KMT - Kraus Messtechnik GmbH

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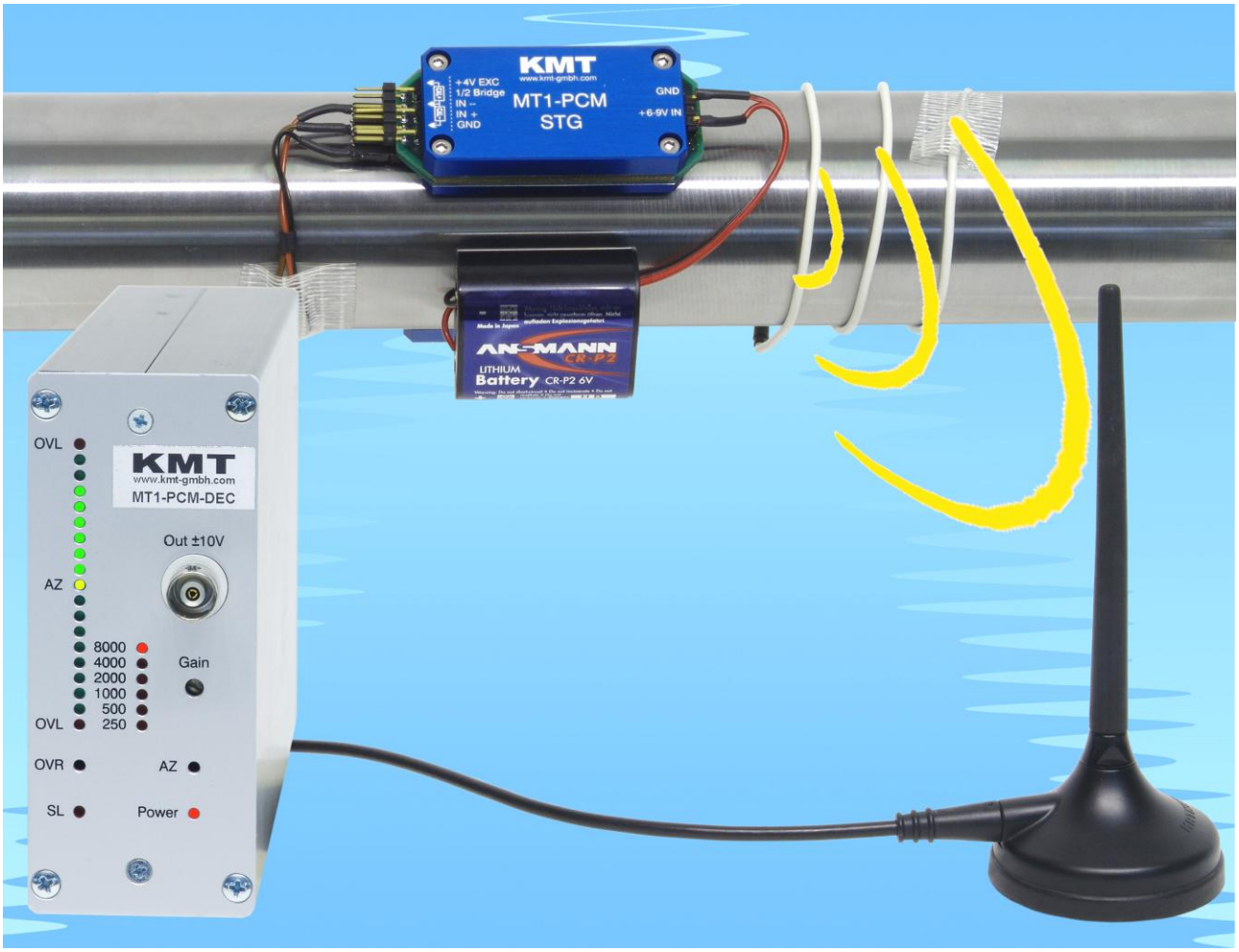
Home Page http://www.kmt-gmbh.com, Email: info@kmt-gmbh.com

MT1-PCM

Digital Radio Telemetry System for Strain Gage Applications on Rotating Shafts

"Gain and Auto Zero setting direct from Receiver Side!"

Operating Instructions



- **Easy to assemble and operate**
- **Strain gage sensors (>350 Ohm)**
- **Full- and half bridge configuration**
- **Excitation fixed 4 Volt DC**
- **Auto-Zero adjustment - Setting receiver side**
- **Gain: 250-8000 - Setting receiver side**
- **External shunt calibration**
- **Digital transmission via radio telemetry 433, 868MHz**
- **Powering through Lithium battery, >22h work time**
- **Distance 1-10 meter (rotating application)**
- **Up to 4 system can work in different radio freq.**
- **Signal bandwidth 0…500Hz (-3dB)**
- **Output +/-10V**
- **System accuracy <0.2%**

General Description

The MT1-PCM single-channel telemetry system offers the easiest handling for the wireless radio transmission of strain gage signals from rotating shafts.

The encoder has dimensions (MT1-PCM-STG) of 62x27x13mm (without connectors) and transmitter (40k-Tx) of 62x27x11mm (without connectors). Each module has a weight of about 30g. The encoder/transmitter parts are simply mounted on the rotating shaft with a special fiber reinforced tape and add steel trip.

Powering of the transmission part is with battery 6-9V, power consumption 70mA. The digital data transfer between transmitter and receiver is realized by radio frequency 433MHz or 868MHz, transmitting power 10mW

