

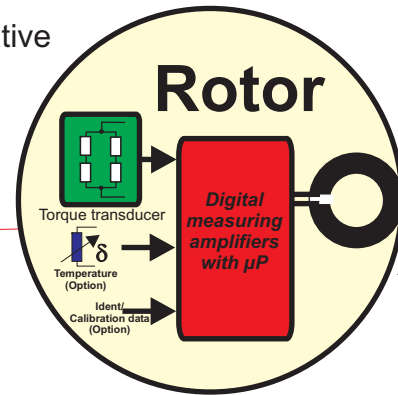


# Special Torque Transducer

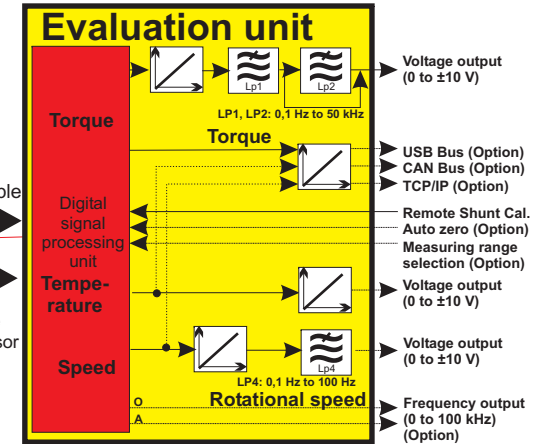
# High Precise Dynamic Torque Meter for Propshaft



alternative



Pick up  
Cable  
Inductive speed sensor



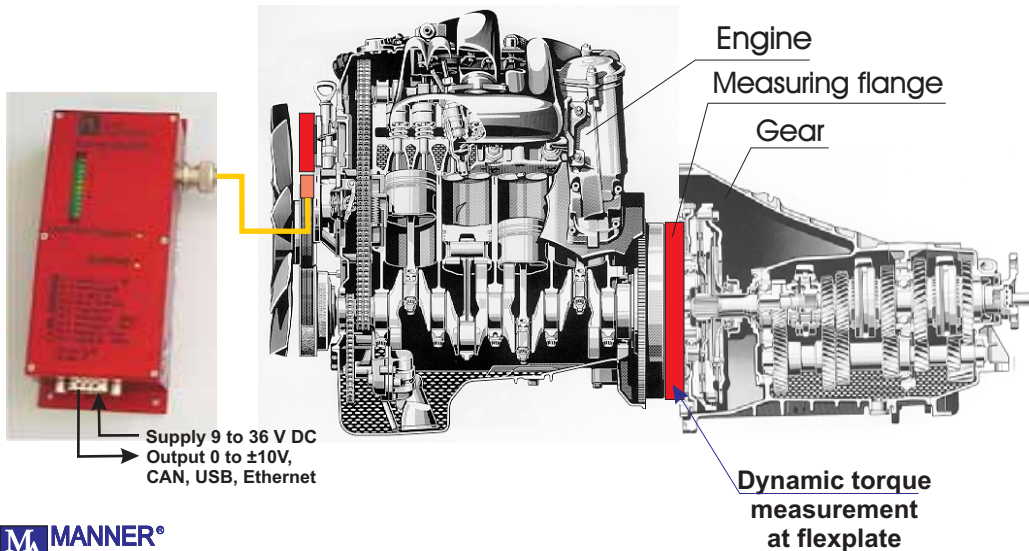
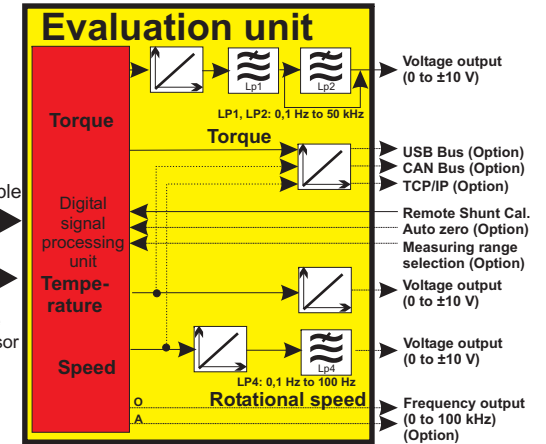
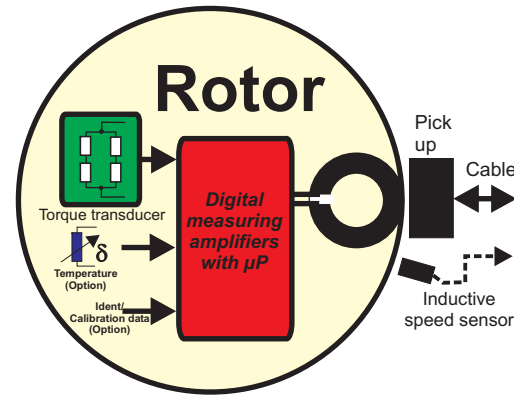
Supply 9 to 36 V DC  
Output 0 to ±10V,  
CAN, USB, Ethernet

## Torque meter propshaft:

**Torque ranges available: 1 Nm to 6 kNm**  
**Linearity and hysteresis: < 0,1 %**  
**High signal bandwidth 0 to 1 (10) kHz (-3 dB)**  
**High reliable digital transmitting with 16 Bit resolution**  
**Zerodrift / Gaindrift: 0,01 %/°C (0,002 %/°C optional))**  
**Max. radial acceleration: 10000 g**  
**Temperature range: -25 to + 160 °C**  
**(Optional -40 to +160°C environmental temperature)**  
**Optional speed acquisition**  
**Optional additional temperature acquisition channel for E-modul drift compensation**  
**Supply receiver: 9 to 36 V DC, 300 mA**  
**Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet**  
 Type: MWP\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_oil\_<Dz>

1 kNm	0,25	85	10 Hz	-	-
to	0,1	125	100 Hz	RC	1
6 kNm		160	1 kHz		60
			10 kHz		

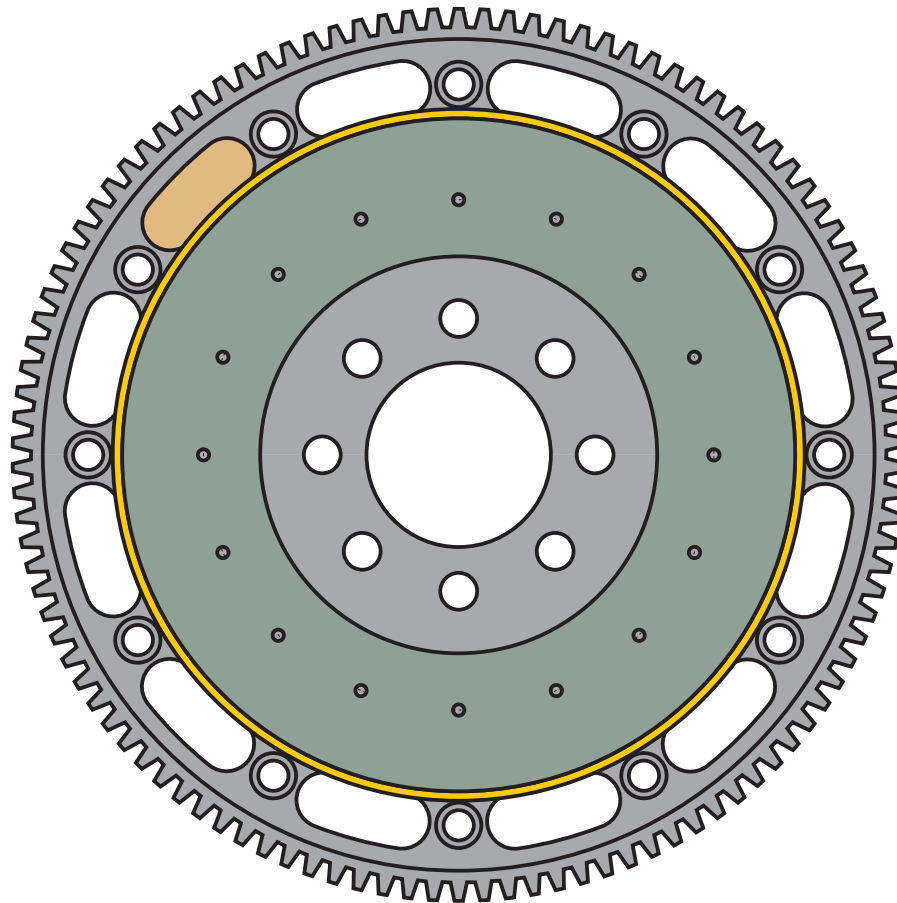
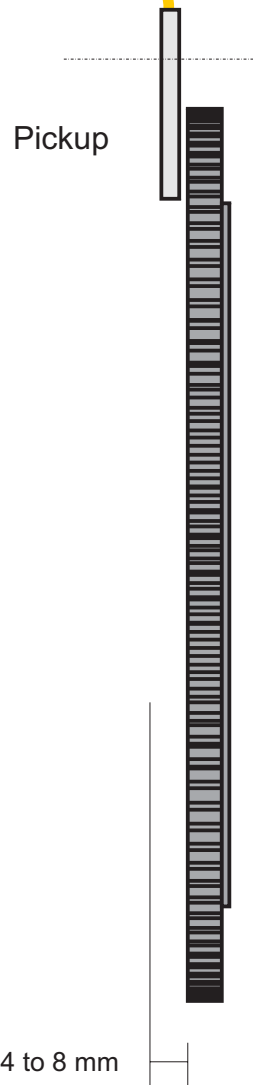
# High Precise Torque Measuring Disk between Engine and Gear (Flexplate)



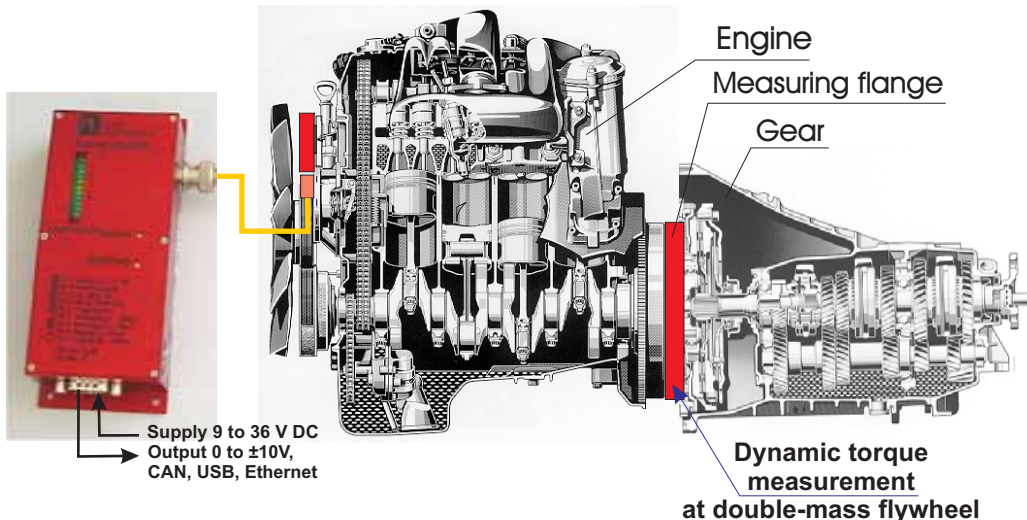
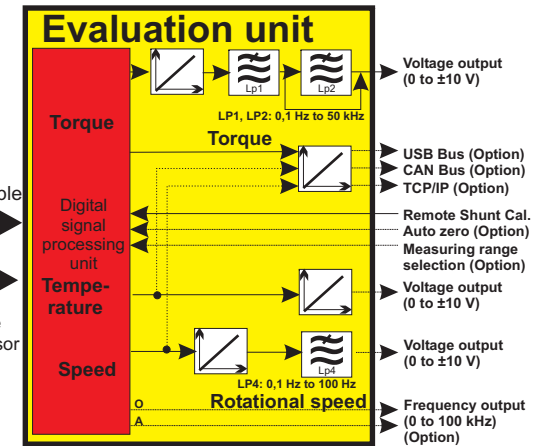
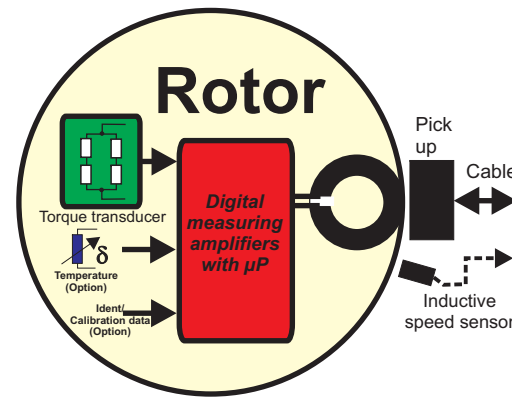
## Torque meter Flexplate:

Torque ranges available: 500 Nm to 2000 Nm						
Linearity and hysteresis: < 0,1 %						
High signal bandwidth 0 to 1 (10) kHz (-3 dB)						
High reliable digital transmitting with 16 Bit resolution						
Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional))						
Max. radial acceleration: 10000 g						
Temperature range: -25 to + 125 °C						
(Optional -40 to +160°C environmental temperature)						
Optional speed acquisition						
Optional additional temperature acquisition channel for E-modul drift compensation						
Supply receiver: 9 to 36 V DC, 300 mA						
Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet						
Type: MWF>_<range>_<accuracy>_<temp>_<6.3>_<PCM16>_<bandwidth>_<rmc>_oil_<Dz>_<T>						
500 Nm	0,25	85	10 Hz	-	1	-
to	0,1	125	100 Hz	RC	120	1
2000 Nm		160	1 kHz			
			10 kHz			

# High Precise Torque Measuring Disk between Engine and Gear (Flexplate)



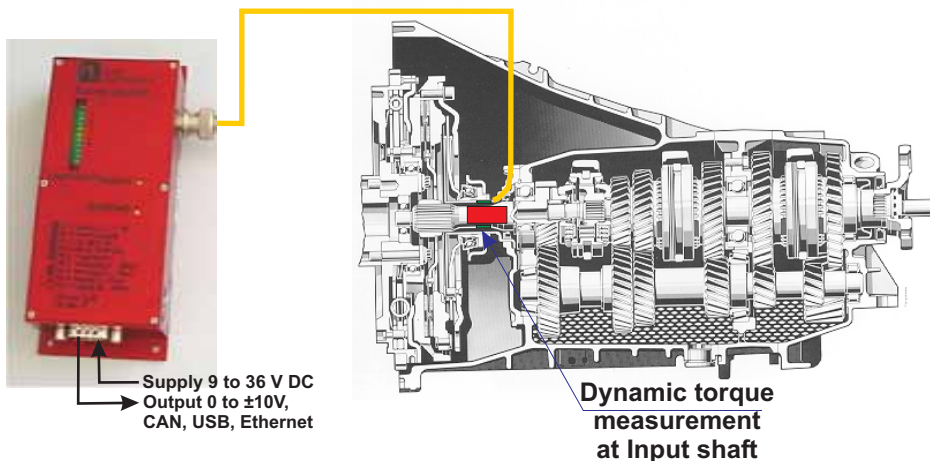
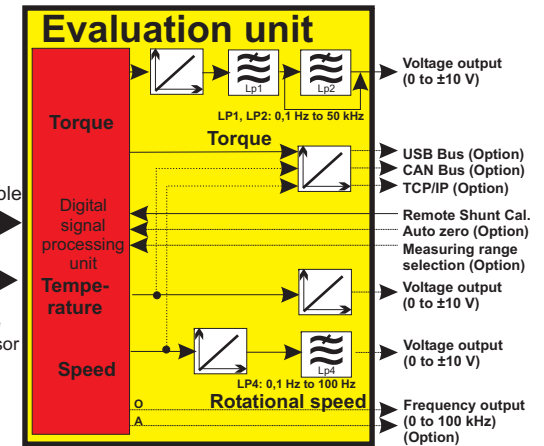
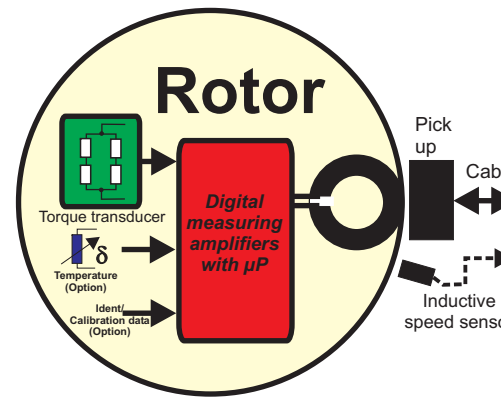
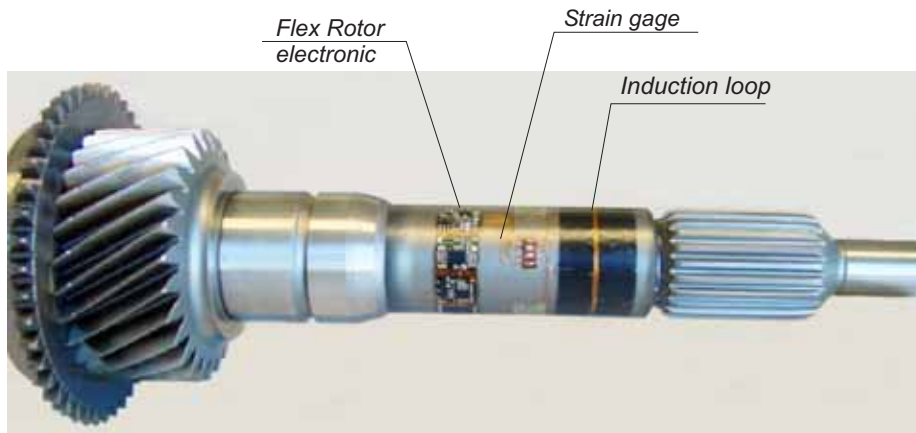
# High Precise Torque Measuring Disk between Engine and Gear (Double-mass Flywheel)



## Torque Meter Double-Mass Flywheel:

Torque ranges available: 500 Nm to 2000 Nm						
Linearity and hysteresis: < 0,1 %						
High signal bandwidth 0 to 1 (10) kHz (-3 dB)						
High reliable digital transmitting with 16 Bit resolution						
Zerodrift / Gain drift: 0,01 %/°C (0,003 %/°C optional)						
Max. radial acceleration: 10000 g						
Temperature range: -25 to +125 °C						
(Optional -40 to +160°C environmental temperature)						
Optional speed acquisition						
Optional additional temperature acquisition channel for E-modul drift compensation						
Supply receiver: 9 to 36 V DC, 300 mA						
Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet						
Type: MWT_<range>_<accuracy>_<temp>_<6.3>_<PCM16>_<bandwidth>_<rmc>_oil_<Dz>_<T>						
500 Nm	0,25	85	10 Hz	-	1	-
to	0,1	125	100 Hz	RC	120	1
2000 Nm		160	1 kHz			
			10 kHz			

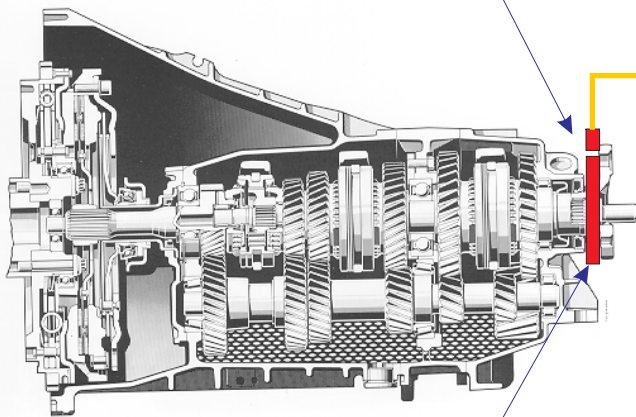
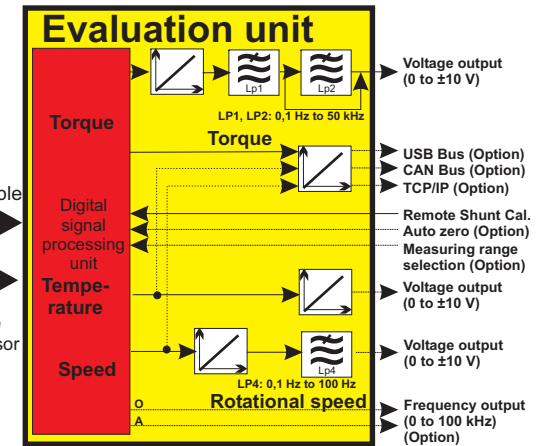
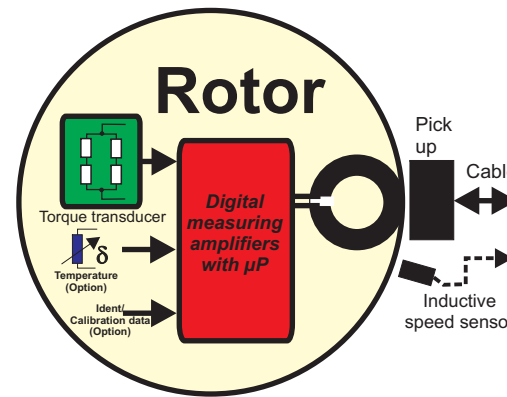
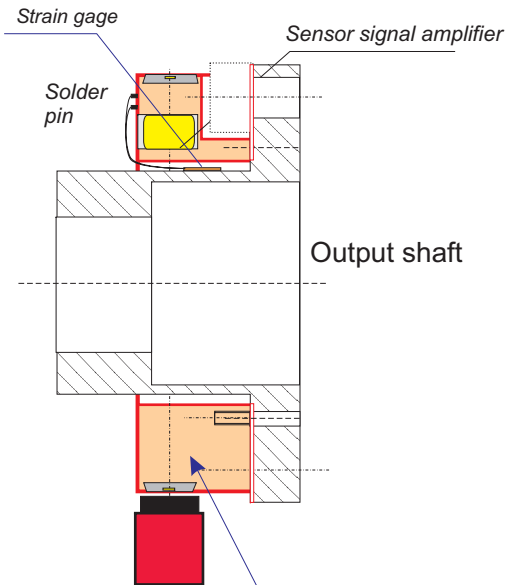
# Torque Measuring at Gear Input Shaft



