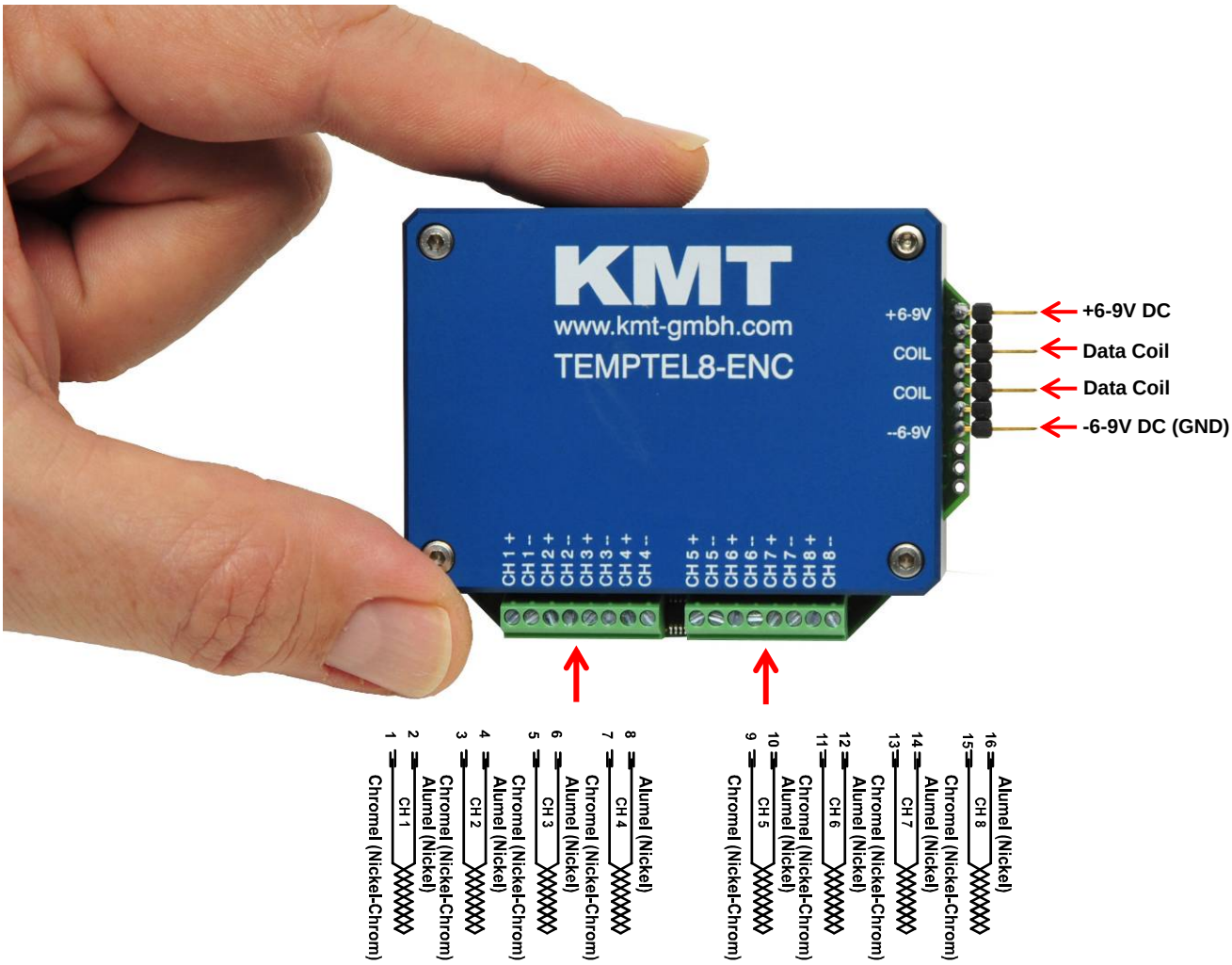
- For thermo couples K or J
- Linearization for K or J
- Galvanic isolated inputs
- Cold junction compensation
- 12 bit ADC resolution
- Signal bandwidth 0-30 Hz
- Different temperature ranges
- Inductive digital transmission
- 4 or 8 channel version
- Analog output +/- 10V
- Current outputs 0-20mA (Opt.)
- Powering of encoder with battery

**TMS** • Telemetrie-Messtechnik Schnorrenberg • Dipl.-Ing. Werner Schnorrenberg
Habichtweg 30, D-51429 Bergisch Gladbach, Tel: 02204-9815-52, Fax: 02204-9815-53, Mobil: 0171-8902387
Bankverbindung: Sparkasse KölnBonn, Kto.-Nr: 1900310663, BLZ: 370 501 98

# Safety notes

- The device should only applied by instructed personnel.
- The power head emits strong magnetic radiation at 30-60 kHz to a distance of 300 mm. Therefore persons with cardiac pacemakers should not work with this device!
- Magnetic data storage media should be kept in a distance of at least 3m from the power head to avoid data loss. The same is valid for electromagnetic sensitive parts, devices and systems.
- Do not place the power head in the switched-on state on metallic objects, because this results in eddy currents which could overload the device and strong heat up small objects. Also the probe could be destroyed!
- No metallic objects, other than the disc-type coil, should be located in the air gap of the power head. The same applies to metallic parts within a radius of up to 50 mm in all directions.
- Do not use damaged or faulty cables!
- Never touch in the area between shaft and inductive head, the rotating shaft itself or rotor electronic contacts during operation!
- This is a “Class A” system suitable for operation in a laboratory or industrial environment. The system can cause electromagnetic interferences when used in residential areas or environments. In this case the operator is responsible for establishing protective procedures.