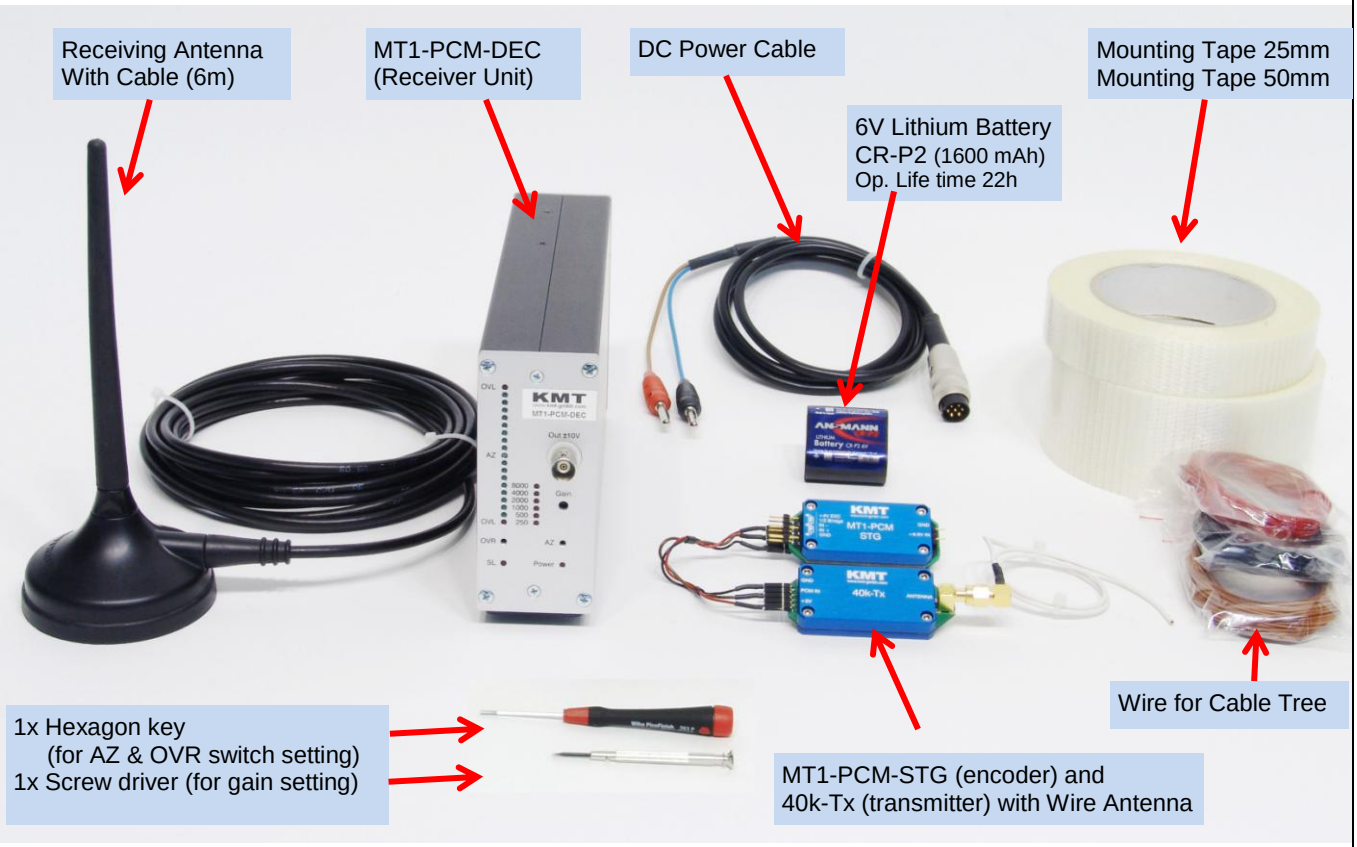
Functional Description

The MT1-PCM transmitter transmits a digital radio frequency signal to the receiver. The distance between transmitter and receiver (depends of application) is 1-10 meter. "Not rotating Point to Point application upto 100m at free view"

The receiver unit offers a BNC connector at the front panel with analog outputs ± 10 V. An LED bar indicator shows the actual level and a successful Auto Zero calibration. Overload is indicated by the last LED´s in pos. or neg. direction of the bar graph. These OVL-LED´s operate in peak-hold mode and are reset by pressing the overload switch.

Strain gage sensors (>350 Ohm) in full- and half- bridge configuration can be directly connected to the transmitter. The excitation is fixed to 4 Volt DC and the gain is set by the gain switch on the receiver side. An auto-zero (AZ) adjustment is executed by pressing the AZ button on the front side of the receiver. The successful AZ operation is indicated by a yellow LED in the middle of the LED bar indicator. When the AZ completes the LED continuously illuminates. A continued flashing of the yellow LED indicates some error in the AZ electronics. In this case please contact the support of KMT. Additional to the AZ you have the possibility to calibrate the bridge by external shunt (+ and -). The AZ setting is stored in a Flash-RAM and thus is not lost during power-off. Use only shielded sensor cable.

MT1-PCM Set Contains:



Technical Data - Transmitter

MT1-PCM-STG

Straingage:	Full and 1/2 bridge >350 Ohm,
Excitation:	4 VDC (fixed)
Gain:	250; 500; 1000; 2000; 4000; 8000 (select able from receiver side)

Gain table

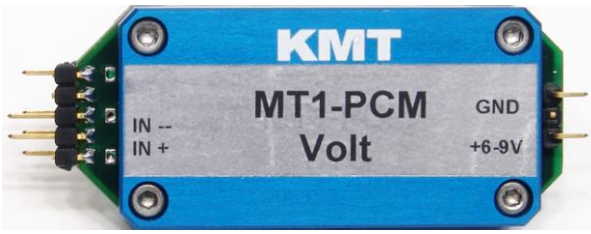
Gain	Autozero range
250	100%
500	200%
1000	400%
2000	400%
4000	400%
8000	400%

Shunt Cal:	Via external resistor for positive and negative calibration
Analog bandwidth:	**0 - 500 Hz (-3 dB)**
Operating temperature:	- 10 to + 80 °C
Scanning rate:	2000 Hz
Resolution:	12bit (ADC)

40k-Tx transmitter:

Carrier frequency:	433MHz or 868MHz, 10mW transmitting power
Dimensions:	MT1-PCM-STG = 62x27x13mm (without connectors) 40k-Tx = 62x27x11mm (without connectors)
Weight:	each about 30 gram (without cables)
Static acceleration:	**up to 3000g (only with inductive power!)** **with lithium battery about 1000g**
Powering:	MT1-PCM-STG By battery 6-9V (powering **40k-Tx** trough MT1-PCM-STG, +5V/GND)
Power consumption:	70mA
Operating time	with CR-P2 Lithium 1600mAh battery 22h

Optional: ***Inductive powering***



MT1-PCM-VOLT

High level inputs:	+/- 20, 10V, 5V, 2.5V, 1.25V or 0.625V
Range:	250; 500; 1000; 2000; 4000; 8000 (select able from receiver side)

Gain table

INPUT range	Gain
+/- 20V	250
+/- 10V	500
+/- 5V	1000
+/- 2.500V	2000
+/- 1.250V	4000
+/- 0,625.V	8000

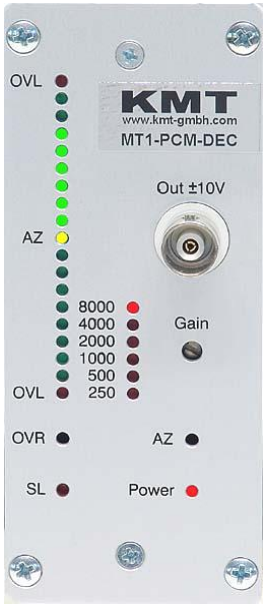
Analog bandwidth:	**0 - 500 Hz (-3 dB)**
Operating temperature:	- 10 to + 80 °C
Scanning rate:	2000 Hz
Resolution:	12bit (ADC)

40k-Tx transmitter:

Carrier frequency:	433MHz or 868MHz, 10mW transmitting power
Dimensions:	MT1-PCM-STG = 62x27x13mm (without connectors) 40k-Tx = 62x27x11mm (without connectors)
Weight:	each about 30 gram (without cables)
Static acceleration:	**up to 3000g (only with inductive power!)** **with lithium battery about 1000g**
Powering:	MT1-PCM-STG By battery 6-9V (powering **40k-Tx** trough MT1-PCM-STG, +5V/GND)
Power consumption:	70mA
Operating time	with CR-P2 Lithium 1600mAh battery 22h

