TEL1-PCM-BATT

Operating Instructions

Digital Telemetry System for Strain Gage Applications on Rotating Shafts

“Gain and Auto Zero setting direct from Receiver Side!”

INSTRUCTIONS FOR QUALIFIED PERSONNEL ONLY!
General Description

The TEL1-PCM single-channel telemetry system offers the easiest handling for the wireless transmission of strain gage signals from rotating shafts. The very small encoder 35 x 18 x 12 mm with a weight of 13g. The transmitter (encoder) part is simply mounted on the rotating shaft with a special fiber reinforced tape.

The data transfer between transmitter and receiver is digital. The powering of the transmission part by the TEL1-PCM BATT is supplied by 6-9V battery.

Functional Description

The TEL1-PCM-BATT transmitter provides a pulse code modulated signal (PCM) to an induction winding around the shaft. The magnetic field of this winding enables the inductive transmission of the signal from coil to pickup. From there the signal is transferred by cable (5 m) to the receiver. The maximum distance between the transmitter coil and the pickup is 150mm.

The receiver unit offers a BNC connector at the front panel with analog outputs ±10 V and a optional a digital output for PCM interface ECIA100 (for notebooks) or IF 16 (PCI Desktop). 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. The yellow LED flashes as long as the AZ is in progress. 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. The AZ setting is stored in a Flash-RAM and thus is not lost during power-off. Use only shielded sensor cable.

TEL1-PCM-BATT Set Contains:

- Inductive PH-Pickup with 5m cable
- TEL1-PCM-BATT-DEC (Decoder)
- Mounting tape 2x 25mm Length 50meter
- Ferrite tape 30mm x 3 meter (isolate magnetic field between shaft and coil)
- DC-Power cable
- TEL1-PCM-BATT-STG (Encoder for strain gages)
- 6V Lithium battery
- Hexagon key to activate the OLV and AZ switch
- Screw driver to set the gain
- CU wire, 0.5mm for coil (insulated with lacquer)
Technical Data

TEL1-PCM-STG-BATT

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

<table>
<thead>
<tr>
<th>Gain</th>
<th>Resolution</th>
<th>Autozero range</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>12 bit</td>
<td>100%</td>
</tr>
<tr>
<td>500</td>
<td>12 bit</td>
<td>200%</td>
</tr>
<tr>
<td>1000</td>
<td>12 bit</td>
<td>400%</td>
</tr>
<tr>
<td>2000</td>
<td>12 bit</td>
<td>400%</td>
</tr>
<tr>
<td>4000</td>
<td>12 bit</td>
<td>400%</td>
</tr>
<tr>
<td>8000</td>
<td>11 bit</td>
<td>400%</td>
</tr>
</tbody>
</table>

Analog signal bandwidth: 0 - 1200 Hz (-3 dB)
Operating temperature: -10 to +80 °C
Scanning rate 6.944kHz
Dimensions: 35 x 18 x 12mm (without connectors)
Weight: 13 grams
Static acceleration: up to 1000g
TEL1 PCM BATT Powering: By battery 6-9V
Power consumption: 70mA
Housing: splash-water resistant (except the connector pins)

TEL1-PCM-TH-K - Select Gain 250!
At Gain 500 multiply the values x2, Gain 1000 with x4
Max. Voltage output at receiver is +10V!

<table>
<thead>
<tr>
<th>°C</th>
<th>Calibrator out (mV)</th>
<th>Output at receiver (DEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal (V)</td>
<td>Min. (V)</td>
</tr>
<tr>
<td>0</td>
<td>-1.203</td>
<td>0.06</td>
</tr>
<tr>
<td>50</td>
<td>0.820</td>
<td>0.50</td>
</tr>
<tr>
<td>100</td>
<td>2.893</td>
<td>1.00</td>
</tr>
<tr>
<td>150</td>
<td>4.935</td>
<td>1.50</td>
</tr>
<tr>
<td>200</td>
<td>6.935</td>
<td>1.98</td>
</tr>
<tr>
<td>250</td>
<td>8.950</td>
<td>2.46</td>
</tr>
<tr>
<td>300</td>
<td>11.005</td>
<td>2.98</td>
</tr>
<tr>
<td>350</td>
<td>13.090</td>
<td>3.45</td>
</tr>
<tr>
<td>400</td>
<td>15.194</td>
<td>3.95</td>
</tr>
<tr>
<td>450</td>
<td>17.313</td>
<td>4.46</td>
</tr>
<tr>
<td>500</td>
<td>19.441</td>
<td>4.96</td>
</tr>
<tr>
<td>550</td>
<td>21.573</td>
<td>5.47</td>
</tr>
<tr>
<td>600</td>
<td>23.702</td>
<td>5.99</td>
</tr>
<tr>
<td>650</td>
<td>25.822</td>
<td>6.49</td>
</tr>
<tr>
<td>700</td>
<td>27.926</td>
<td>6.99</td>
</tr>
<tr>
<td>750</td>
<td>30.010</td>
<td>7.49</td>
</tr>
<tr>
<td>800</td>
<td>32.072</td>
<td>7.99</td>
</tr>
<tr>
<td>850</td>
<td>34.110</td>
<td>8.46</td>
</tr>
<tr>
<td>900</td>
<td>36.123</td>
<td>8.94</td>
</tr>
<tr>
<td>950</td>
<td>38.110</td>
<td>9.42</td>
</tr>
<tr>
<td>1000</td>
<td>40.072</td>
<td>9.90</td>
</tr>
</tbody>
</table>

