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SENSORTELEMETRIE

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Radio Sensortelemetry

for Testing and Monitoring

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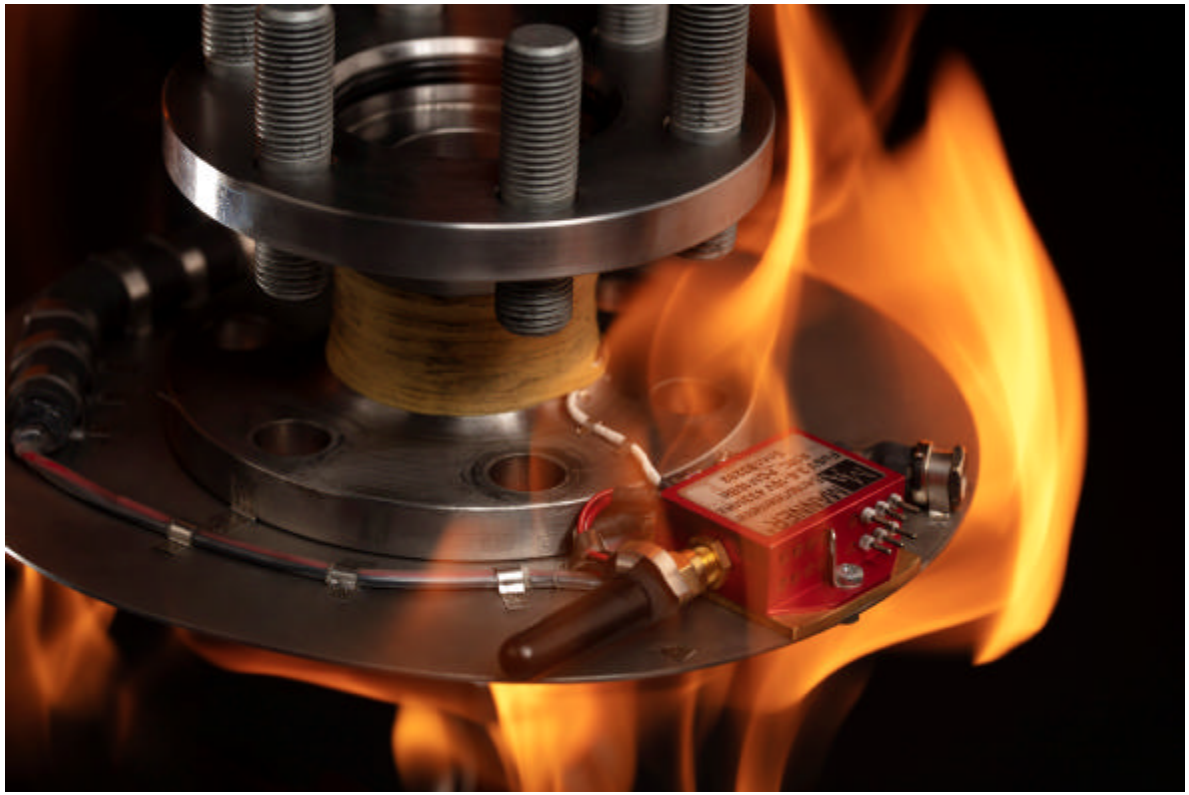
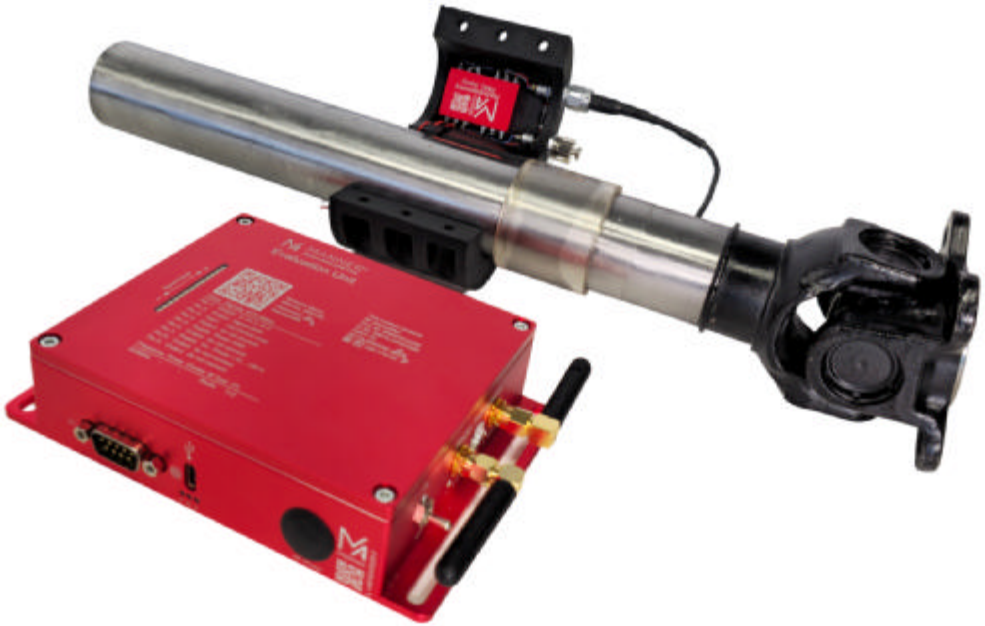
Why Radiotelemetry?

- Fast operational readiness
- Flexible in use
- High transmission range
- Reliable data transmission
- Robust
- Remotely configurable
- High number of channels with high signal bandwidth (standard sampling rate: 5000 per second, optional 80 000 per sec)
- Miniaturized
- Customized housing variants available



What does a Radiotelemetry system consist of?

- Sensor(s)
- Sensor signal amplifier
- Antenna(s)
- Power supply
  - Battery / rechargeable battery
  - Inductive
- Evaluation unit / receiver
- Optional:
  - Software / Manner app
  - Accessories
  - Installation service / support
  - Calibration service



How does Radiotelemetry works

MANNER Software
incl. Data recording

Rotating Components

up to 40 m
Transmission range

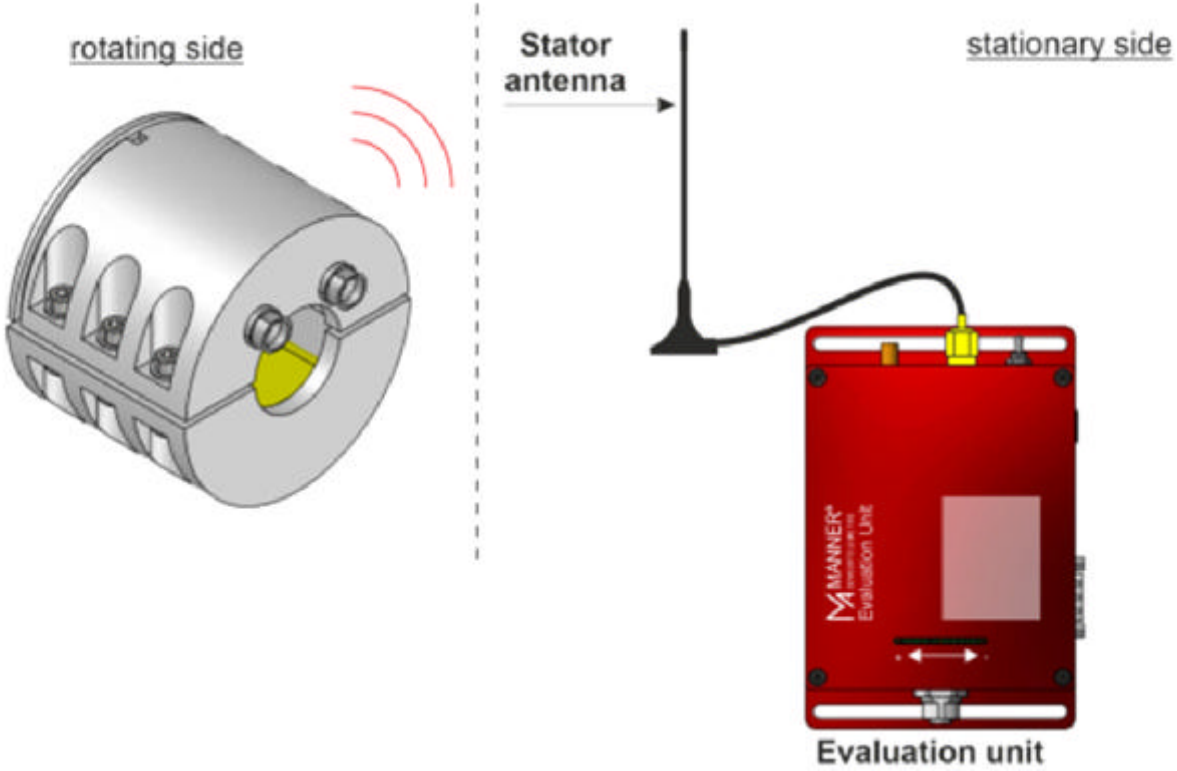
Stationary Components

- Can Bus (digital)
- Ethernet (digital)
- EtherCAT (digital)
- USB (digital)
- Spannung
- Electricity
- Frequenz