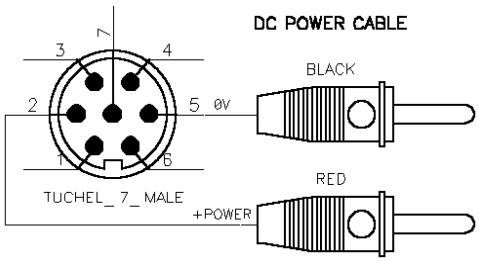
Optional: ***Inductive powering***

Technical Data - Receiver



Front side

Rear side



MT1-PCM-DEC

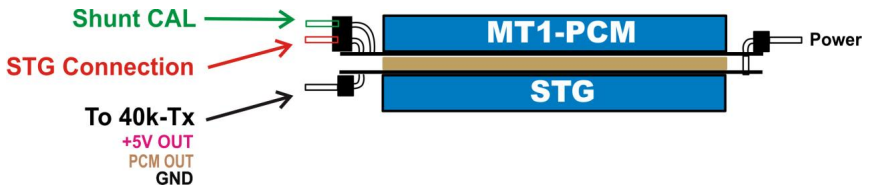
Font side:

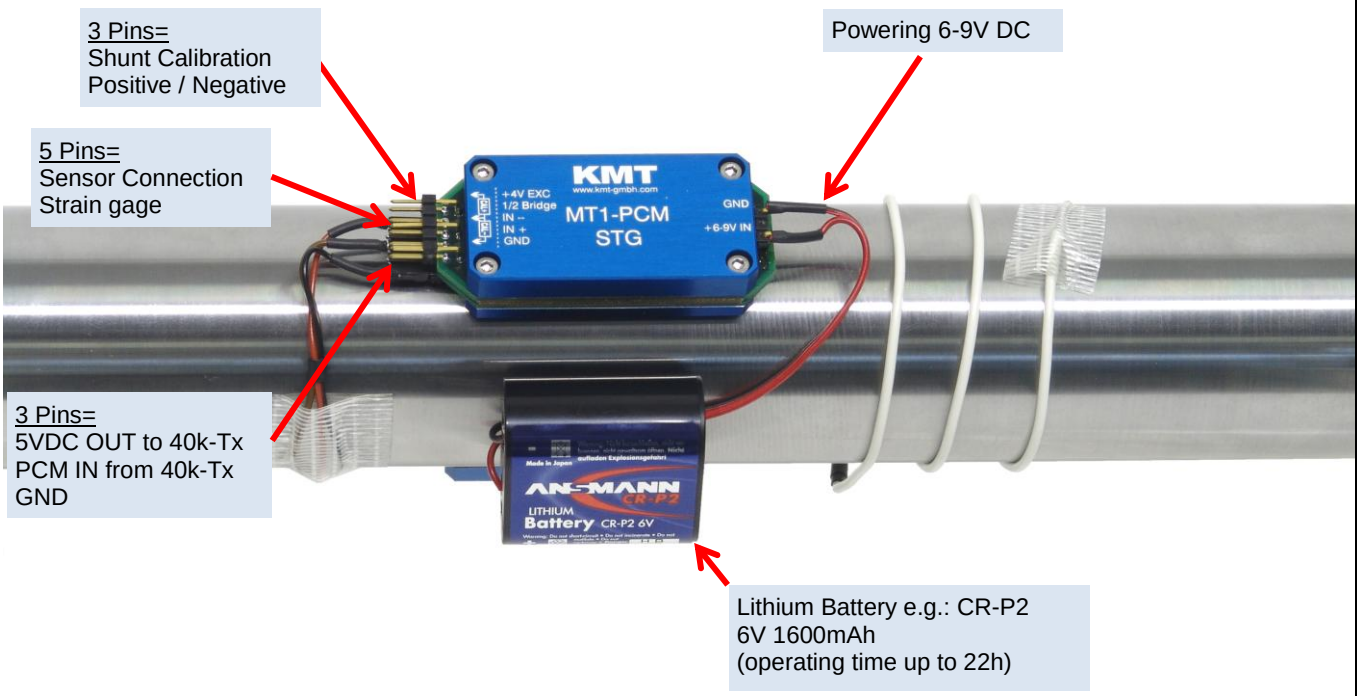
Analogue output:	+/-10V via BNC
Resolution:	12bit (DAC)
Gain setting :	via screw switch
Auto Zero setting:	via micro switch
Overload LED's	(Red ON) reset: via micro switch
Autozero LED:	
	Yellow ON- successful AZ (output signal <+/-30mV)
	Yellow OFF- not successful AZ (output sign. >+/-30mV)
	if flashing, call support of KMT, error in EPROM
Green LED's:	Bargraph +/-
SL LED:	Red ON = if error of data transmitting
SL LED:	Red Flashing = if the battery is empty
Power ON LED:	Red ON = if power switch on

Rear side:

Antenna:	Input for receiving antenna
RF Level:	LED indicator for radio frequency
Fuse LED:	Flashing if fuse is defect
Powering:	10-30V DC, Input via 7pol. Tuchel
Switch:	ON/OFF
Operating temperature:	- 10 to + 70 °C
Dimensions:	200 x 105 x 44 (without connectors!)
Weight	950 grams
Static acceleration:	up to 200g
System accuracy	(without sensor): +/- 0.2 %

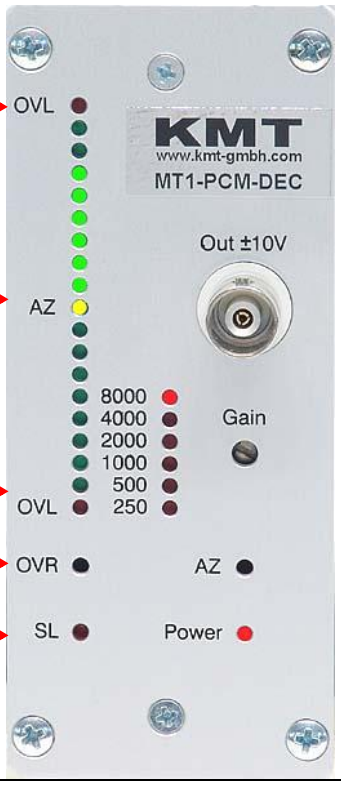
Transmitting Part:





Receiving Part:

Front



Positive Baragraph LED
With overload indicator

Yellow ON- successful AZ
(output signal <+/-30mV)
Yellow OFF- not successful AZ
(output signal >+/-30mV)
If flashing, call support of KMT, error in EPROM

Negative Baragraph LED
With overload indicator

Reset button of overload indicator

Red ON = if error of data transmitting
Red Flashing = if the battery is empty

Analog output +/-10V

Gain switch

AZ button

Power On LED

Rear

LED Flashing if fuse damage

Power ON/OFF switch

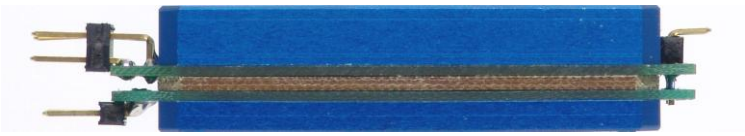
IN - Receiving Antenna

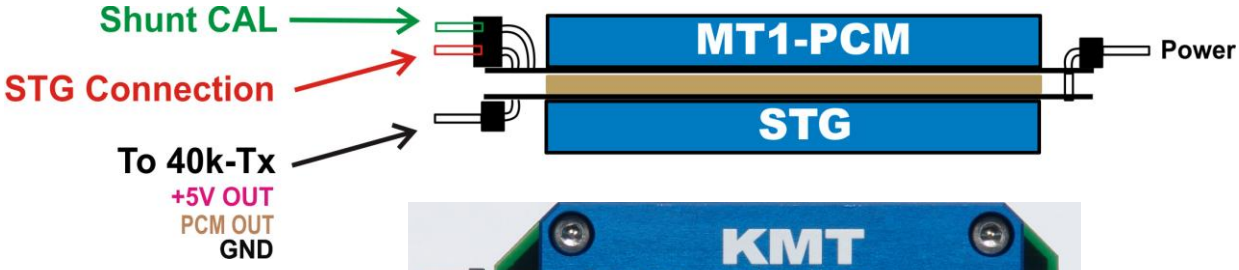
RF Level: LED indicator for Radio Frequency