Calibrator OMEGA CA71S3, measure at a clamping point temperature of 30°C (after 30 min run time)
**TEL1-PCM-DEC**

**Front side:**
- Analogue output: +/-10V via BNC (Optional 4-20mA) *(delay between analog IN/OUT 15mS constant!!)*
- Digital output for PCM Interface IF16 (ECIA100) OPTION
- Gain setting: via screw switch
- Auto Zero setting: via micro switch
- Overload LED’s (Red ON) reset: via micro switch
- Green LED’s: Bargraph +/-
- Autozero LED:
  - Yellow ON- successful AZ
  - Yellow OFF- not successful AZ
  - *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:**
- Output to Powerhead: via 6pol. Tuchel
- Fuse LED: Flashing if fuse is defect
- Powering: 10-30V DC (min. 24Watt), 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: upto 200g
- System accuracy*: +/- 0.2%

*measure with gain 1000, 350ohm (0.1%) full bridge - test bridge!!*

**TEL1-PCM-Pickup**

Function:
- Receiving PCM magnetic field in PCM modulated code Distance between the transmitter coil and the pickup is 5-150mm
- Output to TEL1-PCM-Decoder: Via 6pol. Tuchel Plug incl. 5m cable
- Operating temperature: -10 to +80 °C
- Dimensions: 53x66x30mm (without cable)
- Weight: 200 grams (without cable!)
- Housing: splash-water resistant IP65 (except connector).
- Cable length standard 5m! Longer on request, but max. 50m!
Transmitting Part:

- Strain gage connection
- Coil connection
- Coil, depends of shaft diameter
- 4-25 parallel windings of 0.5 CU wire, see table for help.

Receiving Part:

- Positive Baragraph LED
  - With overload indicator
- Auto Zero LED
  - ON = successful
  - OFF = Not successful
- Negative Bargraph LED
  - With overload indicator
- Reset button of overload indicator
- LED ON = Error data transmission
- LED Flashing = Battery voltage lower 6V

- Analog output +/-10V
- Gain switch
- AZ button
- Power On LED

The pins for battery (e.g. CR-P2 1500mA)
Use only 6-9V battery
Red point = + pole for battery
Rear

- Flashing if fuse damage
- Data input from Pickup and output to Powerhead
- PCM OUT for Interface
- Power ON/OFF switch
- Power IN DC 10 – 30V

Pickup
Distance of 5-150mm

DC-Power cable

Technical Data are subject to change without notice!
**Pin Connection:**

**Note:**
The Powerhead must be fixed in the middle of the coil in a distance from 5 to 150 mm.

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**Digital data transfer & Battery 6-9V powering**
Shaft Installation

2 layers of the special ferrite tape around the shaft

Fix with 2 layers of mounting tape around the shaft

Coil, depends of shaft diameter 4-25 parallel windings of 0.5 CU wires, see table for help.

Solder the wires of the coil on the input pins of TEL1-PCM-STG “COIL”
**Caution:**

Fix TEL1-PCM 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 hose clamps for final fixing!! The individual components are to be distributed in such a way on the shaft that imbalances are avoided.
Find the correct amount of windings

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

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Windings</th>
</tr>
</thead>
<tbody>
<tr>
<td>490</td>
<td>4</td>
</tr>
<tr>
<td>290</td>
<td>5</td>
</tr>
<tr>
<td>190</td>
<td>7</td>
</tr>
<tr>
<td>150</td>
<td>9</td>
</tr>
<tr>
<td>120</td>
<td>10</td>
</tr>
<tr>
<td>80</td>
<td>12</td>
</tr>
<tr>
<td>45</td>
<td>16</td>
</tr>
<tr>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

Optimum windings for steel shafts

Coil, depends of shaft diameter 4-25 parallel windings of 0.5 CU wire
Attention

- Use only special lithium batteries for rotating applications
- Use only shielded sensor cable
- When used on rotating shafts, all connections must be soldered.
- Mounting of the modules on a shaft must be first fixed with mounting tape (only for prefixing) and then with additional **steel strip!!!**
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 responsabilité, que le produit

Bezeichnung
Name
Nom

Messdatenübertragungssystem

Typ, Modell, Artikel-Nr., Größe
Type, Model, Article No., Taille

TEL1-PCM, TEL1-PCM-BATT

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 and therefore corresponds to the regulations of the Directive
et les rapports d'essais notifiés et, ainsi, correspond aux règlement de la Directive.

Otterfing, 27.04.2006
Martin Kraus

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