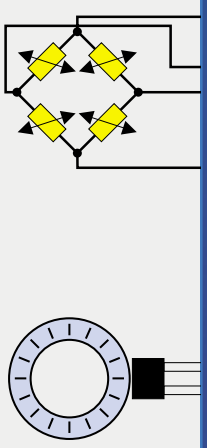
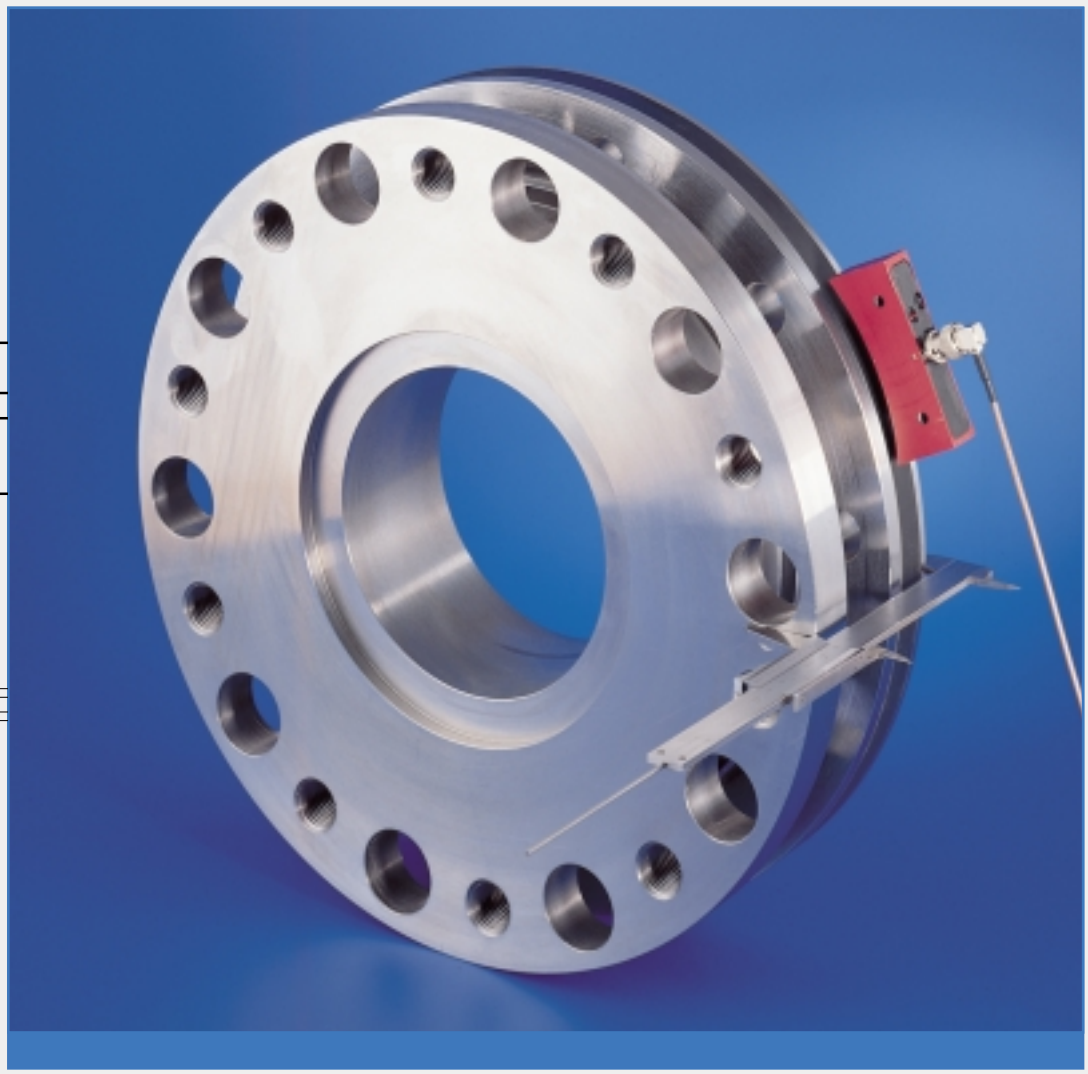
Torque and Performance Sensors for Test-Stand Applications (Slip-Ring-Free)





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Torque Sensors from Manner Sensor Telemetry

The most critical values in power transmission are torque and speed. These values are typically measured via sensors installed directly on the drive shaft. This information is of great value both in performance testing and process control.