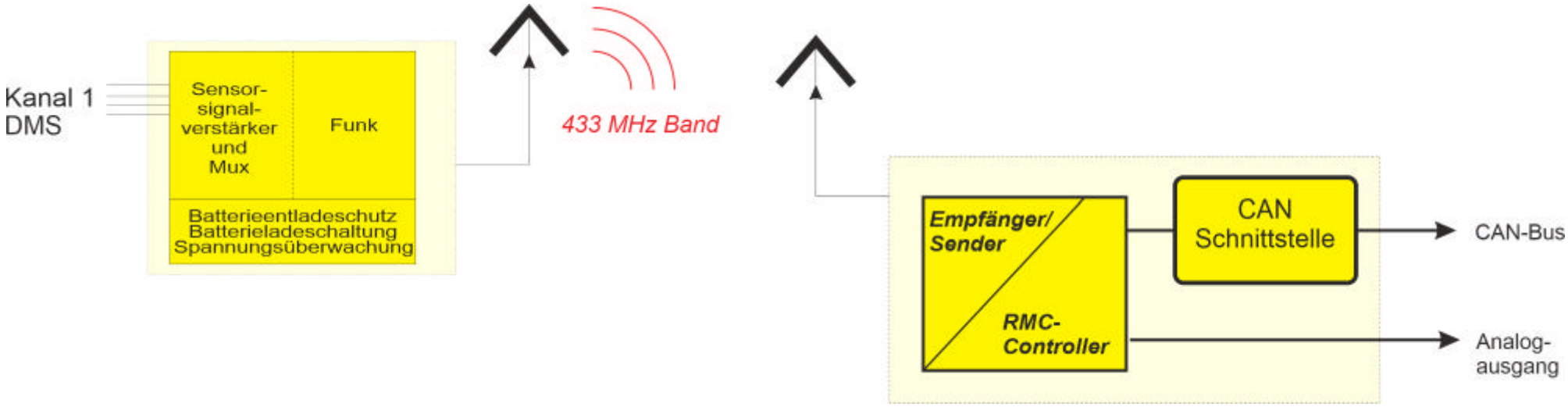
remote control

Maximum application flexibility thanks to battery / rechargeable battery supply
(alternative extension by inductive supply possible)

Transmission principle (example: side shaft)



Block diagram example: 1 channel radio



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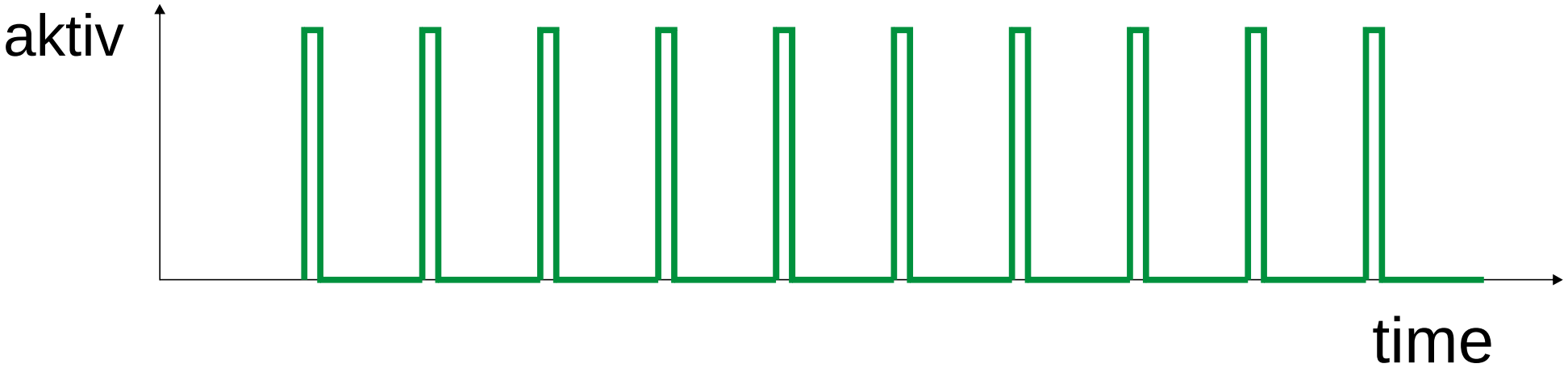
Important facts

- Transmission range (up to 40m)
- High environmental robustness (operating temperature up to 150°C with fatigue strength and use of high-temperature batteries)
- Configurable for various sensors (strain gages, thermocouples, PT100, acceleration sensors, etc.)
- High signal resolution with 16 bit
- High signal sampling rate/measurement channel (up to 5,000 samples)
- Signal bandwidth/measurement channel (up to 2 kHz, -3 dB)
- Measuring channels / module (1 to 14)
- Up to 16 modules in parallel (244 measurement channels)
- Low power consumption and therefore long operating time. Continuous torsion measurement on drive shaft over approx 50h (before the battery has to be recharged).

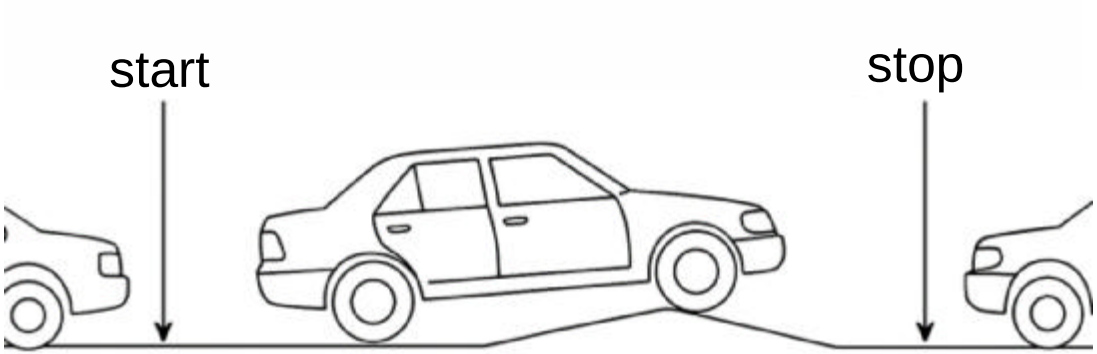
Scanning Mode

- The MANNER radio system can be individually parameterized for so-called scanning modes.
- Sensor signals are recorded and transmitted at intervals of between 50 milliseconds and 10 minutes.
- This significantly reduces energy consumption. Operating times of up to 2 years can be can be realized without changing the battery.



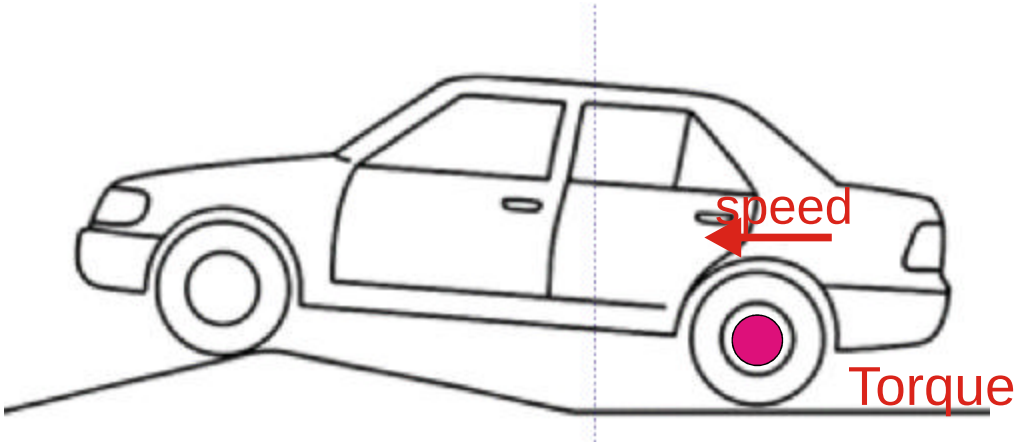
Sensorsignal acquisition signal triggert

- Another feature from Manner.
- The radio system monitors the sensor signal and starts transmission automatically when the sensor signal changes.
- At the end of the measurement run, for example, the radio system automatically ends the transmission and goes back into sleep mode. This so-called follow-up time can also be set from 0 - 255 seconds.
- This protects the battery, increases the service life and prevents the recording of unreleased data.