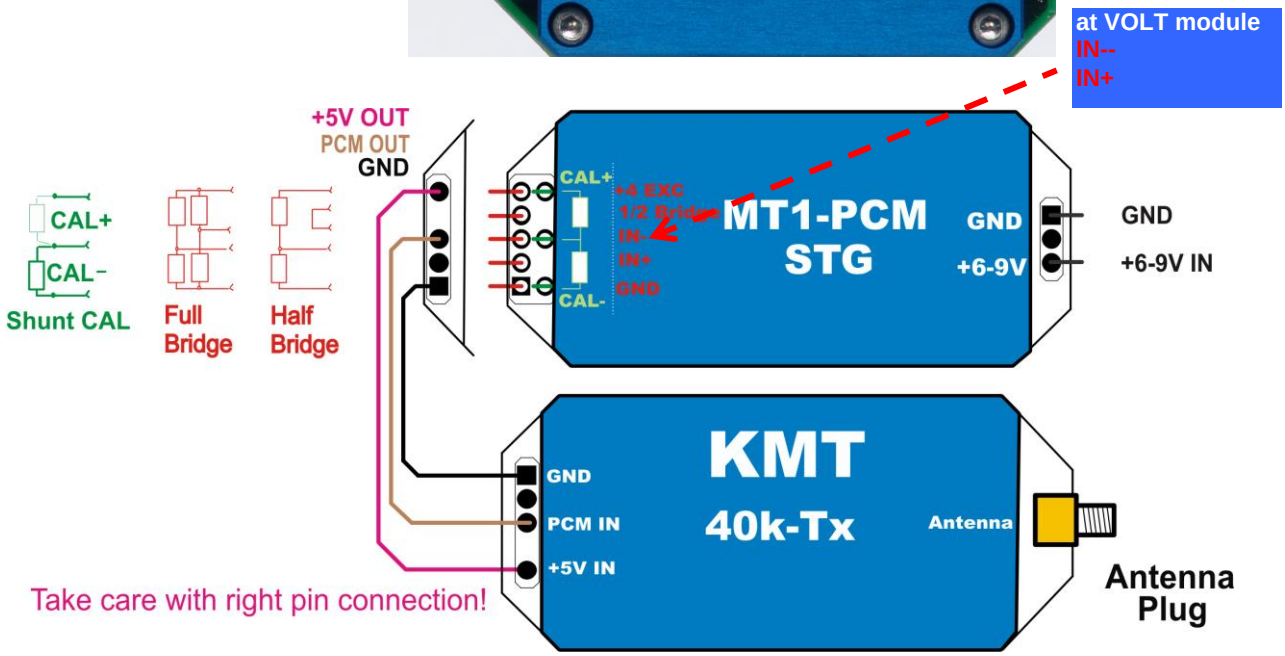
Power In DC 10 – 30V

Receiving Part:

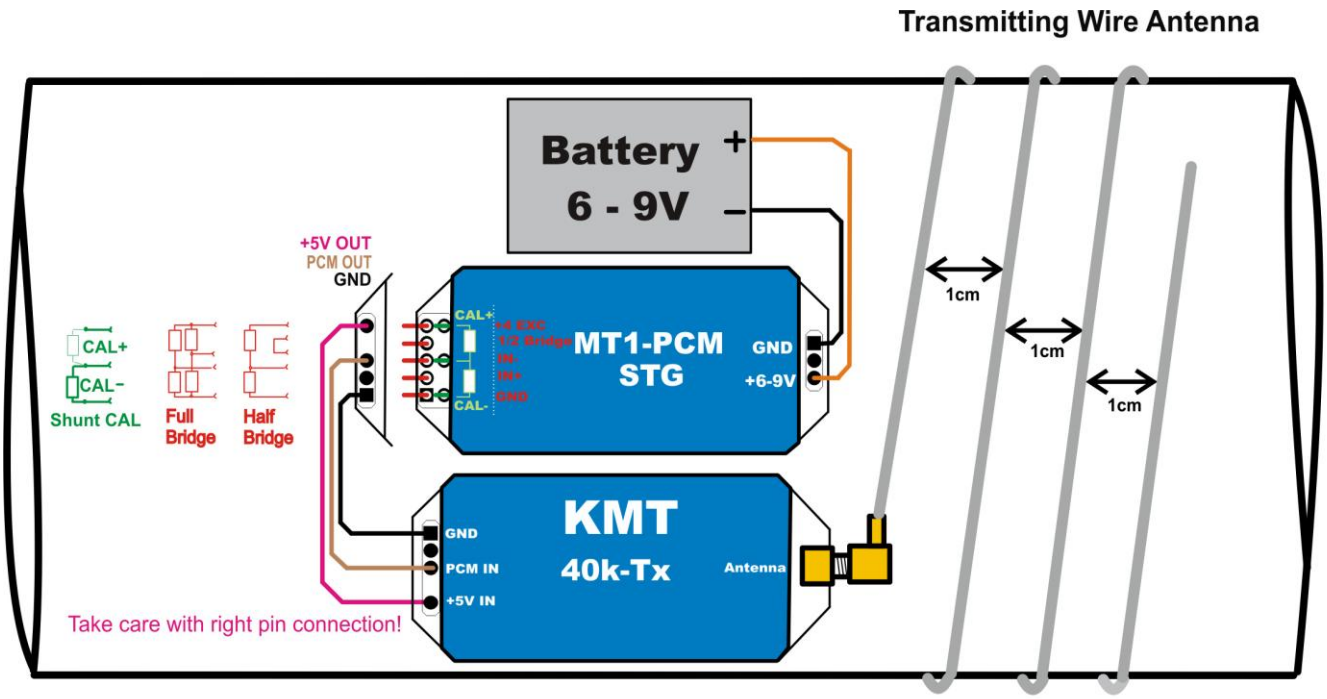
Pin Connection:

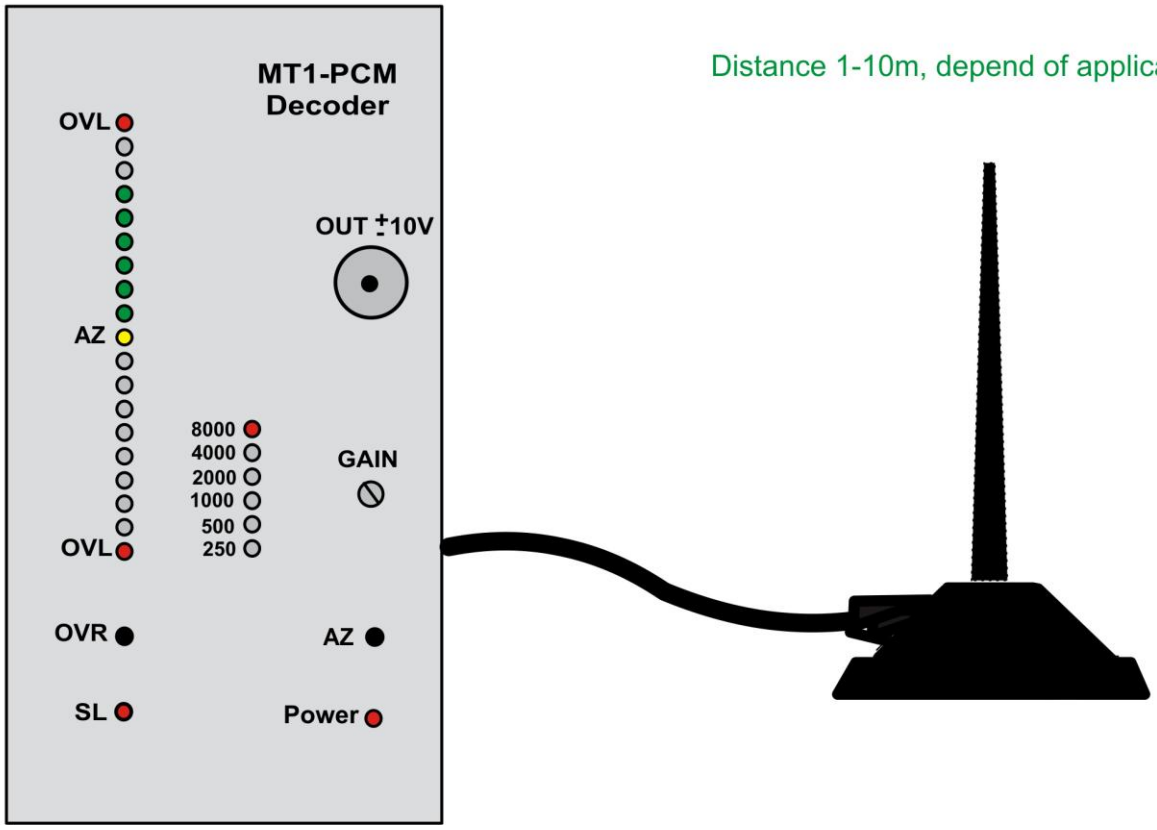






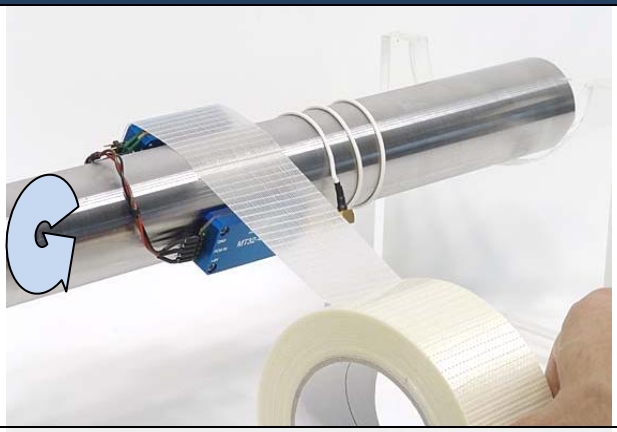
Block Diagram:



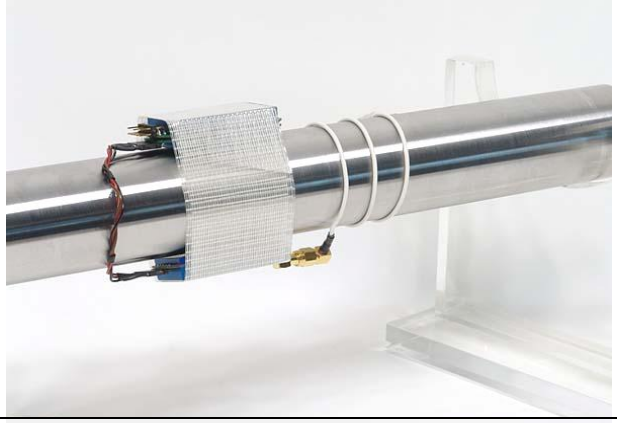


Distance 1-10m, depend of application!

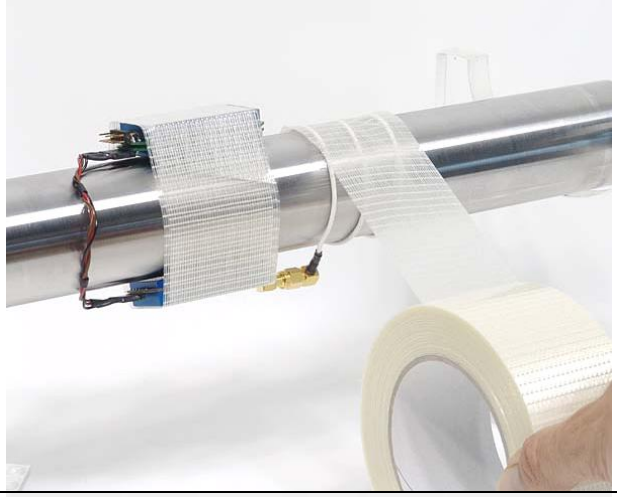
Mounting on Shaft:

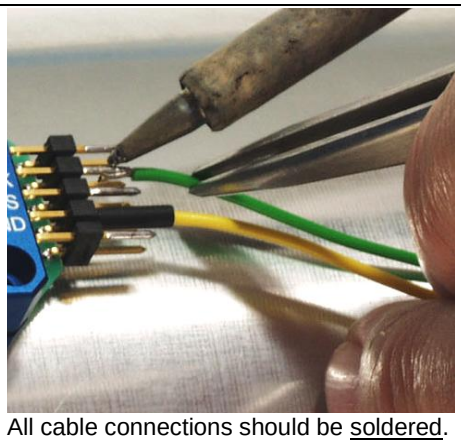


Caution:
Fix MT1-PCM-STG and Tx-40k module with at least 10 layers of the special mounting tape around the shaft. Depending on the shafts RPM and diameter particular attention needs to be paid to the safe mounting of the components.
The manufacturer doesn't accept liability for damages, which results from insufficient attachment of the individual components.
The tape is only for test purposes, in order to test the electrical function of the units in the idle state of the shaft.



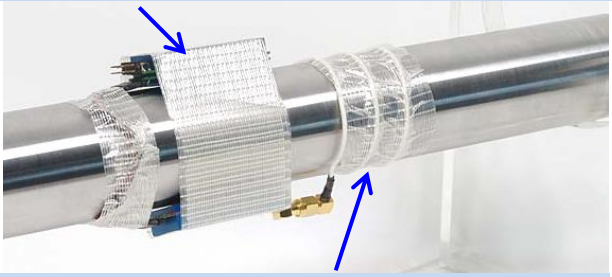
During the rotation test appropriate safety precautions should be taken.
The entire installation may be used only by authorized persons. By using tape for the attachment, it has to be used in the direction of rotation of the shaft and the end has to be secured. Only non-elastic tapes (**Fiberglas Tape)** with high tensile strength should be used for pre-fixing. Additionally, use steel strip for final fixing!!
The individual components are to be distributed in such a way on the shaft that imbalances are avoided.