The obvious problem is how to get this information from a rotating sensor. MANNER Sensor Telemetry provides an elegant solution with is patented quick mount torque sensors. All of the torque detection systems from MANNER Sensor Telemetry feature non-contact signal transmission with MANNER's patented sensor telemetry method. Since the signal transmission uses a simple wire loop, shafts and bearings are not required, reducing cost and mechanical complexity such as special coupling and mounting fixtures.

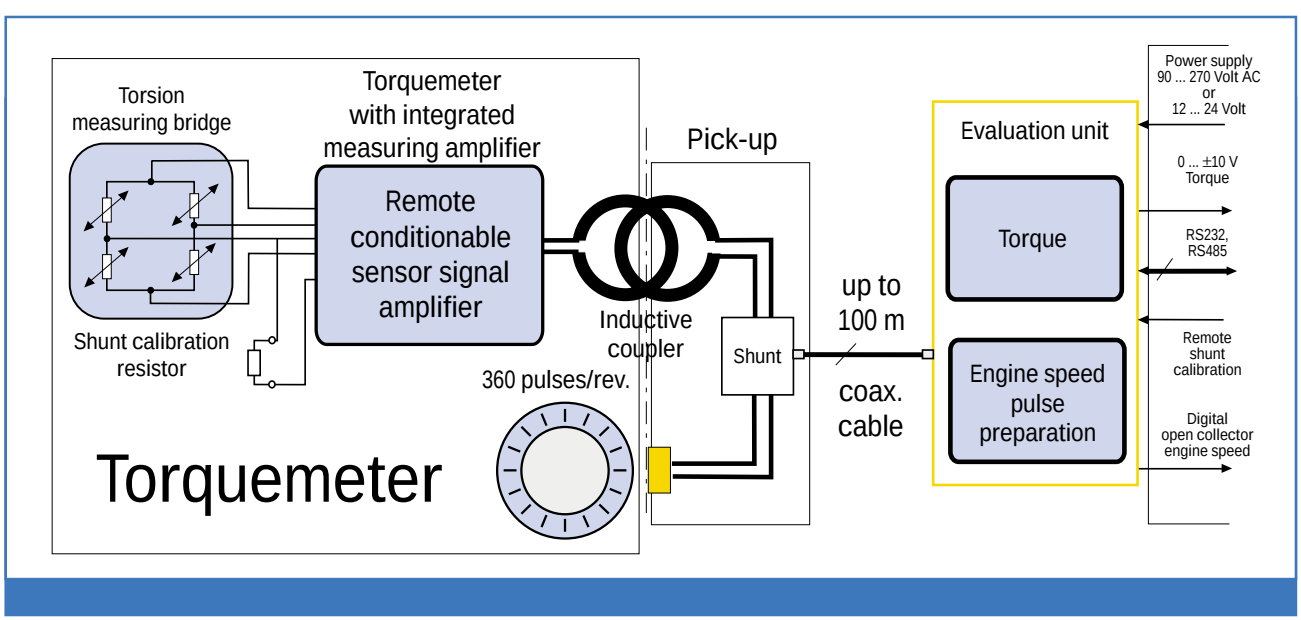
A new optional function allows the torquemeter to be remotely calibrated electronically from the control unit. With this "Remote Conditioning" feature, the calibration data is electronically stored within the torquemeter itself, thus producing a normalized output signal. With this electronics package, the torquemeter can be exchanged without recalibration. ISO 9000 recalibration can be carried out without direct contact with the torquemeter itself. This is especially important in installations where the unit is enclosed or not easily accessible. Each torquemeter carries its own electronic identification, insuring that the proper range unit has been installed.