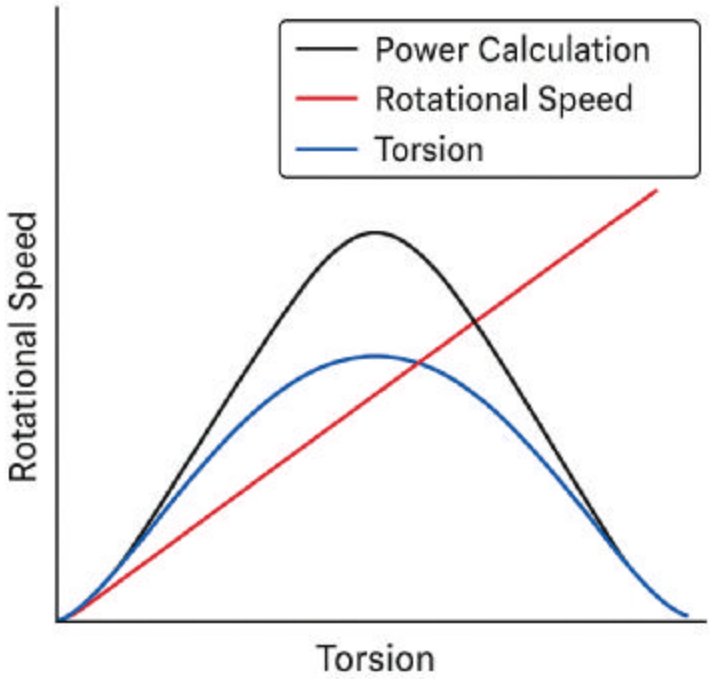
Sensorsignals plus speed signal

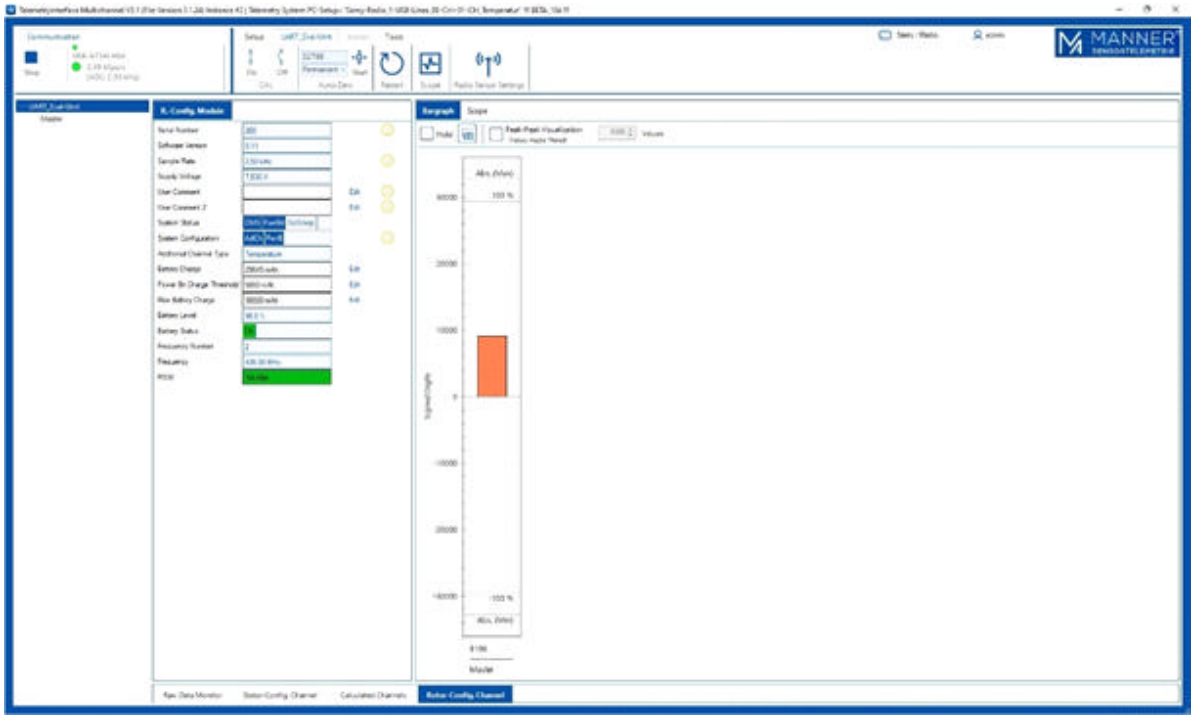
- A further Feature from Manner.
- The radio telemetry is able to aquisite the sensor signals and also to capture the rotations speed of the shaft .
- With addtional speed signal is real time power flow analysis available



Realtime power measurement

- Integrated speed sensor. (optional)
- This enables the MANNER system to display the power directly in the event of a torsion measurement.





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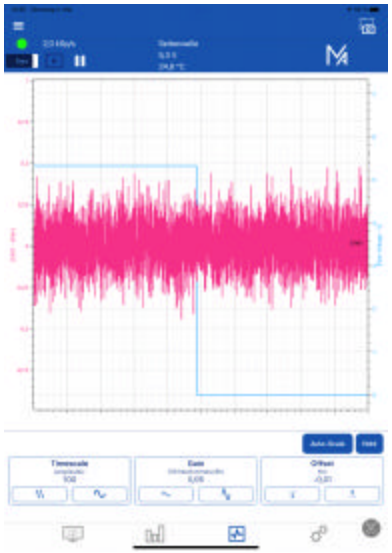
Advantages

- Remote control and setup via software or Manner app
- On / off, measuring range changeover, auto zero function, ...
- Condition monitoring (measurement signal displayed as a bar graph or oscilloscope)
- Display of signal quality, battery capacity and remaining operating time
- Digitized signal processing
- Analog or digital measurement signal available. (voltage, current, frequency, USB, CanBus, Ethercat, Ethernet, WLan....)



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Application examples

- Automotive (torque on drive shafts / side shafts side shafts / brake disk temperature,.....)
- Agricultural technology (PTO shafts / spreading disk / rotary harrow / cutter bar)
- Construction machinery (mining truck, wheel loader, forklift)
- Industry (stone mill, extruder shafts,....)
- Process monitoring (temperature, pressure/.....)
- Marine (ship propulsion shaft /.....)
- Aviation (propeller /.....)
- Medical technology
- Wind power (vibration measurement / torque / bending,.....)
- Wherever rotating sensor signals are measured.....

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Radio telemetry overview

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Technical data and Specific information

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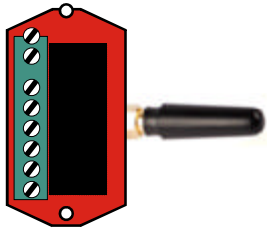
Configuration WIFI Telemetry

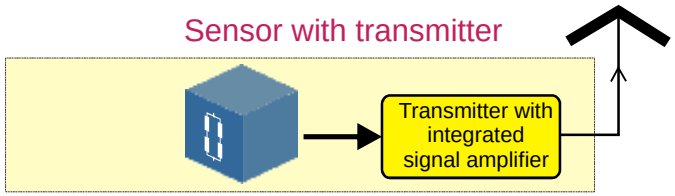
sensor

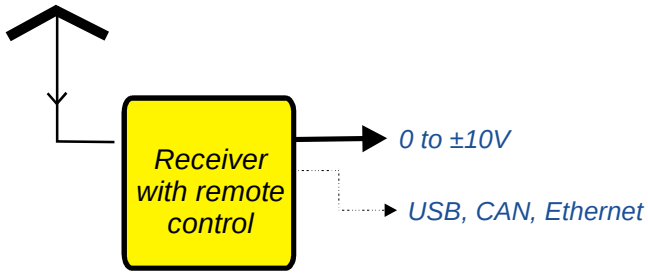
transmitter with sensor signal amplifier (solder terminals)

type: **AW_M_...**
receiver



transmitter with sensor signal amplifier (screw terminals)





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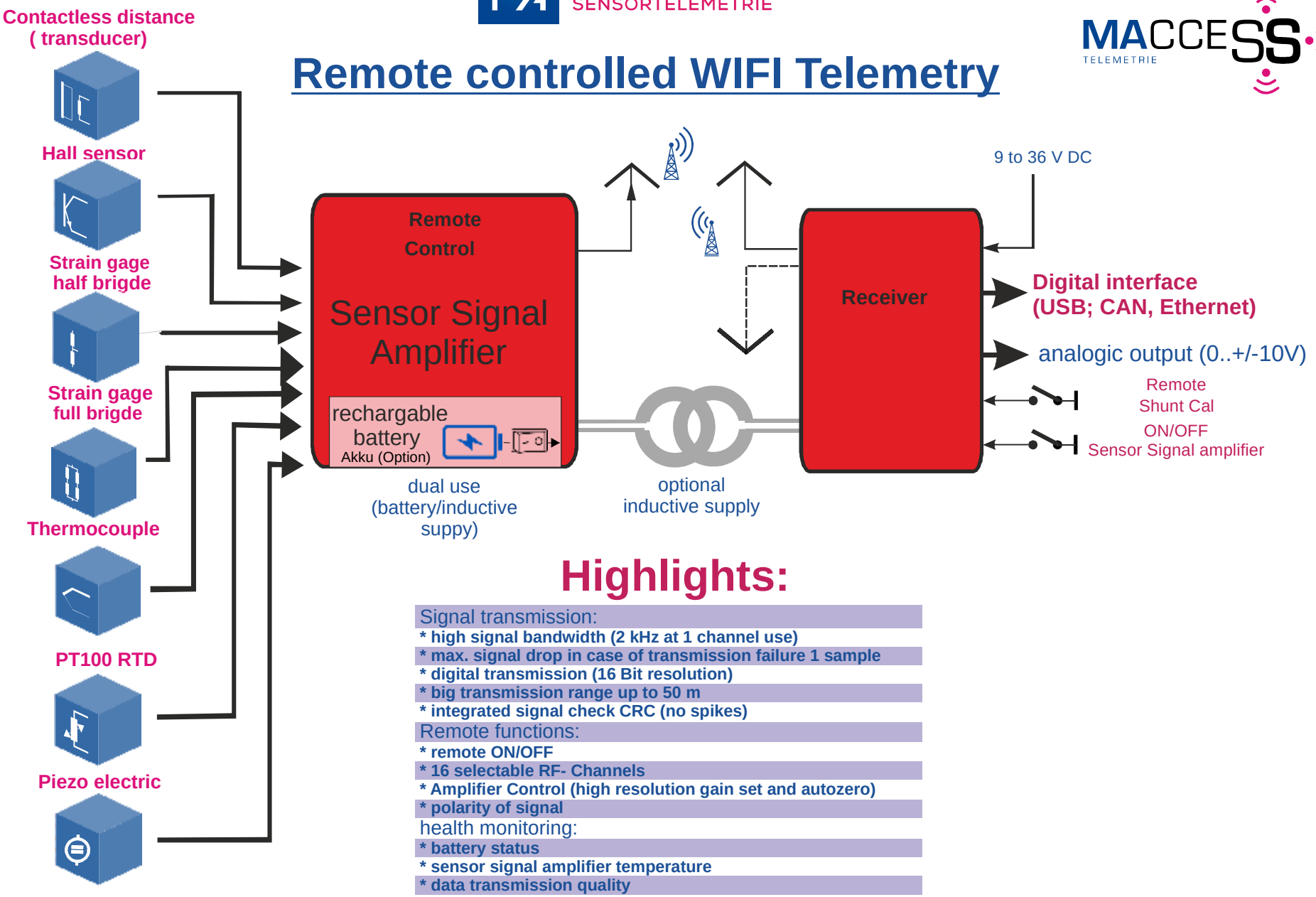
Remote controlled WIFI Telemetry



Highlights:

Signal transmission:
- * high signal bandwidth (2 kHz at 1 channel use)
- * max. signal drop in case of transmission failure 1 sample
- * digital transmission (16 Bit resolution)
- * big transmission range up to 50 m
- * integrated signal check CRC (no spikes)

Remote functions:
- * remote ON/OFF
- * 16 selectable RF- Channels
- * Amplifier Control (high resolution gain set and autozero)
- * polarity of signal

health monitoring:
- * battery status
- * sensor signal amplifier temperature
- * data transmission quality

