

TORQUE MEASUREMENT  
TECHNOLOGY FROM HBK

# A new dimension of precision

For optimum results in torque measurement.





# Continuous innovation

## T10F

The world's first torque measuring flange



## T12

The first fully digital torque transducer



## T40/T40B

The benchmark for torque measurement technology



## T12HP

A new standard in precision measurement



## INNOVATING FOR OVER 80 YEARS

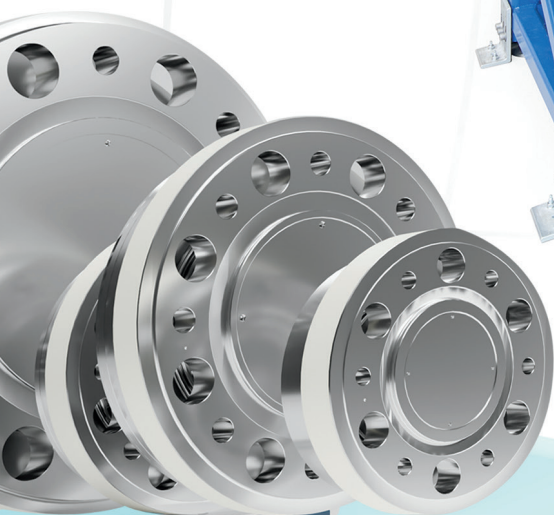
With over 80 years of experience, HBM sets standards in the field of torque measurement. HBM leads the global market in innovation and is continually developing new, state-of-the-art technologies. From non-contact torque transducers with energy and signal transmission to the torque measuring flange, and from the unique 400 kNm calibration machine to the high-precision T12HP transducer: HBM sets the benchmark for torque measurement technology, with unwaveringly excellent results and maximum precision.



Calibration service up to **400 kNm**

## T110/T100

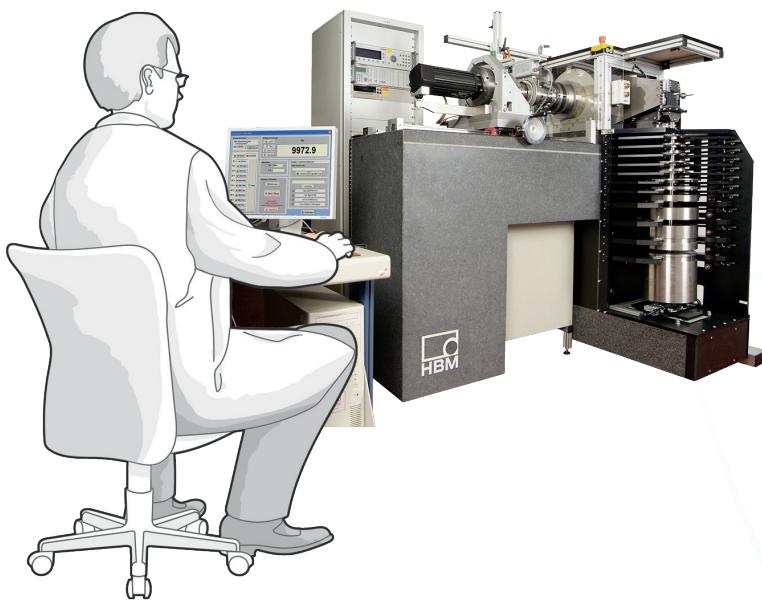
The new innovative torque sensor platform