## Torque Meter Input Shaft:

Torque ranges available: 500 Nm to 2000 Nm						
Linearity and hysteresis: < 0,1 %						
High signal bandwidth 0 to 1 (10) kHz (-3 dB)						
High reliable digital transmitting with 16 Bit resolution						
Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional)						
Max. radial acceleration: 10000 g						
Temperature range: -25 to +125 °C						
(Optional -40 to +160°C environmental temperature)						
Optional speed acquisition						
Optional additional temperature acquisition channel for E-modul drift compensation						
Supply receiver: 9 to 36 V DC, 300 mA						
Output voltage: 0 to $\pm 10$ V, USB, CAN-Bus, Ethernet						
Type: MWGI_<range>_<accuracy>_<temp>_<6.3>_<PCM16>_<bandwidth>_<rmc>_oil_<Dz>_<T>						
500 Nm	0,25	85	10 Hz	-	1	-
to	0,1	125	100 Hz	RC	120	1
2000 Nm		160	1 kHz			
			10 kHz			

# Torque Measuring at Gear Output Shaft



Dynamic torque measurement at output shaft



## Torque Meter Output Shaft:

Torque ranges available: 1000 Nm to 6000 Nm

Linearity and hysteresis:  $< 0,1$  %

High signal bandwidth 0 to 1 (10) kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gain drift: 0,01 %/°C (0,003 %/°C optional)

Max. radial acceleration: 10000 g

Temperature range: -25 to +125 °C

(Optional -40 to +160°C environmental temperature)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

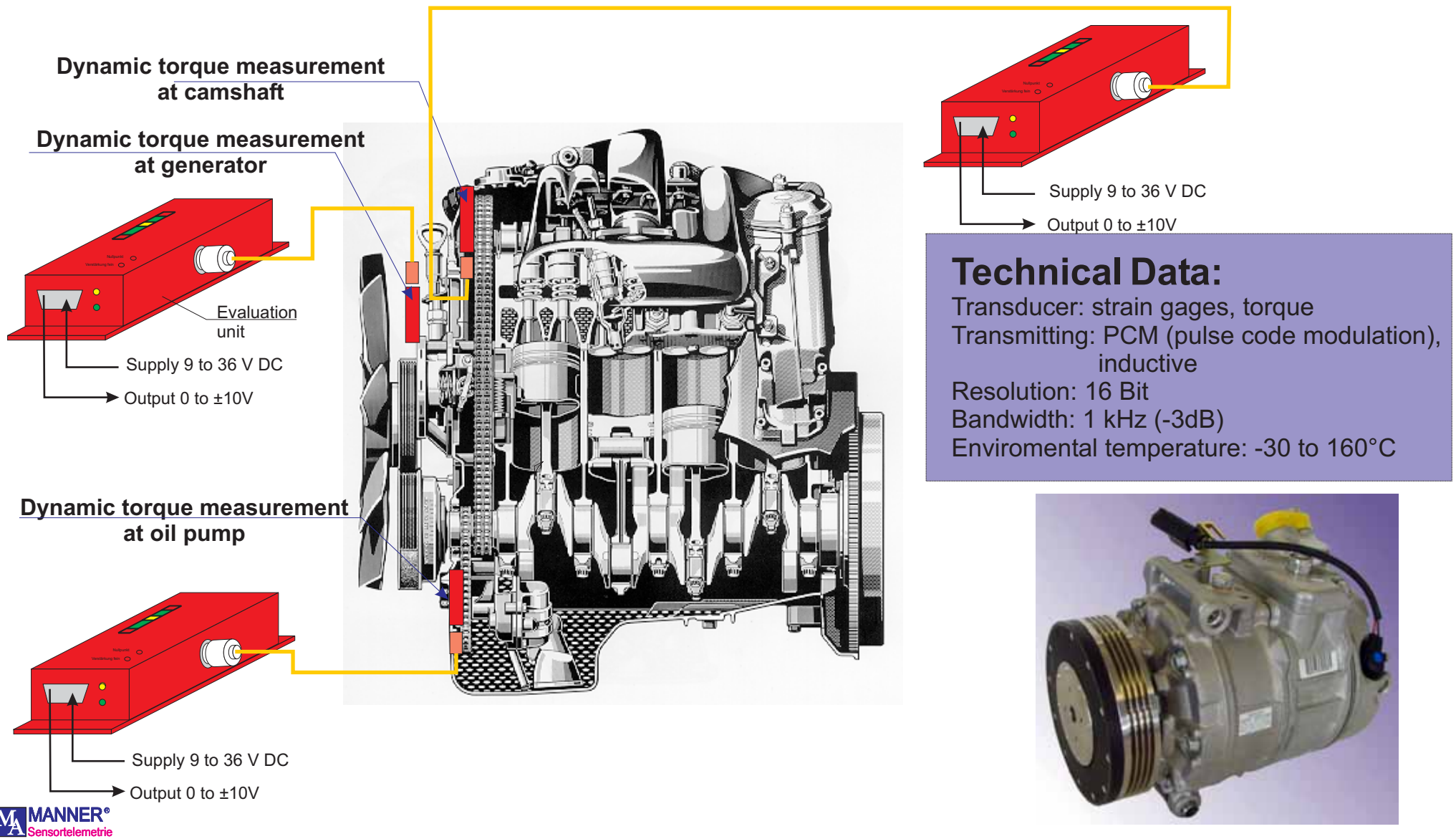
Supply receiver: 9 to 36 V DC, 300 mA

Output voltage: 0 to  $\pm 10$  V, USB, CAN-Bus, Ethernet

Type: MWGO\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_oil\_<Dz>\_<T>

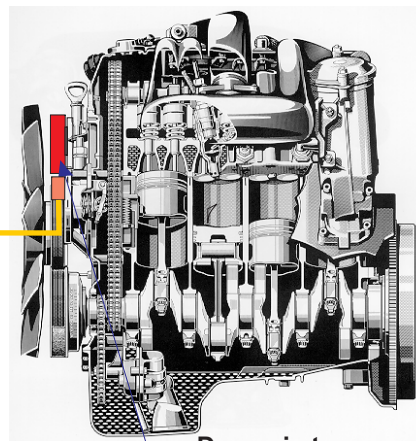
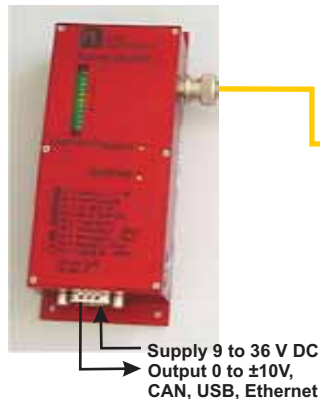
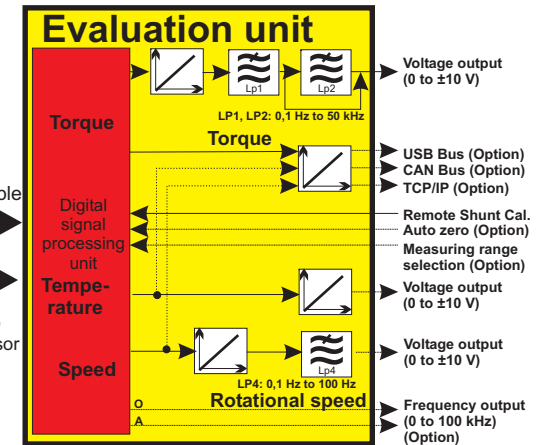
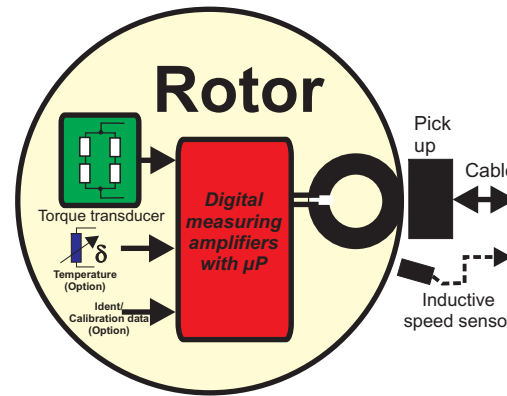
500 Nm	0,25	85	10 Hz	-	1	-
to	0,1	125	100 Hz	RC	120	1
2000 Nm		160	1 kHz			
			10 kHz			

# Dynamic Torque Measurement at an Engine





# High Precise Dynamic Torque Acquisition Pulley Climate Compressor



## Torque Meter Climate Compressor:

Torque ranges available: 5 Nm to 200 Nm

Linearity and hysteresis: < 0,1 %

High signal bandwidth 0 to 1 (10) kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional))

Max. radial acceleration: 10000 g

Temperature range: -25 to + 125 °C

(Optional -40 to +160°C environmental temperature)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

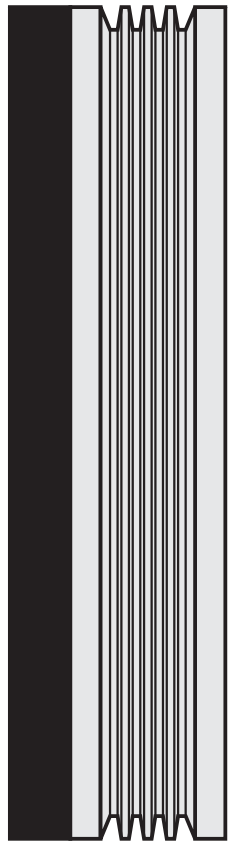
Supply receiver: 9 to 36 V DC, 300 mA

Output voltage: 0 to  $\pm 10$  V, USB, CAN-Bus, Ethernet

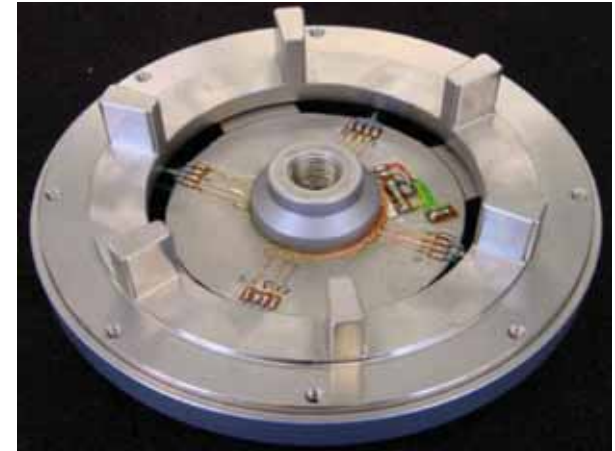
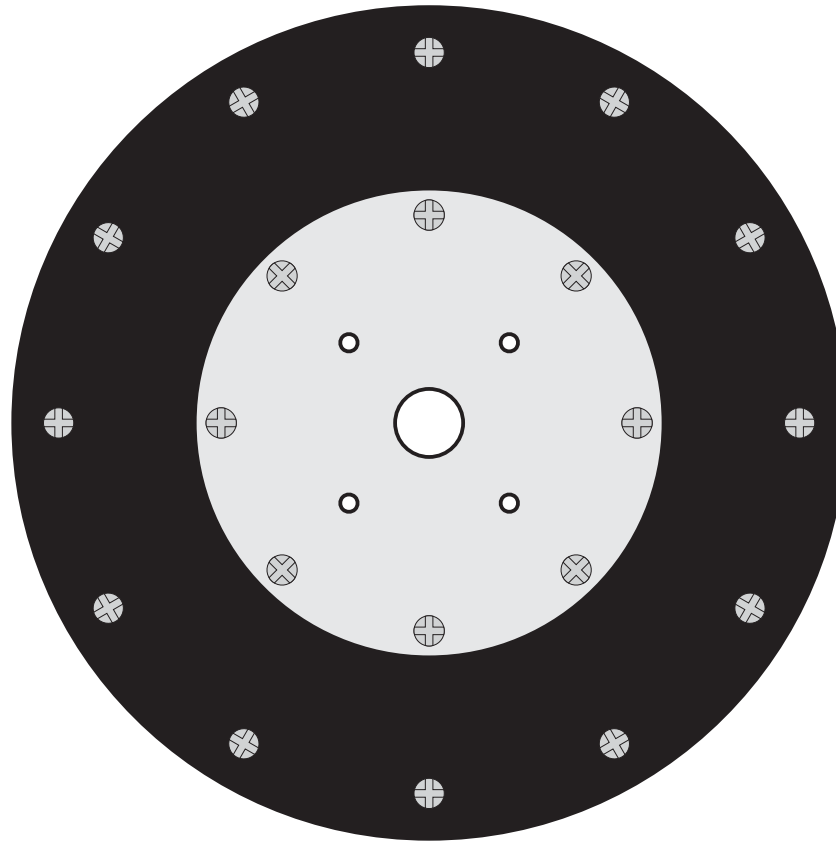
Type: MWC\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_oil\_<Dz>\_<T>

5 Nm	0,25	85	10 Hz	-	1	-
to	0,1	125	100 Hz	RC	120	T
200 Nm		160	1 kHz			
			10 kHz			

## Pulley for Climate Compressor



28,5



# Integrated Torque Limiter for Pulley Climate Compressor

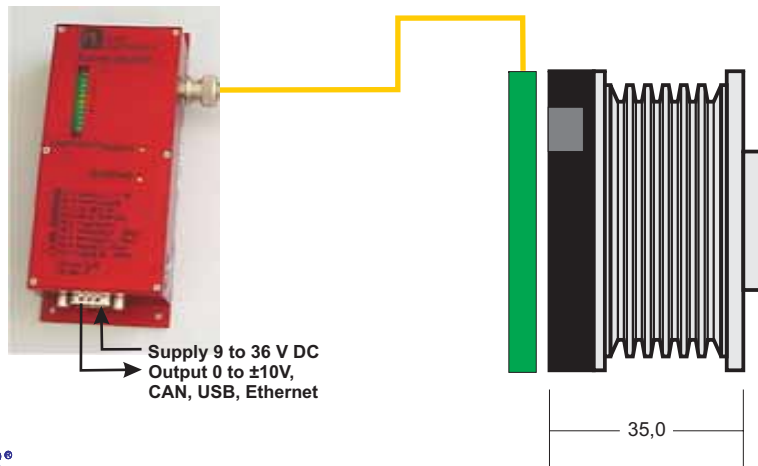
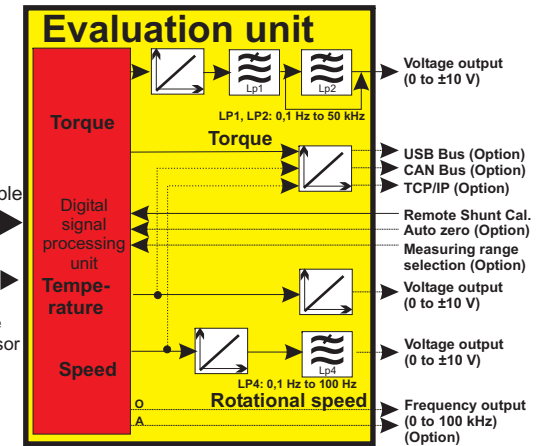
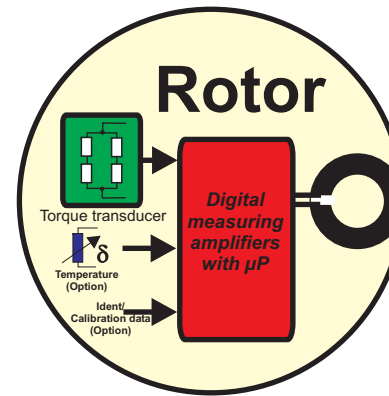
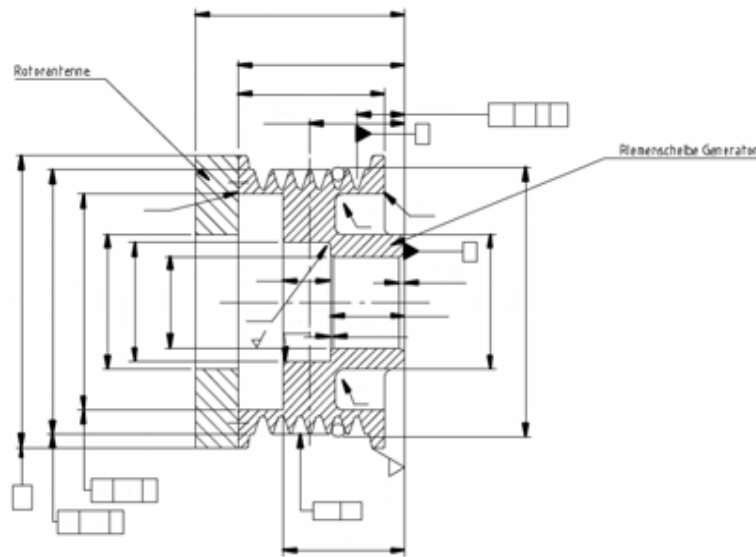
Calsonic-Climate Compressor



Denso-Climate Compressor



# Torque Meter Pulley for Generator



## Torque Meter Pulley Generator:

Torque ranges available: 5 Nm to 200 Nm

Linearity and hysteresis: < 0,1 %

High signal bandwidth 0 to 1 (10/40) kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional))

Max. radial acceleration: 10000 g

Temperature range: -25 to + 125 °C

(Optional -40 to +160°C environmental temperature)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

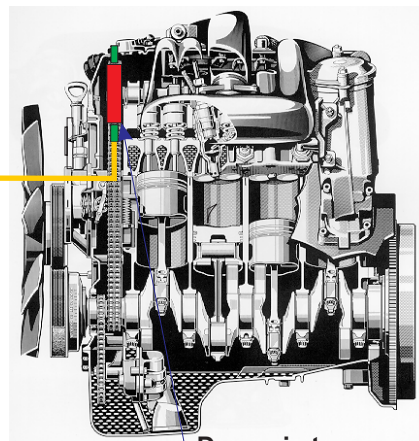
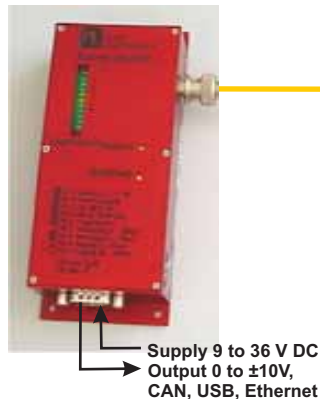
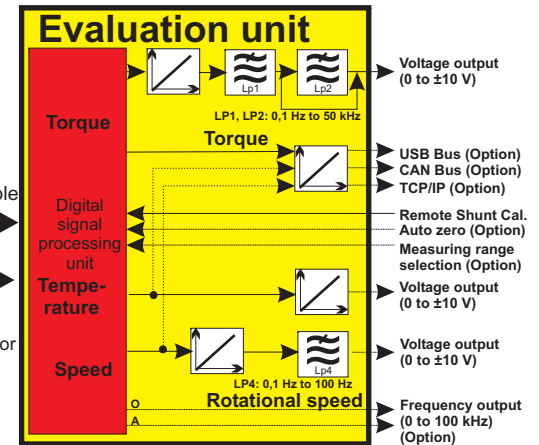
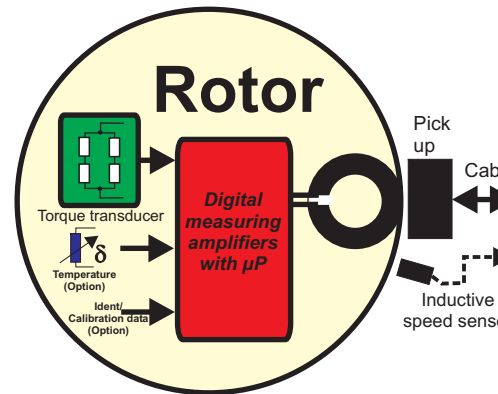
Supply receiver: 9 to 36 V DC, 300 mA

Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet

Type: MWN\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_oil\_<Dz>\_<T>

5 Nm	0,25	85	10 Hz	-	-	-
to	0,1	125	100 Hz	RC	1	T
100 Nm		160	1 kHz			68
			10 kHz			
			40 kHz			

# High precise dynamic Torque Acquisition on Camshaft



Dynamic torque measurement at climate compressor

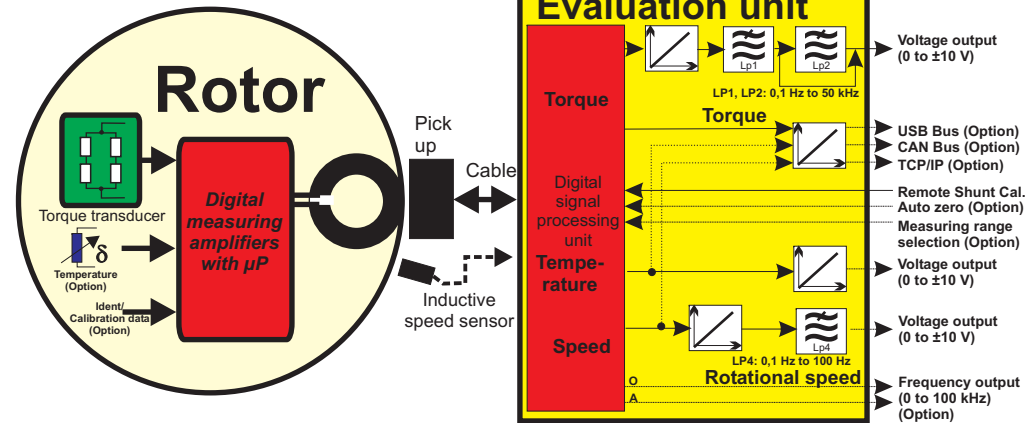
## Torque Meter Climate Compressor:

- Torque ranges available: 5 Nm to 200 Nm
- Linearity and hysteresis: < 0,1 %
- High signal bandwidth 0 to 1 (10) kHz (-3 dB)
- High reliable digital transmitting with 16 Bit resolution
- Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional))
- Max. radial acceleration: 10000 g
- Temperature range: -25 to + 125 °C  
(Optional -40 to +160°C environmental temperature)
- Optional speed acquisition
- Optional additional temperature acquisition channel for E-modul drift compensation
- Supply receiver: 9 to 36 V DC, 300 mA
- Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet

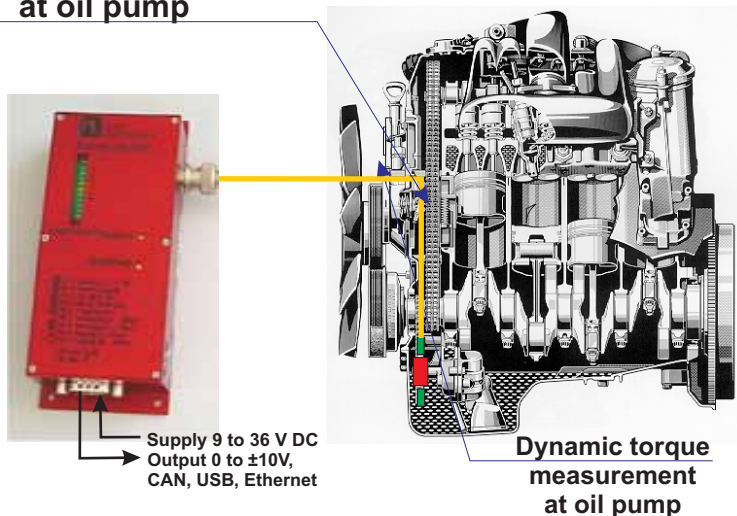
Type: MWN\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_oil\_<Dz>\_<T>

5 Nm	0,25	85	10 Hz	-	-	-
to	0,1	125	100 Hz	RC	1	T
100 Nm		160	1 kHz			68
			10 kHz			
			40 kHz			

# High precise dynamic Torque Acquisition Oil Pump



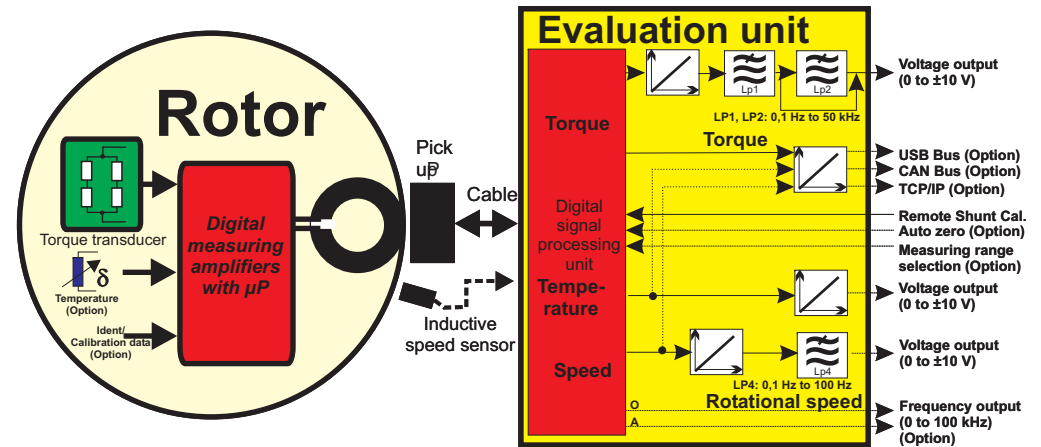
## Dynamic torque measurement at oil pump



## Torque meter Oil pump:

Torque ranges available: 5 Nm to 50 Nm						
Linearity and hysteresis: < 0,1 %						
High signal bandwidth 0 to 1 (10) kHz (-3 dB)						
High reliable digital transmitting with 16 Bit resolution						
Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional))						
Max. radial acceleration: 10000 g						
Temperature range: -25 to + 125 °C (Optional -40 to +160°C environmental temperature)						
Optional speed acquisition						
Optional additional temperature acquisition channel for E-modul drift compensation						
Supply receiver: 9 to 36 V DC, 300 mA						
Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet						
Type: MWO_<range>_<accuracy>_<temp>_<6.3>_<PCM16>_<bandwidth>_<rmc>_oil_<Dz>_<T>						
5 Nm	0,25	85	10 Hz	-	-	-
to	0,1	125	100 Hz	RC	1	T
100 Nm		160	1 kHz			68
			10 kHz			
			40 kHz			

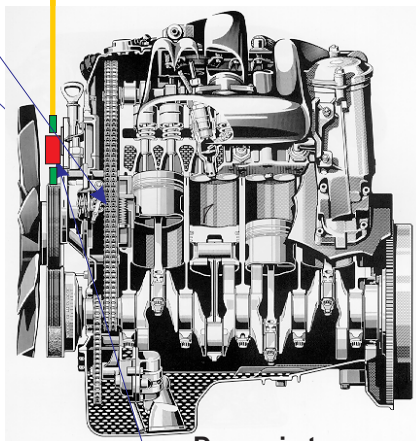
# High precise dynamic Torque Acquisition Steering Booster Pump



## Dynamic torque measurement at booster steering pump



Supply 9 to 36 V DC  
Output 0 to  $\pm 10$ V,  
CAN, USB, Ethernet



Dynamic torque measurement at steering booster pump

## Torque Meter steering Booster Pump:

Torque ranges available: 5 Nm to 50 Nm

Linearity and hysteresis:  $< 0,1\%$

High signal bandwidth 0 to 1 (10) kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gain drift: 0,01 %/°C (0,003 %/°C optional)

Max. radial acceleration: 10000 g

Temperature range: -25 to +125 °C

(Optional -40 to +160°C environmental temperature)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

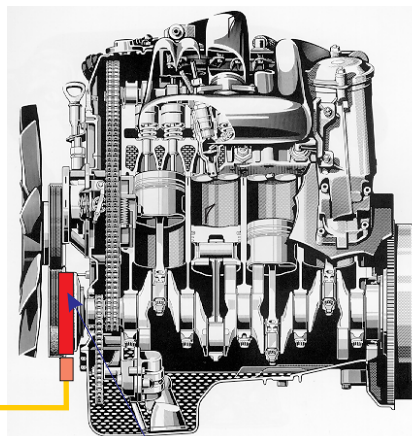
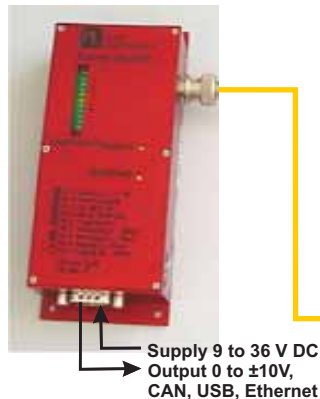
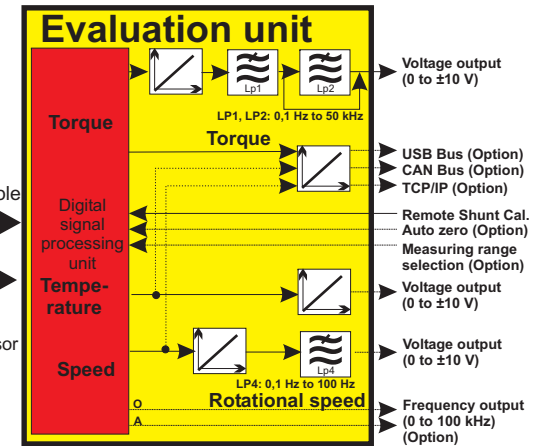
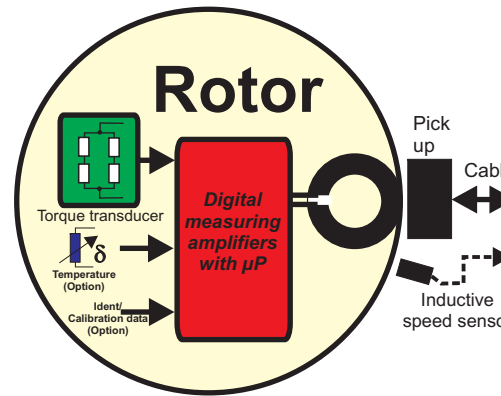
Supply receiver: 9 to 36 V DC, 300 mA

Output voltage: 0 to  $\pm 10$  V, USB, CAN-Bus, Ethernet

Type: MWL\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_oil\_<Dz>\_<T>

5 Nm	0,25	85	10 Hz	-	-	-
to	0,1	125	100 Hz	RC	1	T
100 Nm		160	1 kHz			68
			10 kHz			
			40 kHz			

# High precise dynamic Torque Acquisition at Pulley Crankshaft with integrated Damper



## Torque Meter Pulley Crankshaft:

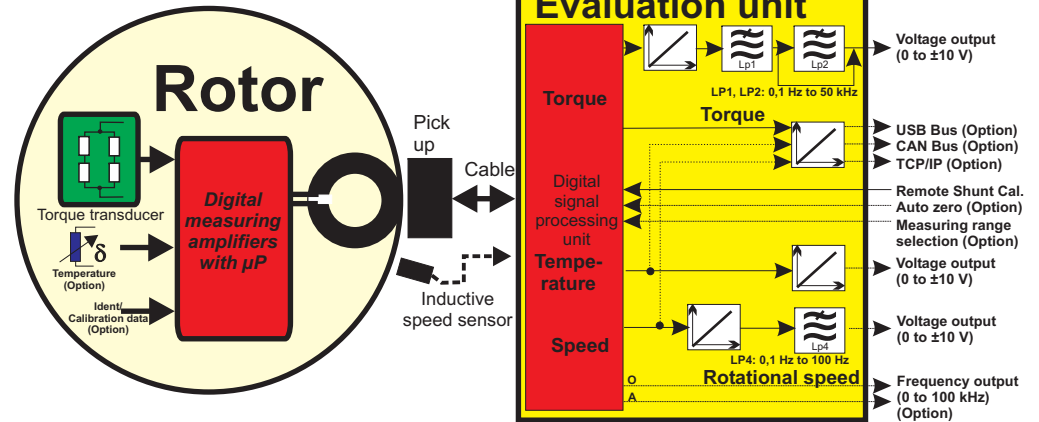
- Torque ranges available: 50 Nm to 200 Nm
- Linearity and hysteresis: < 0,1 %
- High signal bandwidth 0 to 1 (10) kHz (-3 dB)
- High reliable digital transmitting with 16 Bit resolution
- Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional))
- Max. radial acceleration: 10000 g
- Temperature range: -25 to + 125 °C  
(Optional -40 to +160°C environmental temperature)
- Optional speed acquisition
- Optional additional temperature acquisition channel for E-modul drift compensation
- Supply receiver: 9 to 36 V DC, 300 mA
- Output voltage: 0 to  $\pm 10$  V, USB, CAN-Bus, Ethernet

Type: MWK\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_oil\_<Dz>\_<T>

50 Nm	0,25	85	10 Hz	-	-	-
to	0,1	125	100 Hz	RC	1	T
200 Nm		160	1 kHz			68
			10 kHz			



# High Precise Dynamic Torque Meter with mechanical modified Drive Shafts



Supply 9 to 36 V DC  
Output 0 to  $\pm 10$ V,  
CAN, USB, Ethernet



## Torque Meter Drive Shaft modified:

Torque ranges available: 0,5 kNm to 4 kNm

Linearity and hysteresis: < 0,1 %

High signal bandwidth 0 to 1 (10) kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gaindrift: 0,01 %/°C (0,002 %/°C optional))

Max. radial acceleration: 10000 g

Temperature range: -25 to + 160 °C

(Optional -40 to +160°C environmental temperature)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

Supply receiver: 9 to 36 V DC, 300 mA

Output voltage: 0 to  $\pm 10$  V, USB, CAN-Bus, Ethernet

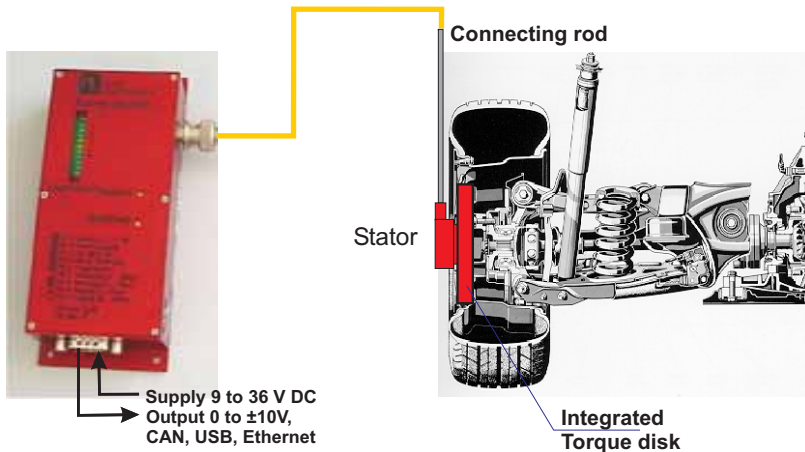
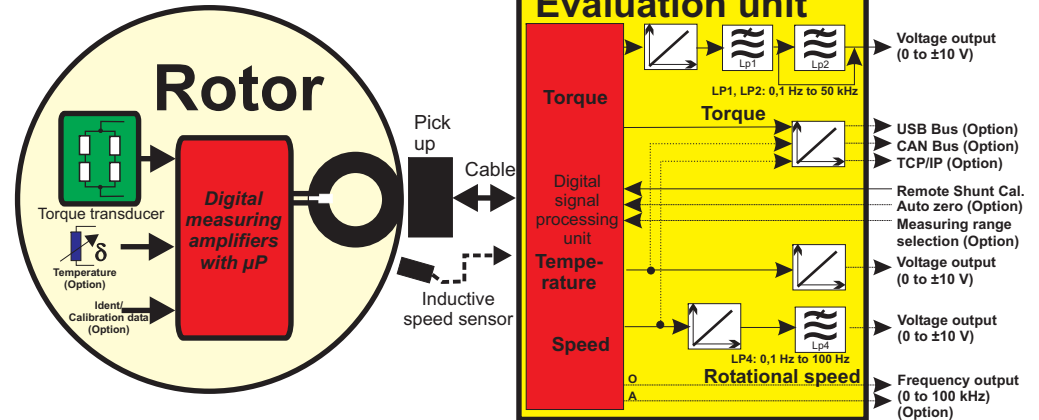
Type: MWDr\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_oil\_<Dz>

1 kNm	0,1	85	10 Hz	-	-
to		125	100 Hz	RC	1
6 kNm		160	1 kHz		48
			10 kHz		

## Applications with flexible adaptive Stator Antenna



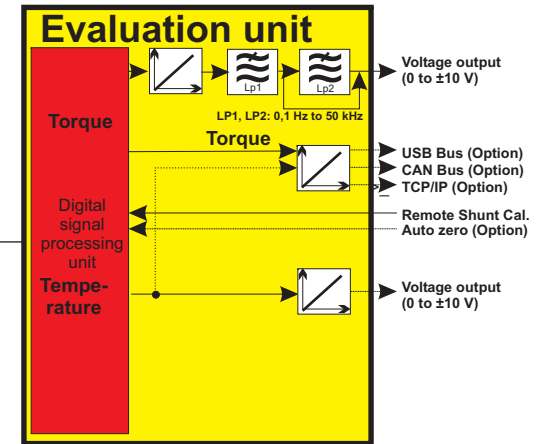
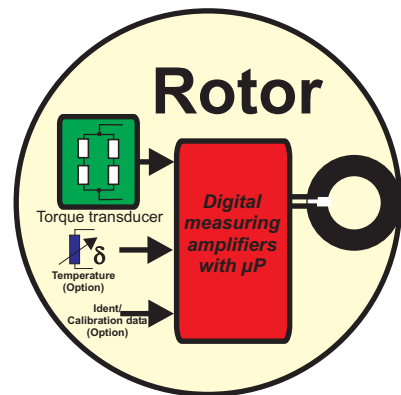
# High precise Wheel Torque Sensor



## Wheel Torque Meter with inductive Transmission:

Torque ranges available: 0,5 kNm to 5 kNm						
thin disk integrated in rim (20 mm)						
very light (material Titanium)						
Linearity and hysteresis: < 0,1 %						
High signal bandwidth 0 to 1 kHz (-3 dB)						
High reliable digital transmitting with 16 Bit resolution						
Zero drift / Gain drift: 0,01 %/°C (0,003 %/°C optional))						
Max. radial acceleration: 10000 g						
Temperature range: -25 to + 125 °C						
(Optional -40 to +160°C environmental temperature)						
Optional speed acquisition						
Optional additional temperature acquisition channel for E-modul drift compensation						
Supply voltage: 9 to 36 V DC, 300 mA						
Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet						
Type: MWR_<range>_<accuracy>_<temp>_<6.3>_<PCM16>_<bandwidth>_<rmc>_<Dz>_<T>						
	0,5 kNm	0,25	85	10 Hz	-	-
	to	0,1	125	100 Hz	RC	T
	5 kNm		160	1 kHz		180
						360

# Wheel Torque Meter based on Radio Telemetry

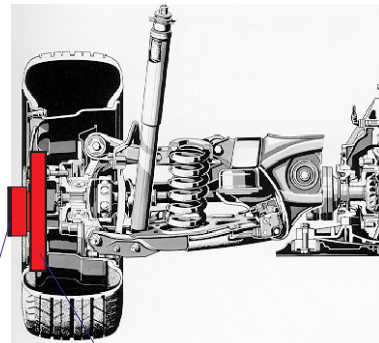


## Wheel Torque Meter for Cars (Radio Transmission):

Torque ranges available: 500 Nm to 4 kNm						
Linearity and hysteresis: < 0,1 %						
High signal bandwidth 0 to 1 (10) kHz (-3 dB)						
High reliable digital transmitting with 16 Bit resolution						
Zerodrift / Gain drift: 0,01 %/°C (0,003 %/°C optional))						
Max. radial acceleration: 10000 g						
Temperature range: -25 to + 125 °C						
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)						
Optional additional temperature aquisition channel for E-modul drift compensation						
Supply receiver: 9 to 36 V DC, 300 mA						
Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet						
Type: MWR_<range>_<accuracy>_<temp>_<Fu>_<6.3>_<PCM16>_<bandwidth>_<rmc>_<T>						
	0,5 kNm	0,25	85	10 Hz	-	-
	to	0,1	125	100 Hz	RC	T
	4 kNm			1 kHz		

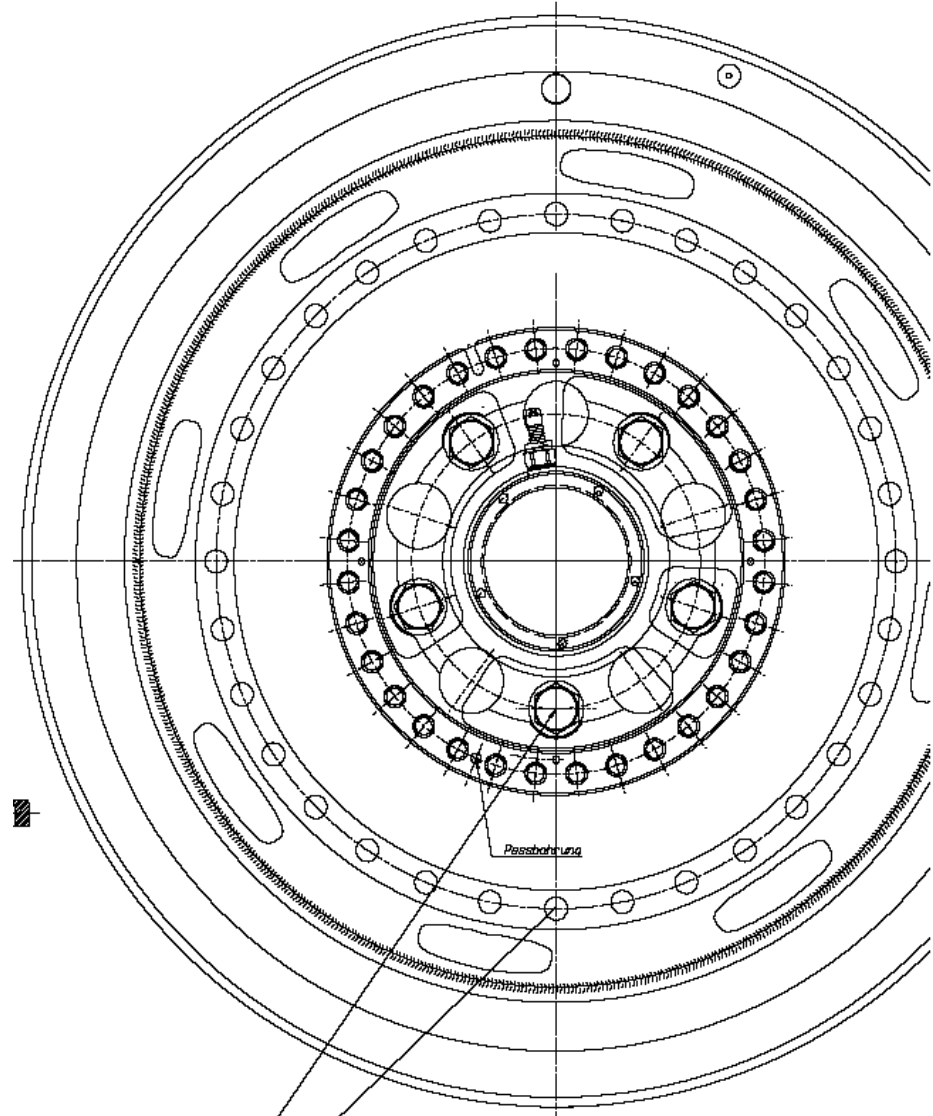
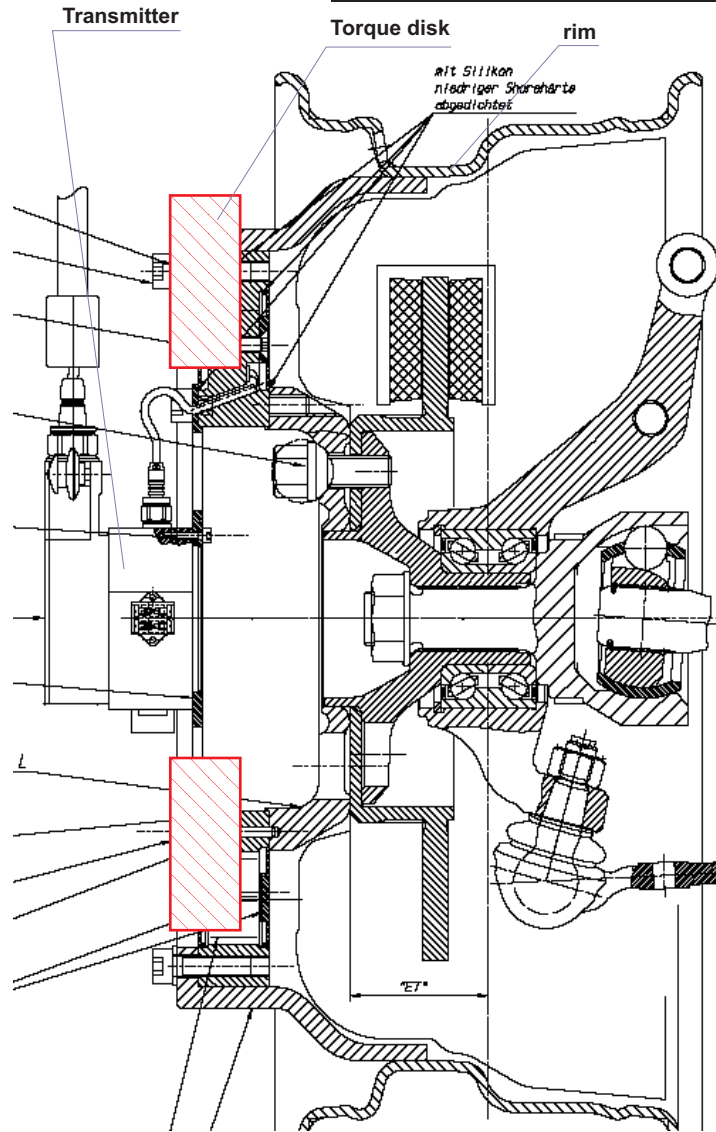