All cable connections should be soldered.
The user has to pay attention to connect the wires to the correct pins - the units have no reverse-connect protection!

10 layers of the special mounting tape around the shaft.
We recommend add. use a steel strip for final fixing!!

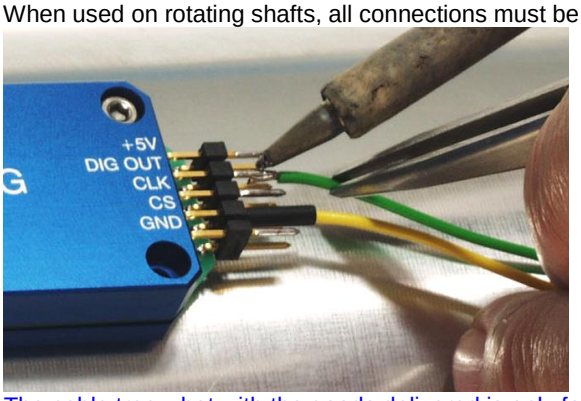


Fix with 3 layers of mounting tape around the antenna and cables

Steel strip

Attention

- Use only special lithium Battarys for rotating applications
- Use only shielded sensor cable
- When used on rotating shafts, all connections must be soldered.



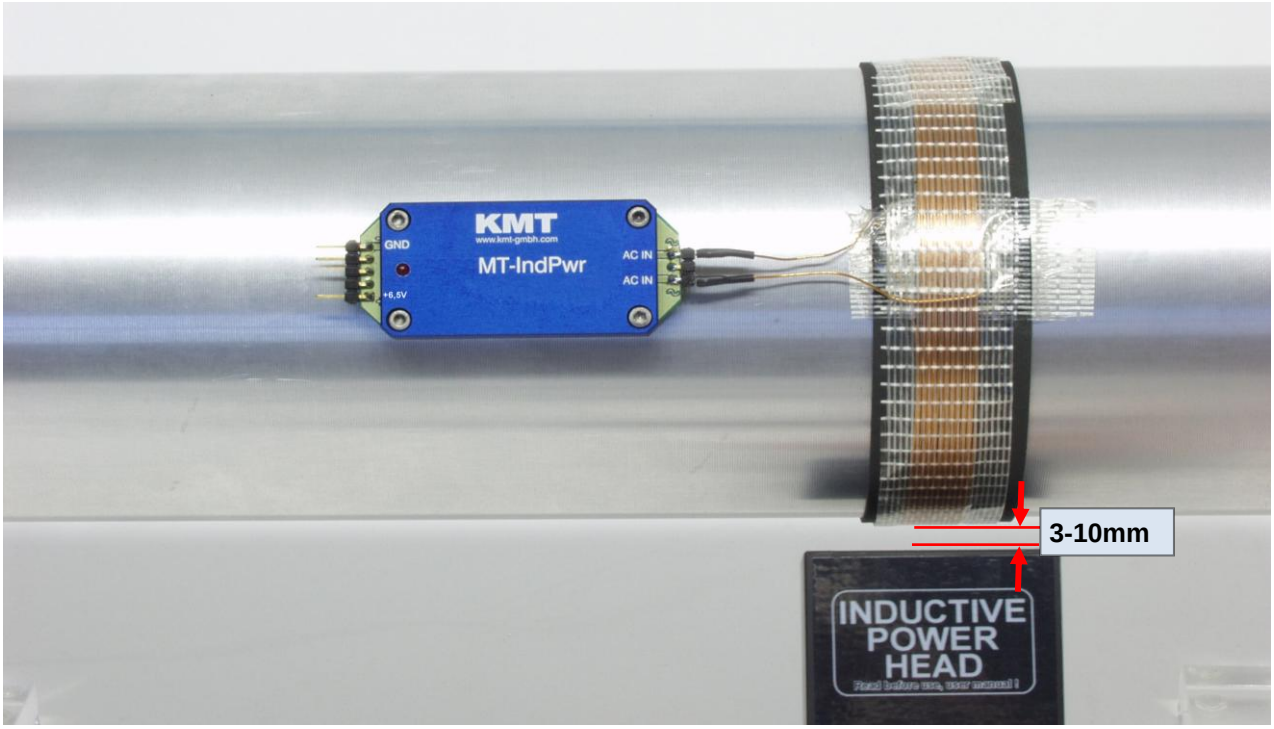
The cable tree what with the goods delivered is only for test purpose!

- Mounting of the modules on a shaft must be first fixed with mounting tape (only for prefixing) and then with a steel strip!!!

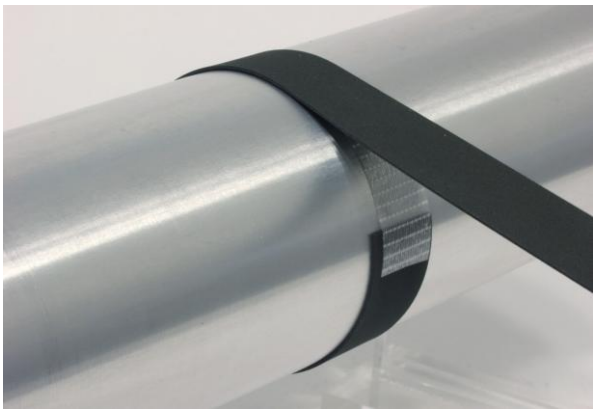
MT - Inductive power supply set:

(Picture shows standard Inductive power supply for diameter up to 200mm)

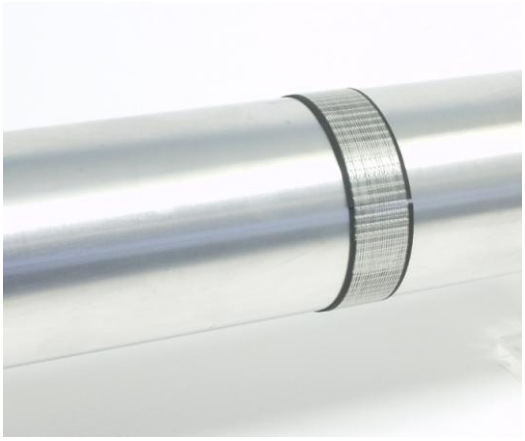
Mounted on shaft:

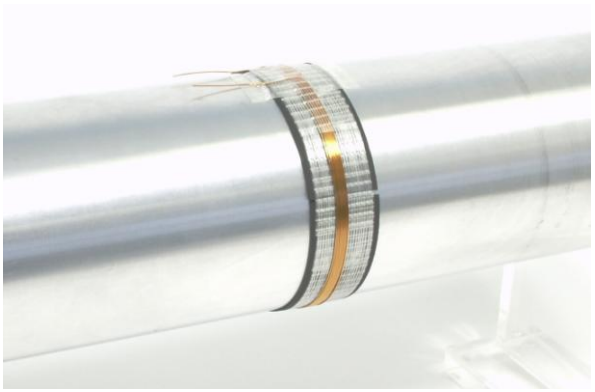


Installation of coil for inductive powering on shaft



Attach for electromagnetic insulation “Ferrite Tape” **2 x one** layer around the shaft.
Fixed with 2 layers mounting tape





Wind the 0.5 mm enameled copper wire around the shaft:

4-25 windings for 1000-20mm diameter

Other diameter on request!

