User Manual

CTP4/8/16

4/8/16-channel sensor telemetry system with different sensor inputs. High transmitting rate up to 5Mbit

INSTRUCTIONS FOR QUALIFIED PERSONNEL ONLY!

- Inputs for STG, TH-K, ICP or VOLT
- Simultaneous sampling
- 16 bit resolution
- Software programmable
- Signal bandwidth up to 24kHz (4-CH)
- Powering 7-30V
- Radio telemetry transmission
- Output analog +/- 10V (Decoder)
- Digital data interface to PC (option)
- Waterproofed ENC housing (IP65)
The CTP4/8/16 is a multi-channel sensor telemetry system for moving or point-to-point applications. The 2-channel plug-in acquisition modules from the encoder are easy to change and include signal condition, anti-aliasing-filter, A/D converter. All channels will simultaneous sampling. All acquisition modules are manage at CTP-Controller and encoded PCM output to the radio transmitter. Finally, PCM data is transmitted via radio frequencies to the receiver.

Various configurations of different sensor modules are available incl. signal conditioning for strain gages (STG), thermocouples type K (TH-K), ICP sensors, potentiometer sensors (POT) and voltage inputs. Mixed configuration available (2-CH-steps). All sensor modules are software programmable via LAN-Adapter. The LAN-Adapter has an integrated web interface and enables easy access!

The stationary receiver (Decoder) provides 4, 8 or 16 +/-10V analog outputs via Sub-D male socket (option: digital PC interface). The analog signal bandwidth can reach up to 24kHz with 5Mbit transmitter in 4-channel mode. The measurement accuracy is <±0.2 % (without sensor). The CTP4/8/16 is specified for operational temperatures from -20° C to +70° C. The maximum distance between transmitter and receiving antenna is approx. 150 m – depending on the application and bitrate!

### Signal bandwidth, sampling rates and delay time:

<table>
<thead>
<tr>
<th>Bit rate</th>
<th>2 Channels</th>
<th>4 Channels</th>
<th>8 Channels</th>
<th>16 Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000 kbit/s</td>
<td>24000 Hz max.</td>
<td>12000 Hz (31250 Hz)</td>
<td>6000 Hz (15625 Hz)</td>
<td></td>
</tr>
<tr>
<td>2500 kbit/s</td>
<td>1,6 ms</td>
<td>2,3 ms</td>
<td>4,5 ms</td>
<td>8,9 ms</td>
</tr>
<tr>
<td>1250 kbit/s</td>
<td>6000 Hz (15625 Hz)</td>
<td>3000 Hz (7812.5 Hz)</td>
<td>1500 Hz (3906.25 Hz)</td>
<td>750 Hz (1953.125 Hz)</td>
</tr>
<tr>
<td>625 kbit/s</td>
<td>4,7 ms</td>
<td>9,4 ms</td>
<td>18,3 ms</td>
<td>35,7 ms</td>
</tr>
<tr>
<td>312,5 kbit/s</td>
<td>3000 Hz (7812.5 Hz)</td>
<td>1500 Hz (3906.25 Hz)</td>
<td>750 Hz (1953.125 Hz)</td>
<td>375 Hz (976.56 Hz)</td>
</tr>
<tr>
<td></td>
<td>9,4 ms</td>
<td>19,1 ms</td>
<td>36,3 ms</td>
<td>71,5 ms</td>
</tr>
</tbody>
</table>
**CTP4/8/16 Encoder for 4-8 or 16 channels**

4,8 and 16-CH encoder in IP65 Aluminum housing

Encoder inside (e.g. 4-CH)

### CTP acquisition modules

#### CTP-STG-V3
- Acquisition module for 2 strain gages
- Full, half and quarter bridge (≥350Ω)
- Offset calibration by auto zero
- Manual offset shifting after auto zero
- Gain: 1:2-4-8-16-32
- Signal bandwidth 0Hz to 3000Hz
- Resolution 16bit
- Accuracy <0.2%
- Current consumption with full bridge 350 ohm 75mA