Integrated Transmitting Antenna



Integrated Torque disk

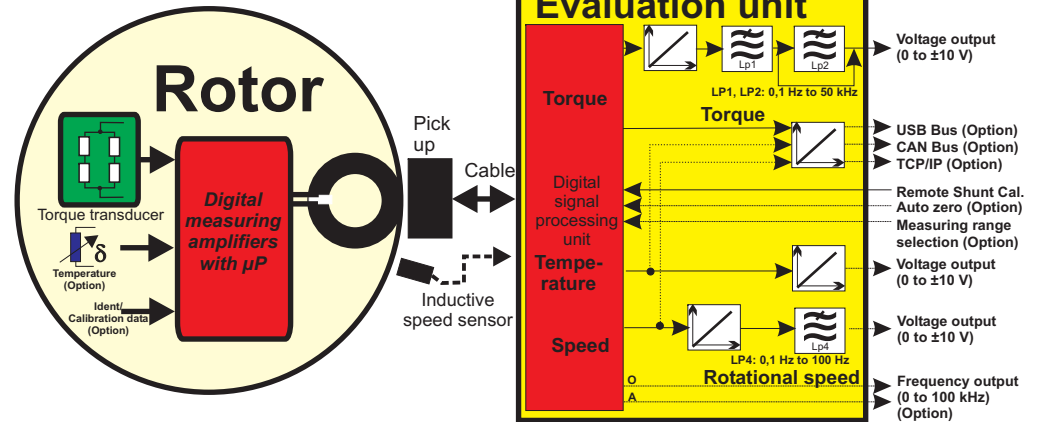
# Mechanical Setup Wheel Torque Meter



# High Precise Dynamic Traktor Power Take Off Torque Meter

## Applications:

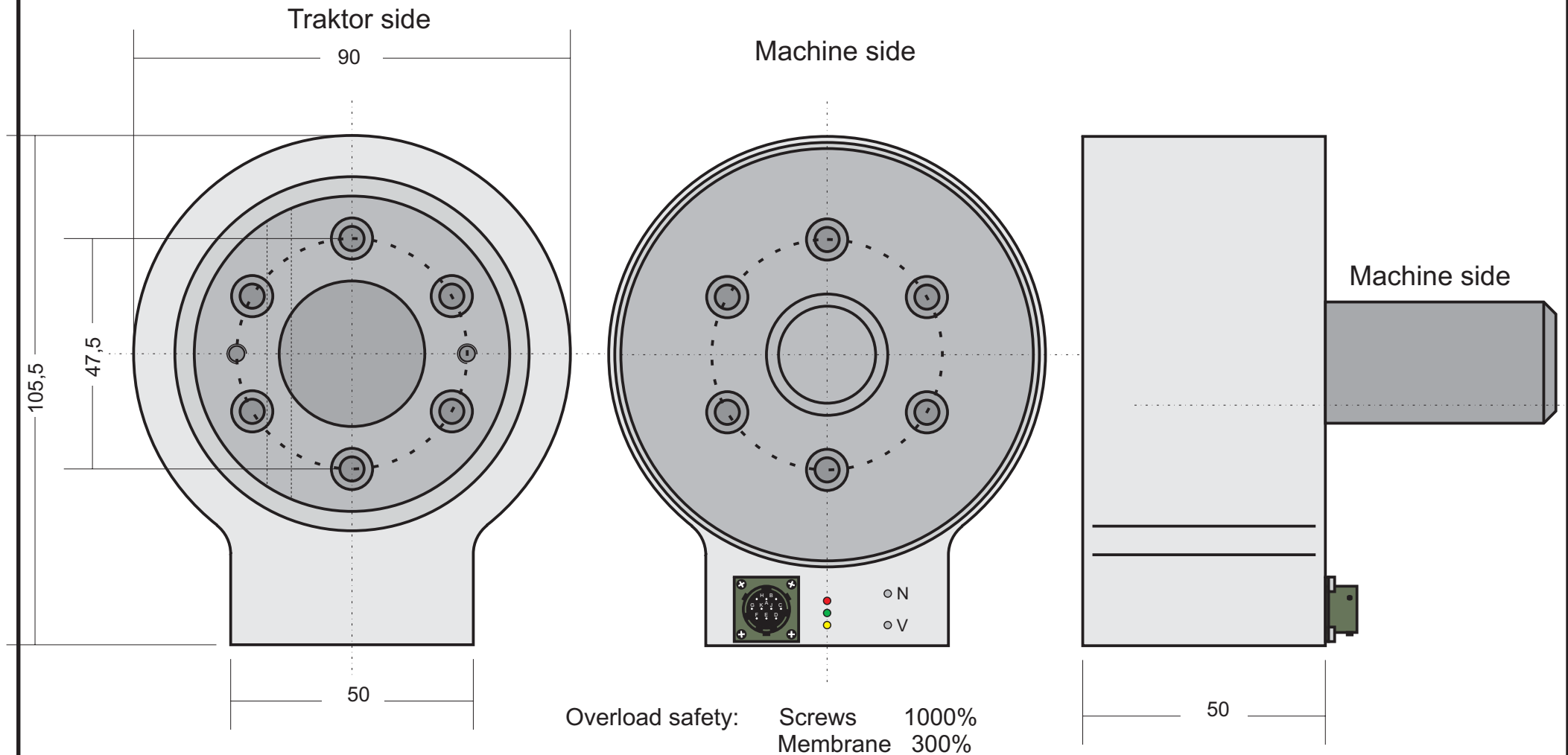
- \* tractors
- \* power take off
- \* agricultural applications



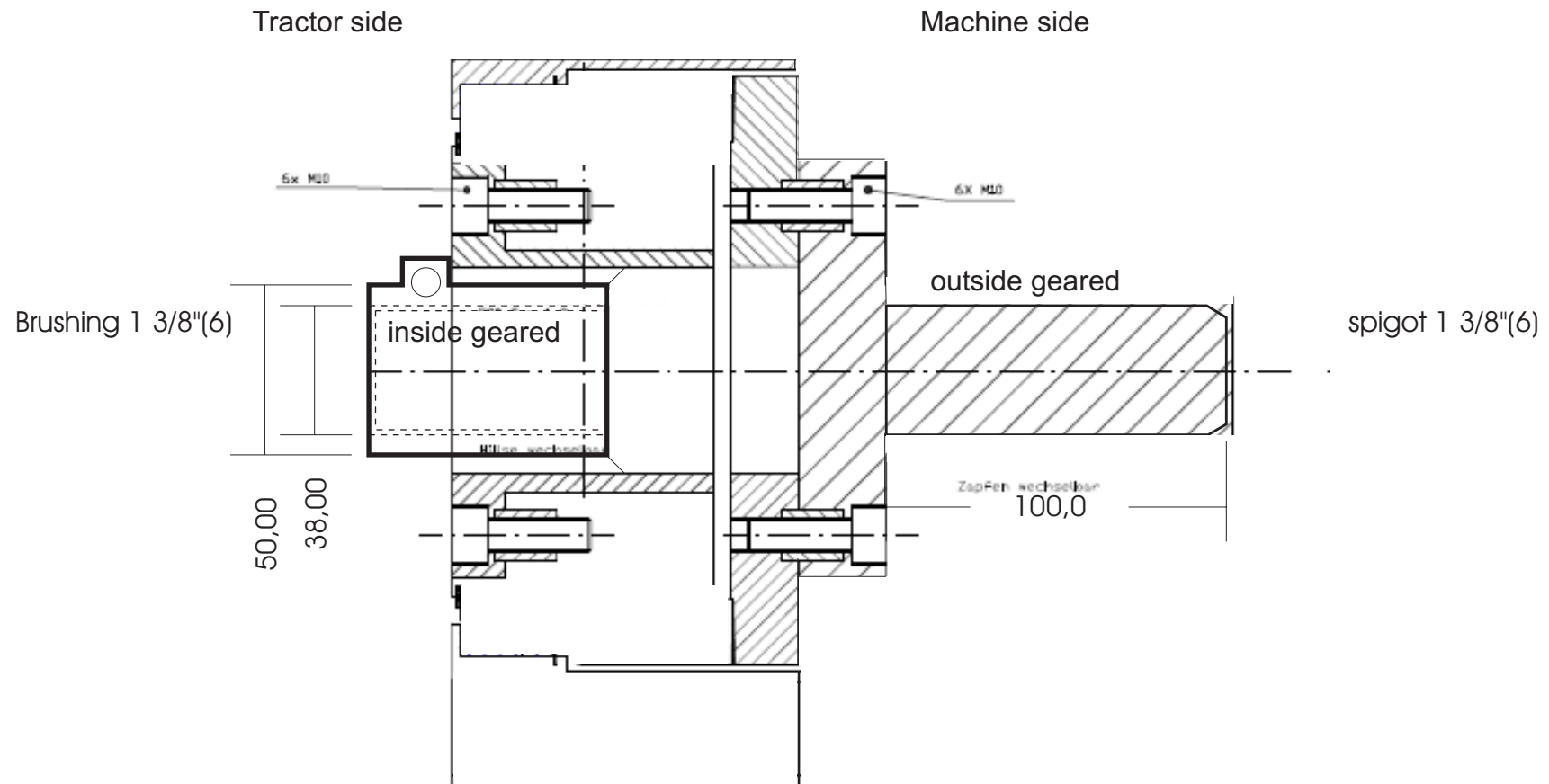
## Traktor Power take off Torque Meter :

Torque ranges available: 0,5 kNm to 5 kNm						
exchange connection parts (						
over load proofnes: 300 %						
Linearity and hysteresis: < 0,1 %						
High signal bandwidth 0 to 1 kHz (-3 dB)						
High reliable digital transmitting with 16 Bit resolution						
Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional))						
Max. radial acceleration: 10000 g						
Temperature range: -25 to + 125 °C						
Integrated speed acquisition						
Optional additional temperature acquisition channel for E-modul drift compensation						
Protection IP65						
Supply receiver: 9 to 36 V DC, 300 mA						
Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet						
Type: MWB_<range>_<accuracy>_<temp>_<6.3>_<PCM16>_<bandwidth>_<rmc>_<Dz>_<T>_wa						
	0,5 kNm	0,25	85	10 Hz	-	-
	to	0,1		100 Hz	RC	120 T
	5 kNm			1 kHz		

# Mechanical Outline Traktor Power Take Off Torque Meter



# Mechanical Outline Traktor Power Take Off Torque Meter replaceable Connection Parts



Power take off measuring system  
2500Nm  
with 1 3/8"(6) adapter

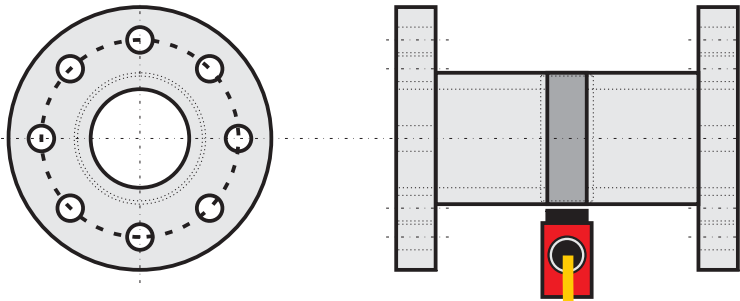


# Custom spec. High Speed Torque Meter

## Applications:

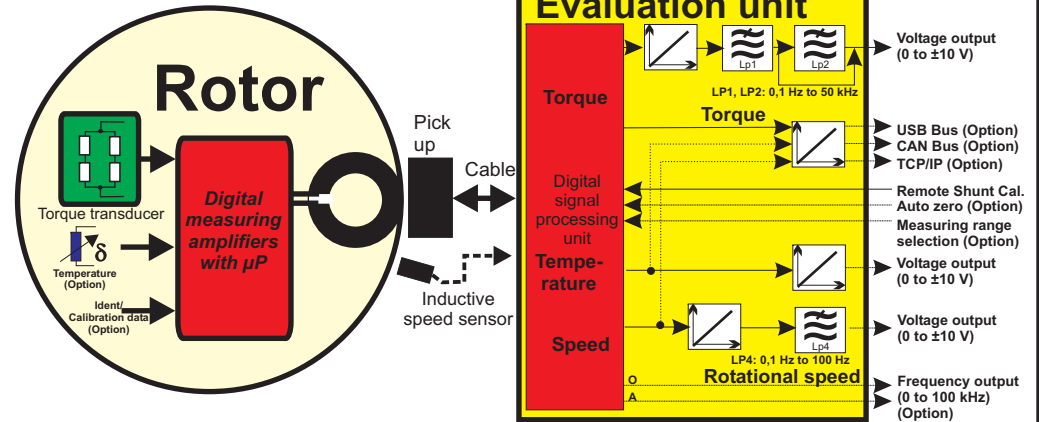


- \* gas turbines
- \* turbo pumps
- \* test rigs
- \* high speed couplings
- \* custom spec appl.



Evaluation unit

Supply 9 to 36 V DC  
Output 0 to ±10V,  
CAN, USB, Ethernet



## High Speed Torque Meter:

Torque ranges available: 1 kNm to 1000 kNm

Speed > 0 to 25000 rpm (range depending)

Contactless, no maintenance

Linearity and hysteresis: < 0,1 %

Very stiff: 0,02 degree (nominal), low inertia

high admissible bending moment

High signal bandwidth 0 to 1 kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional)

Max. radial acceleration: 10000 g

Temperature range: -25 to + 125 °C (optional -40..+160°C)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

Supply receiver: 9 to 36 V DC, 300 mA

Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet

Type: MWD\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_<Dz>\_<T>\_<wa>\_<Ex>

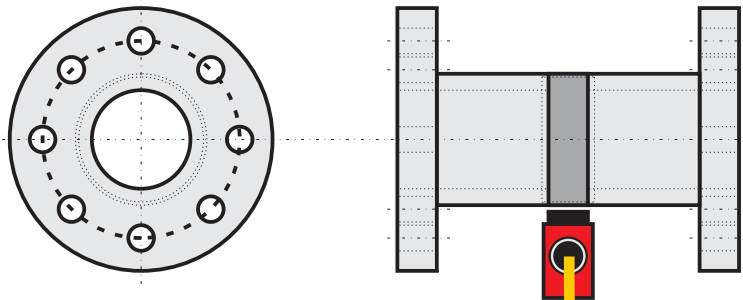
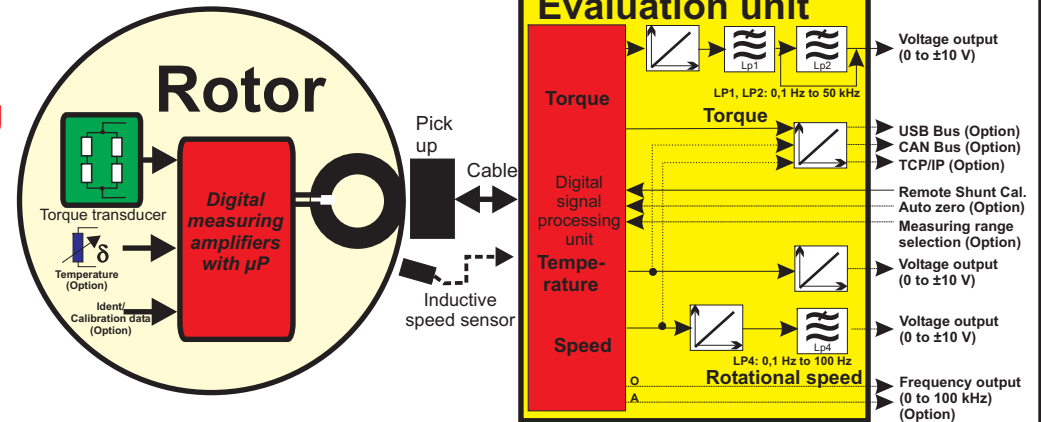
1 kNm	0,25	85	10 Hz	-	-	-	-	-
to	0,1	125	100 Hz	RC	1	T	IP65	Ex
1000 kNm		160	1 kHz		48			
			2 kHz					
			10 kHz					

# Custom spec. Torque Meter based on modified Customer Part



## Applications:

- \* process monitoring
- \* over load supervision
- \* test rigs
- \* couplings
- \* custom spec appl.