Speed signals are also transmitted by means of the non-contact telemetry system. Performance information is calculated within the control electronics. RS232 and RS485 as well as standard analog interfaces are available.

MANNER torquemeters use highly accurate strain gages to detect the torque information. A precision, remotely programmable amplifier mounted on flange of the torquemeter conditions and digitizes the measured information. The patented MANNER Telemetry System accepts antenna clearances up to 10 mm allowing maximum flexibility in your installation.

The inductive transmission technology is exceptionally robust and highly resistant to EMV interference in accordance with DIN standards. Torque and speed signals can be transmitted via coaxial cable distances of up to 100 meters.

MANNER non-contact, bearing free torquemeters significantly reduce costs. They don't require expensive flex couplings or special mountings and are virtually maintenance-free. Accuracy, overload protection, flange configuration, and temperature stability can be tailored specifically for your installation. If the listed options don't meet your needs, the engineering group at MANNER Sensor Telemetry can provide you with torque and speed sensors that will precisely fit your application.



Features

- **compact and quick to mount (45 mm at 1 kNm)**
- **bearing-free (no friction)**
- **non-contact measuring data transmission**
- **assembly without curved teeth coupling**
- **high shearing force and axial force stability**
- **high antenna distance between torque sensor and stator (10 mm typical)**
- **integrated engine speed data collection**
- **maintenance-free via inductive energy coupling**
- **digital transmission (digitalization in rotor electronics)**
- **very easy handling and assembly, with minimal space requirements**
- **customized measuring-signal bandwidth from 0 ... 10 kHz**
- **high environmental stability (IP 67)**
- **high immunity to interference, EMV tested according to DIN**
- **ambient temperature from -20 °C to +125 °C (optionally from -30 °C to 150 °C)**
- **integrated long-distance calibration system**
- **engine speeds, according to type, up to 30,000 rpm**
- **integrated evaluation display**
- **electronic identification**

The Torque System Consists of:

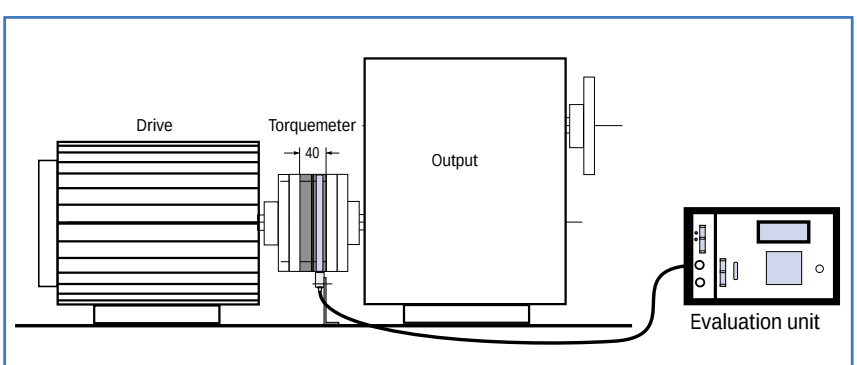
- torquemeter
- pick-up
- evaluation unit

Advantages of Manner Torque Sensors Compared to Conventional Technology

- allows construction of compact test stands
- compact design (1kNm > diameter 132 mm, length = 45 mm)
- cost reduction via elimination of supplementary bearing arrangements
- high torsional rigidity
- simple to assemble
- custom flange appearance
- easily adaptable to all kinds of installations
- evaluation unit with performance determination
- customized flange geometry