#### CTP-VOLT-V3
- Acquisition module for 2x high level inputs
- Range: ±0.625V, ±1.25V, ±2.5V, ±5V, ±10V
- Signal bandwidth 0Hz to 3000Hz
- (*see table of cut-off-frequency)
- Resolution 16bit
- Accuracy <0.2%
- Current consumption 60mA

#### CTP-ICP-V3
- Acquisition module for 2 ICP sensors
- Current EXC. 4mA
- Gain: 1-2-4-8-16-32
- Signal bandwidth 3 Hz to 3000Hz
- (*see table of cut-off-frequency)
- Resolution 16bit
- Accuracy <0.2%
- Current consumption 100mA

#### CTP-P100/1000 (RTD) V3
- Acquisition module for 2 RTD sensors
- Range: 100 to 600°C, 50 to 300°C or 25 to 150°C
- Type Pt100 or Pt1000
- Current EXC. 1mA
- Connection: 4-, 3- and 2 wire
- Sensor break detection
- Signal bandwidth 6Hz
- Resolution 16bit
- Accuracy <0.2%
- Current consumption 60mA

#### CTP-CONTROL-V3
- Controller 1-32 acquisition modules
- Output: PCM
- Programmable via LAN adapter
- Current consumption 40mA, with LAN-adapter 140mA

### System Parameters ENCODER:

| Channels: | 4, 8 or 16 |
| Resolution: | 16 bit A/D converter with anti-aliasing filter, simultaneous sampling of all channels |
| Line-of-sight distance: | up to 150m (depends of application and bit rate) More range with special antennas on request! |
| Powering: | 7-30V DC |
| Analog signal bandwidth: | See table |
| Transmission: | Digital PCM format |
| Transmission Power: | 10mW |
| Dimensions: | CT4= 90x90x52mm, CT8=90x125x52mm, CT16=90x185x52mm (L x W x H) |
| Weight: | CT4=450g, CT8=580g, CT16=820g |
| Operating temperature: | -20 … +80°C |
| Housing: | Aluminum anodized, waterproofed (IP65) |
| Humidity: | 20 … 80% no condensing |
| Vibration: | 5g |
| Static acceleration: | 100g in all directions |
| Shock: | 200g in all directions |

*Technical specifications are subject to change without notice!*
**System Parameters:**

- **Channels:** 8 x +/-10V analog outputs via BNC or 4x BNC at CTP-DEC4
- **Resolution:** 16 bit D/A converter, with smoothing filter
- **Power supply input:** 10-30 VDC, power consumption <24 Watt
- **Analog signal bandwidth:** see frequency table
- **Transmission:** Digital PCM Format
- **Dimensions:** 205 x 105 x 65mm
- **Weight:** 1.25 kg without cables and antenna
- **Overall system accuracy between encoder input and decoder output:** +/-0.2% without sensor influences
- **Environmental**
  - **Operating:** -20 … +70°C
  - **Humidity:** 20 … 80% not condensing
  - **Vibration:** 5g
  - **Static acceleration:** 10g in all directions
  - **Shock:** 100g in all directions

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**CTP-DEC16**  Receiver unit for max 16 Channels output via 37 pol. Sub D
(radio transmission version with **diversity** (dual) receiver 312.5, 625 and 1250kbit)

**System Parameters:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
<td>16 x +/-10V analog outputs via Sub-D male socket</td>
</tr>
<tr>
<td>Resolution</td>
<td>16 bit D/A converter, with smoothing filter</td>
</tr>
<tr>
<td>Power supply input</td>
<td>10-30 VDC, power consumption &lt;24 Watt</td>
</tr>
<tr>
<td>Analog signal bandwidth</td>
<td>see frequency table</td>
</tr>
<tr>
<td>Transmission</td>
<td>Digital PCM Format</td>
</tr>
<tr>
<td>Dimensions</td>
<td>205 x 105 x 65mm</td>
</tr>
<tr>
<td>Weight</td>
<td>1.25 kg without cables and antenna</td>
</tr>
<tr>
<td>Overall system accuracy</td>
<td>+/-0.2% without sensor influences</td>
</tr>
<tr>
<td>Operating</td>
<td>-20 ... +70°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>20 ... 80% not condensing</td>
</tr>
<tr>
<td>Vibration</td>
<td>5g</td>
</tr>
<tr>
<td>Static acceleration</td>
<td>10g in all directions</td>
</tr>
<tr>
<td>Shock</td>
<td>100g in all directions</td>
</tr>
</tbody>
</table>