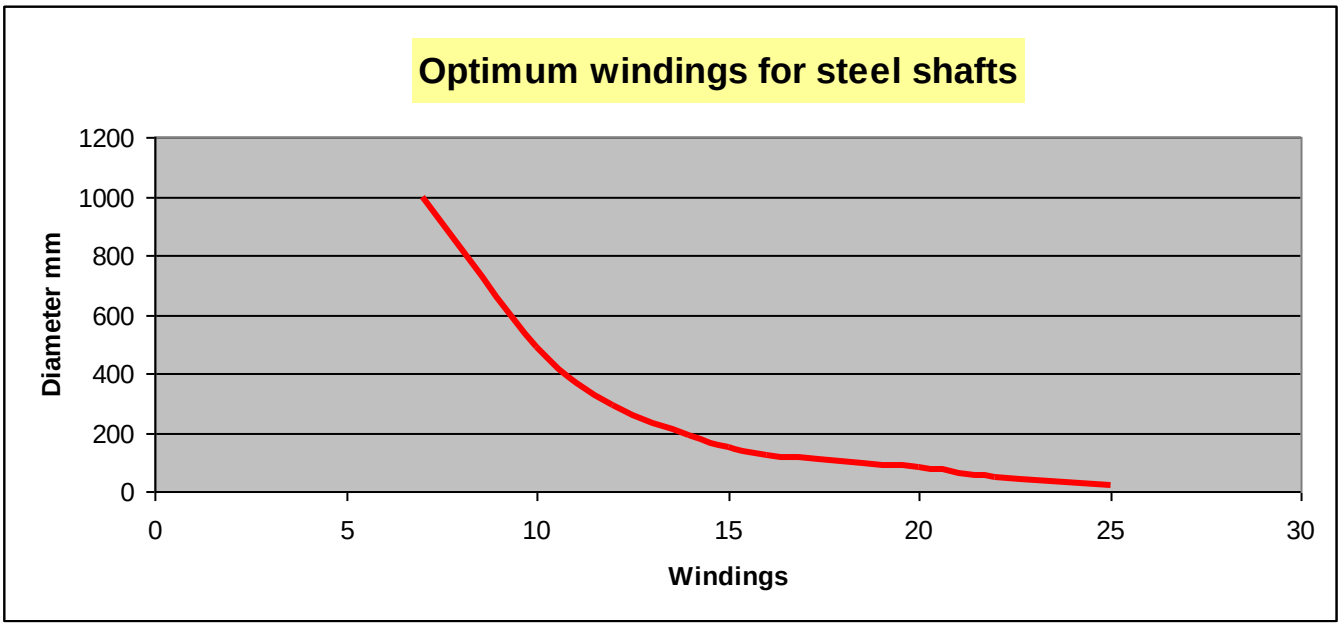
<u>Note:</u> “The inductive load of the MT1- IND-PWR and the capacitator in the Power Head must be in resonance to get the optimal transmission. The inductive load of the shaft depends of diameters, material and number of windings. ”

To find the optimal transmission try one winding more ore less. The LED on the Inductive Power module will help to find the best configuration. The distance between Powerhad and the coil is 3-10mm.

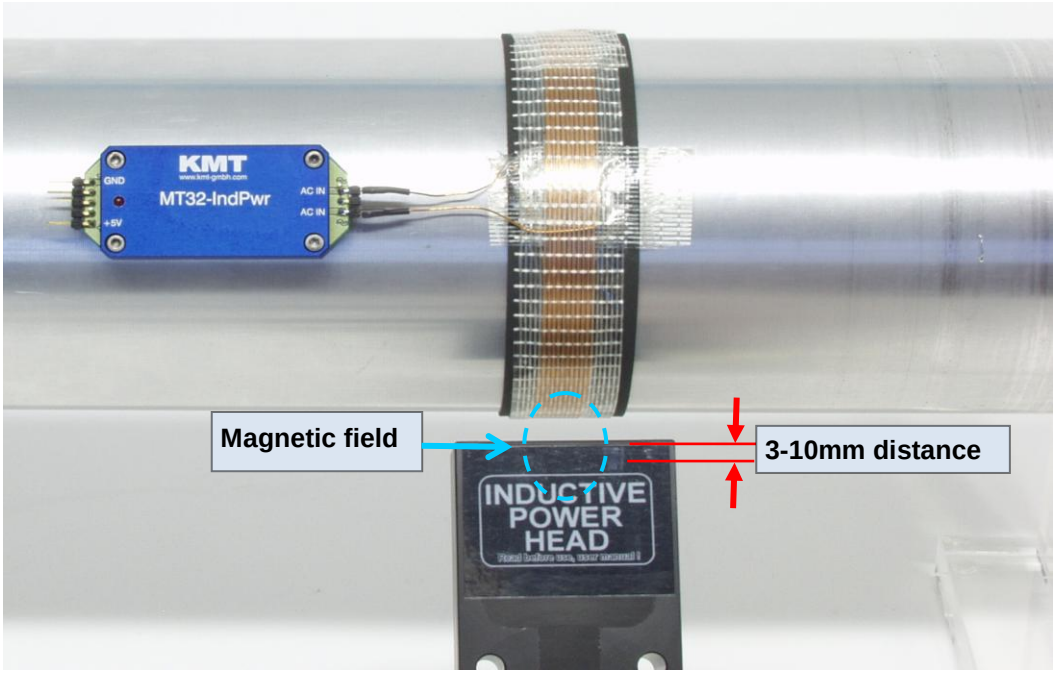
Control the output voltage and move the powerhead in the max distance to the coil.
The minimum Output voltage must be 6,5 V!

Fix all with 2-3 layers around the coil with mounting tape.