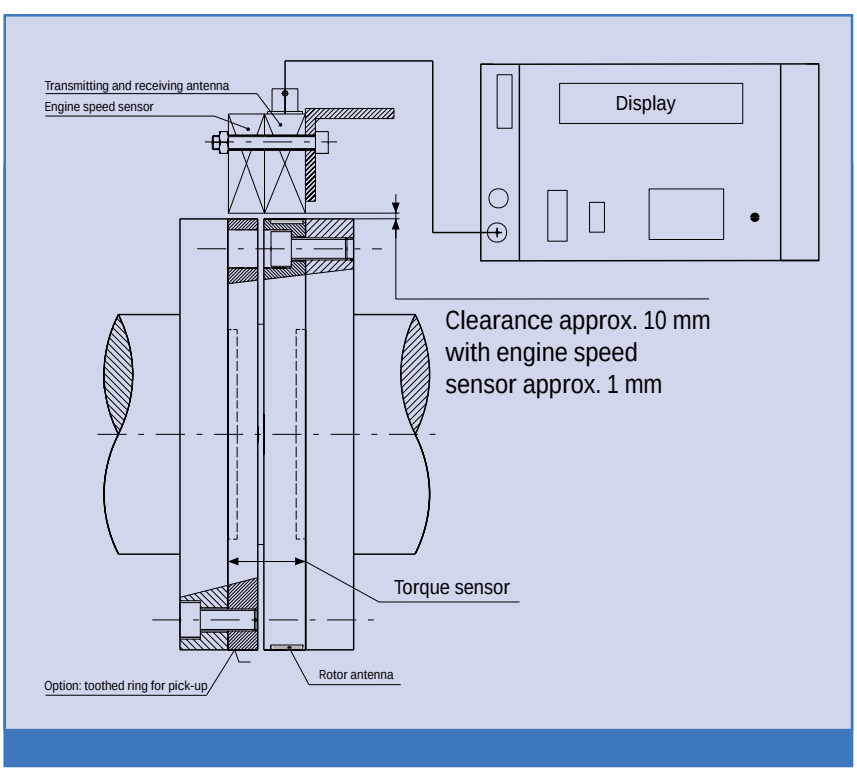
Areas of Application

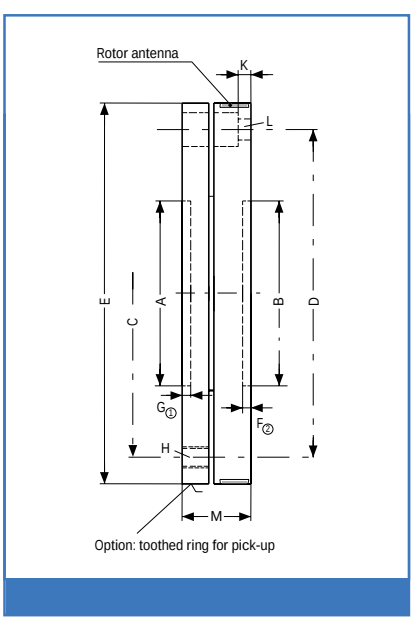
- **test stand technology**
- **terotechnology**
- **vehicle measuring technology**
- **gear and motor measuring technology**
- **process technology**
- **machine monitoring**
- **process monitoring**
- **rheometer**
- **agriculture**
- **ship's propulsion**
- **mining**
- **aviation**



Quick-Mount Torque Sensors

Measuring range	Nm/KNm	50 Nm	1 KNm	2 KNm	3 KNm	5 KNm	10 KNm	20 KNm	50 KNm
Fit (mm)	ø A	30h7	75h6	90h7	90h7	110h7	110h7	140h6	175h7
Fit (mm)	ø B	30h7	75h7	90h7	90h7	110h7	110h7	140h6	220h6
Hole circle (mm)	ø C	47 ±0,1	101,5 ±0,1	130 ±0,1	130 ±0,1	155,5 ±0,1	155,5 ±0,1	218 ±0,1	328 ±0,1
Hole circle (mm)	ø D	47 ±0,1	101,5 ±0,1	130 ±0,1	130 ±0,1	155,5 ±0,1	155,5 ±0,1	218 ±0,1	328 ±0,1
Exterior (mm)	ø E	78	132	164	164	194	194	270	270
Length (mm)	F	2	3	4	4	4	4	4,5	4,5
Length (mm)	G	2	3	4	4	4	4	6	6
Thread (mm)	H	M5	M8	M12 x 1,5	M12 x 1,5	M14	M16	M18	M18
Thread (mm)	L	M5	M8	M12 x 1,5	M12 x 1,5	M14	M16	M18	M18
Length (mm)	M	40	45	45	45	60	60	70	90
Quantity	Z	8	6	8	8	10	10	8	10
Eng. speed (1/min)		12000	10000	10000	10000	10000	6000	2000	2000
Corresponding GKN drive shaft			Typ 687 / 20	Typ 687 / 30	Typ 687 25-40	Typ 687 / 45	Typ 687 / 55	Typ 292 / 55	Typ 190 / 65
Temp. range	-20 °C … +125 °C								