# The precise measurement chain

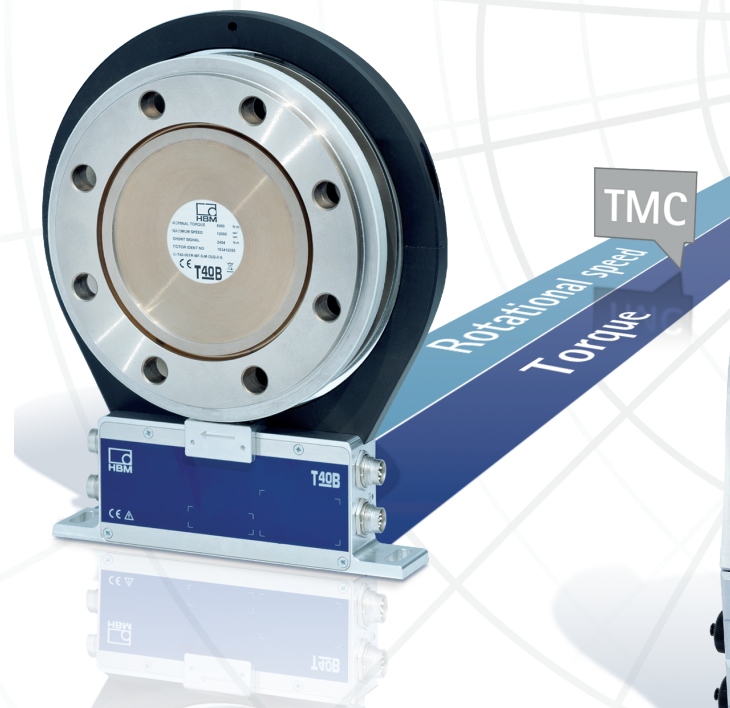
## RELIABLE RESULTS MEASURED WITH PRECISION

From the robust transducer for simple measurement tasks to the high-precision digital torque measuring system: HBM has been the world leader in torque measurement for decades and is your