Options:
- * antenna diversity
- * different digital interfaces (USB,CAN.Ethernet)

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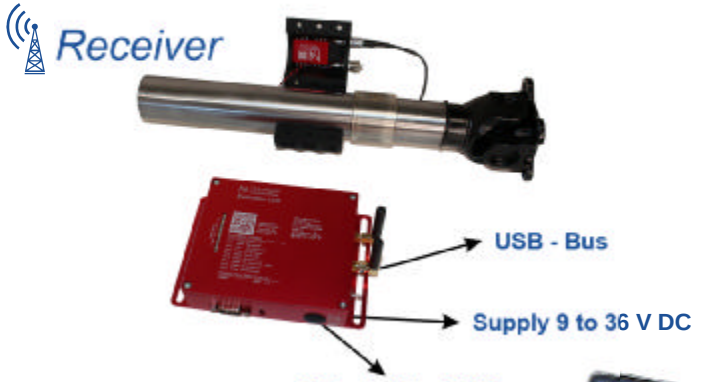
RMC Sensor Telemetry (Wireless)

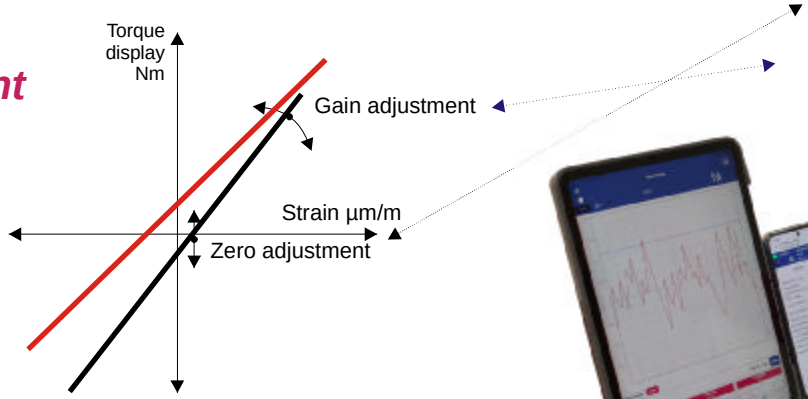
For initial remote setup of the of strain gage application at installation

remote Control via Radio link



**** Auto zero,***
**** Adjusting tolerances in zero point***
**** Adjusting tolerances in gain***
**** Remote On/Off Transmitter***

Remote online re-conditioning without opening of the amplifier



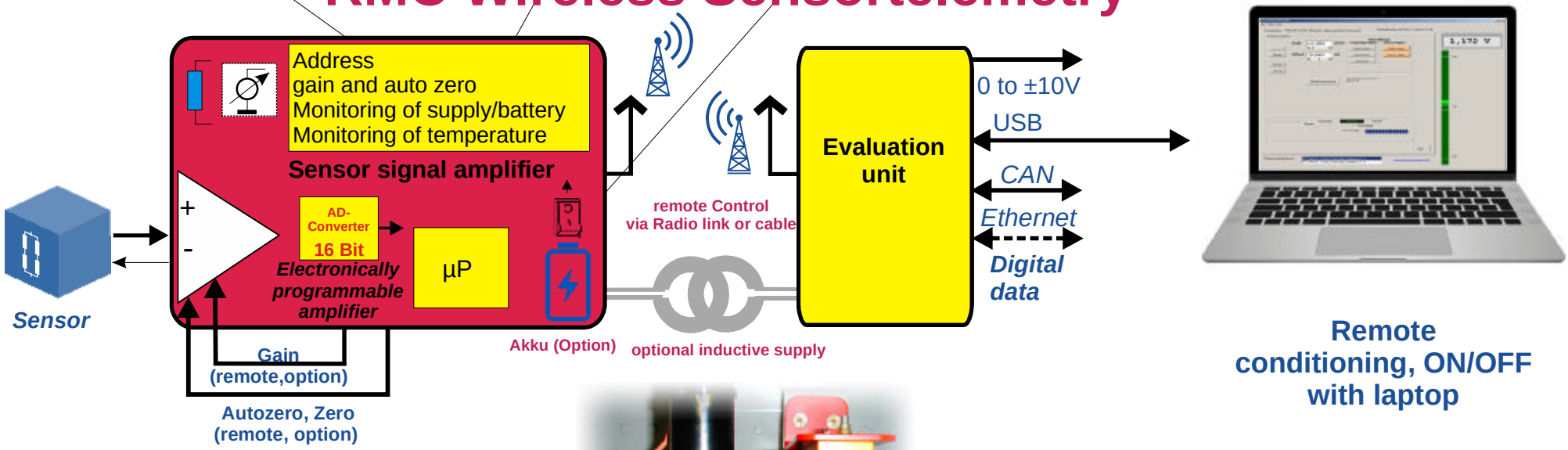
Short Description of Manner Wireless Sensortelemetry

Separate address for each amplifier (option)

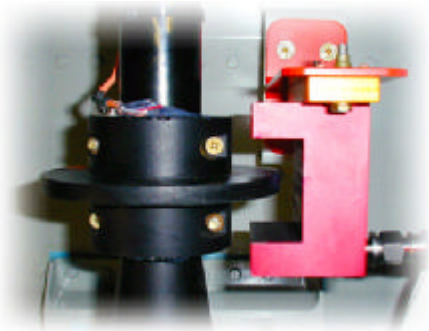
gain, zero adjustable with 16 bits resolution (continueous adjustment) wireless (option)

ON/OFF wireless (option)

RMC Wireless Sensortelemetry



Remote conditioning, ON/OFF with laptop



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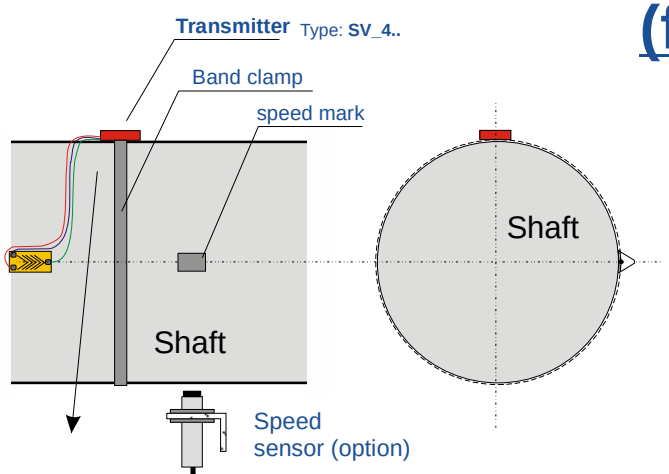
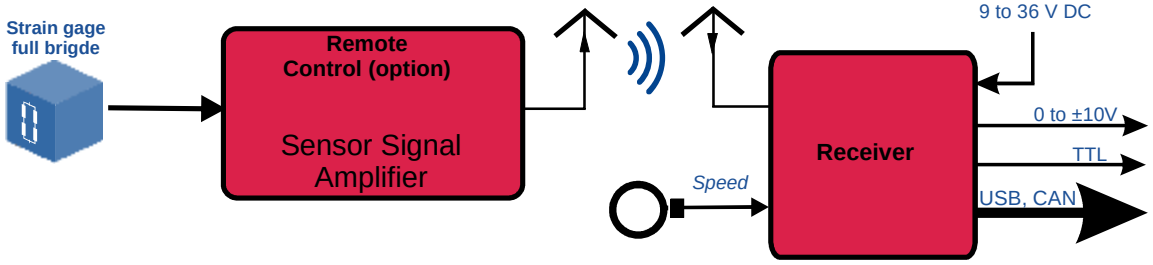
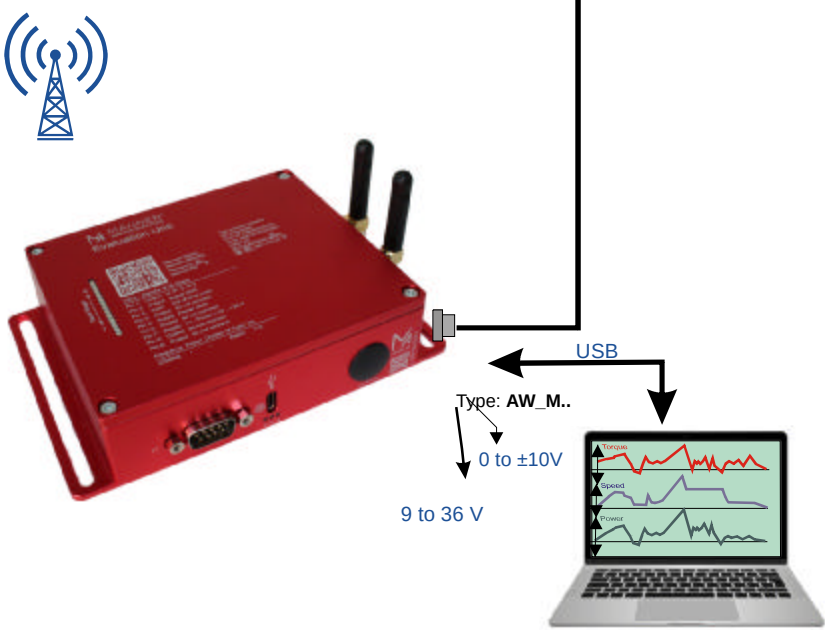
MANNER Radio Sensortelemetry (flexible power meter)







Features:

- Easy mounting
- with Accu-supply 3,6 V Lithium, max 35 hours (one cycle)
- Channel count: 1
- Sample rate: 4000 Sample/s (1 channel)
- Digital transmitting 12/16 Bit resolution with checksum (CRC)
- Transmitting: Radio f = 433/868 MHz, 16 different frequencies
- RF-Power: 10 mW; range: 50 m in open field
- Integrated data protection by checksum 16 Bit CRC
- Low current consumption by low power C-MOS technique: 3,6 V supply
- Integrated transducer amplifier range: 0,1 mV/V to 20 mV/V
- Range adjustable by solderable resistor
- or optional electrical remote programmable range with 12 Bit resolution
- Transducer: Strain gage, full- / half bridge, Thermocouple type K
- Zero drift / Gain drift: 0,01 %/°C (0,003 %/°C optional)
- Optional inductive supply
- Max. accelaration: 1500 g
- Temperature range: -10 to +85°C
- Optional -40 to +120°C environmental temperature