Evaluation unit

Supply 9 to 36 V DC  
Output 0 to ±10V,  
CAN, USB, Ethernet

## High Speed Torque Meter:

- Torque ranges available: 10 Nm to 1000 kNm
- cultivated customer part with mechanical modification
- Contactless, no maintenance
- Linearity and hysteresis: < 0,3 % (depends on steel quality and geometry)
- Very stiff: 0,02 degree (nominal), low inertia
- high admissible bending moment
- High signal bandwidth 0 to 1 kHz (-3 dB)
- High reliable digital transmitting with 16 Bit resolution
- Zerodrift / Gain drift: 0,01 %/°C (0,003 %/°C optional))
- Max. radial acceleration: 10000 g
- Temperature range: -25 to + 125 °C (optional -40..+160°C)
- Optional speed acquisition
- Optional additional temperature acquisition channel for E-modul drift compensation
- Supply receiver: 9 to 36 V DC, 300 mA
- Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet

Type: MWX\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_<Dz>\_<T>\_<wa>\_<Ex>

10 Nm	1	85	10 Hz	-	-	-	-
to	0,25	125	100 Hz	RC	1	T	IP65 Ex
1000 kNm		160	1 kHz		48		
			2 kHz				
			10 kHz				

## Custom spec. Torque Meter based on modified Customer Part



Torque meter integrated in extruder coupling



Torque meter integration on extruder coupling



Torque meter integrated in propshaft



Torque meter integrated in nut runner shaft

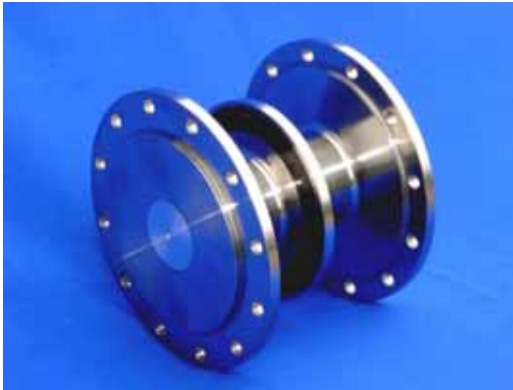


Torque meter integration in intermediate part of coupling



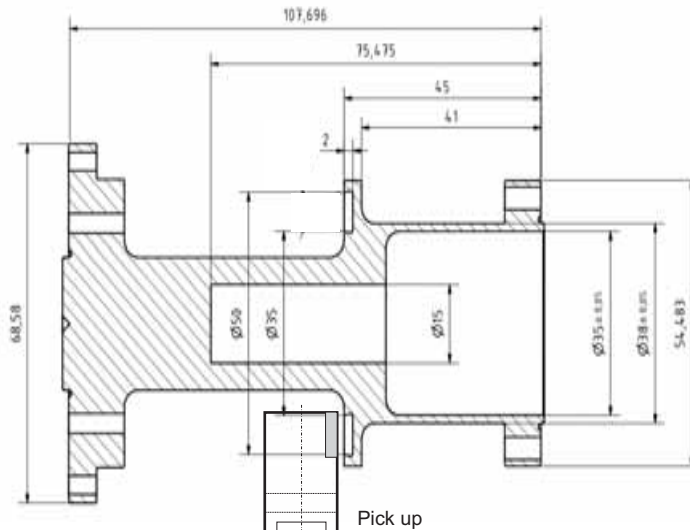
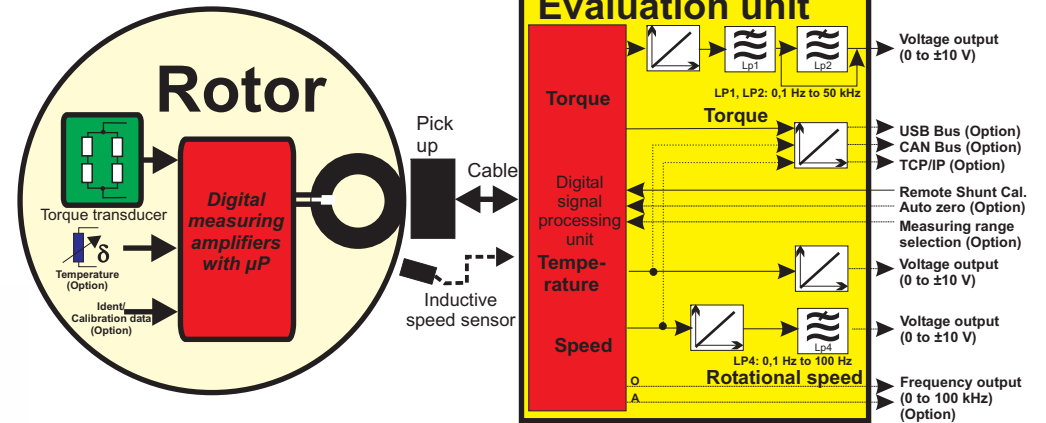
Torque acquisition integrated in coupling

# High Speed Torque Meter



## Applications:

- \* Racing formula 1
- \* Gas turbines
- \* turbo pumps
- \* Helicopter test rigs
- \* Jet turbines



## Evaluation unit



Supply 9 to 36 V DC  
Output 0 to ±10V,  
CAN, USB, Ethernet

max. 50 m

## High Speed Torque Meter:

Torque ranges available: 0,2 kNm to 5 kNm

Speed > 0 to 36000 rpm

Contactless, no maintenance

Linearity and hysteresis: < 0,1 %

Very stiff: 0,02 degree (nominal), low inertia

Admissible longitudinal force: 7,5 N/Nm (niminal)

High signal bandwidth 0 to 1 kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional))

Max. radial acceleration: 10000 g

Temperature range: -25 to + 125 °C (optional -40..+160°C)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

Supply receiver: 9 to 36 V DC, 300 mA

Output data: 0 to ±10 V, USB, CAN-Bus, Ethernet

Type: MHS <range> <accuracy> <temp> <6.3> <PCM16> <bandwidth> <rmc> <Dz> <T> <wa>

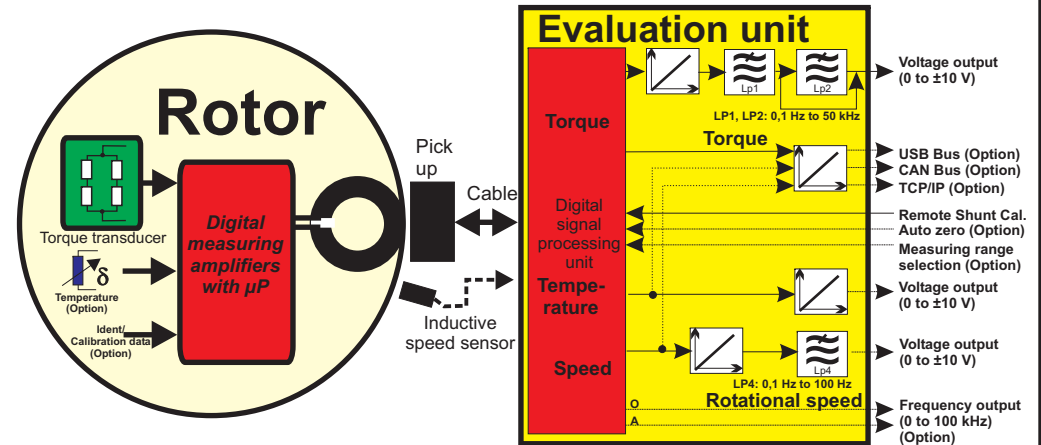
0,2 kNm	0,25	85	10 Hz	-	-	-	-
to	0,1	125	100 Hz	RC	1	T	IP65
5 kNm		160	1 kHz		48		
			2 kHz				
			10 kHz				

# High Speed Torque Meter (very short)



## Applications:

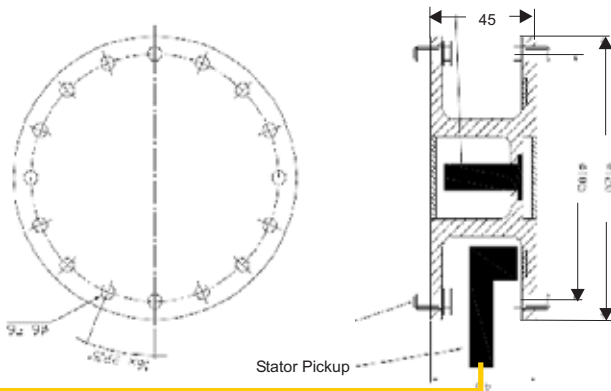
- \* Racing formula 1
- \* Gas turbines
- \* Compressors
- \* Turbo pumps
- \* Helicopter test rigs
- \* Jet turbines



## Evaluation unit



Supply 9 to 36 V DC  
Output 0 to ±10V,  
CAN, USB, Ethernet



## High Speed Torque Meter:

Torque ranges available: 0,2 kNm to 5 kNm

Speed > 0 to 36000 rpm

Contactless, no maintenance

Linearity and hysteresis: < 0,1 %

Very stiff: 0,02 degree (nominal), low inertia

Admissible longitudinal force: 7,5 N/Nm (niminal)

High signal bandwidth 0 to 1 kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional))

Max. radial acceleration: 10000 g

Temperature range: -25 to + 125 °C (optional -40..+160°C)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

Supply receiver: 9 to 36 V DC, 300 mA

Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet

Type: MHS\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_<Dz>\_<T>\_<wa>

0,2 kNm	0,25	85	10 Hz	-	-	-	-
to	0,1	125	100 Hz	RC	1	T	IP65
5 kNm		160	1 kHz		48		
			2 kHz				
			10 kHz				

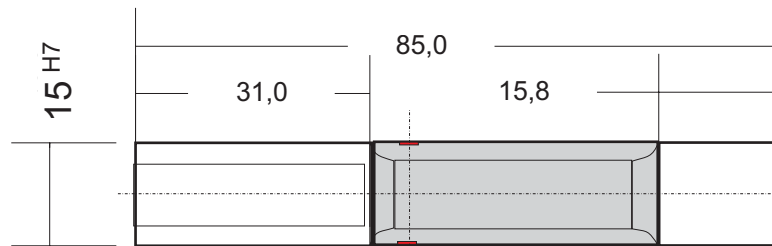
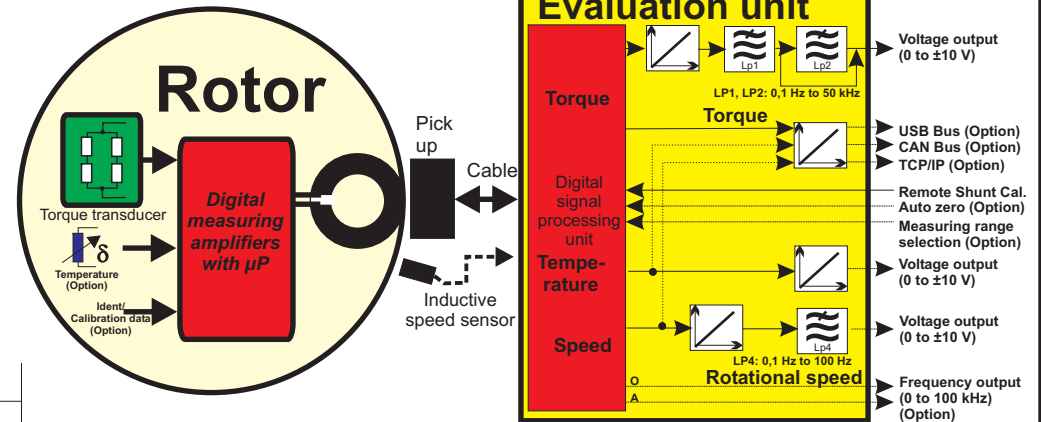
# High Speed Torque Meter (miniaturised)

## Applications:

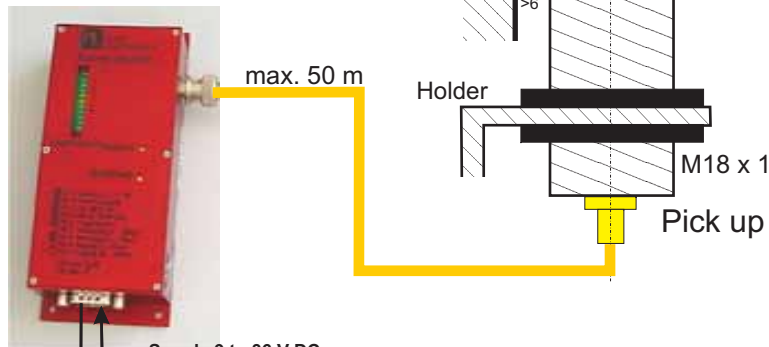
Lenze-Couplings



- \* Test rigs
- \* Load monitoring
- \* Nut runners



### Evaluation unit



Supply 9 to 36 V DC  
Output 0 to ±10V,  
CAN, USB, Ethernet

## High Speed Torque Meter:

Torque ranges available: 5 Nm to 500 Nm

Speed > 0 to 50000 rpm

Contactless, no maintenance

Linearity and hysteresis: < 0,1 %

Very low inertia

High signal bandwidth 0 to 1 kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gain drift: 0,01 %/°C (0,003 %/°C optional)

Max. radial acceleration: 10000 g

Temperature range: -25 to + 125 °C (optional -40..+160°C)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

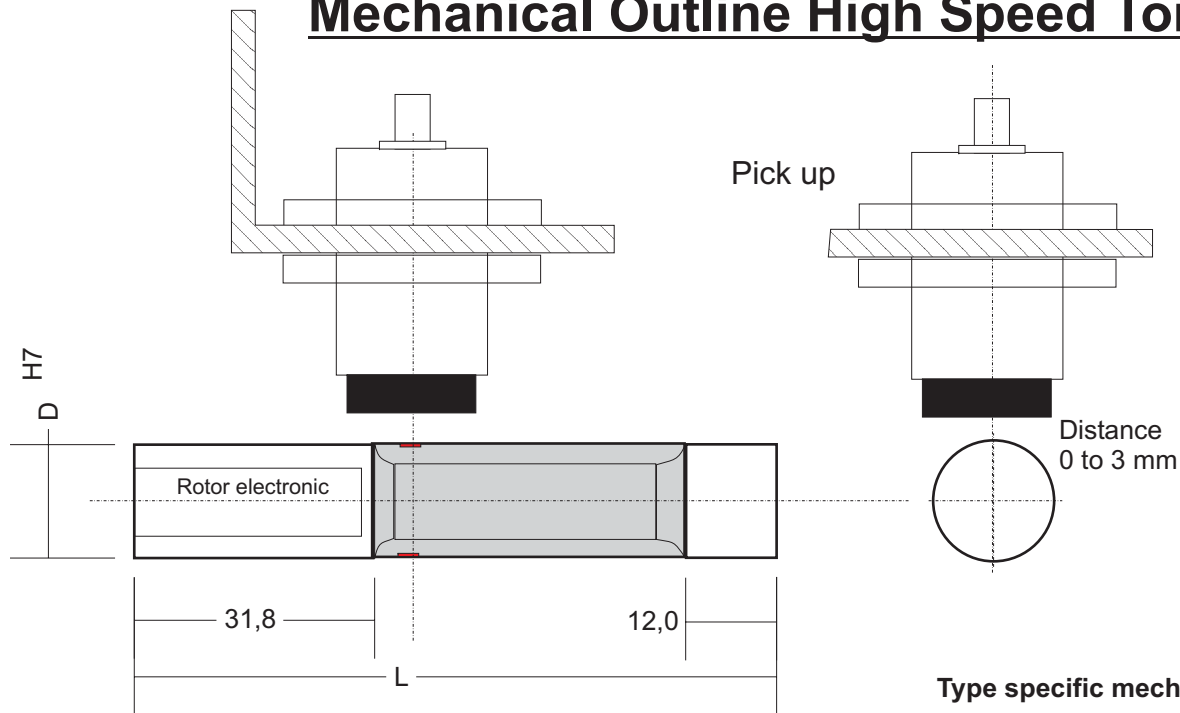
Supply receiver: 9 to 36 V DC, 300 mA

Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet

Type: MWS\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_<Dz>\_<T>\_<wa>

5 Nm	0,25	85	10 Hz	-	-	-	-
to	0,1	125	100 Hz	RC	2	T	IP65
500 Nm		160	1 kHz				
			2 kHz				
			10 kHz				

# Mechanical Outline High Speed Torque Meter (miniaturised)



Torque measuring shaft

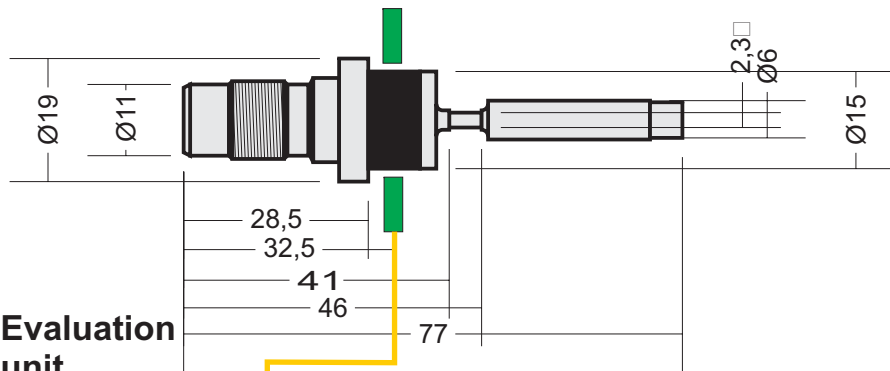
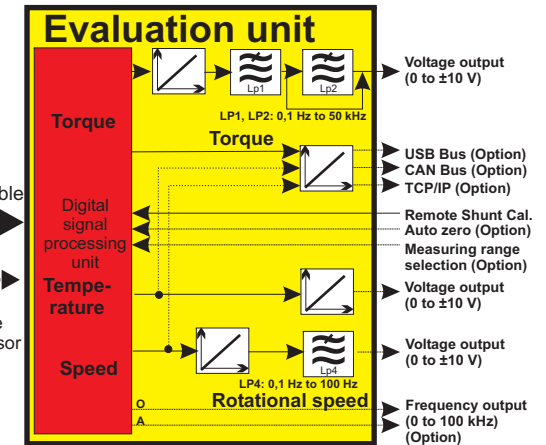
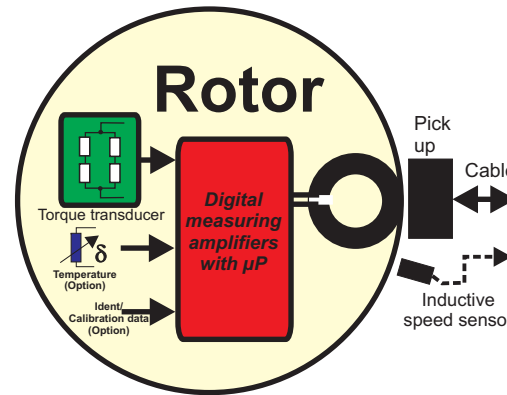


Type specific mechanical Data (Typ MWS....)

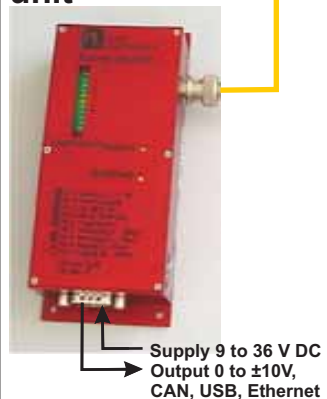
$M_{nom}$ (Nm)	1	5	10	20	50	100	200	500
Diameter D(mm)	15	15	15	15	15	20	25	35
Length L (mm)	85	85	85	85	85	120	150	200
Weight (Rotor) (kg):	0.15	0.15	0.2	0.4	0.4	0.4	0.4	0.4
Inertia ( $10^{-6}$ kgm <sup>2</sup> ):	1,45	1,5	1,7	3	6	10	25	110
<small>(With/without speed system)</small>								
Torsional stiffness (Nm/°):	0,04	0,04	0,04	0,08	0,20	0,40	0,80	2,00
Torsional angle related to $M_{nom}$ (°):	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Axial stiffness (kN/mm) $c_a$ :	5	5	7	9	12	15	18	21
Radial stiffness (kN/mm) $c_r$ :	30	30	40	50	200	400	500	600
Bending moment stiffness (kNm/°) $c_b$ :	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Max. axial load (kN):	0.06	0.10	0.14	0.18	0.37	0.75	0.75	0.75
Max. radial load (kN):	0.06	0.06	0.14	0.18	0.30	0.50	0.65	0.8
Max. bending moment (kNm):	0.01	0.05	0.07	0.15	0.20	0.40	0.60	0.70
Max. excursion at max. axial force (mm):	<0.04	<0.04	<0.04	<0.04	<0.04	<0.08	<0.08	<0.08
Balance quality level (DIN ISO 1940):	G2.5							
Max. speed (rpm):	50,000	50,000	20,000	20,000	20,000	18,000	16,000	14,000
Highspeed option (rpm):	100,000	100,000	80,000	80,000	80,000	36,000	32,000	28,000
Speed acquisition (inductive, teeth/turn):	6	6	6	6	10	12	14	16

Type: MWS\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_<Dz>\_<T>\_<wa>

# Special Torque Meter Turbo Charger (0,5 Nm ... 10 Nm)



Evaluation unit



Supply 9 to 36 V DC  
Output 0 to ±10V,  
CAN, USB, Ethernet

## Type specific mechanical Data

M <sub>nom</sub> (Nm)	0,1	1	5	10
Weight (Rotor) (kg):	0.15	0.15	0.15	0.2
Inertia (10 <sup>-6</sup> kgm <sup>2</sup> ):	1,5	1,5	1,5	1,7
<small>(With/without speed system)</small>				
Torsional stiffness (Nm/°):	0,01	0,01	0,04	0,04
Torsional angle related to M <sub>nom</sub> (°):	0.1	0.1	0.1	0.1
Axial stiffness (kN/mm) c <sub>a</sub> :	1	1	5	7
Radial stiffness (kN/mm) c <sub>r</sub> :	10	10	30	40
Bending moment stiffness (kNm/°) c <sub>b</sub> :	0.1	0.1	0.35	0.35
Max. axial load (kN):	0.05	0.05	0.18	0.18
Max. radial load (kN):	0.05	0.05	0.15	0.15
Max. bending moment (kNm):	0.10	0.10	0.10	0.10
Max. excursion at max. axial force (mm):	<0.04	<0.04	<0.04	<0.04
Balance quality level (DIN ISO 1940):				
Max. speed (rpm):	100.000	100.000	30.000	20.000
Highspeed option (rpm):	180.000	150.000	100.000	80.000
Speed acquisition (inductive, teeth/turn):	0/2	0/2	0/2	0/2

## Turbo Charger Torque Meter:

Torque ranges available: 0,1 Nm to 10 Nm

Speed > 0 to 180000 rpm

Contactless, no maintenance

Linearity and hysteresis: < 0,1 %

Very low inertia

High signal bandwidth 0 to 1 kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional)

Max. radial acceleration: 10000 g

Temperature range: -25 to + 125 °C (optional -40..+160°C)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

Supply receiver: 9 to 36 V DC, 300 mA

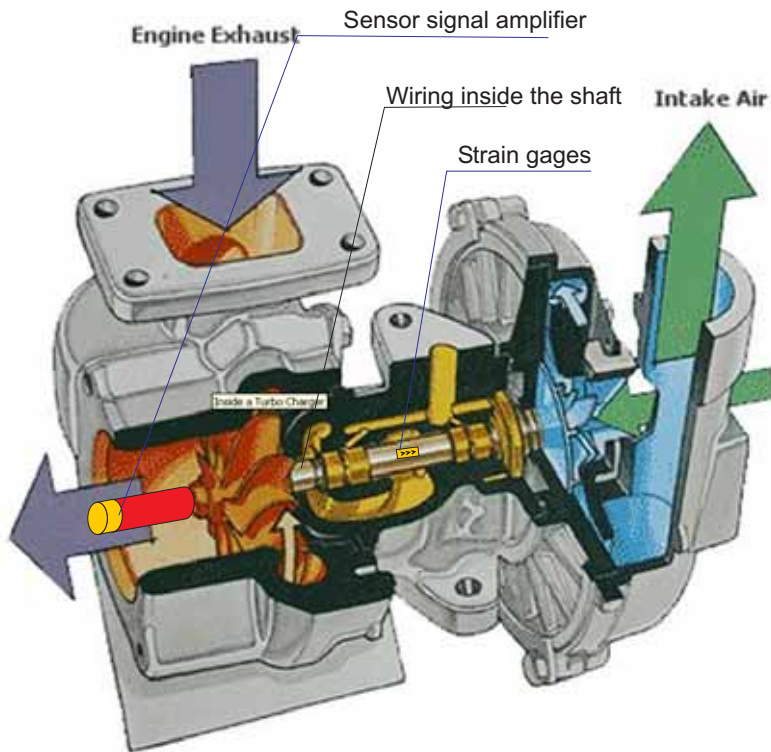
Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet

Type:	MWST	<range>	<accuracy>	<temp>	<6.3>	<PCM16>	<bandwidth>	<rmc>	<Dz>	<T>	<wa>
		0,1 Nm	0,25	85			10 Hz				
		to	0,1	125			100 Hz	-	-	-	-
		10 Nm					1 kHz	RC	2	T	IP65
							2 kHz				
							10 kHz				



# Car Turbocharger Transmitters (Cylinder Form), 200 000 rpm

## Torque measuring at turbo charger



### Torque Sensing

Torque range: 0 to 1 Nm

Type of sensing: strain gage

Accuracy: 1%

Bandwidth 0 to 1 kHz

Temperature range: 0 to 150°C

Bridge supply: 3,3 V

Digital transmission, inductive supply (axial)

Integrated filters

Resolution: 16 Bits

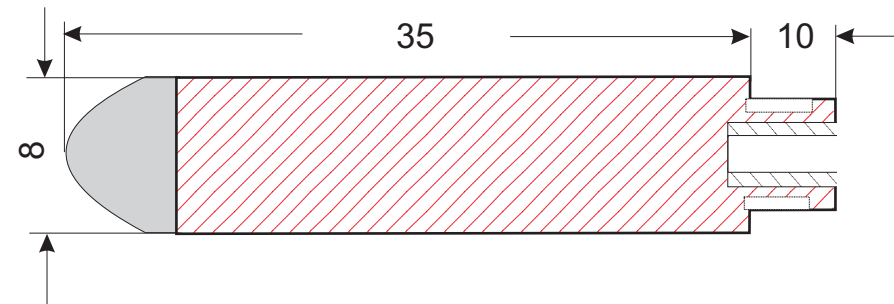
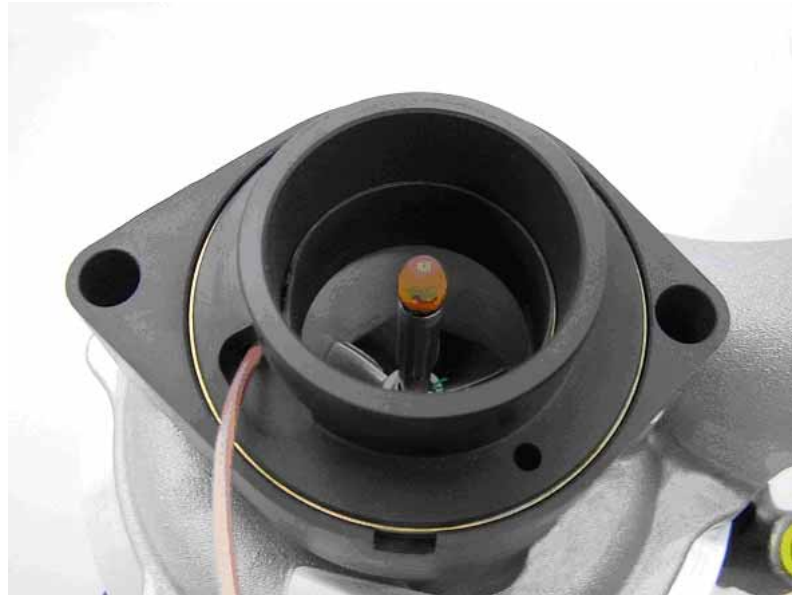
Remote shunt calibration

Max speed: 200,000 rpm

Transmitter: axial mounting on shaft

Type: MW\_T\_D\_1\_150\_PCM\_...

## Car Turbo Charger Transmitters (Cylinder Form), 200 000 rpm



### **1/4 Channel PCM Transmitter**

For thermocouple and strain gage (torque)

Sensitivity: 0,5 mV/V to 20 mV/V

Bandwidth: 10 Hz (0) Hz to 1 kHz

Bridge supply: 3,3 V

Digital transmission, inductive supply (axial)

Integrated filters

Resolution: 16 Bits

Remote shunt calibration

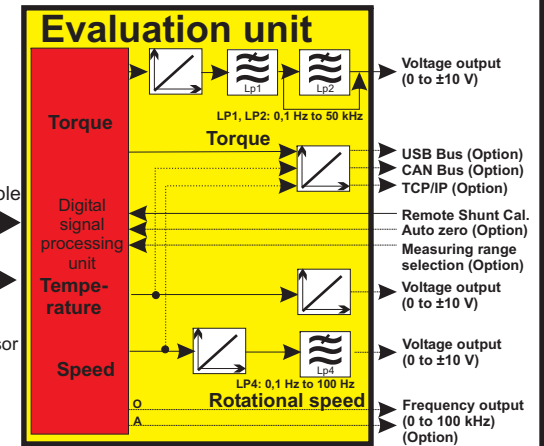
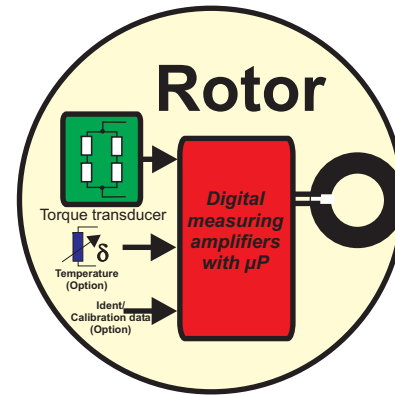
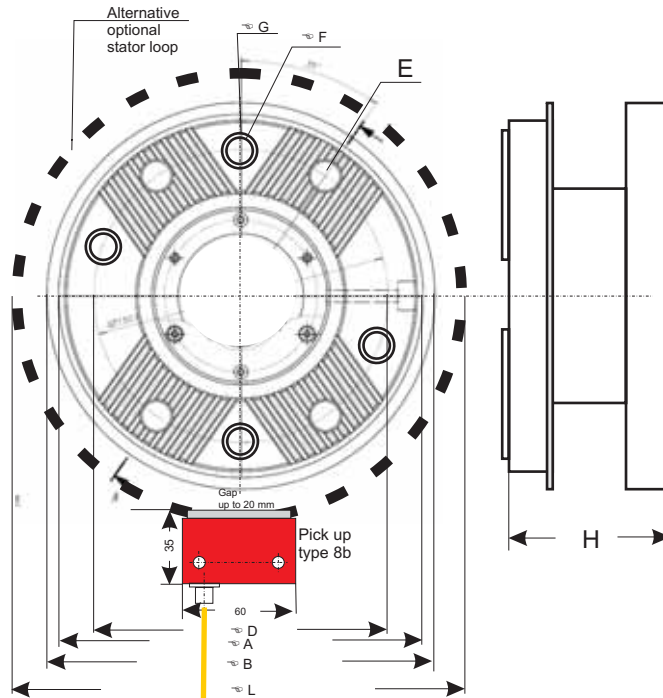
Environmental temperature: -25 to 125°C (160°C)

Max speed: 200 000 rpm

Axial mounting on shaft

Type: MSV\_P\_D\_2\_125\_PCM\_...

# Flanges with X-Toothing



## Evaluation unit



Supply 9 to 36 V DC  
Output 0 to ±10V,  
CAN, USB, Ethernet

Type	X-Toothing according to ISO 12667	MWK 5kNm KV120	MWK 10kNm KV150	MWK 20kNm KV165	MWK 30kNm KV180	MWK 40kNm KV200
A	mm	120h7	150h7	165h7	180h7	200h7
B	mm	132h7	162h7	177h7	192h7	212h7
C	mm	132h7	162h7	177h7	192h7	212h7
D	mm	100	130	140	150	165
E	mm	M10x1	M12	M12	M14	M14
F	mm	11	13	13	15	15
G	mm	18	20	20	22	22
H	mm	50	50	55	60	60
I	mm	140	170	185	200	220
opt. K	mm	166	194	209	244	244

## Torque Meter with X-Toothing:

Torque ranges available: 5 Nm to 50 Nm

Linearity and hysteresis: < 0,1 %

High signal bandwidth 0 to 1 (10) kHz (-3 dB)

High reliable digital transmitting with 16 Bit resolution

Zerodrift / Gaindrift: 0,01 %/°C (0,003 %/°C optional)

Max. radial acceleration: 10000 g

Temperature range: -25 to + 125 °C

(Optional -40 to +160°C environmental temperature)

Optional speed acquisition

Optional additional temperature acquisition channel for E-modul drift compensation

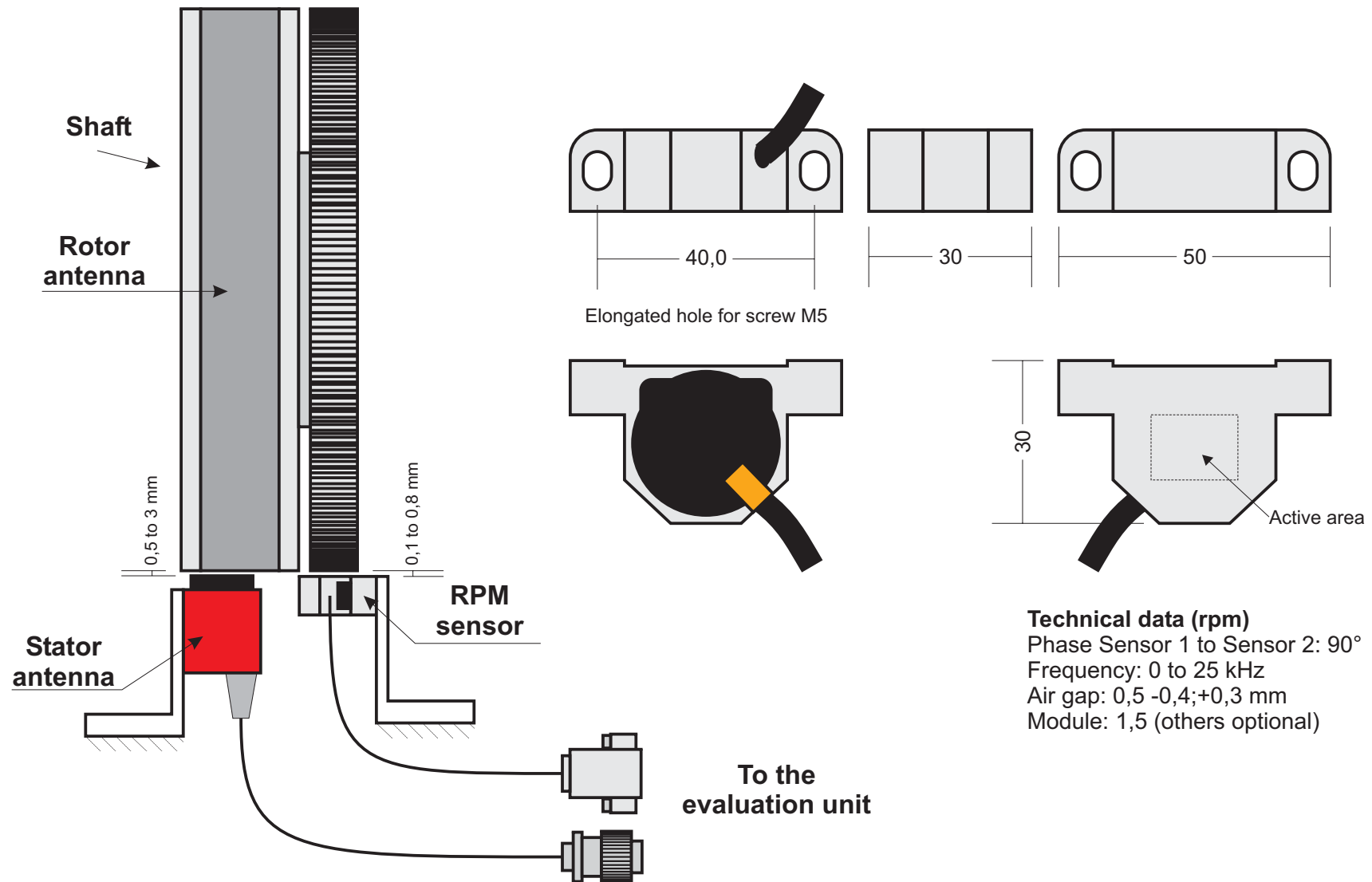
Supply receiver: 9 to 36 V DC, 300 mA

Output voltage: 0 to ±10 V, USB, CAN-Bus, Ethernet

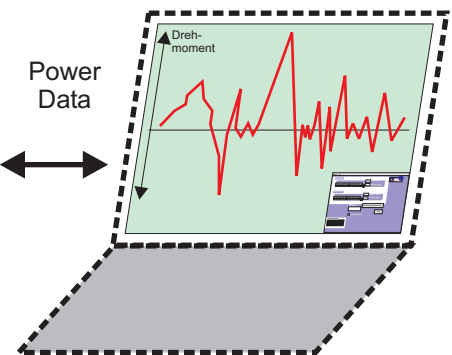
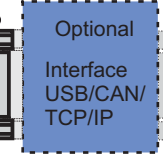
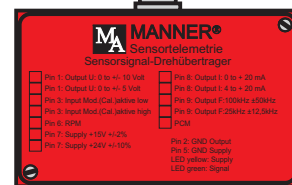
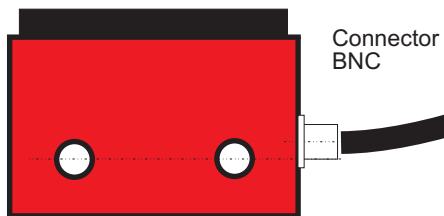
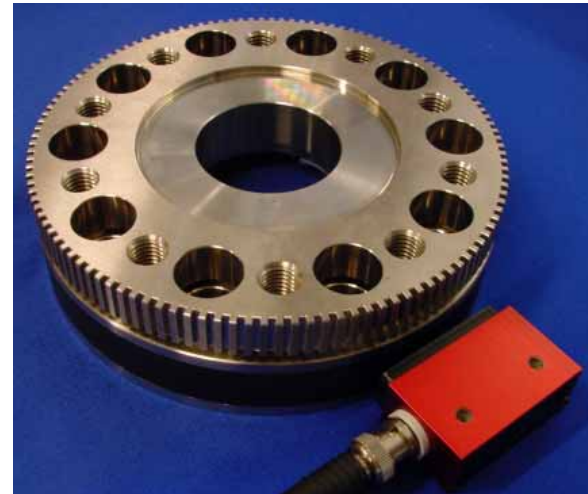
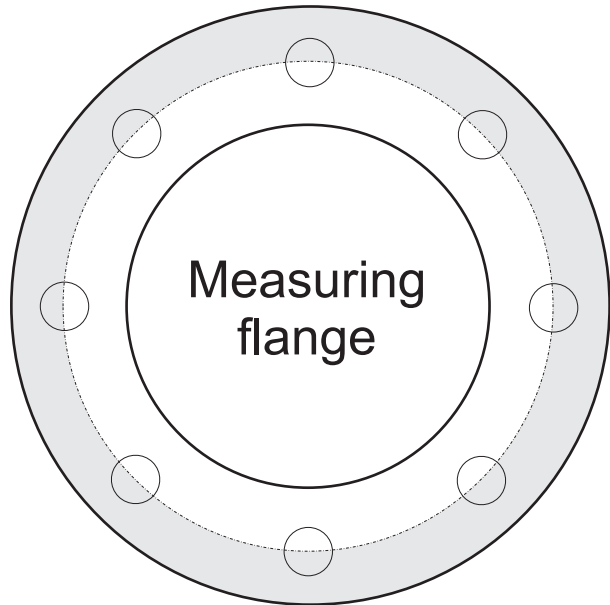
Type: MWV\_<range>\_<accuracy>\_<temp>\_<6.3>\_<PCM16>\_<bandwidth>\_<rmc>\_oil\_<Dz>\_<T>

5 KNm	0,3	85	10 Hz	-	-	-
to	0,1	125	100 Hz	RC	1	T
40 KNm		160	1 kHz			128
			10 kHz			

# Measuring Rotational Speed

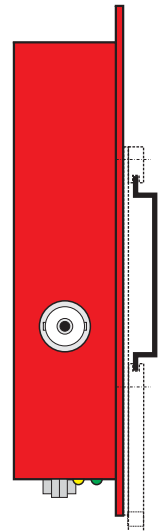
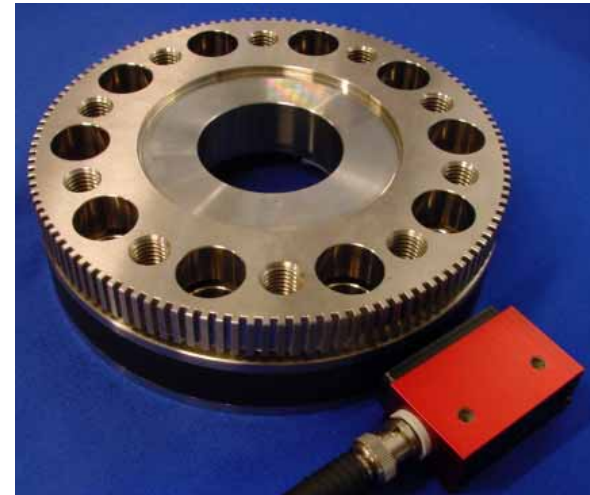
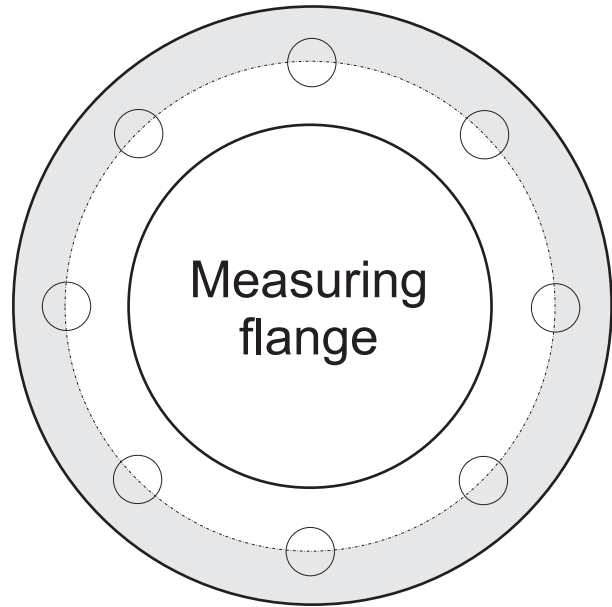


# Torque Measuring System AW\_D Evaluation Unit

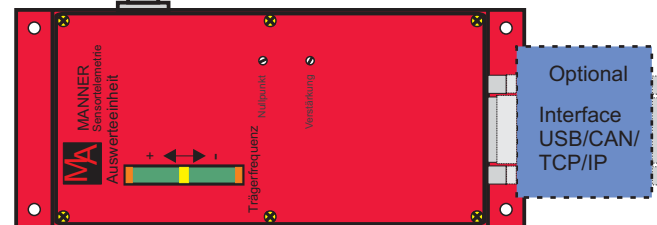
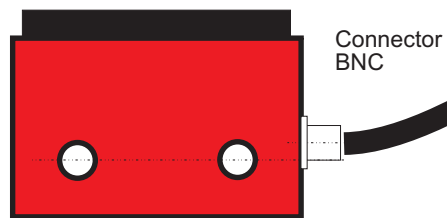


Option

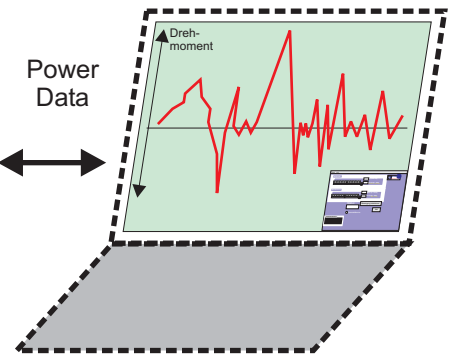
# Torque Measuring System with Compact Evaluation Unit



Mounting type: NS 35/7,5, NS 35/15 (option)

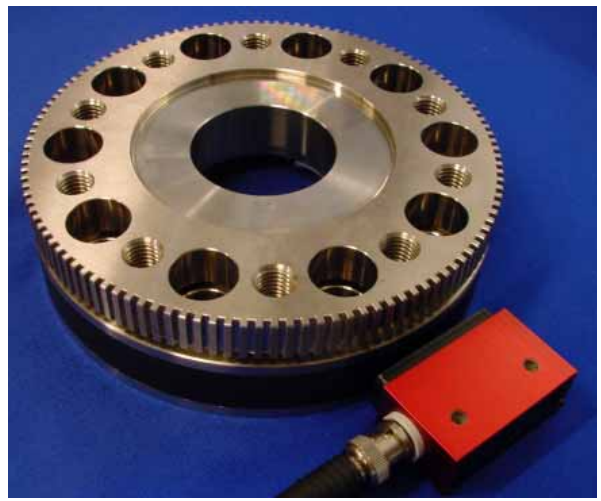
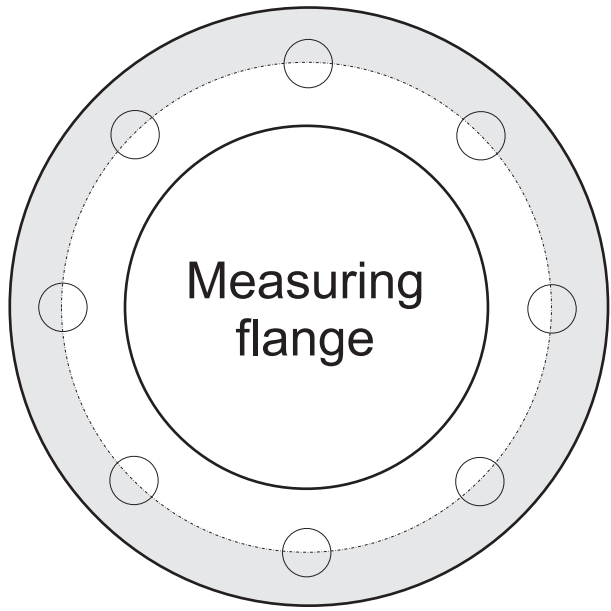