one-stop shop for everything from calibration to transducers, to reliable data acquisition.



### Verifiable and individual

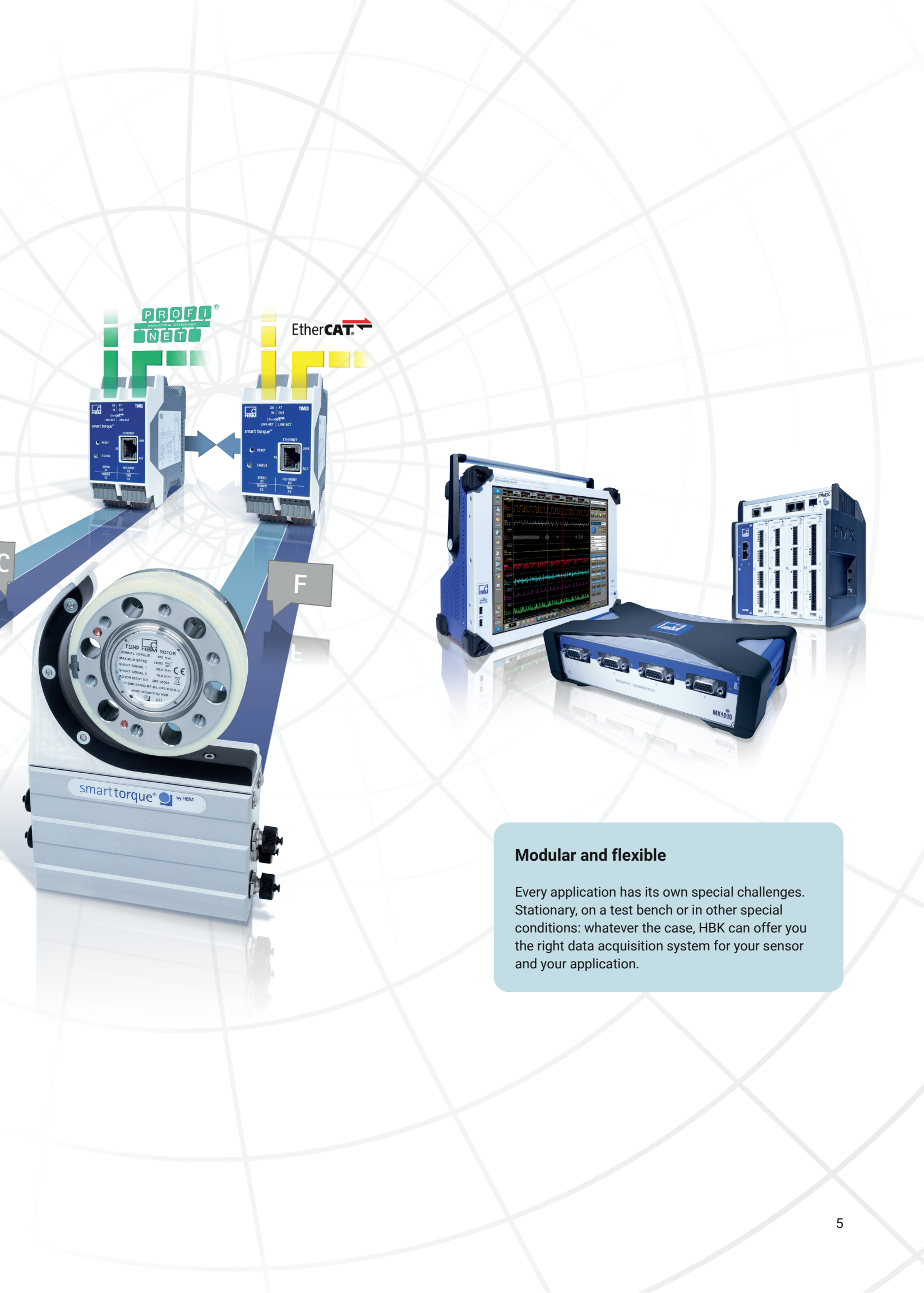
Professional calibration of your torque sensor is a vital prerequisite for ensuring the constant quality of your measurement results.