**Technical Data are subject to change without notice!**
CTP-DEC16  Receiver unit for max 16 Channels output via 37 pol. Sub D (radio transmission version via quad receiver 1250, 2500 and 5000kbit)

**Front side view**

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

**Rear side view**

CTP - DEC16

- Low Pwr out of function!
- Power ON LED
- Power Switch
- Transmission error LED
- Fuse of powering defect LED
- 7-pole female TUCHEL connector for power supply input (10–30V DC)

### CTP –DEC16 System Parameters:

- **Channels:** 16 x +/-10V analog outputs via Sub-D male socket
- **Resolution:** 16 bit D/A converter, with smoothing filter
- **Power supply input:** 10-30 VDC, power consumption <24 Watt
- **Analog signal bandwidth:** see frequency table
- **Transmission:** Digital PCM Format
- **Dimensions:** 205 x 105 x 65mm
- **Weight:** 1.00kg without cables and antenna
- **Overall system accuracy between encoder input and decoder output:** +/-0.2% without sensor influences
- **Environmental**
  - Operating: -20 ... +70°C
  - Humidity: 20 ... 80% not condensing
  - Vibration: 5g
  - Static acceleration: 10g in all directions
  - Shock: 100g in all directions

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**HF BOX Quad** (receiver box with 4 receivers receiver 1250-5000kbit)

**HF BOX Quad System Parameters:**

- **HF receivers**: 4
- **Antenna connection**: SMA
- **Output**: PCM
- **Power supply input**: 10-30 VDC, power consumption <24 Watt
- **Dimensions**: 205 x 105 x 65mm
- **Weight**: 1.050 kg without cables and antenna
- **Environmental**
  - Operating: -20 ... +70°C
  - Humidity: 20 ... 80% not condensing
  - Vibration: 5g
  - Static acceleration: 10g in all directions
  - Shock: 100g in all directions

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**PCM OUT**
- Pin 1 -----
- Pin 2 = PCM + (pink wire)
- Pin 3 = PCM - (blue wire)
- Pin 4/5 = common GND & shield (black/green)
- Pin 6 -----

**Transmission error LED**
- **Fuse of powering defect LED**

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

**PCM OUT**

**PCM IN**
- coming from HF-BOX

**4x SMA inputs for RX antenna**

**4x HF Level display**
- Active DATA LED, up to 2 receivers can be active!
- If a fault data is identified, it will switch automatically to a valid data from other receiver

**PCM/ DATA cable**
- Length 5m standard (up to 25m on request)

**Power Switch**

**PCM OUT**

**PCM IN**
CTP4/8/16 Encoder for 4, 8 or 16 channels – Modules

Controller

Radio transmitter

CTP-Acquisition modules - 2 channels on each
1/2  3/4  5/6  7/8  9/10  11/12  13/14  15/16

If not all 8 CTP modules plugged, a BUS-PLUG must plug on empty slot!

Otherwise the digital bus between is open and system don’t work!!
CTP4/8/16 Encoder for 4, 8 or 16 channels – Pin connection

Strain gage connection

Potentiometer

VOLT connection

ICP connection

Pin 1+2 must connect together for ICP powering!
## Th-K connection

### Setup connection

<table>
<thead>
<tr>
<th>Cable colors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1= brown / +6.5V</td>
</tr>
<tr>
<td>2= black / RX</td>
</tr>
<tr>
<td>3= white / TX</td>
</tr>
<tr>
<td>4= blue / -----</td>
</tr>
</tbody>
</table>

### PWR – Powering connection

<table>
<thead>
<tr>
<th>Cable colors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1= brown / +Vin</td>
</tr>
<tr>
<td>2= black / GND</td>
</tr>
<tr>
<td>3= Blu / -----</td>
</tr>
</tbody>
</table>