# Transmitting unit TEMPTEL4/8-ENC (Encoder)



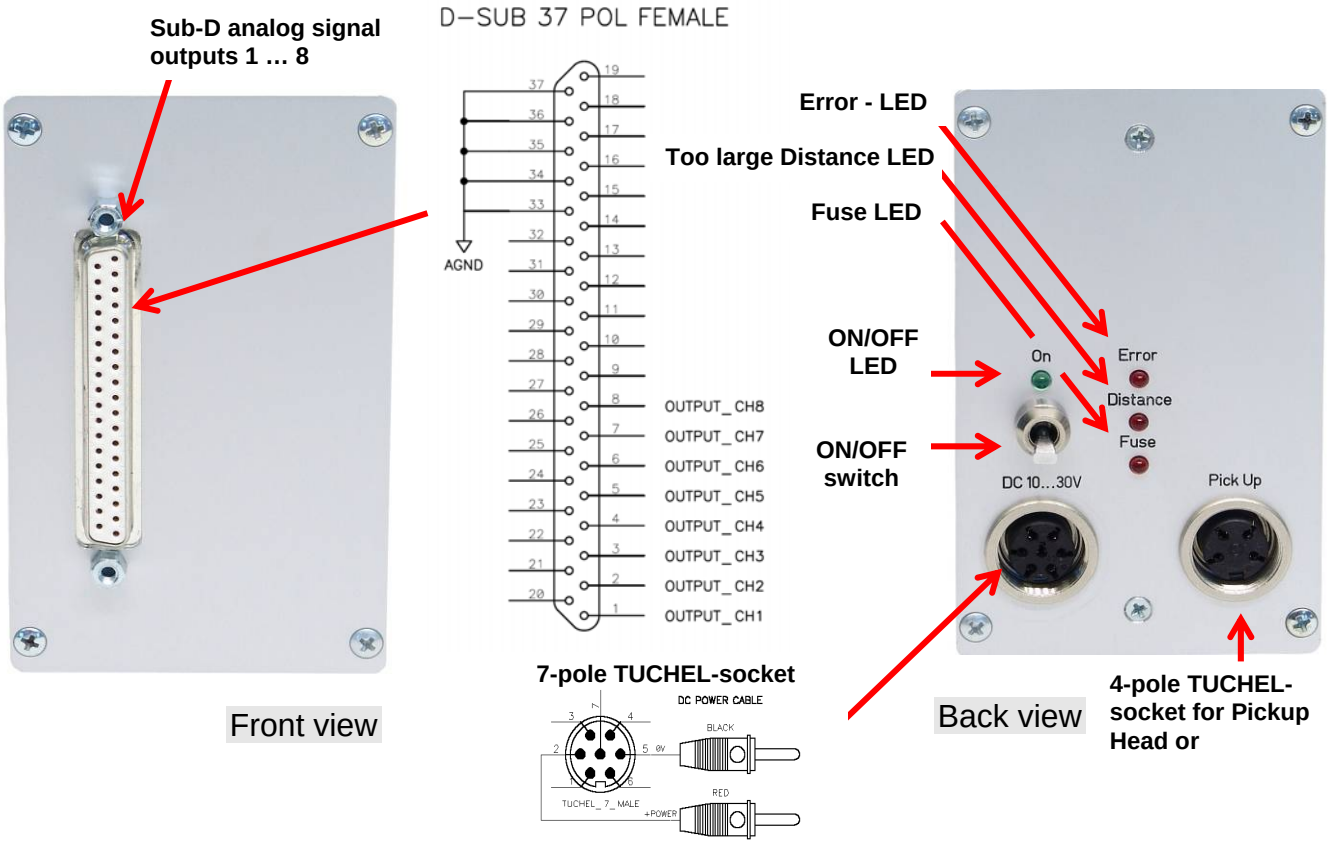

**SC Module TH-K (J):**

| | |
|---|---|
| Sensor: | thermo-couple, type K (J) with cold junction compensation<br>**inputs full galvanic isolated!!** |
| Temperature measuring range type K: | -50°C to +1000°C (standard), or -50°C to +500°C or -50°C to +250°C<br>specify temperature range at order! |
| Temperature measuring range type J:<br>type *J on request* | -50°C to +750°C or -50°C to +500°C or -50°C to +250°C<br>specify temperature range at order! J on request |