### Precise and future-proof

Precision torque transducers in combination with digital TIM-PN/EC interface modules are ideal for highly dynamic applications. Via the field bus, they enable torque and speed measurements to be incorporated with ease in higher-level test bench automation and control systems.





### Modular and flexible

Every application has its own special challenges. Stationary, on a test bench or in other special conditions: whatever the case, HBM can offer you the right data acquisition system for your sensor and your application.



# A new dimension of precision

At HBK, we develop and produce all the components of the measurement chain – and ensure maximum precision for sensors, amplifiers, and software. This harmonised system ensures that you can achieve the best possible results for any application.



## Automotive

Exact, precise measured values over the entire measuring range are vital in the automotive industry, whether for testing and optimising engines, or reducing rolling resistance to increase efficiency.



## Shipping

Fast and accurate torque measurement for reducing emissions is extremely important for the optimum running of gas and dual-fuel marine engines.



## Aviation

The requirements for speed and accuracy are stringent, for example, for testing turbines, turbo propellers and turboshafts.



## Wind power

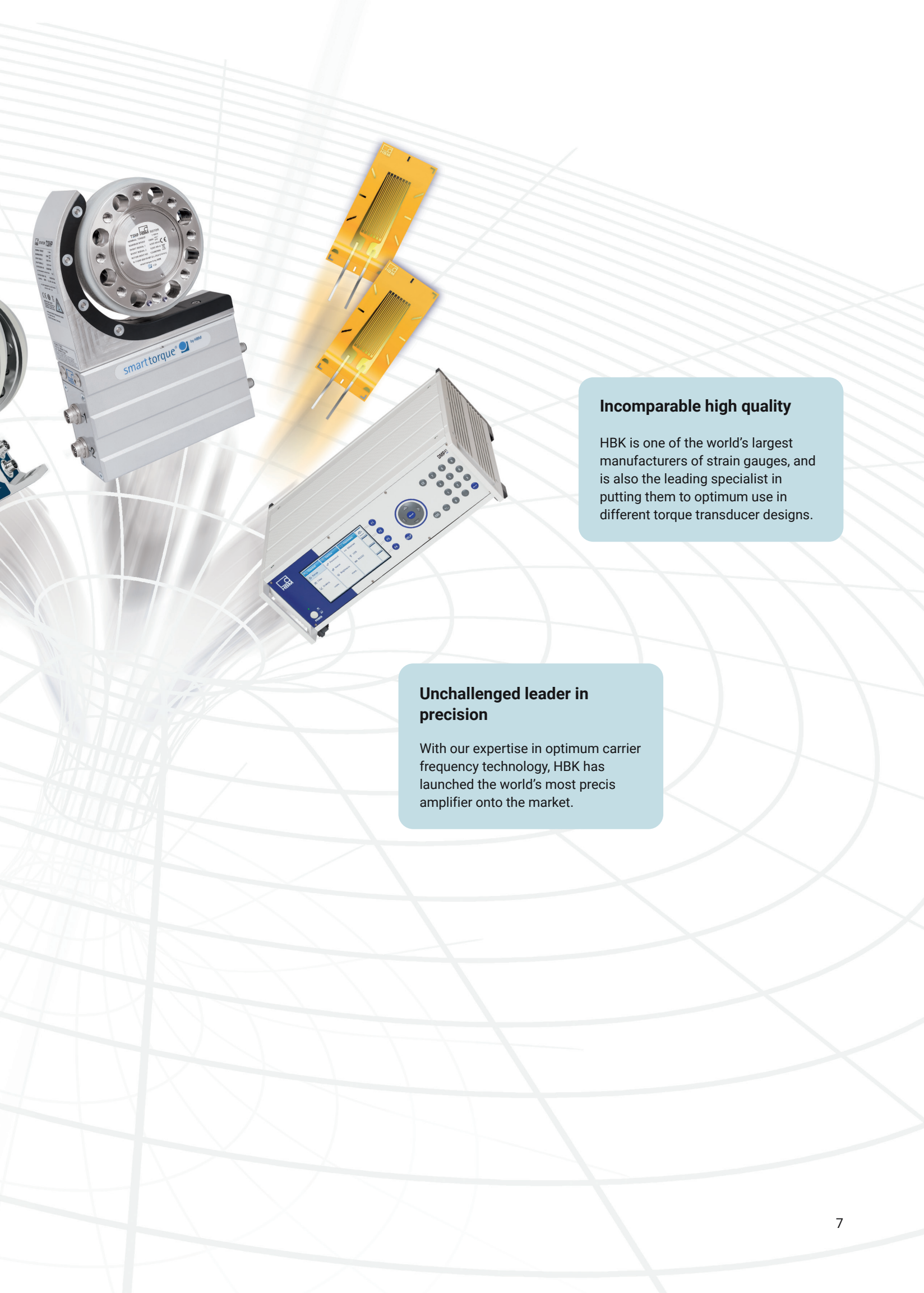
High torque is what count in wind energy. Precise measurement technology increases component efficiency under extremely high nominal torque.



## Unbeatable mechanical design

The intelligent design of the measuring body ensures high accuracy in terms of linearity and hysteresis, and therefore a precise measurement result.





### Incomparable high quality

HBK is one of the world's largest manufacturers of strain gauges, and is also the leading specialist in putting them to optimum use in different torque transducer designs.

### Unchallenged leader in precision

With our expertise in optimum carrier frequency technology, HBK has launched the world's most precise amplifier onto the market.



# The HBK calibration laboratory: a global standard

The HBK calibration laboratory is one of the best known and best performing labs in the world. In 1977 it was the first calibration laboratory in Germany to be accredited by the DKD (German Calibration Service), and HBK regularly invests in expanding and enhancing the various systems. Calibration with DAkkS certificate or a verifiable working standard calibration by HBK: the choice is yours.