Z = quantity of threads / bore holes
①/② = optional shaft bore-hole fitting
Dimensions A,B,C,D according to standard series of drive shaft manufacturer or customer wishes.

Custom-Built Rotating Torque Sensors for Production Application

Increasing automation and process monitoring requires not only engine speed data collection but torque data collection as well. While engine speed data has been collected for several years now, torque data collection – which is just as important – has been hindered by high costs, space requirements and design problems.

Why Monitor Torque in a Production Application?

- The capability of a drive system can be optimized by monitoring torque so that maximum power can be applied without exceeding the load capability of the system. Torque monitoring also provides a safety factor by quickly indicating overload or error conditons. Production throughput can be significantly increased with accurate torque information.
- A torque sensor can recognize overload situations or system errors (bearing damage, excessively high material throughput) and prevent damage by acting on the electronic control.
- Protection for expensive installations (avoids guarantee problems).
- Performance is precisely logged.
- Collection of process sequence data in process-technological installations (mixers, stirrers) with on-site adjustment.
- Control and logging of assembly screw processes, etc.

The Solution

On the basis of the patented sensor telemetry method, production parts such as clutches and cardan shafts can re-function as torque sensors without a problem after a few minimal constructional changes. Production parts are fitted with strain measurement strips and extended via a telemetric measuring amplifier, and the entire sensor is then electronically packaged. A stationary pick-up (up to 10 mm away from the shaft) converts the torque signal into either a voltage signal (-10 volts to +10 volts), a current signal (0-20 mA) or a digital signal (serial interface). The pick-up is powered by 24 volts.

The Distinctive Advantages

- **no wear and tear, no maintenance needed because of non-contact transmission of torque**
- **high environmental stability and sturdiness via total packaging of the sensor (IP 67)**
- **minimal modification expense for serial part**
- **minimal dimensions of electronics (covers only 3 mm of part)**
- **high accuracy**
- **temperature stability up to 125 °C**
- **process-control-compatible output signal**

TECHNICAL SPECIFICATIONS:

Precision classes	%	0,5, 0,3, 0,1
Rated load torque	Nm	50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000, 25000, 50000
Gain factor	mV/V	1,0
Characteristic value tolerance	%	0,3
Temperature influence per 10 K in relation		
to initial value (zero)	%	0,2, 0,1, optional 0,03
Temperature influence per 10 K in relation		
to initial value (measured value)	%	0,2, 0,1, optional 0,03
Linearity deviation including hysteresis	%	0,3, 0,1
Consistency (rel. standard deviation)	%	0,02
Bridge resistor	Ohm	350, 700, 1000
Supply voltage	Volt	2,5, 5, 10
Reference temperature	°C	20
Signal bandwidth	kHz	1, optional 10
Initial signal (analog)	Volt	-10 ... +10 Volt, 0 ... 20 mA
Initial signal (digital)		RS232, RS485
Evaluation unit power	Volt	90 ... 270 Volt AC, ±15 Volt DC, +12 Volt DC, +24 Volt DC
Working temperature (dynamo hub)	°C	-25 ... +85, optional -30 ... +125
Working temperature (evaluation unit)	°C	-25 ... +85
Storage temperature	°C	-50 ... +90
Mechanical values (in relation to rated load torque)		
Static maximal load	%	200
Static breaking load	%	400
Torsional stiffness	degrees	< 0,005
Protection type		IP 42, optional IP 67
Engine speed	rpm	0 ... 8000, optional 0 ... 30.000
Engine speed data collection	pulse/rev.	1, 360, optional 5000
Weight		dependent on measuring range