**System Parameters:**

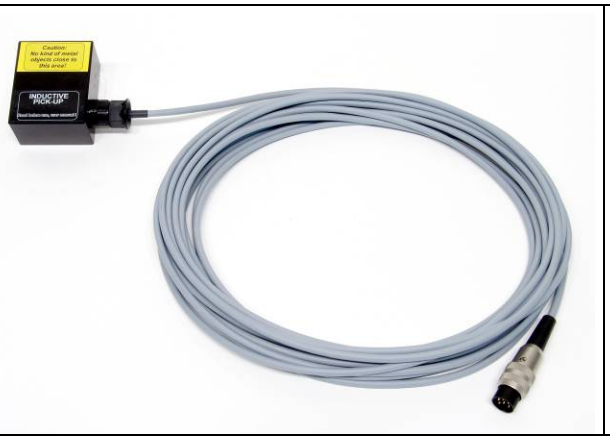
| | |
|---|---|
| Channels: | 4 or 8 |
| Resolution: | 12 bit A/D |
| Line-of-sight distance: | distance 5-50mm at battery power (between coil and Pickup Head) |
| Powering: | 6-9V by battery or optional inductive power supply |
| Current consumption: | 130 mA |
| Analog signal bandwidth: | 4x 0…30Hz or 8x 0…30Hz (scanning rage 312.5Hz/CH) |
| Dimensions: | 70mm x 50 x 22.5mm (housing) |
| Weight: | 110 g without cables |
| Transmission: | Induktive ,digital PCM Miller Format - FSK |
| Operating temperature: | - 20 … +70°C |
| Housing: | Aluminum IP 54 |
| Humidity: | 20 ... 80% no condensing |
| Static acceleration: | 1000g in all directions |
| Shock: | 2000g in all directions |