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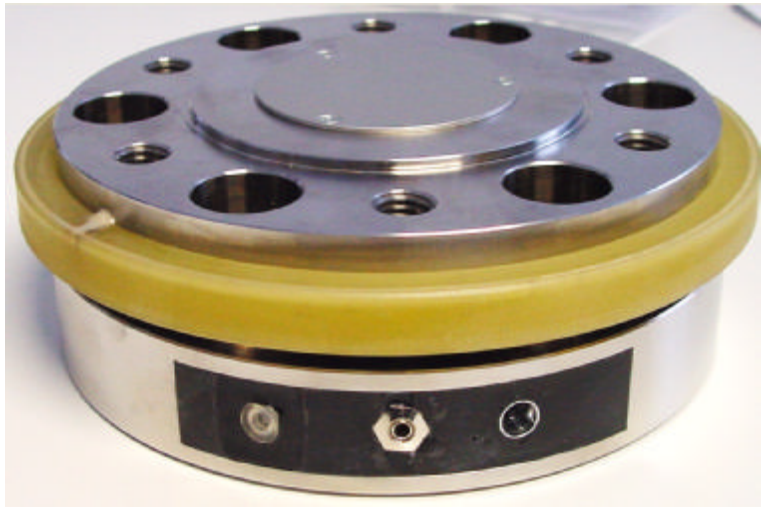
Torque Meter based on Radio Telemetry



Receiver

Features:

- Universal torque meter for short term use
- Ranges available: 10 Nm to 50 kNm
- Linearity and hysteresis: 0,2 %
- High bandwidth 0 to 1 kHz(-3 dB)
- High reliable digital transmitting 16 Bit resolution
- Zero drift / Gain drift: 0,01 %/°C (0,003 %/°C optional)
- Easy mounting
- Transmitting: Radio f = 433/868 MHz
- RF-Power: 10 mW; range: 40 m in open field
- Integrated data protection by checksum (16 Bit CRC)
- Low current consumption by low power C-MOS technique: 3,6 V supply
- with Accu-supply 3,6 V Lithium, max 35 hours (one cycle)
- Max. radial accelaration: 1500 g
- Temperature range: -10 to +85°C
- Optional -40 to +120°C environmental temperature
- Supply receiver: 9 to 36 V DC, 100 mA
- Output voltage: 0 to ±10 V, 0(4) to 20 mA, USB, CAN

Type system: type: **MF**_<range>_<precision>_<bandwidth>_<mod>_<AW>_**F**_<Inter>

	10 Nm	0,25%	10 Hz	PCM12	AW_M	---
	to	0,1%	100 Hz	PCM16	AW_T	USB
	50 kNm	0,05%	1 kHz			CAN

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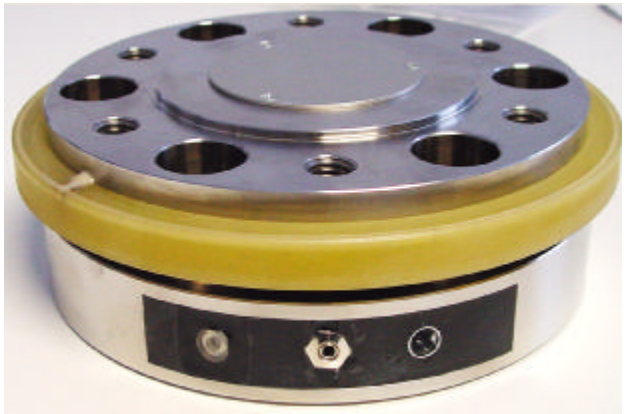
Climate Compressor Torque Meter based on wireless Telemetry



Receiver

Features:

- Climate compressor torque meter for short term use
- Ranges available: 20 Nm to 50 kNm
- Linearity and hysteresis: 0,25 %
- High bandwidth 0 to 1 kHz(-3 dB)
- High reliable digital transmitting 16 Bit resolution
- Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional)
- Easy mounting
- Transmitting: Radio f = 433/868 MHz
- RF-Power: 10 mW; range: 40 m in open field
- Integrated data protection by checksum (16 Bit CRC)
- Low current consumption by low power C-MOS technique: 3,6 V supply
- with Accu-supply 3,6 V Lithium, max 25 hours (one cycle)
- Max. radial accelaration: 1500 g
- Temperature range: -10 to +85°C
- Optional -40 to +120°C environmental temperature
- Supply receiver: 9 to 36 V DC, 100 mA
- Output voltage: 0 to ±10 V, 0(4) to 20 mA, USB, CAN

Type system: type: **MFC**_<range>_<precision>_<bandwidth>_<mod>_<AW>_**F**_<Inter>

	20 Nm	0,25%	10 Hz	PCM16	AW_M	---
	to	0,1%	100 Hz		AW_P	USB
	50 Nm		1 kHz			CAN

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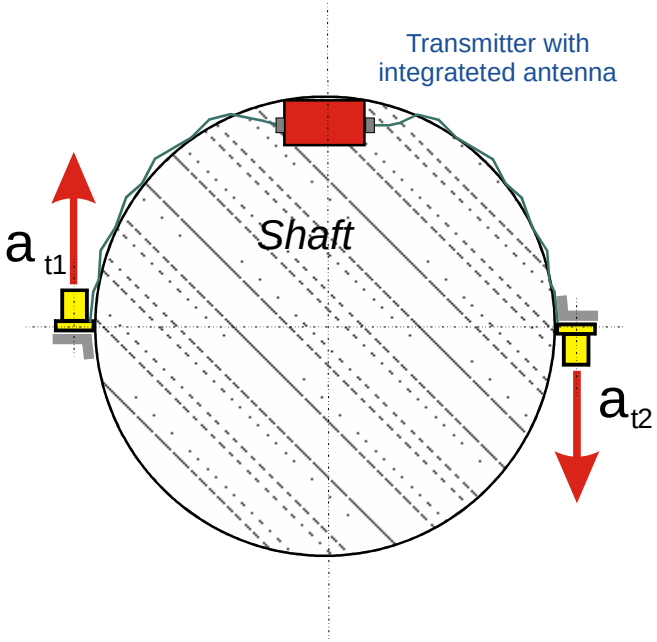
Aquisition of Torsional Acceleration Meter with Wireless Telemetry with ICP Sensors

for example
on crank shaft puley

Receiver



Features:

- **Universal torsional accelaration meter for short term use**
- **Ranges available: 1 g ... 100 g**
- **Linearity and hysteresis: 0,2 %**
- **High bandwidth 0 to 1 kHz (-3 dB)**
- **Zero drift / Gain drift: 0,01 %/°C (0,003 %/°C optional)**
- **Easy mounting (srew or clamping)**
- **Transmitting: Radio f = 433/868 MHz**
- **RF-Power: 10 mW; range: 40 m in open field**
- **High reliable digital transmission, integrated data protection by checksum**
- **low current consumption by low power C-MOS technique: 3,6 V supply**
- **with Accu-supply 3,6 V Lithium, max 35 hours (one cycle)**
- **Eviromental temperature range: -10 to +85°C (-40..+125°C opt.)**
- **Supply receiver: 9 to 36 V DC, 100 mA**
- **Output voltage: 0 to ±10 V, 0(4) to 20 mA, USB, CAN, TCP/IP**

Type system: type: **MFB**_<range>_<precision>_<bandwidth>_<mod>_<AW>_**F**_<Inter>

1 g	0,25%	10 Hz	PCM12	AW_M	---
to		100 Hz	PCM16	AW_T	USB
500 g	0,1%	1 kHz			CAN
		10 kHz			TCP/IP

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Wheel Torque Meter based on Wireless Telemetry

Receiver

Features:

- Wheel torque meter for cars
- Ranges available: 500 Nm to 4 kNm
- Linearity and hysteresis: 0,1 %
- Based on titanium with overload protection
- High bandwidth 0 to 1 kHz(-3 dB)
- High reliable digital transmitting 16 Bit resolution
- Zerodrift / Gain drift: 0,01 %/°C (0,003 %/°C optional)
- Easy mounting
- Transmitting: Radio f = 433/868 MHz, 16 different frequencies
- Integrated transmitting antenna, waterproof
- RF-Power: 10 mW; range: 20 m in open field
- Integrated data protection by checksum (16 Bit CRC)
- Low current consumption by low power C-MOS technique: 3,6 V supply with Accu-supply 3,6 V Lithium, max 35 hours (one cycle)
- Max. radial accelaration: 1500 g
- Temperature range: -25 to +85°C
- Optional -40 to +120°C environmental temperature
- Supply receiver: 9 to 36 V DC, 100 mA
- Output voltage: 0 to ±10 V, 0(4) to 20 mA, USB, CAN

Type system: type: **MFW**_<range>	_<precision>	_<bandwidth>	_<mod>	_<AW>	**_F**_<Inter>
500 Nm to 4 kNm	0,1%	100 Hz to 1 kHz	PCM16	AW_M AW_P	--- USB CAN