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**Technical Data are subject to change without notice!**
Set of CTP-Decoder with external HF-Box (static part)

- 4x 0dB magnetic foot antennas with coaxial cable
- Quad receiver
- CTP DEC16
- Option BNC16 BOX
- DC power cable for DEC16 & HF BOX
- 5m PCM DATA cable
- OPTION! AC/DC adapter for DEC16 & HF BOX

Set of CTP-ENCODER (moving part)

- OPTION! 1x 0dB magnetic foot Tx antennas with coaxial cable
- CTP DEC16
- Sensor cables
- -3dB Tx antenna
- OPTION! AC/DC adapter for ENCODER
- DC power cable for ENCODER
- LAN adapter, must connect only for setup or AZ of modules!

Technical Data are subject to change without notice!
SET of a Point to Point system with special receiving helix antennas and omni-transmitting antenna

With transmitting booster ranges over 2km possible
Point to Point system
omni-transmitting antenna mount on car roof
Point to Point system
receiving helix antennas on 4m masts

- Recommend distance between antennas 35-40cm
- Recommend distance between antennas about 40cm
- Min. mast height >3m, for longer range 5-10m recommend

Min. mast height >3m, for longer range 5-10m recommend
1) Power the CTP ENCODER with power 7-30 VDC

2) Connect the LAN-Adapter on the SETUP connector of CTP ENCODER

3) Adjust your notebook to manual on e.g. IP 192.168.0.20

4) Connect LAN-Adapter with your notebook via cross-over LAN cable

5) Open e.g. Microsoft Internet Browser and enter IP address **192.168.0.110** of LAN-Adapter

6) Now you get access on the web-interface and can adjust the CTP acquisition module
First you can download the stored parameters from the acquisition modules via LAN adapter from the controller module. All connected acquisition modules will detect!

**Caution:**

Never use the refresh button on your browser; otherwise the parameters of you browser cash will upload to the MTP-STG!
BRIDGE setting STG

KMT MT-PRO Analog Channel Setup

Channel 1  | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 1
Channel 2  | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 2
Channel 3  | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 3
Channel 4  | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 4
Channel 5  | Strain Gauge Type: QUARTER-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 5
Channel 6  | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 6
Channel 7  | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 7
Channel 8  | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 8
Channel 9  | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 9
Channel 10 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 10
Channel 11 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 11
Channel 12 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 12
Channel 13 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 13
Channel 14 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 14
Channel 15 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 15
Channel 16 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 16
Channel 17 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 17
Channel 18 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 18
Channel 19 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 19
Channel 20 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 20
Channel 21 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 21
Channel 22 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 22
Channel 23 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 23
Channel 24 | Strain Gauge Type: FULL-BRIDGE | Gain: 1000 | Make Autozero: | Manual Offset: 0 | Channel 24

Select full-, half- or quarter-bridge by popup window

Execute through [Upload Parameters to MT-PRO and perform Autozero] button

If you want test your bridge, you can execute the function [Test-Shunt Resistor for 20 sec] button

In this case all STG channels get a shunt-cal step of about 80% of the from measuring range at GAIN 2000
In this case all STG channels get a shunt-cal step of about 40% of the from measuring range at GAIN 1000
In this case all STG channels get a shunt-cal step of about 20% of the from measuring range at GAIN 500
In this case all STG channels get a shunt-cal step of about 10% of the from measuring range at GAIN 250
In this case all STG channels get a shunt-cal step of about 5% of the from measuring range at GAIN 125
Select gain of 125-250-500-1000 or 2000 by popup window

After change the gain you must make a new autozero!!

Execute through "Upload Parameters to MT-PRO and perform Autozero" button
Select Auto-Zero per channel. The Auto-Zero function will be executed only once per upload the parameters to MTP-STG! It will be stored also after power off in the MTP-STG until you make a new Auto-Zero on this channel!

Execute through "Upload Parameters to MT-PRO and perform Autozero" button.
After AutoZero you can shift (if necessary) the offset in +/-2000 steps

Execute through "Upload Parameters to MT-PRO and perform Autozero" button