Measuring range* in N·m		0.1 N·m	0.5** N·m	1 N·m	2 N·m	5 N·m	10 N·m	20 N·m	50 N·m	100 N·m	200 N·m	500 N·m	1 kN·m	2 kN·m	3 kN·m	5 kN·m	10 kN·m	25 kN·m	400*** kN·m	Up to 1.1 MN·m	
Working standard calibration	Possible increments																				
	10																				
	6																				
	C																				
DAkkS calibration	Possible increments																				
	6																				
	10																				
	8																				
DAkkS calibration	5																				
	A																				
	B																				
	C																				

Standard offer  
 Not possible  
 On request, by an external accredited calibration laboratory

Lowest measurement uncertainty: >0.008%

A 4+3 Increasing/decreasing series (DIN 51309, EA-10/14 or DKD-R 3-5)

B 2+1 Increasing/decreasing series (VDI 2646)

C 1+1 Increasing/decreasing series

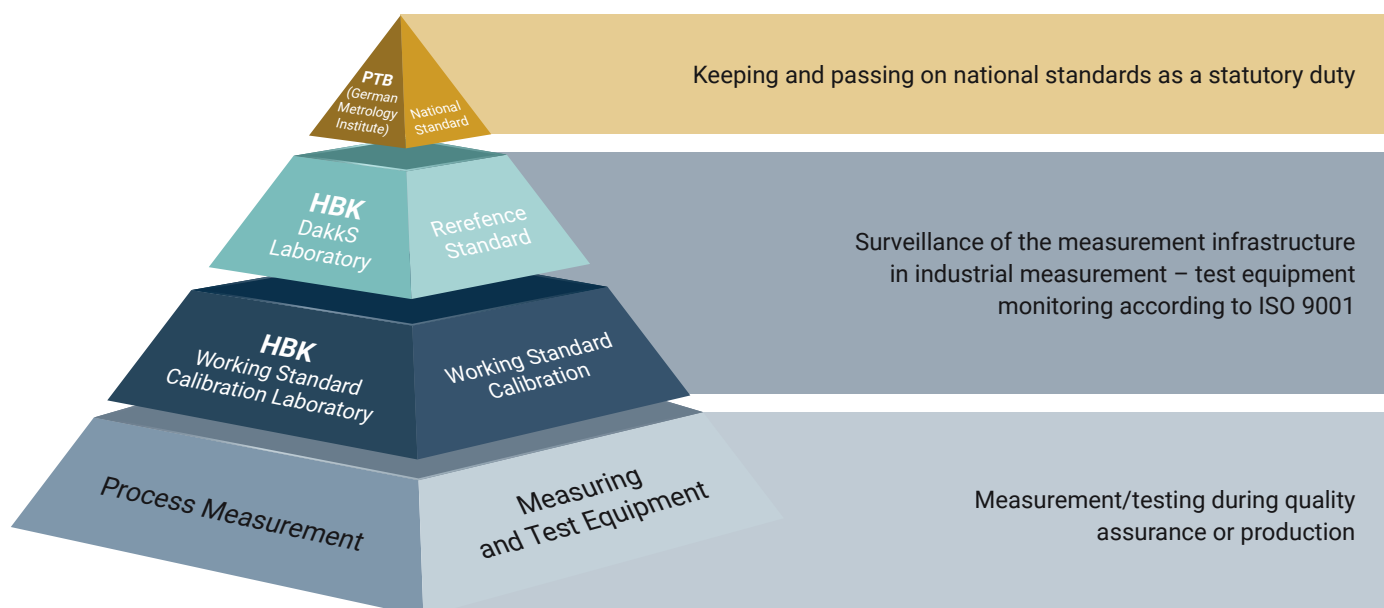
\* In the 5 N·m to 1 kN·m range: for DAkkS every increment at an interval of 1 N·m is possible

In the 100 N·m to 25 kN·m range: for DAkkS every increment at an interval of 100 N·m is possible

In the 3 kN·m and 400 kN·m range: for DAkkS every increment at an interval of 1 kN·m is possible