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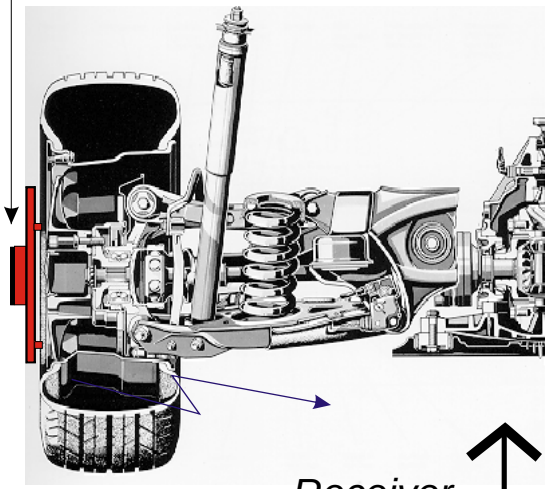
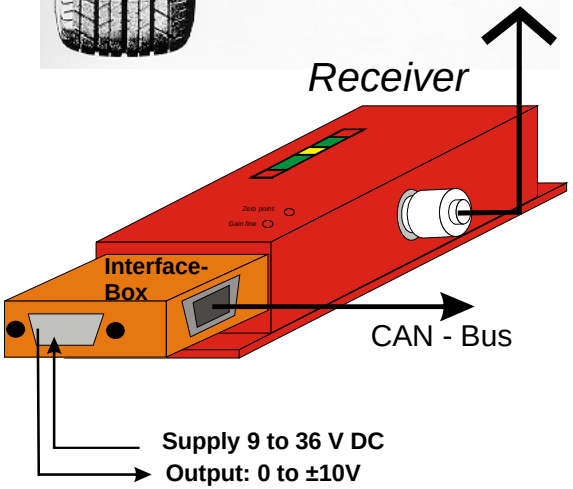
Wheel Wireless Telemetry with CAN-Bus Interface

Multichannel transmitter with integrated strain gage amplifier (with Accu)



Receiver



Features:

- Easy mounting
- with Accu-supply 3,6 V Lithium, max 35 hours (one cycle)
- Channel count: 1 or multi channel (max. 16)
- Sample rate: 4000 Sample/s/channel
- Digital transmitting 12/16 Bit resolution with checksum (CRC)
- Transmitting: Radio f = 433/868 MHz, 16 different frequencies
- RF-Power: 10 mW; range: 30 m in open field
- Low current consumption by low power C-MOS technique: 3,6 V supply
- Integrated transducer amplifier range: 0,1 mV/V to 20 mV/V
- electrical remote programmable range with 12 Bit resolution
- Transducer: strain gage, full- / half bridge, Thermocouple type K
- Zerodrift / Gain drift: 0,01 %/°C (0,003 %/°C optional)
- Optional inductive supply
- Max. accelaration: 1500 g
- Optional -40 to +120°C environmental temperature

Type system: MSV_**Rad**_<channel>_<precision>_<temperature>_<mod>_**F**_<sample>_<Inter>

2	0,2	85	PCM12	1	USB
to	0,1	125	PCM16	10	CAN
32		150		1000	
				4000	

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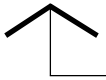

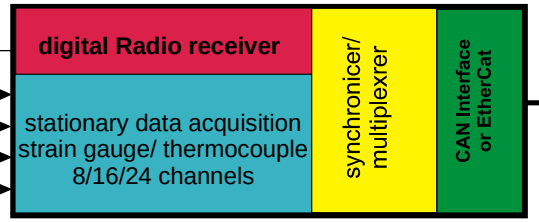

CAN-Bus,
EtherCAT,
USB

n
n
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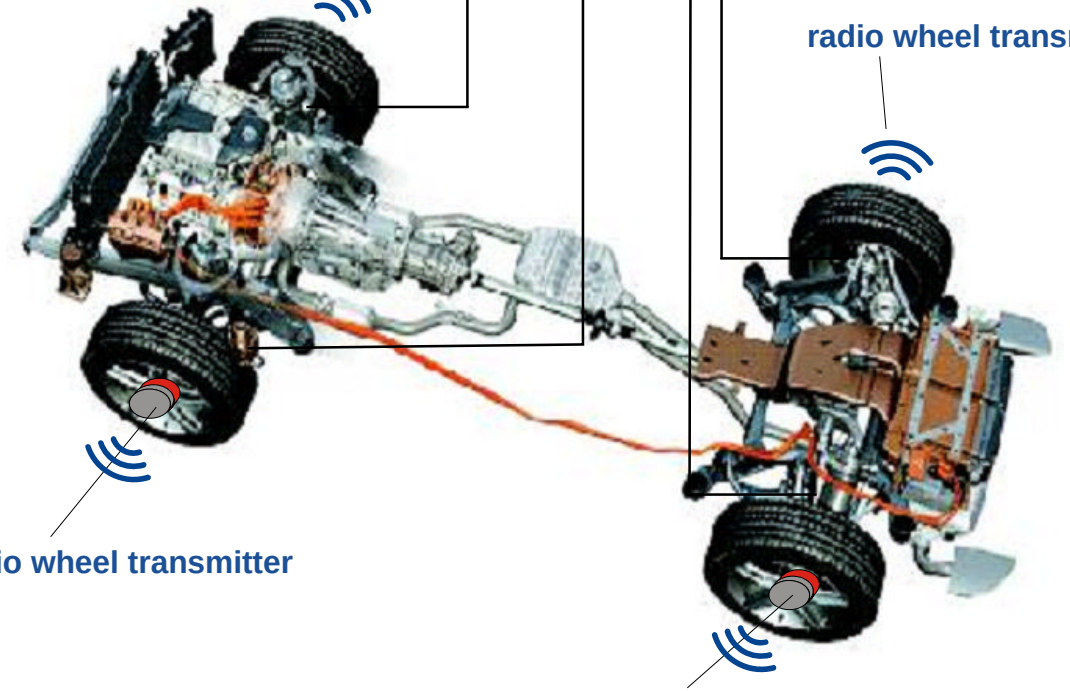
n

radio wheel transmitter

radio wheel transmitter



radio wheel transmitter

radio wheel transmitter

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Radio-Sensortelemetry Components

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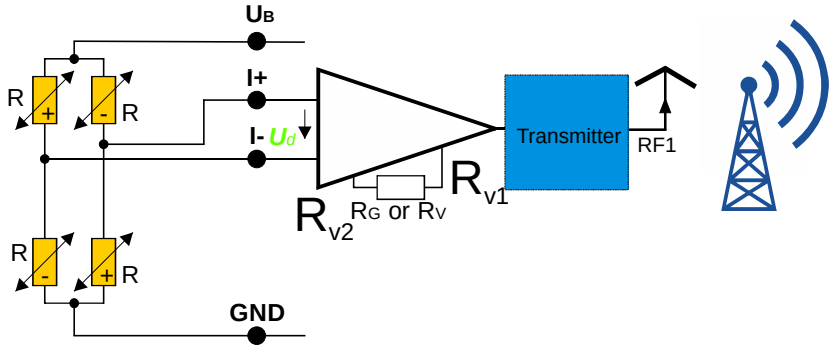
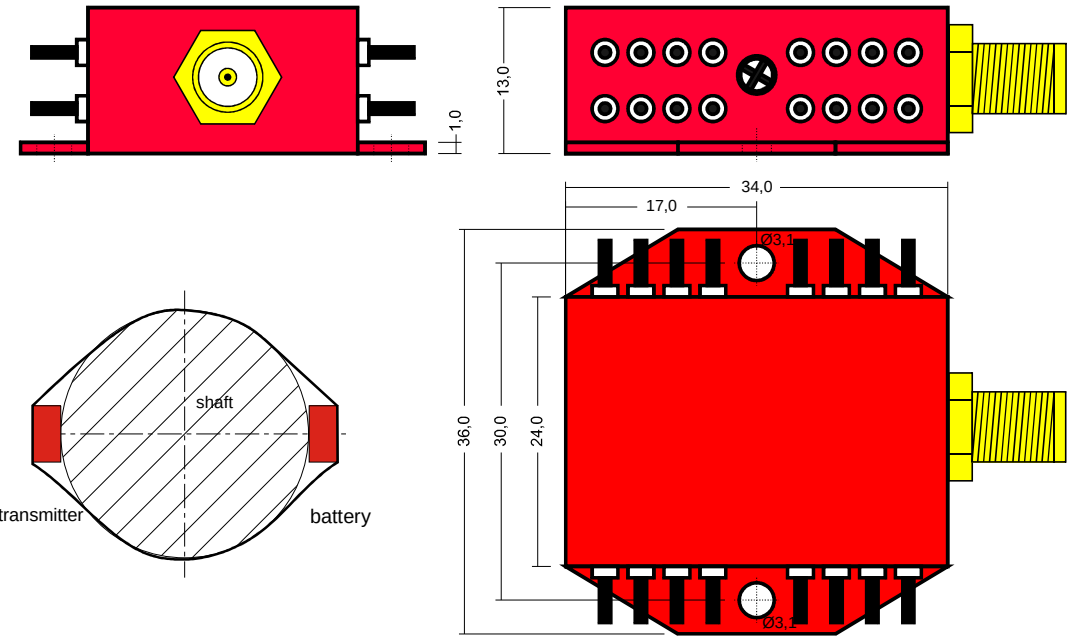
Sensor Signal Amplifier Type 4a





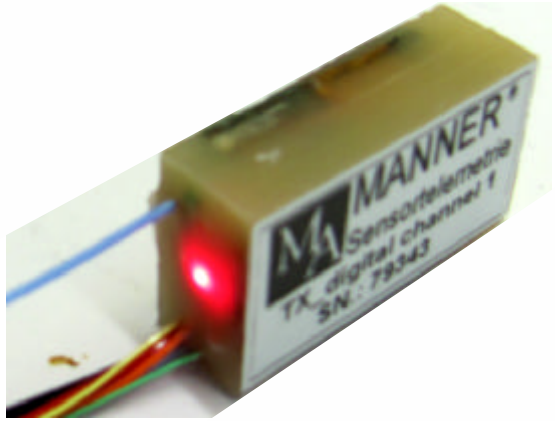
1/2 Channel Radio Sensortelemetry transmitter