# Receiving unit TEMPTEL4/8 DEC (Decoder)



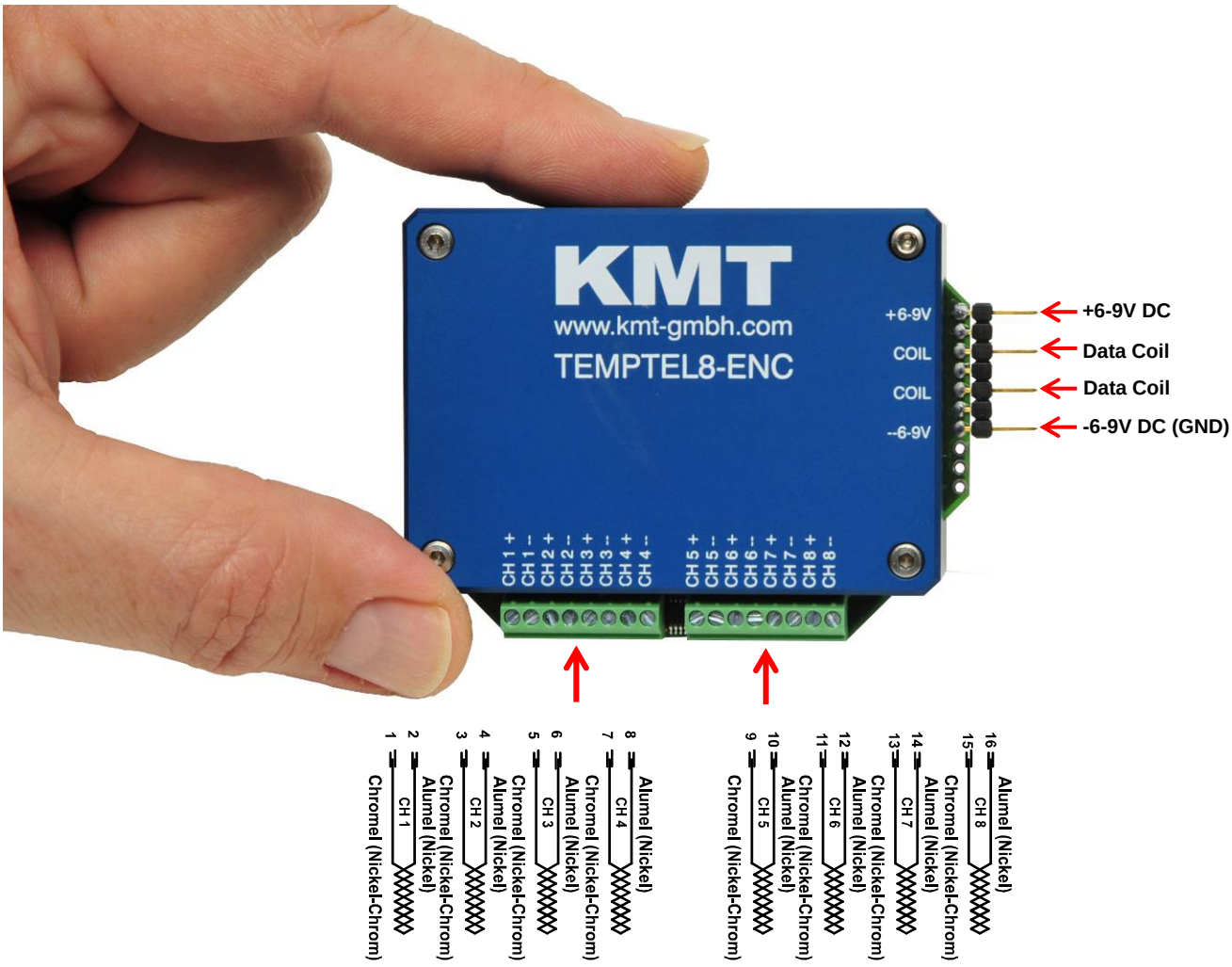

**System Parameters:**

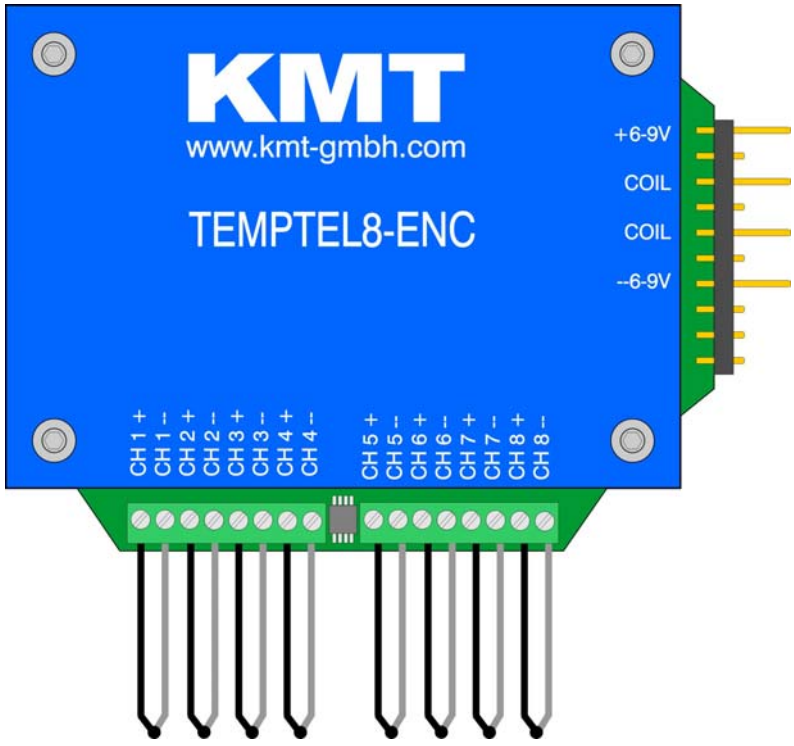
| | |
|---|---|
| Channel: | 4 or 8 analog outputs via 37-pole sub-D +/-10V (linearised)<br>(optional current output 0-20mA via 25-pole sub-D) |
| Receiving: | inductive PCM Telemetry |
| Resolution: | 12 bit D/A converter, with smoothing filter |
| Dynamic: | 72dB |
| Power supply input: | 10-30 VDC |
| Current consumption: | 300mA at 10V, 100mA at 30V |
| Analog signal bandwidth: | 4 x 0 … 30Hz or 8 x 0 … 30Hz |
| Dimensions: | 205 x 105 x 65mm |
| Weight: | 1.00 kg without cables and antenna |
| Overall system accuracy between encoder input and decoder output: | +/-0.5% without sensor influences |
| <u>Environmental</u> | |
| 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 |



TEMPTEL-Pickup
Pickup head receive inductive data from coil
Distance between the transmitter coil and the pickup is 5-100mm
PCM output to TEMPTEL4/8-DEC via 5pol. Tuchel plug incl. 5m cable.
(Cable length standard 5m, optional 20m)
Operating temperature: - 10 to +80 °C
Dimensions: 45x60x25mm (without cable)
Weight: 400 grams (with 5m cable!)
Housing: splash-water resistant IP65 (except connector).

## TEMPTEL4/8-ENC - pin connection Th K-ISO IND-data transmission



## Output table of Th K-ISO

| Temperature measuring range type K: -50°C to +250°C | | | |
|---|---|---|---|
| Temperature [°C] | Output [V] | | |
| -50 | -2.00 | | |
| 0 | 0.00 | | |
| 50 | 2.00 | | |
| 100 | 4.00 | | |
| 150 | 6.00 | | |
| 200 | 8.00 | | |
| 250 | 10.00 | | |

| Temperature measuring range type K: -50°C to +500°C | | | |
|---|---|---|---|
| Temperature [°C] | Output [V] | Temperature [°C] | Output [V] |
| -50 | -1.00 | 250 | 5.00 |
| 0 | 0.00 | 300 | 6.00 |
| 50 | 1.00 | 350 | 7.00 |
| 100 | 2.00 | 400 | 8.00 |
| 150 | 3.00 | 450 | 9.00 |
| 200 | 4.00 | 500 | 10.00 |

| Temperature measuring range type K: -50°C to +1000°C | | | | | | | |
|---|---|---|---|---|---|---|---|
| Temperature [°C] | Output [V] | Temperature [°C] | Output [V] | Temperature [°C] | Output [V] | Temperature [°C] | Output [V] |
| -50 | -0.50 | 250 | 2.50 | 550 | 5.50 | 850 | 8.50 |
| 0 | 0.00 | 300 | 3.00 | 600 | 6.00 | 900 | 9.00 |
| 50 | 0.50 | 350 | 3.50 | 650 | 6.50 | 950 | 9.50 |
| 100 | 1.00 | 400 | 4.00 | 700 | 7.00 | 1000 | 10.00 |
| 150 | 1.50 | 450 | 4.50 | 750 | 7.50 | | |
| 200 | 2.00 | 500 | 5.00 | 800 | 8.00 | | |