\*\* 3 increments only

\*\*\* No vibratory torque





# Looking for your own customised sensor? We can produce to your specification!

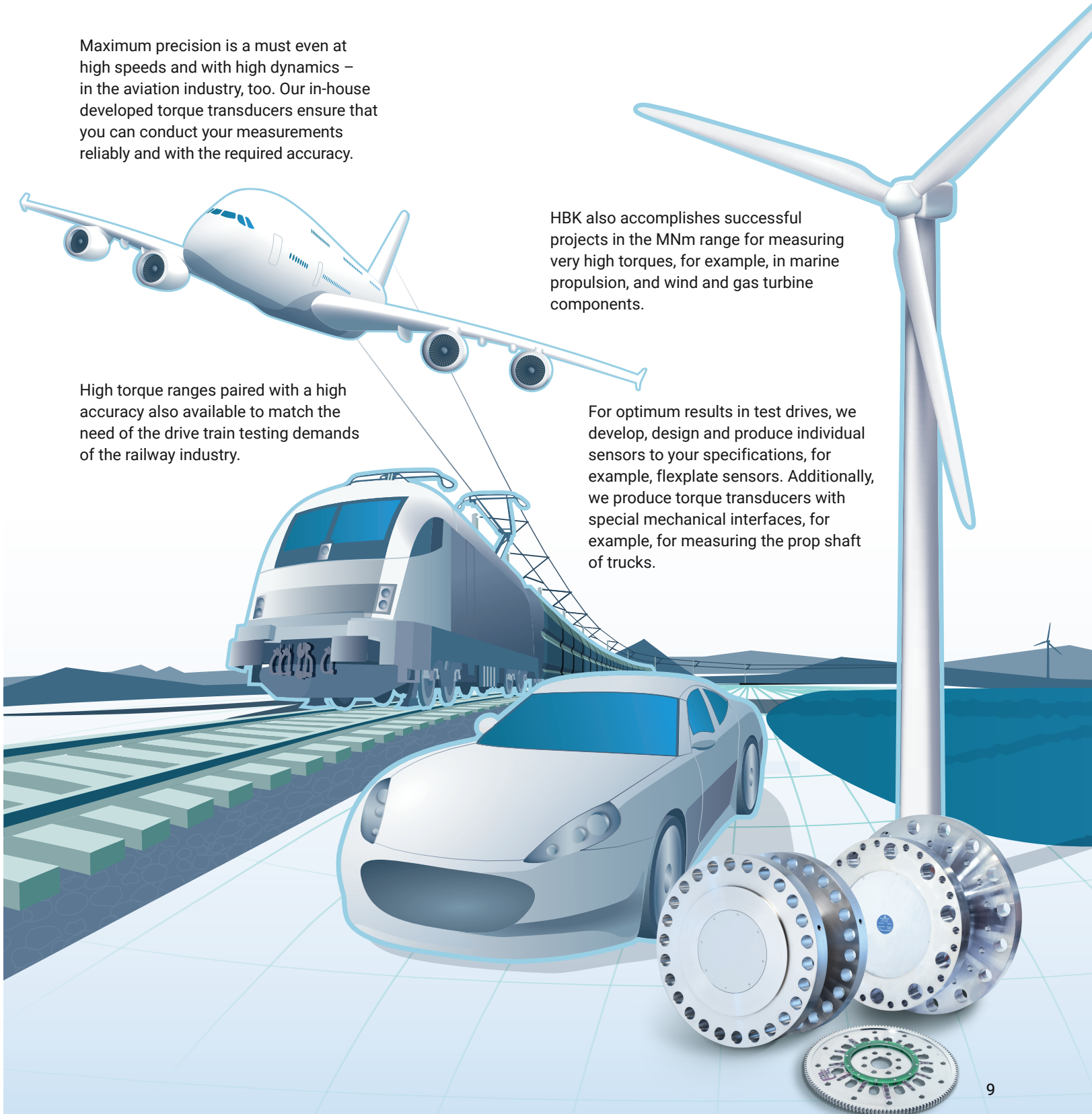
If our standard products are not the right option for you, we will design a solution completely in line with your ideas including the design, verification, validation and manufacture of the final product – even in large quantities.

Maximum precision is a must even at high speeds and with high dynamics – in the aviation industry, too. Our in-house developed torque transducers ensure that you can conduct your measurements reliably and with the required accuracy.

HBK also accomplishes successful projects in the MNm range for measuring very high torques, for example, in marine propulsion, and wind and gas turbine components.