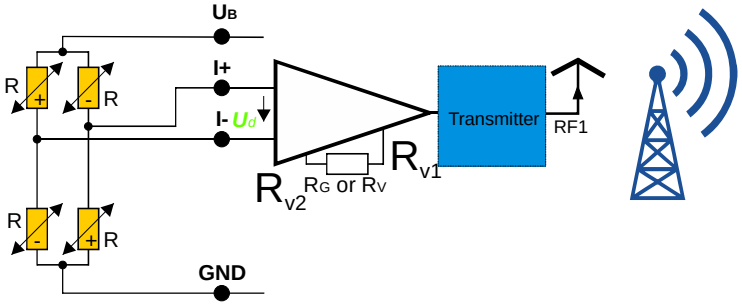
- For strain gage, PT100, Thermocouple
- Sensitivity: 0,02 to 20 mV/V
- Bandwidth 10 Hz / 0 Hz to 1 kHz
- Brigde supply: 3 V
- Strain gage: 350 Ω
- Transmission: Radio Sensortelemetry PCM
- Integrated filter
- Resolution: 14 Bit (16 Bit)
- Drift zero: 0,02 (0,01, 0,005 option)
- Supply: 3,3 to 12 V, 50 mA
- Remote range control, auto zero (option)
- Environmental temperature: -25 to +85°C (120°C)
- Max load: 1 000 g (depends on fixing)

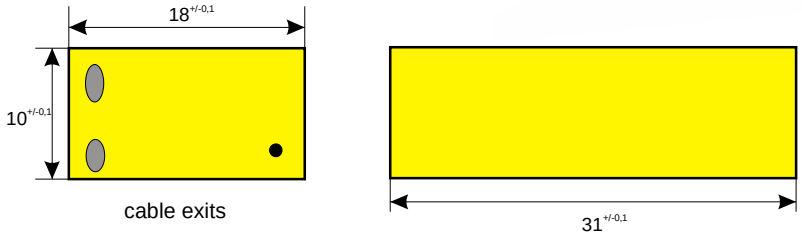
Type: SV_4a_<accuracy>_<temp>_Fu_<mod>_<bandwidth>_<rmc>_<TC>

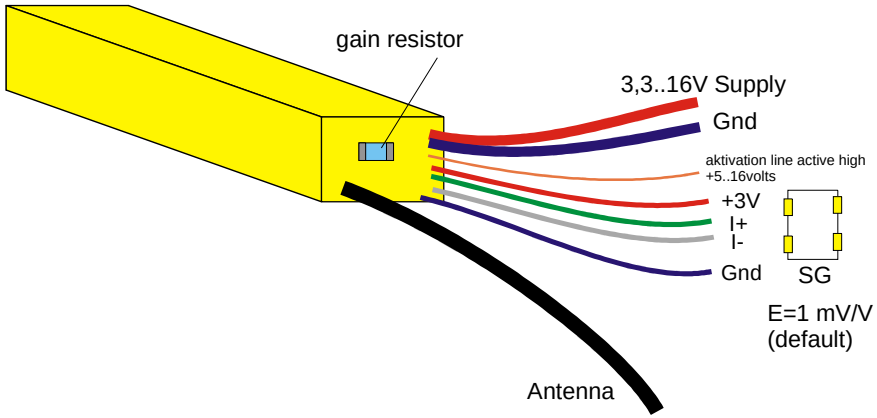
0,02	85	PCM16	1 kHz	-	-
0,01	120		2 kHz	RC	TC
0,005			10 kHz		

Miniature Sensor Signal Amplifier Type Epoxy









1 Channel Radio Sensortelemetry transmitter

- For strain gage, PT100, Thermocouple
- Sensitivity: 0,02 to 20 mV/V
- Bandwidth (10 Hz / 0 Hz to 1 kHz
- Brigde supply: 3 V
- Strain gage: 350 Ω (1000 Ω)
- Transmission: Radio Sensortelemetry PCM, 433 MHz
- Integrated filter
- Resolution: 16 Bit
- Drift zero: 0,02 (0,01, 0,005 option)
- Supply: 3,3 to 16 V, 50 mA
- Remote range control, auto zero (option)
- Environmental temperature: -25 to +85°C (120°C)
- weight. 20 g, Max load: 3 000 g (depends on fixing)
- Type: SV_7a_<accuracy>_<temp>_Fu_<mod>_<bandwidth>_<rmc>_<TC>

1 kHz	0,02	85	PCM16	-	-
	0,01	120		RC	TC
	0,005				

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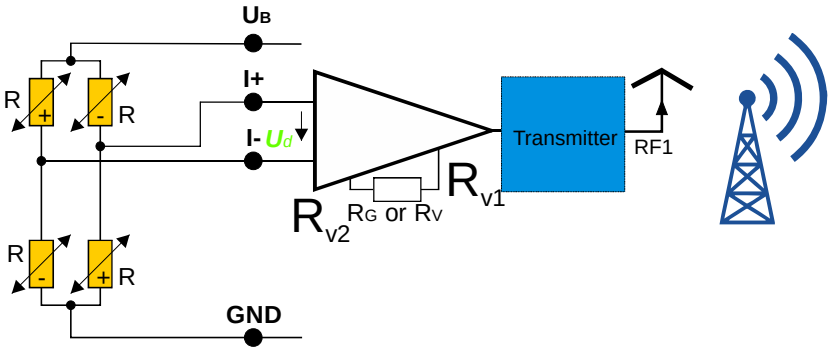
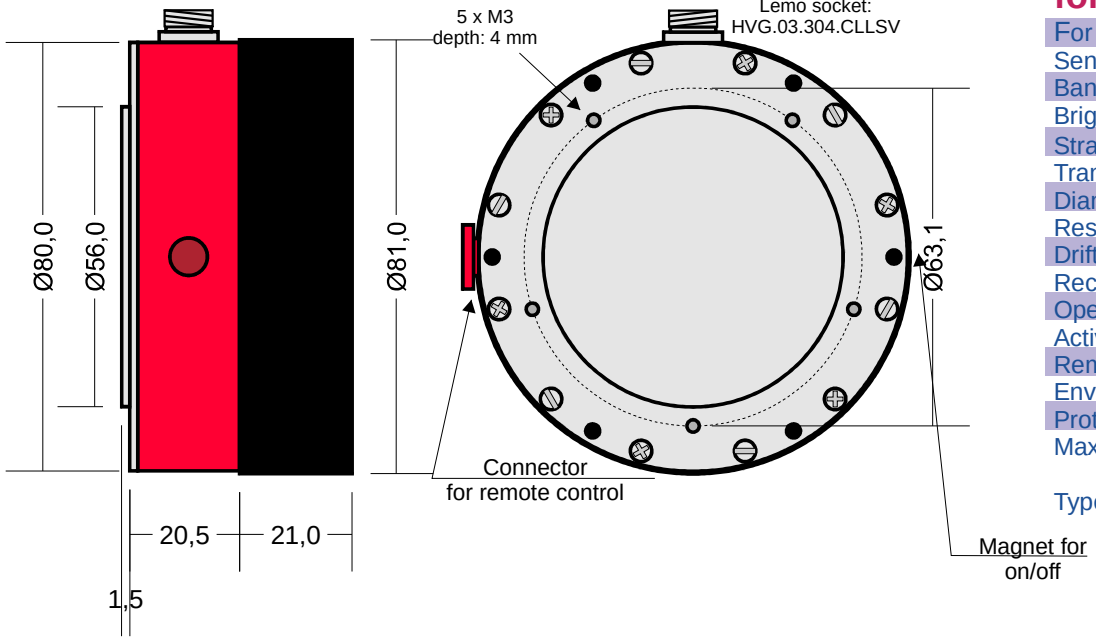
Sensor Signal Amplifier Type SV_Rad





1 Channel Radio Sensortelemetry transmitter for wheels or shaft end applications

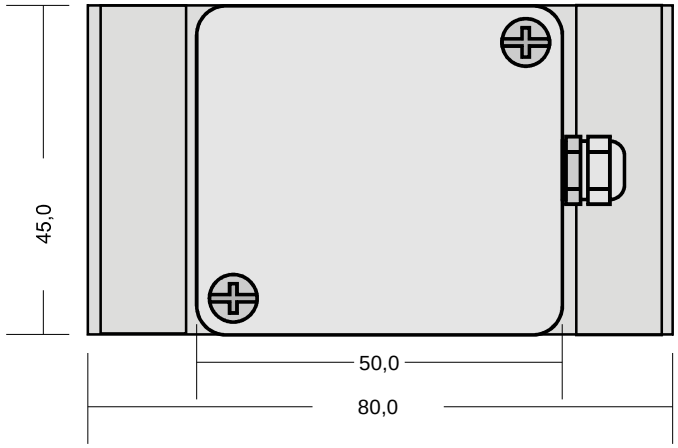
- For strain gage, PT100, Thermocouple
- Sensitivity: 0,02 to 20 mV/V
- Bandwidth 10 Hz / 0 Hz to 1 kHz
- Brigde supply: 3 V, battery or accu (rechargeable)
- Strain gages: 350 Ω
- Transmission: Radio Sensortelemetry PCM
- Diameter: 80 mm, height: 43 mm
- Resolution: 12 Bit (16 Bit)
- Drift zero: 0,02 (0,01, 0,005 option)
- Recharging by inductive recharging cap (contactless)
- Operating time between recharging: 30 hours
- Activating by switch
- Remote range control, auto zero (option)
- Environmental temperature: -25 to +85°C (120°C)
- Protection: IP67
- Max load: 1 000 g (depends on fixing)

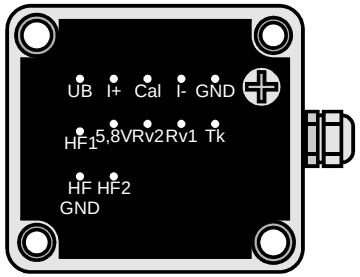
Type: SV_Rad_<accuracy>_<temp>_Fu_<mod>_<bandwidth>_<rmc>_IP67_<TC>