Optional Interface USB/CAN/TCP/IP

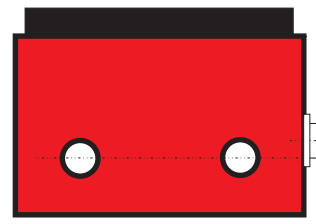
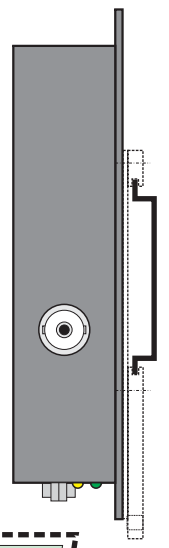


Option

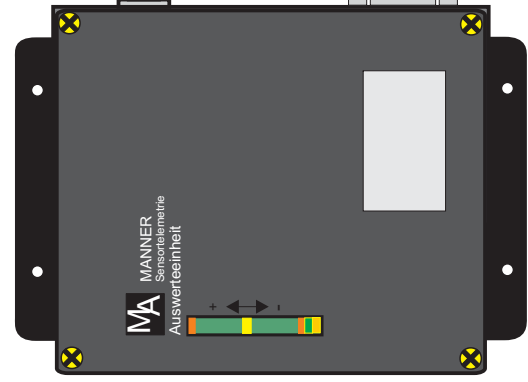
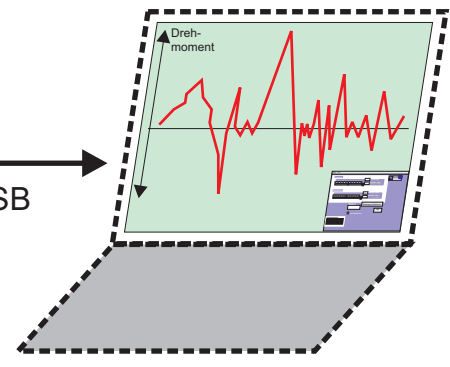
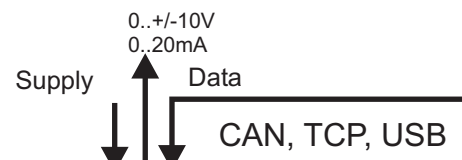
# Torque Measuring System with Power Evaluation Unit



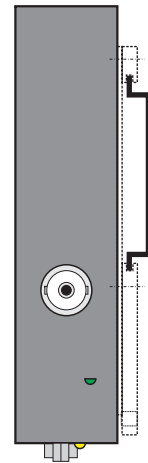
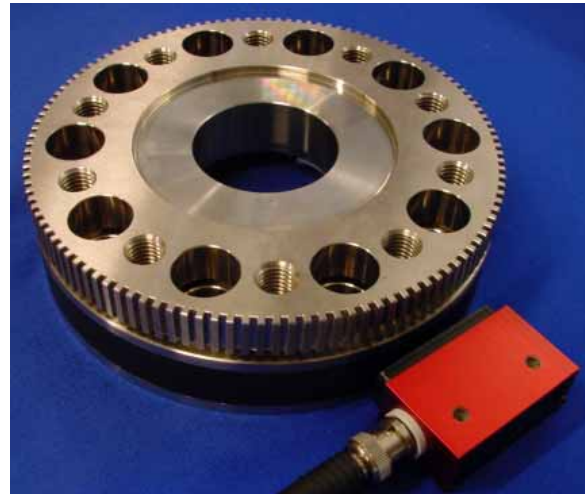
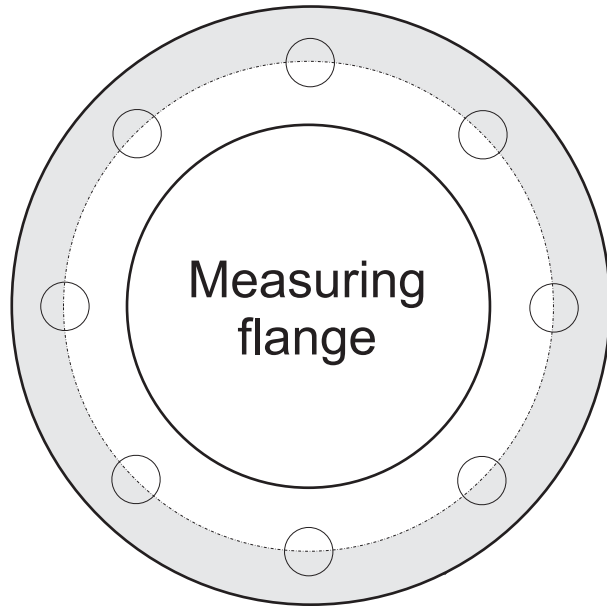
Mounting type: NS 35/7,5, NS 35/15 (option)



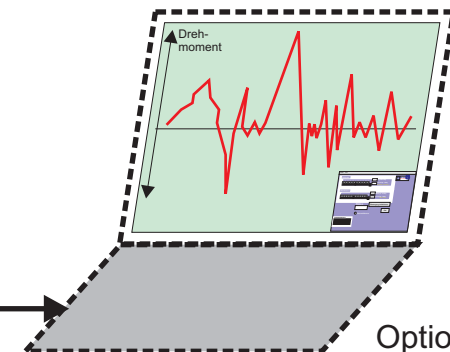
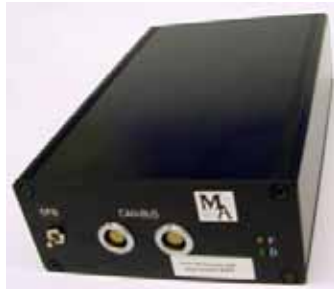
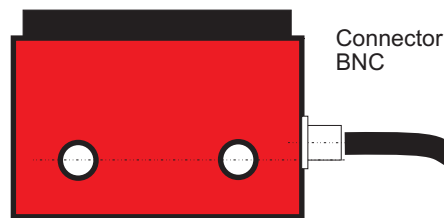
Connector BNC



# Torque Measuring System with Digital Evaluation Unit

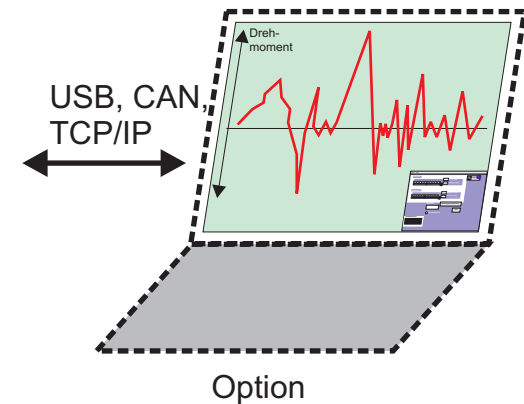
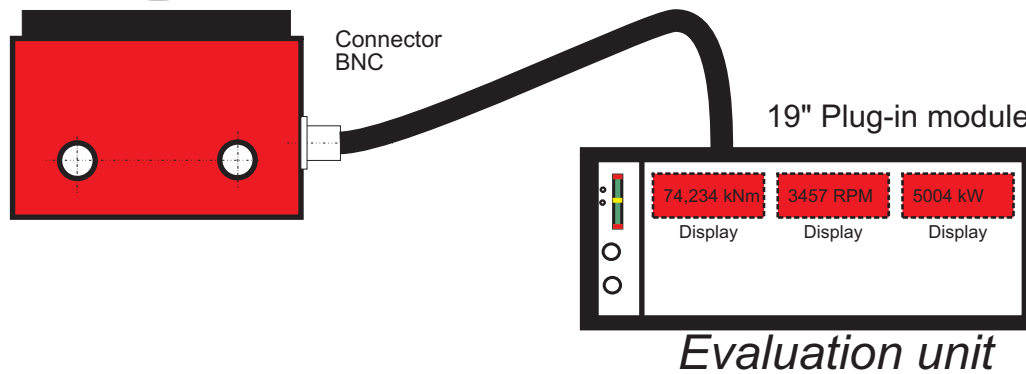
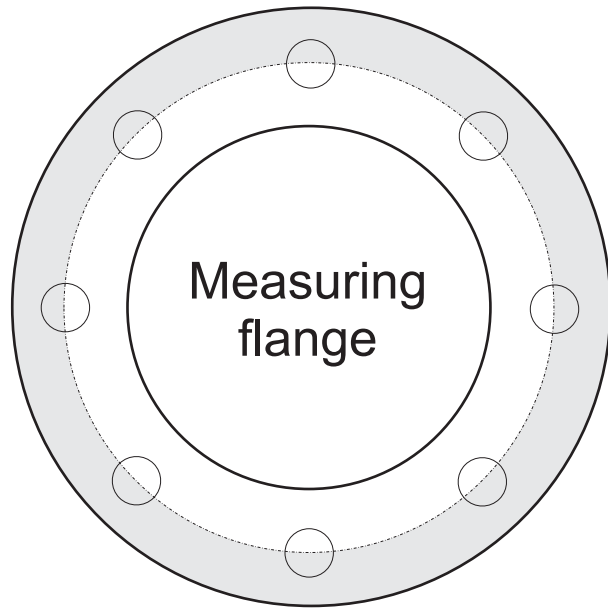


Mounting type: NS 35/7,5, NS 35/15 (option)

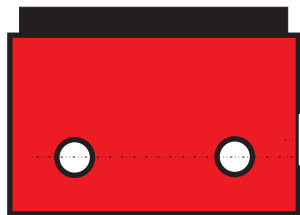
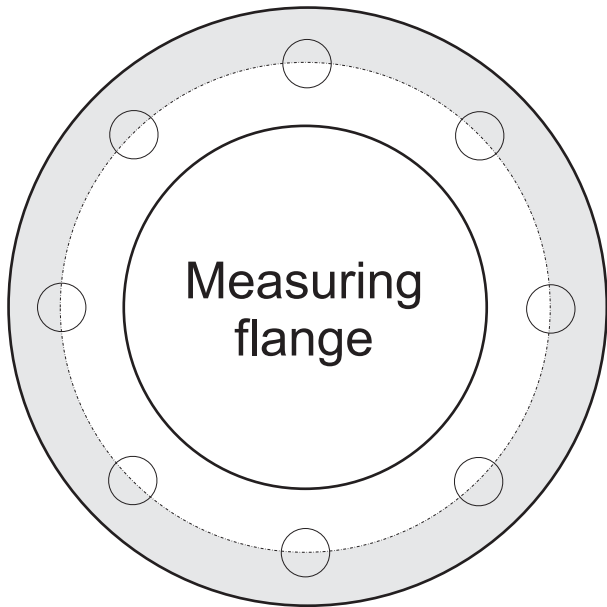




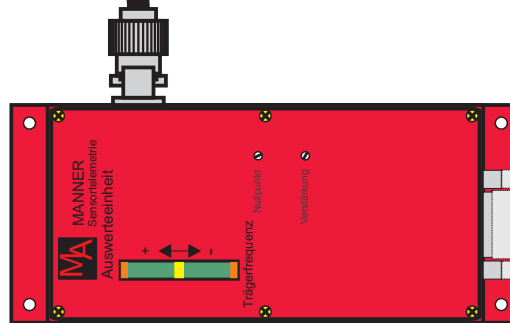
# Torque Measuring System with 19" Evaluation Unit



# Torque Measuring System with Compact Evaluation Unit

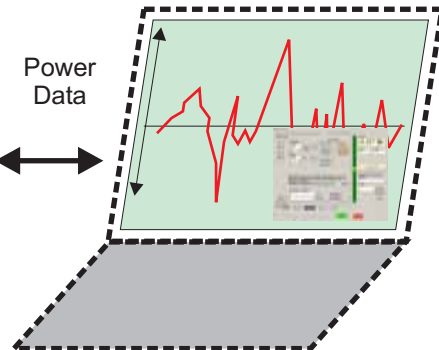


Connector BNC



Optional Interface USB/CAN

Power Data



Option

File Setup Tools Info

Configuration Remote-Control Scope Data-Aquisition Service Configuration: PCMRMC1-Channel

**Remote Control**

Start Stop Cal on Cal off

Torque range: 01,0000 kNm (Read note)

Offset: -00,7348 mV (Read note)

Invert

**Rotor Memory**

Temporary Values: Read Values Send Value Auto-Set Sens. Auto-Zero

Stored Values: Read Values Send + Store

Important Note: Settings in mV and mV/V are approximate values and were adjusted for a 350Ohm Bridge at 1mV/V. The exact settings has to be determined by calibration. Calculation of a correction factor for different bridge resistors: Calculate

Fileoperation - Computer

Adjustfactor Autoset Path Load Values Save Values

**Status-Information**

6,63 kS/s Fileoperation Receive Transmit Acknowledge

Online Exit

**Measvalue**

-0,017 Nm

Userfield 1: Meistelle 1 Userfield 2: Configuration 1

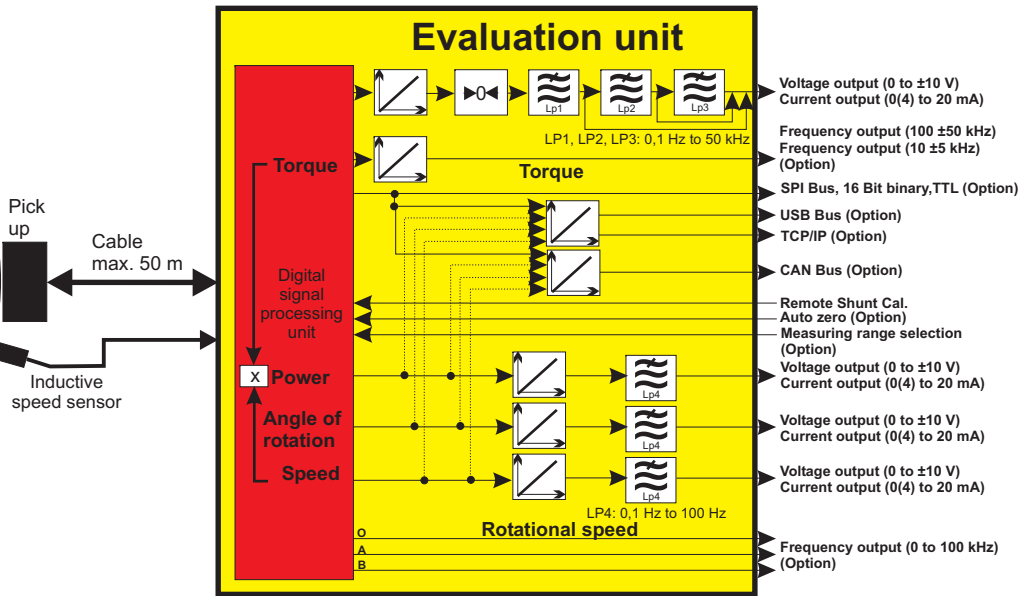
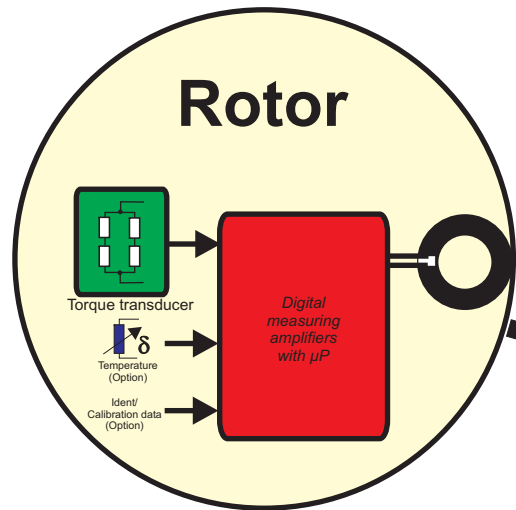
Show external DISPLAY

Export Measvalues - internal function

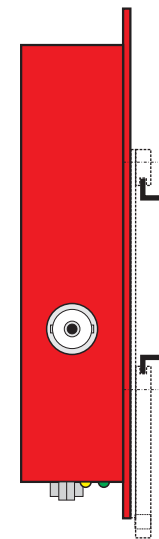
Filename: Add Value Show Values Save

Comment: Add Value Show Values Save

# Block Diagram / Signal Flow of Digital Torque Flange / Shaft

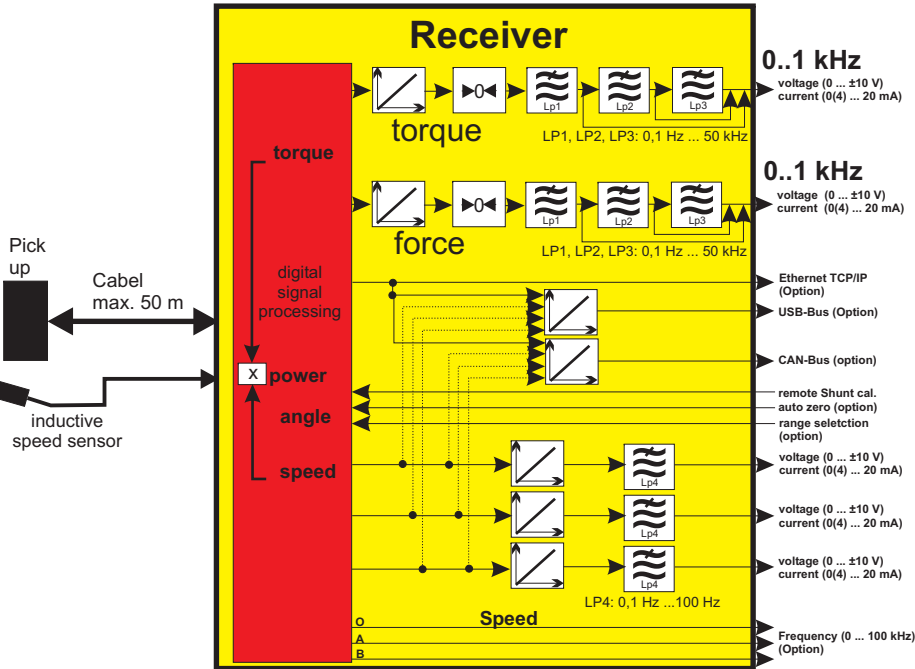
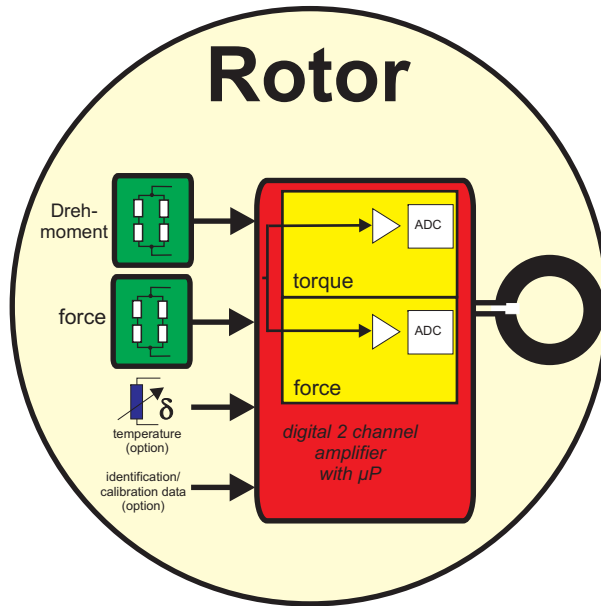


Compact evaluation unit



Mounting type: NS 35/7,5, NS 35/15 (option)