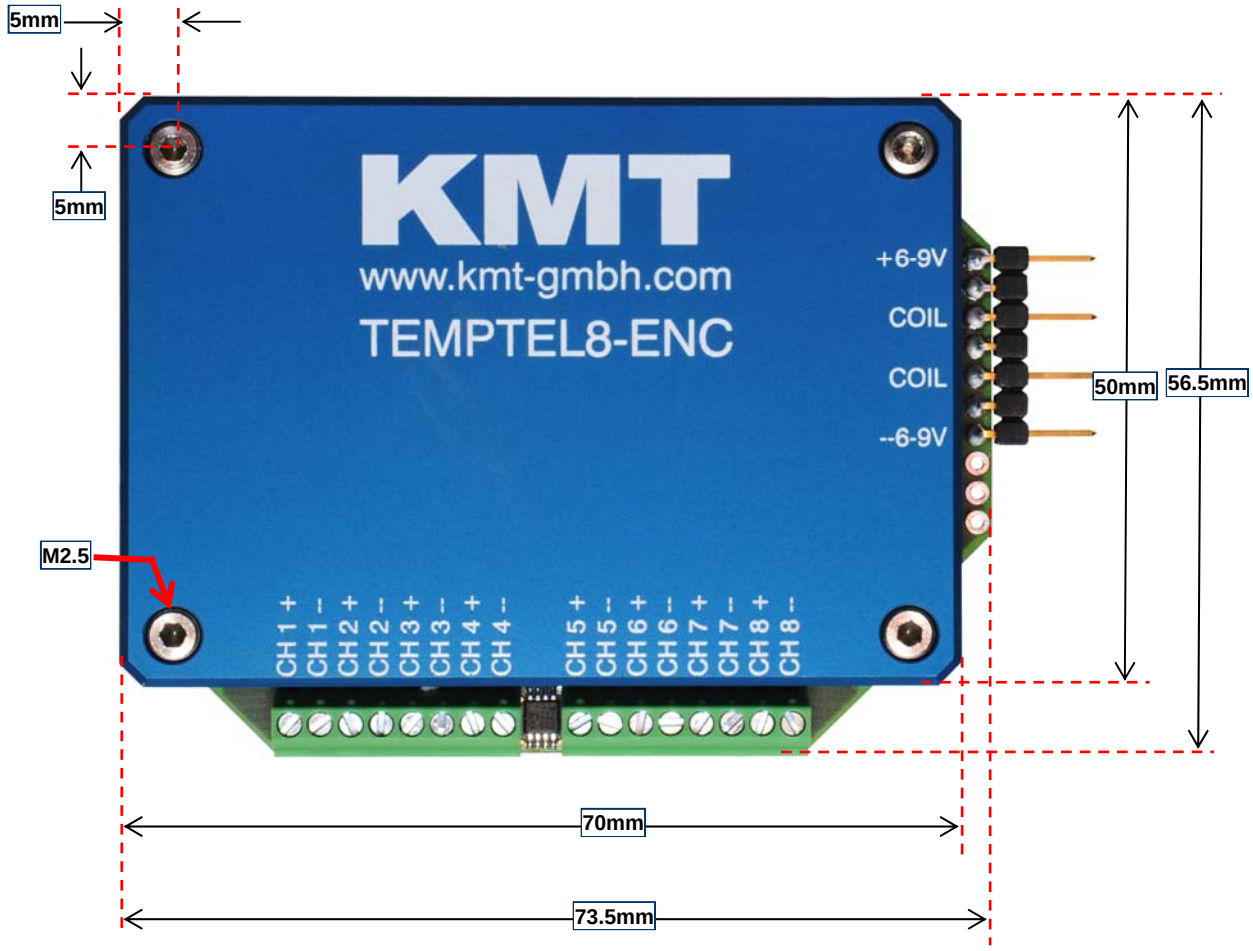
## Output table of Th J-ISO

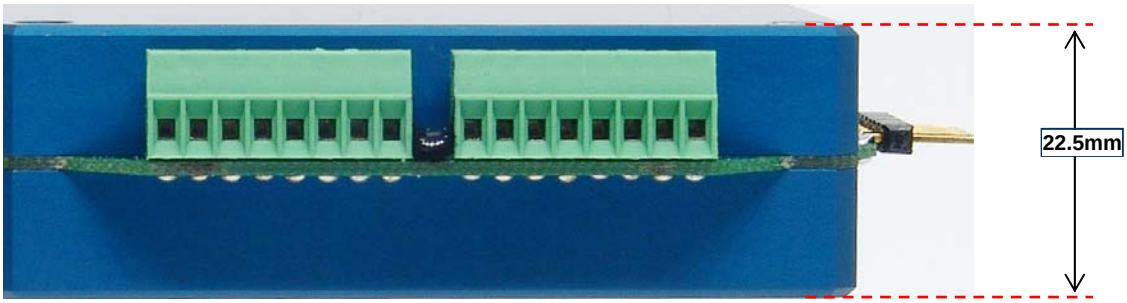
| Temperature measuring range type J: -50°C to +250°C | | | |
|---|---|---|---|
| Temperature [°C] | Output [V] | | |
| -50 | -2.00 | | |
| 0 | 0.00 | | |
| 50 | 2.00 | | |
| 100 | 4.00 | | |
| 150 | 6.00 | | |
| 200 | 8.00 | | |
| 250 | 10.00 | | |

| Temperature measuring range type J: -50°C to +500°C | | | |
|---|---|---|---|
| Temperature [°C] | Output [V] | Temperature [°C] | Output [V] |
| -50 | -1.00 | 250 | 5.00 |
| 0 | 0.00 | 300 | 6.00 |
| 50 | 1.00 | 350 | 7.00 |
| 100 | 2.00 | 400 | 8.00 |
| 150 | 3.00 | 450 | 9.00 |
| 200 | 4.00 | 500 | 10.00 |

| Temperature measuring range type J: -50°C to +750°C | | | |
|---|---|---|---|
| Temperature [°C] | Output [V] | Temperature [°C] | Output [V] |
| -50 | -0,67 | 375 | 5.00 |
| 0 | 0.00 | 450 | 6.00 |
| 75 | 1.00 | 525 | 7.00 |
| 150 | 2.00 | 600 | 8.00 |
| 225 | 3.00 | 675 | 9.00 |
| 300 | 4.00 | 750 | 10.00 |