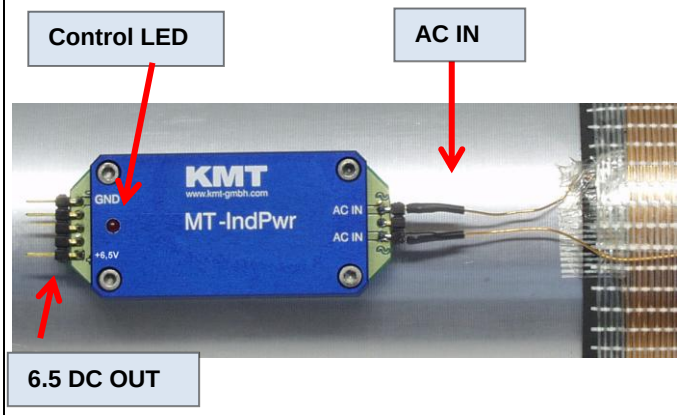
Find the correct amount of windings of inductive power coil



Diameter (mm)	Windings
1000	7
490	10
290	12
190	14
150	15
120	16
80	20
45	22
20	25



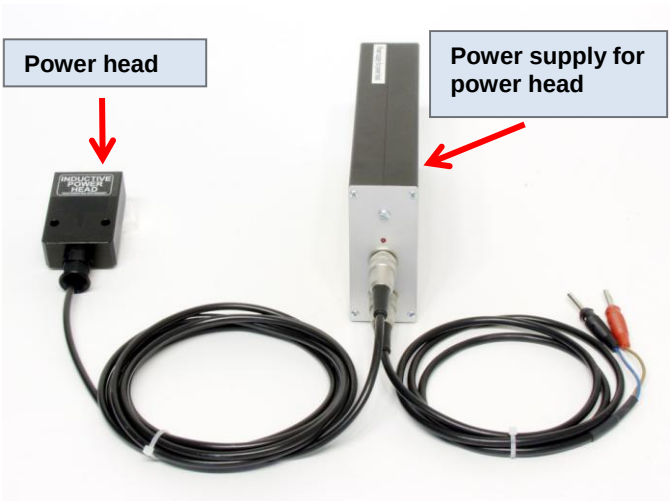
Distance deepened of current consumption
e.g. 200mA 3-5mm, 100mA 5-10mm



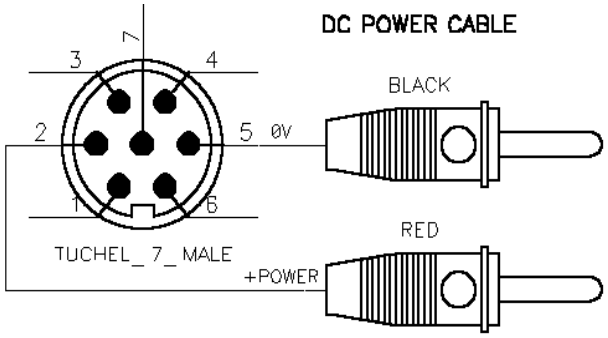
The pins “AC IN” are the AC power input from the coil. On the pins “+5” and “GND“ you get a stabilized output voltage of 5V DC. The control LED will lights up, as soon as the power head is switched on and at the right position - close enough to the coil on the shaft.
The max. load current on the DC output is 100mA.
The AC/DC converter will use instead battery pack!

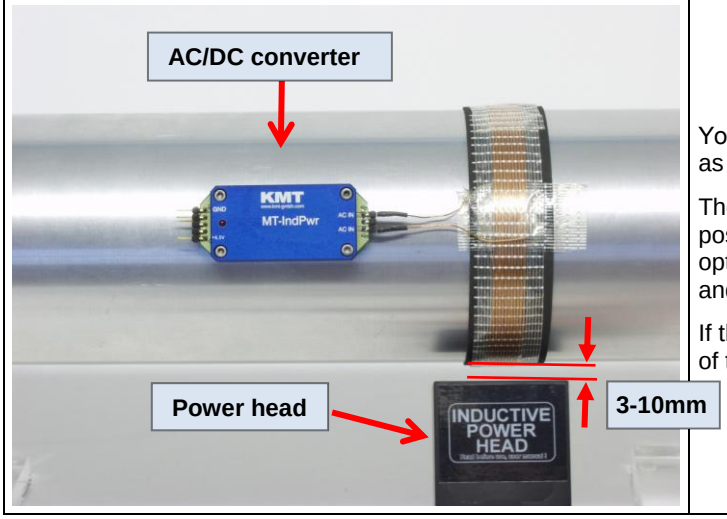
Never use any battery together with the MT-IndPwr!

Installation of the power head for inductive powering



Connect the power head on the “AC Out” socket of the power box and then the DC power cable on the “DC In 10-30V” socket. The two banana plugs have to be connected to a DC power source with red on +10-30V DC and **black** on **0V**.





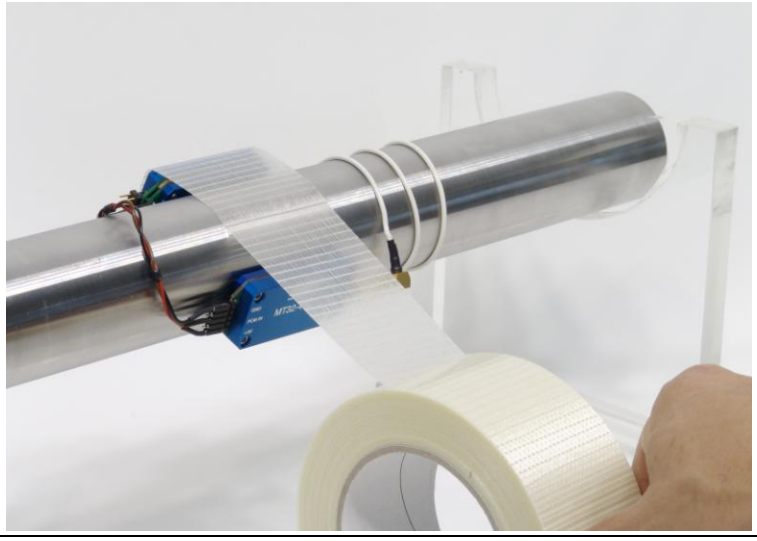
You should mount the power head at a fixed location that it’s as free as possible from vibration influences.

The center of the coil should be in the same horizontal position as the center of the power head. The distance is optimal in the range between 3 and 10mm. (depends of shaft and current consumption)

If the red LED of the AC/DC converter lights up, the position of the power head is OK.

Fixing of MT1 Modules

Fix all MT1 modules with at least 10 layers of the special mounting tape around the shaft.
According to the shafts RPM and diameter it's particularly paid attention to safe mounting of the components. The manufacturer doesn't accept liability for damages, which results from not sufficiently attachment of the individual components. The provided cable harness and the tape are only for test purposes, in order to test the electrical function of the units in the idle state of the shaft.



Steel strip

During the rotation test appropriate safety tools are to be attached.
The entire installation may be used only by authorized persons. By using tape for the attachment, it has to be used in the direction of rotation of the shaft and the end has to be secured against removing. Only non-elastic tapes with high tensile strength have to be used for pre-fixing. **Add. use steel strip for final fixing!!**

The individual components are to be distributed in such a way on the shaft that imbalances will avoid.

Safety notes for inductive powering

- The device should only applied by instructed personnel.
- The power head emits strong magnetic radiation at 40-60 kHz to a distance of 20 cm. 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 15–20 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.

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Home Page http://www.kmt-gmbh.com, Email: info@kmt-gmbh.com

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	**Messdatenübertragungssystem**
Name	
Nom	

Typ,Modell,Artikel-Nr., Größe	**MT1-PCM**
Type,Model, Article No.,Taille	
Type, Modèle, Mo.d'Article,Taille	

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, 02.05.2006	**Martin Kraus** KMT Kraus Messtechnik GmbH Gewerbering 9 D-83624 Otterfing - Germany Tel. 08024-48737 - Fax 08024-5532 www.kmt-gmbh.com
Ort und Datum der Ausstellung	Name und Unterschrift des Befugten
Place and Date of Issua	Name and Signature of authorized person
Lieu et date d'établissement	Nom et signature de la personne autorisée