# Block Diagram / Signal Flow digital Torque Flange with integrated Force Sensor (2 Channels)

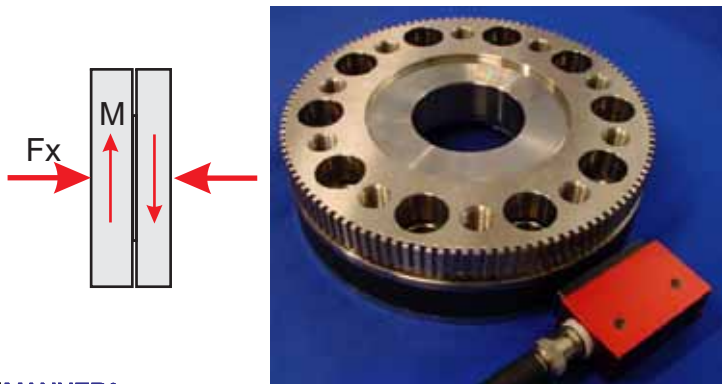


Torque

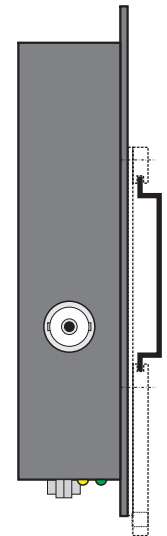
Force

Power

Speed

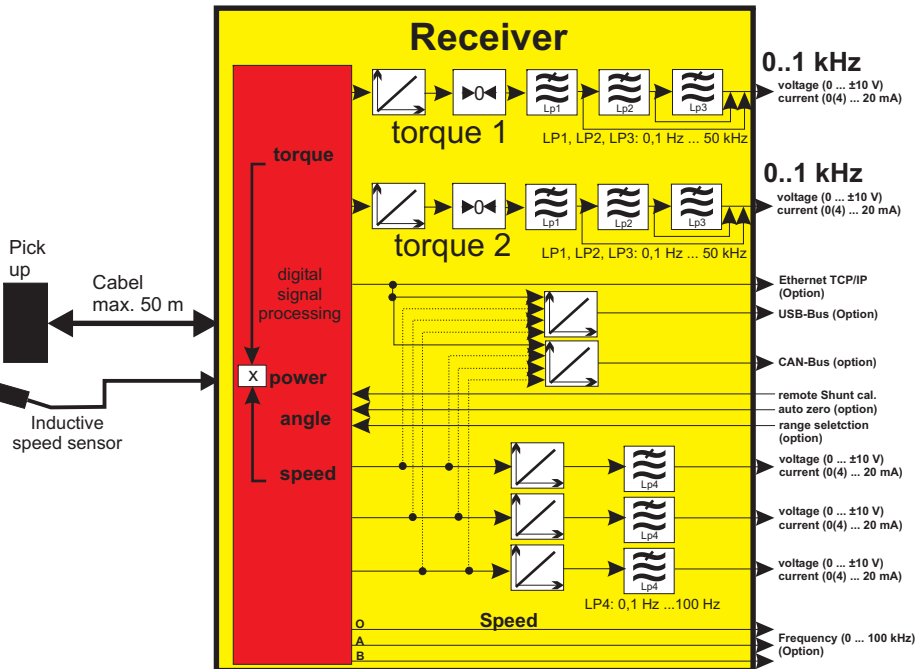
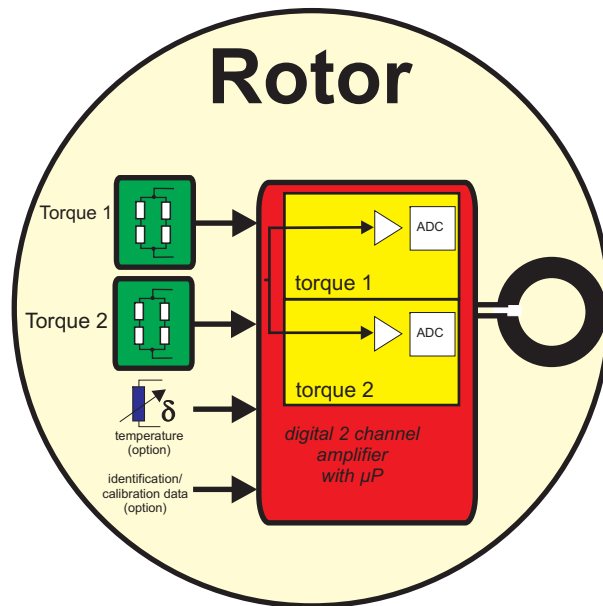


receiver



Mounting type: NS 35/7,5, NS 35/15 (option)

# Block Diagram / Signal Flow digital simultaneous double Range Torque Flange / Shaft (2 Channels)



Torque 1

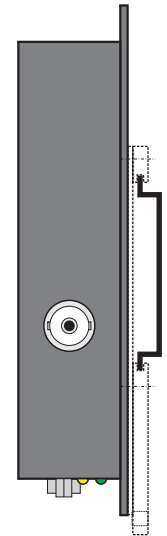
Torque 2

Power

Speed

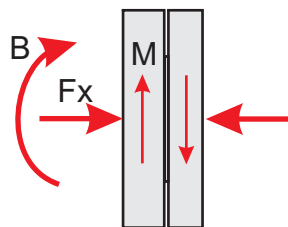
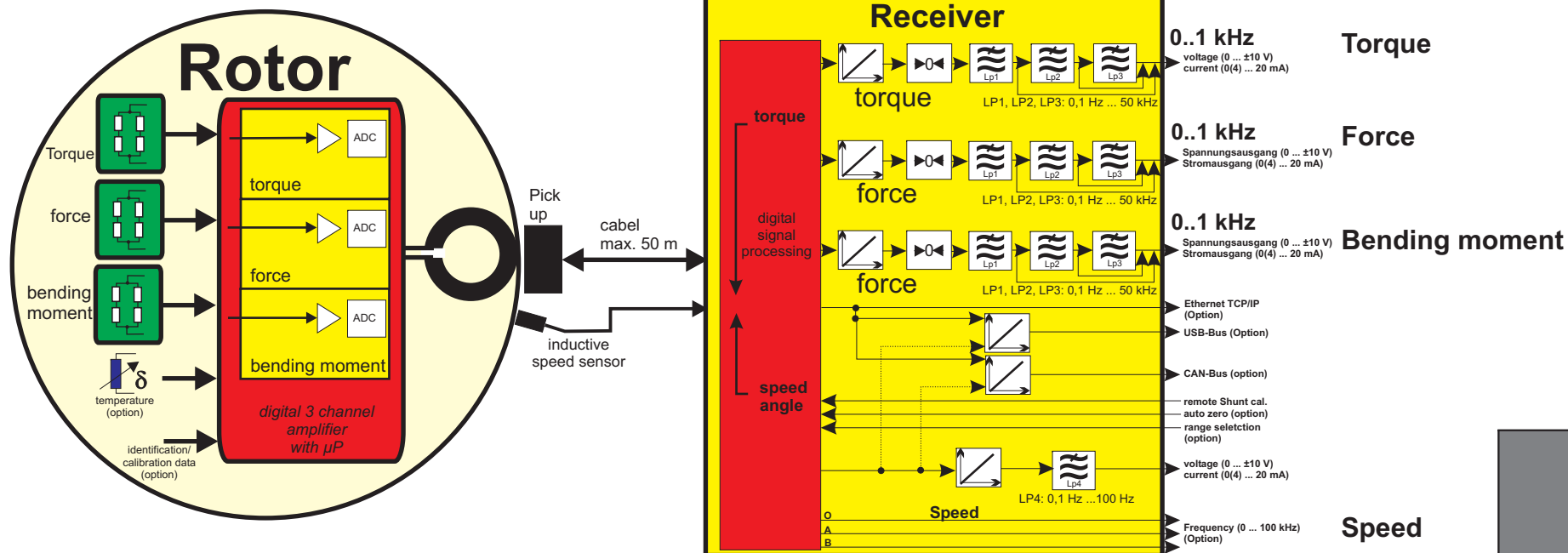


Receiver

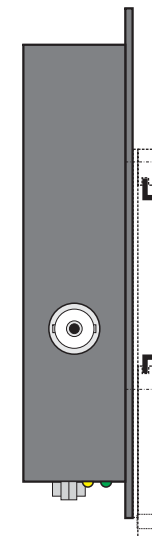


Mounting type: NS 35/7,5, NS 35/15 (option)

# Block Diagram / Signal Flow digital Combination Flange Torque, axial Force, bending Moment (3 Channels)



**Receiver**



Mounting type: NS 35/7,5, NS 35/15 (option)

# General Specification Torque Transducer MW...

## Torque

### Deviation of Linearity including hysteresis (total system, related to $M_{Nom}$ )

Digital / analog: <0.1 % (0.05 %, 0.03 % Option)

### Repeatability

(DIN 1319, standard deviation): <±0.03 %

### Available Output Signals

Voltage: 0 to ±10 V (rated to torque range),  $R_{internal} = 50 \Omega$

Current: 0(4) to 20 mA (rated to torque range), max. load = 300  $\Omega$

Frequency: 100 ±50 kHz (rated to torque range),  $R_{internal} = 50 \Omega$

SPI Bus (Data, Clock, Frame)

USB Bus

CAN Bus

### Available Signal Bandwidth (Low pass filter 5th order Bessel):

#### Group delay time:

Bandwidth	Frequency / Digital	Analog
10 Hz (-3 dB):	60 ms	100 ms
100 Hz (-3 dB):	6 ms	10 ms
<b>1 kHz (-3 dB):</b>	<b>600 <math>\mu</math>s</b>	<b>1,000 <math>\mu</math>s</b>
10 kHz (-3 dB):	120 $\mu$ s	200 $\mu$ s
50 kHz (-3 dB):	20 $\mu$ s	40 $\mu$ s

Option switchable low pass filter

Resolution electrical signal: 16 Bit

Residual signal ripple output voltage: <5 mV

Remote controlled shunt signal: 80 % of  $M_{Nom}$

### Temperature drift per 10 K of the output signal

#### Zero point (rated to $M_{Nom}$ , total system)

Analog output: ±0.05 % (±0.01 % Option)

Digital / frequency output: ±0.04 % (±0.005 % Option)

#### Signal span (rated to $M_{Nom}$ , total system)

Analog output: ±0.05 % (±0.02 % Option)

Digital / frequency output: ±0.03 % (±0.01 % Option)

Long-term drift over 48 hours (voltage output): <3 mV

### EMC: Emission per EN6126

RFI voltage \ power \ field strength: Class A

Immunity from interference (EN61326-1)

Electromagnetic field: 30 V/m

Magnetic field: 50 A/m

ESD: 10 kV

Degree of protection (EN 60529): IP54 (IP65 Option)

Reference temperature: 23 °C

Working temperature: -10 to +85 °C (-45 to +160 °C Option)

Storage temperature: -25 to +90 °C (-55 to +170 °C Option)

Vibration resistance: 1,000 g for 1 h

Impact resistance: 2,000 g

Balance quality per DIN ISO 1940: see type

Max. axial displacement (flange to pick up): <1.5 mm

Max. radial distance (flange to pick up): 0.3 to 2 mm (0 to 20 mm)

### Max. loads

Max. torque (related to  $M_{Nom}$ ): 400 % (800 % Option)

Breaking torque (related to  $M_{Nom}$ ): 800 % (1600 % Option)

Oscillation (peak to peak) DIN 50100 (related to  $M_{Nom}$ ): 300 %

### Speed system

Type: massive toothed rim, inductive pick up

Number of increments: see special data sheet

#### Outputs

1 trace: digital TTL

2 trace: digital TTL, 90° phase shift (Option)

Analog output range: 0 to +10 V, related to speed $_{Nom}$  (Option),  $R_{internal} = 50 \Omega$

Bandwidth: 100 Hz (-3dB)

Group delay time (digital): <10  $\mu$ s

Temperature drift: <0.02 % of related speed $_{Nom}$

### Pick up 8a

Weight: 0.1 kg

Dimensions: 50 x 35 x 20 mm (60 x 55 x 40 mm Option)

### Receivers

(available types)

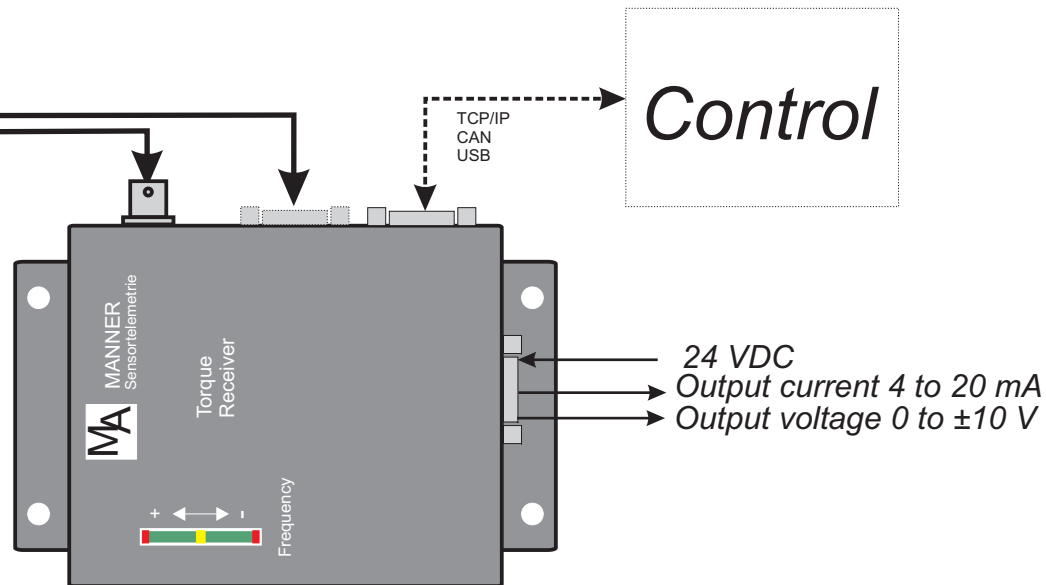
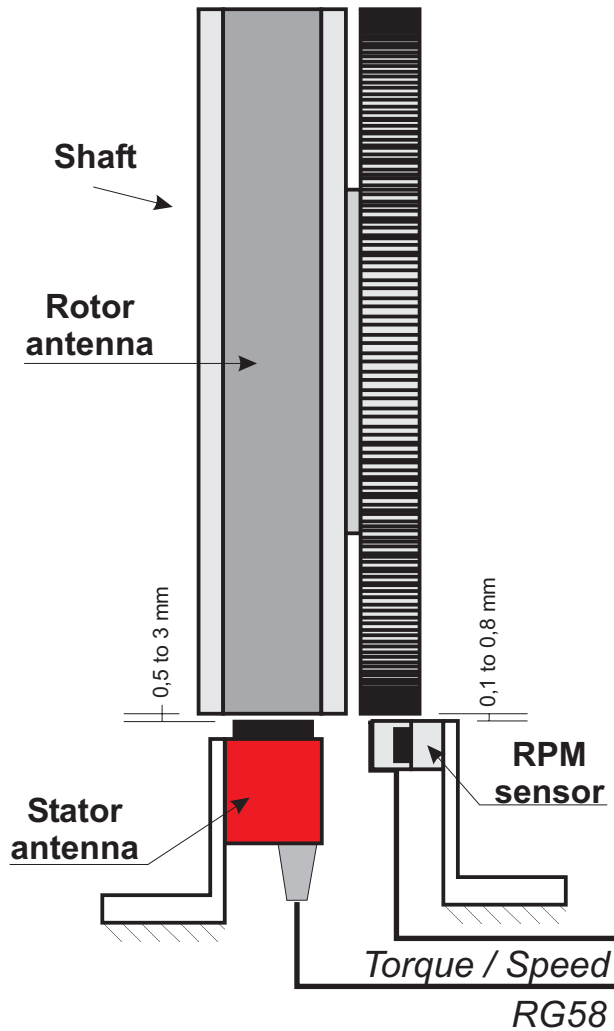
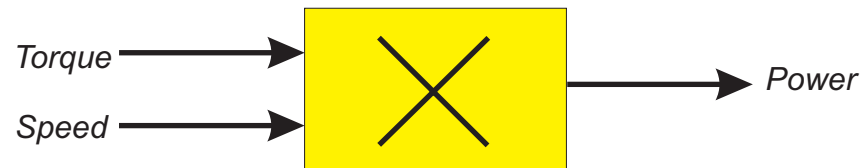
Receiver compact supply: 24 V DC, 1 A, (9 to 36 V DC Option)

Receiver plug-in card 19" Rack supply: ±15 V DC, 1 A

19" Rack supply: 90 to 270 V AC, 50 / 60 Hz

# Online Power Calculation

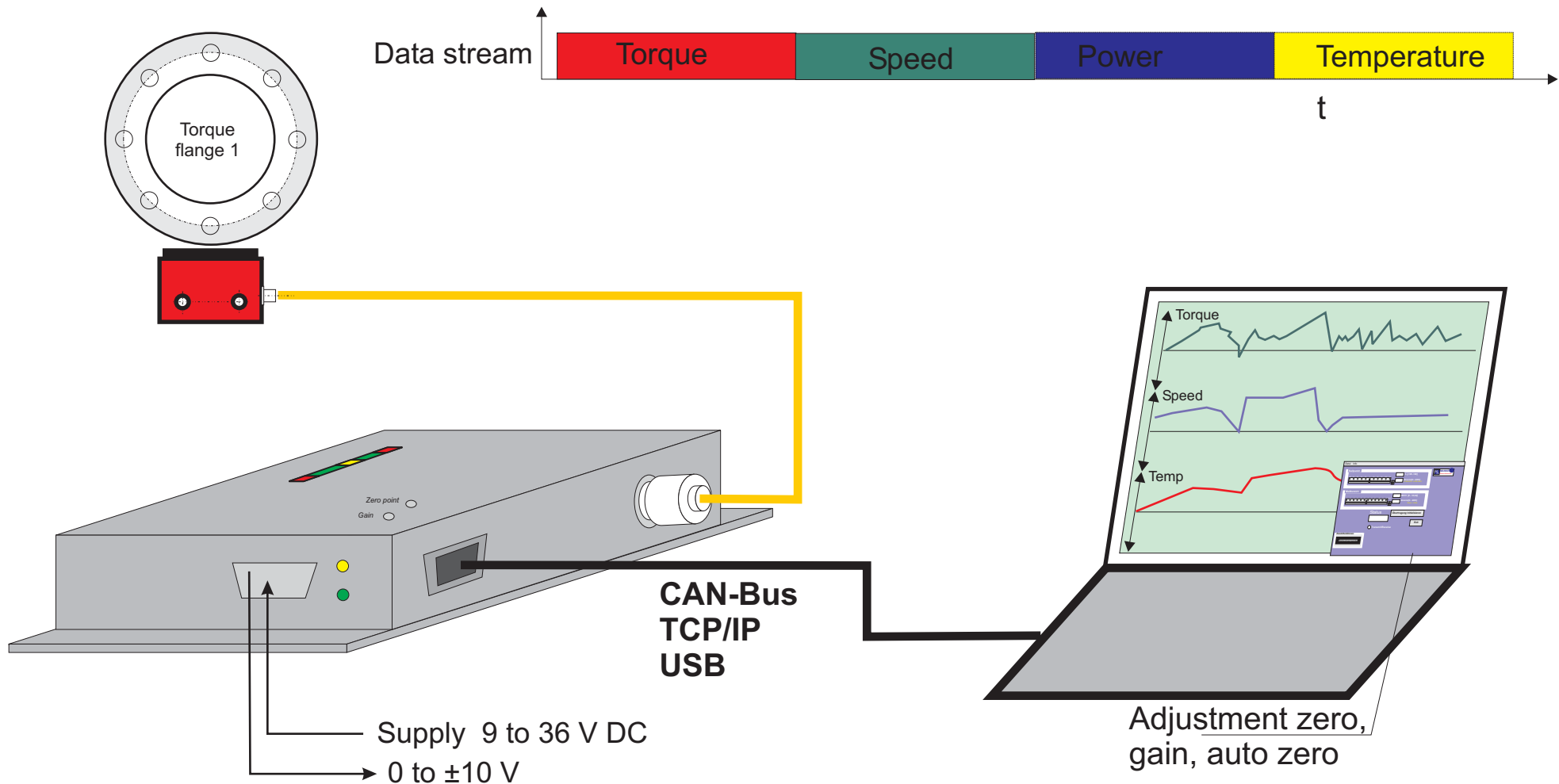
\* Online power calculation by the evaluation unit  
Online multiplication of torque and speed





# Configuration

(direct signal data acquisition, torque, no analog output)



# Data Recording Software

(Software package data acquisition - optional)

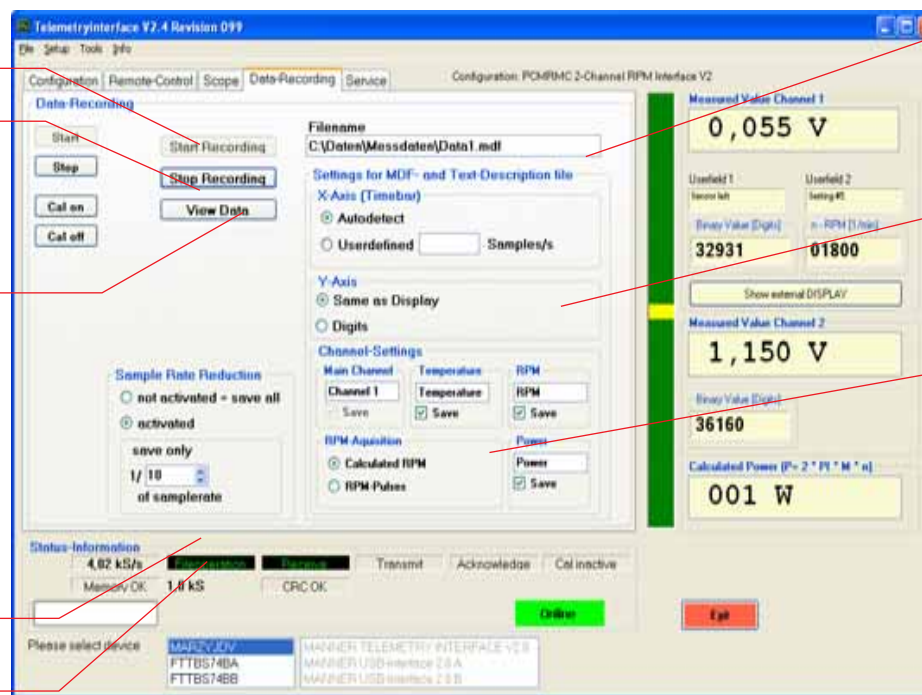
Start recording into a file

Stop recording into a file

Show data with additional external viewer PVIEW - if installed

Display file operation activity

Number of saved samples



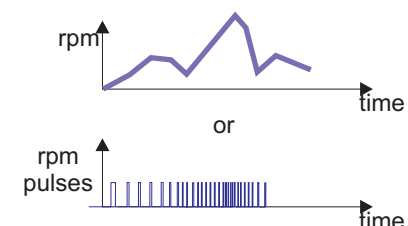
Input field for path and file name

Additional information, which is saved in the description files

Option for RPM-systems save calculated rpm or save rpm-pulses to datafile

On menu setup, there is the possibility to activate an averaging for the calculated rpm. For option 'Calculated RPM' take care of the correct setting at configuration (SampleRate).

No other program must be active at the PC while recording data into a file. This can effect a loss of data.



# Data Display Software Pview

(Software package data acquisition - optional)

Visualisation of recorded Datas



# Product Key Special Torque Sensors

Type: MW<x>\_<range>\_<accuracy>\_<temp>\_<Freq>\_<sys>\_<mod>\_<bandwidth>\_<rmc>\_<wa>\_<Dz>