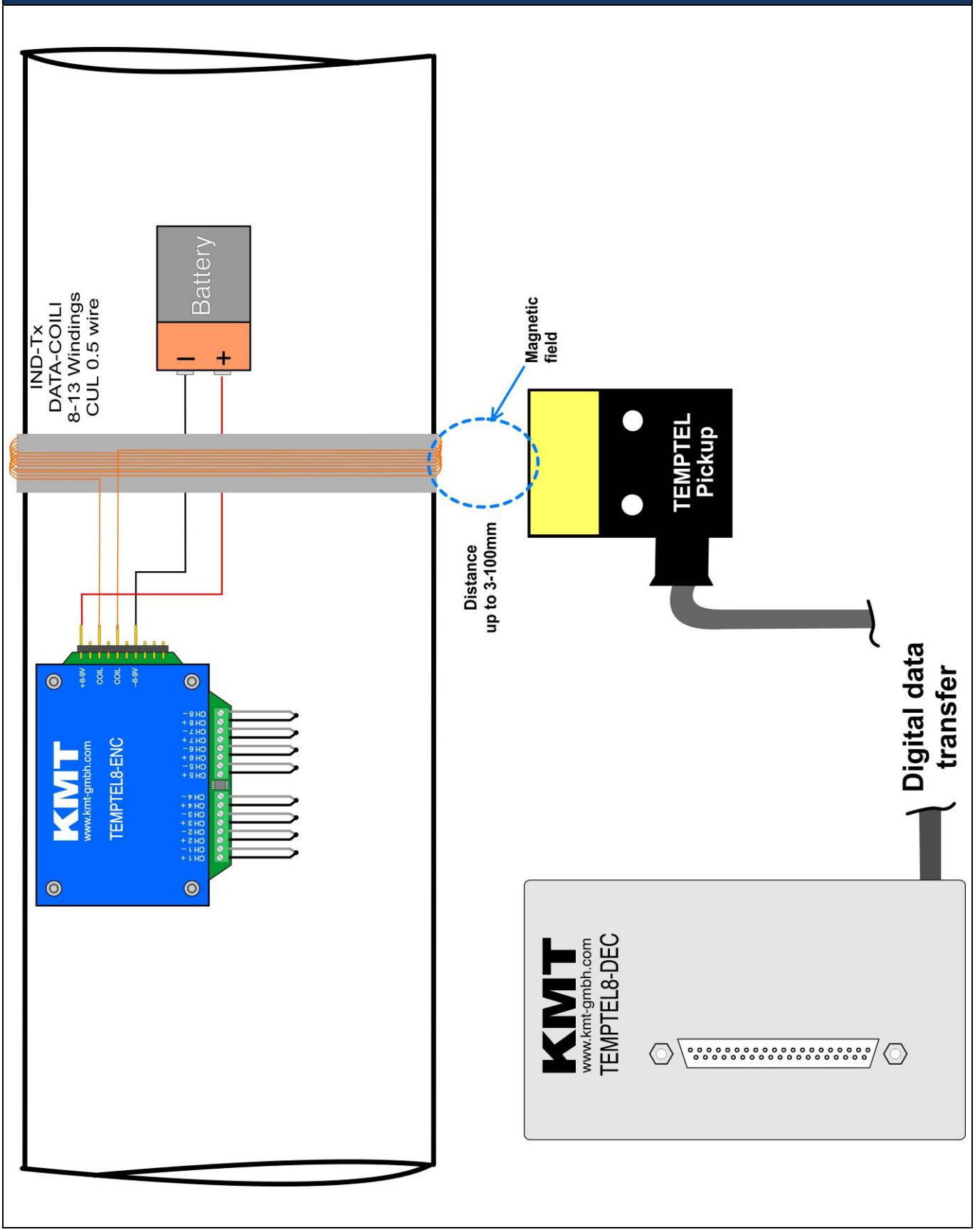
## TEMPTEL8-ENC - Dimensions:



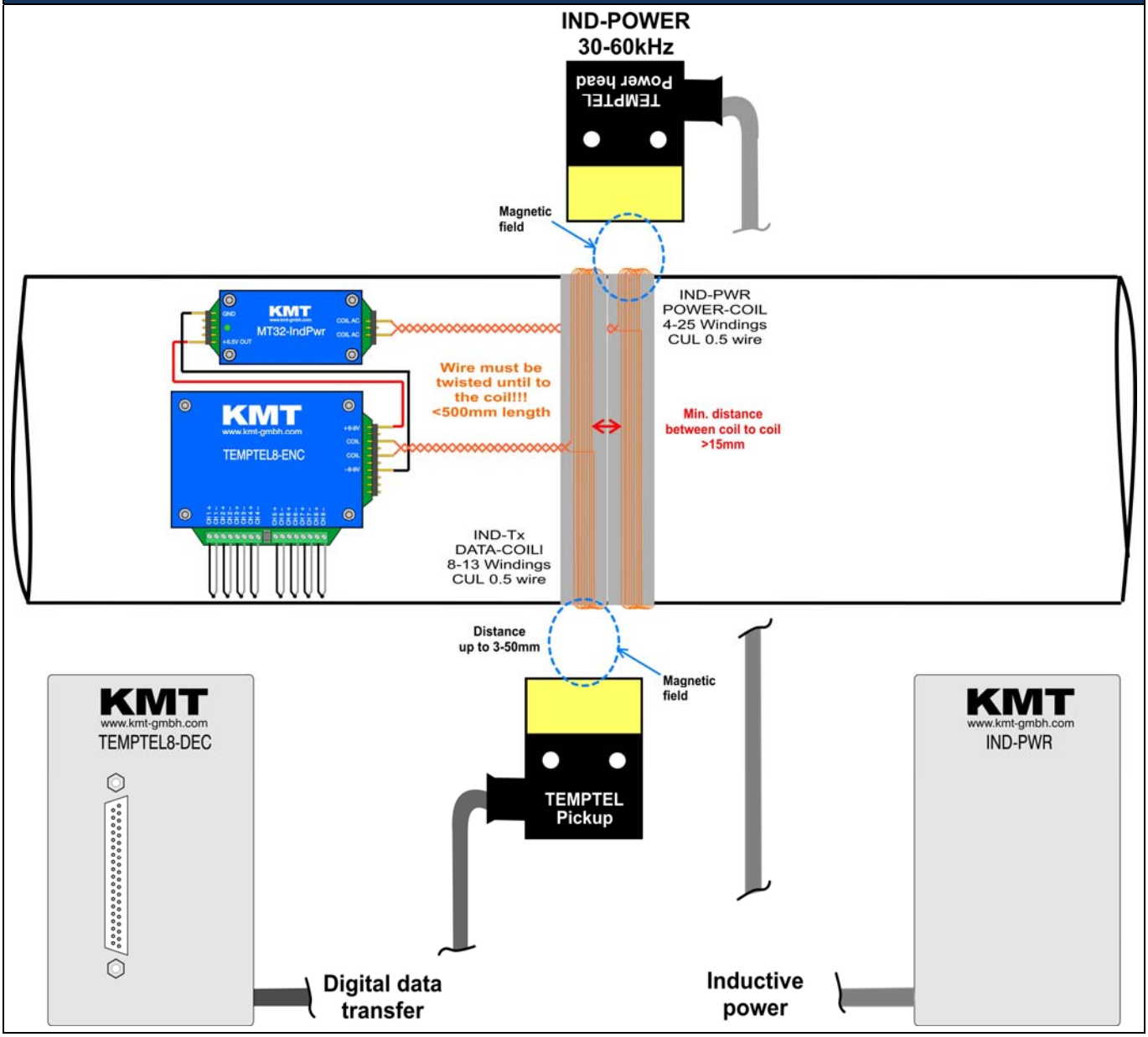




Total weight 110g

## Block diagram with battery power

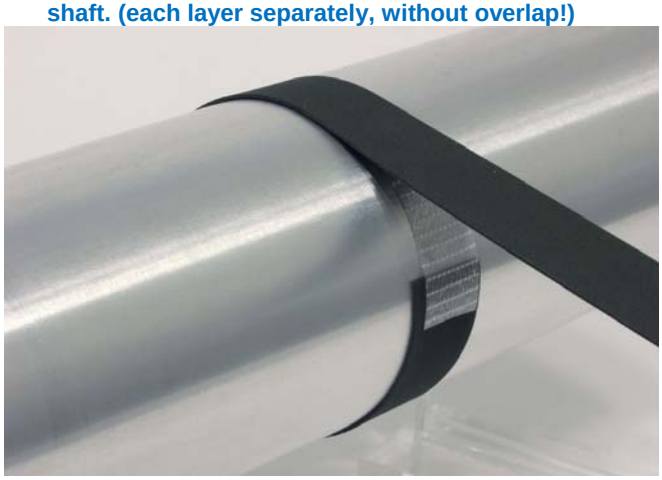


## Block diagram with optional inductive power supply



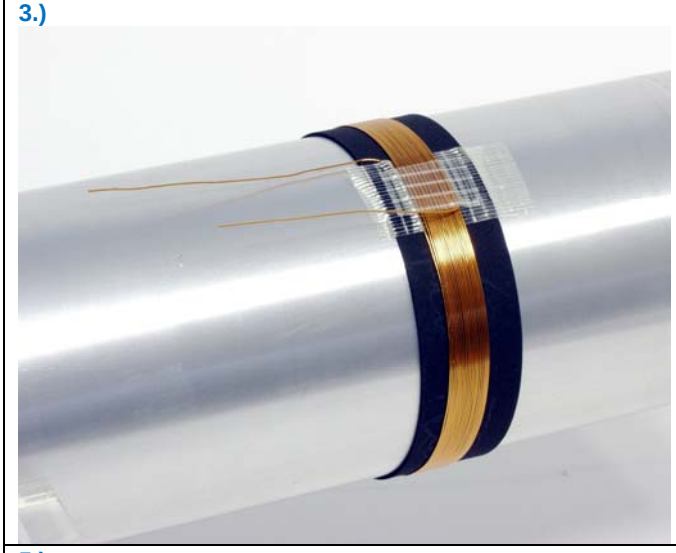
# Installation of transmitting coil on a shaft