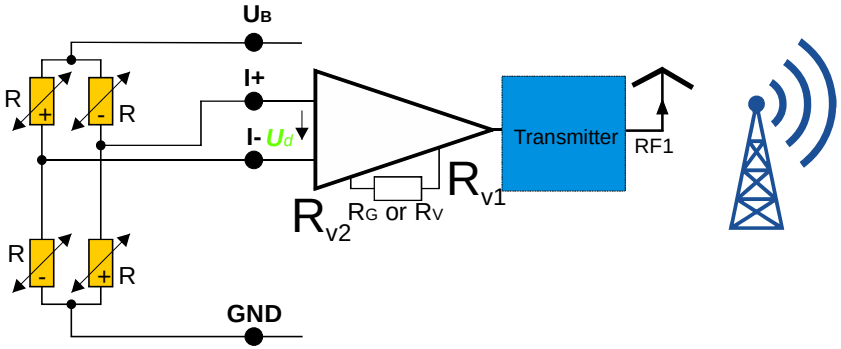
0,02	85	PCM16	1 kHz	-	-
0,01	120		2 kHz	RC	TC
0,005			10 kHz		

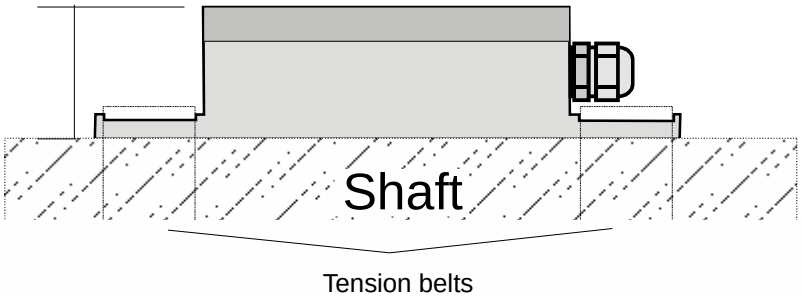
Sensor Signal Amplifier Type 8b

special for tension belt fixing (waterproof)









1 Channel Radio Sensortelemetry transmitter with integrated transmitting antenna and accu pack

- For strain gage, PT100, Thermocouple
- Sensitivity: 0,02 to 20 mV/V
- Bandwidth 10 Hz / 0 Hz to 1 kHz
- Brigde supply: 3 V
- Strain gages: 350 Ω
- Transmission: Radio Sensortelemetry PCM
- Integrated filter
- Resolution: 14 Bit (16 Bit)
- Drift zero: 0,02 (0,01, 0,005 option)
- Supply: 3,3 to 12 V, 50 mA,
- operating with 1 accu charge 30 hours
- Remote range control, auto zero (option)
- Environmental temperature: -25 to +85°C (120°C)
- protection: IP65
- Max load: 1 000 g (depends on fixing)

Type: SV_8b_<accuracy>_<temp>_Fu_<mod>_<bandwidth>_<rmc>_wa_<TC>

0,02	85	FM	1 kHz	-	-
0,01	125	PCM16	2 kHz	RMC	TC
0,003	150		10 kHz		

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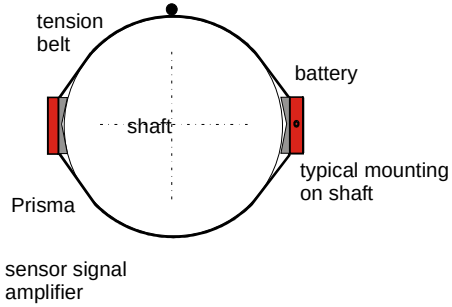
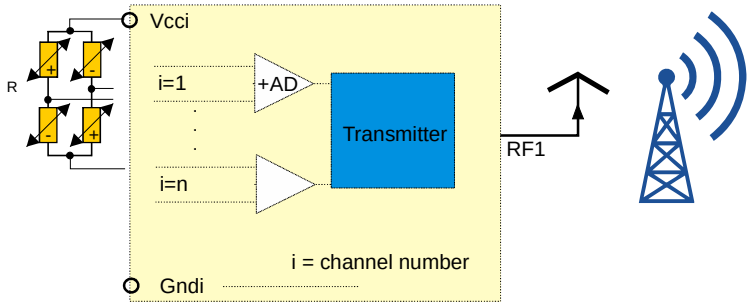
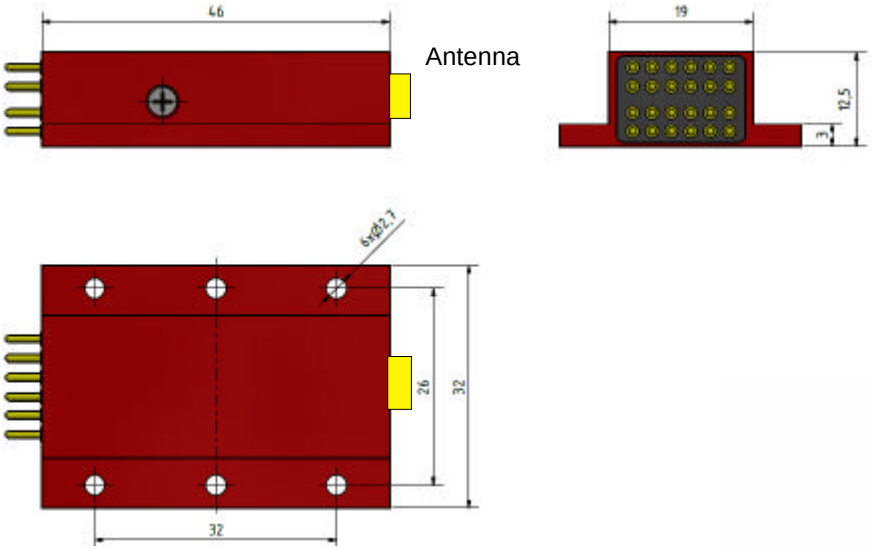
4 channel signal Amplifier Type M







4 Channel Radio Sensortelemetry transmitter

- For strain gage, PT100, Thermocouple
- Sensitivity: 0,02 to 20 mV/V
- Bandwidth (10 Hz / 0 Hz to 1 kHz
- Brigde supply: 3 V
- Strain gage: 350 Ω (1000 Ω)
- Transmission: Radio Sensortelemetry PCM, 433 MHz
- Integrated filter
- Resolution: 16 Bit
- Drift zero: 0,01, (0,005 option)
- Supply: 3,3 to 16 V, 80 mA
- Remote range control, auto zero (option)
- Environmental temperature: -25 to +85°C (120°C)
- weight. 20 g, Max load: 3 000 g (depends on fixing)

Type: SV_7a_<accuracy>_<temp>_Fu_<mod>_sample>_<bandwidth>_<rmc>

0,01	85	PCM16	2000 /s	0,5 kHz	-
0,005	120		4000 /s	1 kHz	RC
			8000 /s	2 kHz	

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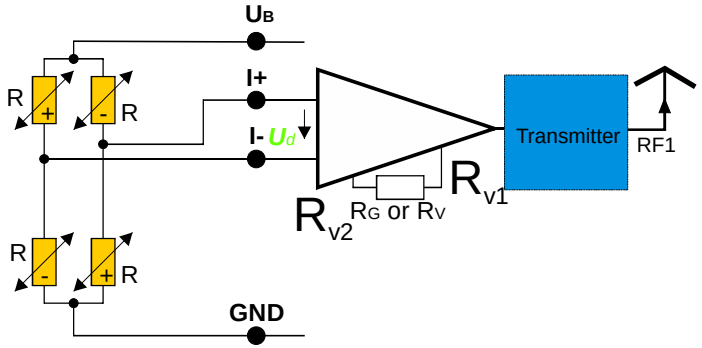
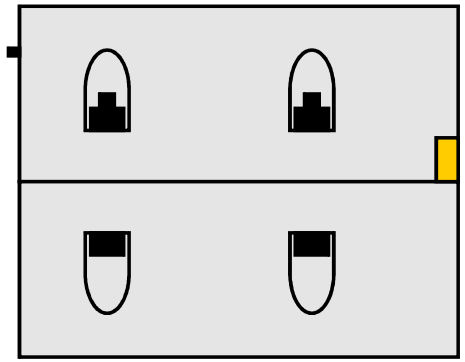
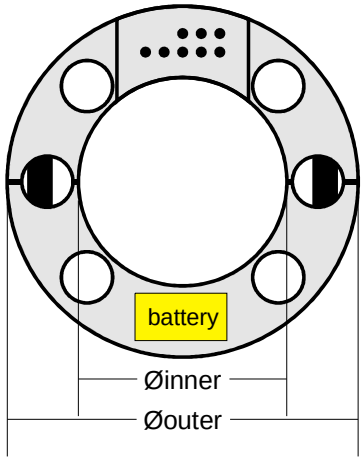
Sensor Signal Amplifier Type 9

Through hole
Ø = 7mm for weight reduction







Inner diameter: 17 to 50mm
Outer diameter = Inner diameter + 20mm
(without integrated battery)
or
Outer diameter = Inner diameter + 30 mm
(with integrated rechargeable battery)

1 Channel Radio Sensortelemetry transmitter

For strain gage, PT100, Thermocouple
Sensitivity: 0,02 to 20 mV/V
Bandwidth 10 Hz / 0 Hz to 1 kHz
Brigde supply: 3 V
Strain gages: 350 Ω
Transmission: Radio Sensortelemetry PCM
Integrated filter
Resolution: 14 Bit (16 Bit)
Drift zero: 0,02 (0,01, 0,005 option)
Supply: 3,3 to 12 V, 50 mA
Remote range control, auto zero (option)
Environmental temperature: -25 to +85°C (120°C)
Max load: 1 000 g (depends on fixing)

Type: SV_9_<accuracy>_<temp>_Fu_<mod>_<bandwidth>_<rmc>_<wa>_<TC>

1 kHz	0,02	85	PCM12	-	-	-
	0,01	120	PCM16	RMC	IP52	TC
	0,005				IP65	
					IP67	