**1.) Mount 2 layers of the special ferrite tape around the shaft. (each layer separately, without overlap!)**



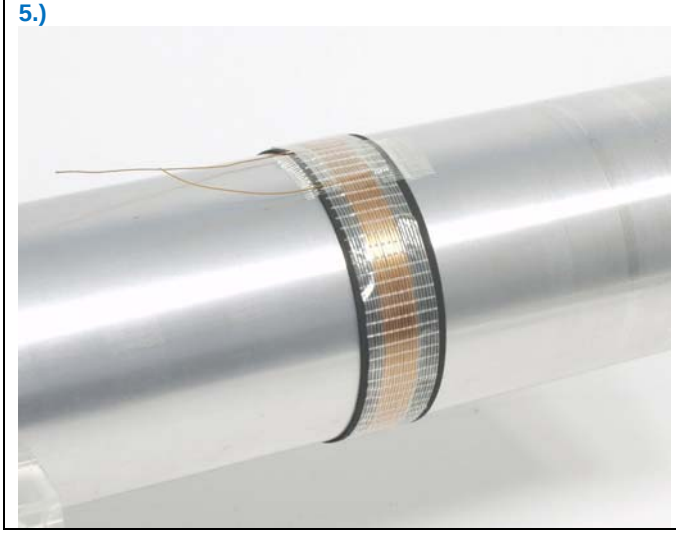
**2.) Coil, depends of shaft diameter 8-13 parallel windings of 0.5 CUL wires (see table for help)**


**3.)**



**4.) Fix with 3-4 layers of mounting tape around the shaft**

**5.)**

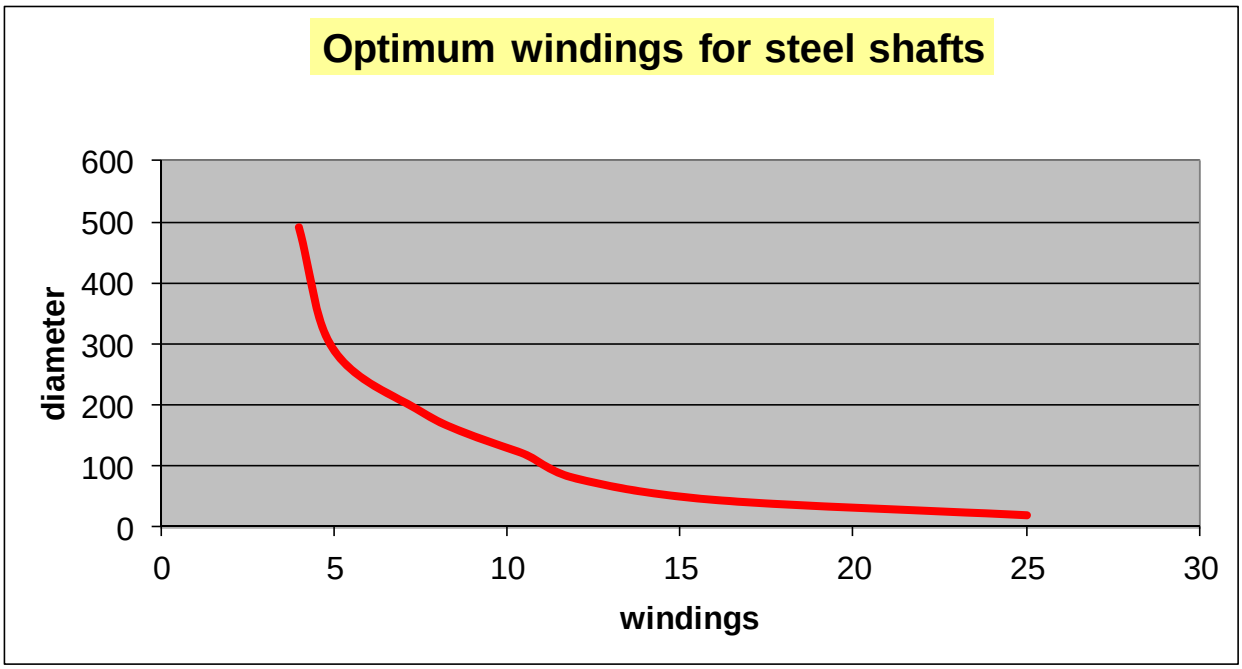


**6.)**

# Find the correct amount of windings

The number of windings depends on several factors. The most important influential factors are the diameter, the materiel of the shaft and the environment around the shaft. The table standing below will help you to estimate the number of windings fast. To optimize your results you can try one winding more or less.

**Coil, depends of shaft diameter 8-13 parallel windings of 0.5 CUL wire**


| Diameter (mm) | Windings |
|---|---|
| 490 | 4 |
| 290 | 5 |
| 190 | 7 |
| 150 | 9 |
| 120 | 10 |
| 80 | 12 |
| 45 | 16 |
| 20 | 25 |
| | |