High torque ranges paired with a high accuracy also available to match the need of the drive train testing demands of the railway industry.

For optimum results in test drives, we develop, design and produce individual sensors to your specifications, for example, flexplate sensors. Additionally, we produce torque transducers with special mechanical interfaces, for example, for measuring the prop shaft of trucks.



# Equal to any challenge



Type			TN	TB2	TB1A	T22	T210	T40B	T40MS
Signal transmission			Non-rotating			Rotating non-contact			
Nominal torque from ... to Nm			100 Nm 20 kNm	100 Nm 10 kNm	100 Nm 10 kNm	0.5 Nm 1 kNm	0.5 Nm 200 Nm	50 Nm 10 kNm	200 Nm 2 kNm
kNm									
Speed [rpm]		Standard	–	–	–	9,000/16,000/ 18,000/20,000 <sup>1)</sup>	14,000/20,000/ /30,000 <sup>1)</sup>	10,000/12,000/ 15,000/20,000 <sup>1)</sup>	25,000
		Option	–	–	–	–	–	12.000/14.000/ 18000/24000 <sup>1)</sup>	30,000
Accuracy [%]	Linearity including hysteresis	Standard	0.02	0.01	0.03	0.3	0.05	0.03	0.03
		Option	–	–	–	–	–	–	–
	Span	Standard	0.02	0.02	0.05	0.2	0.1	0.05 / 0.1 <sup>1)</sup>	0.05
Output signal/rated output									
Torque	Frequency	Standard					±5 kHz	±5/±30/±120 kHz	±5/±30/±120 kHz
	Analogue/ mV/V	Standard	1.5 – 2 mV/V	1 mV/V	1.5 mV/V	±5 V/±8 mA	±10 V	±10 V	±10V
	Dig. signal (TMC)	Standard	–	–	–	–	–	✓	–
Speed	Pulses/ revolution	Option	–	–	–	–	Standard: 512 Option: 1024	128/1024 <sup>3)</sup>	512 / 128 <sup>3)</sup>
Angle of rotation (ref. pulse)		Option	–	–	–	–	–	✓	–
Bus interface		Standard	–	–	–	–	–	TMC	TMC
		Option	–	–	–	–	I/O-Link	–	–
Coupling		Option	–	–	–	✓	–	✓	–
Special features			<ul style="list-style-type: none"> <li>Transfer transducer</li> <li>Very high accuracy</li> <li>Bending moment measurement</li> </ul>	<ul style="list-style-type: none"> <li>Reference transducers</li> <li>Very high accuracy</li> </ul>	<ul style="list-style-type: none"> <li>Reference transducers</li> <li>Compact</li> <li>High rigidity</li> </ul>	<ul style="list-style-type: none"> <li>Voltage output</li> <li>Current output</li> <li>Compact</li> </ul>	<ul style="list-style-type: none"> <li>Integrated speed system</li> <li>Small measuring ranges</li> <li>Voltage output</li> <li>Frequency output</li> <li>High nominal speed</li> <li>IO-Link</li> </ul>	<ul style="list-style-type: none"> <li>High accuracy</li> <li>Digital signal transmission</li> <li>Highly dynamic</li> <li>TIM40 interface module</li> <li>TIM-EC EtherCAT module</li> <li>TIM-PN PROFINET module</li> </ul>	<ul style="list-style-type: none"> <li>Digital signal transmission</li> <li>Highly dynamic lightweight titanium body</li> <li>One rotor size</li> <li>TIM40 interface module</li> <li>TIM-EC EtherCAT module</li> <li>TIM-PN PROFINET module</li> </ul>

1) Dependent on measurement range

2) Optical speed measurement system

3) Magnetic speed measurement system



WITH A DIVERSE RANGE OF TORQUE TRANSDUCERS, HBK OFFERS THE RIGHT SOLUTION FOR EVERYONE. HBK ALSO PRODUCES CUSTOMISED TRANSDUCERS IF REQUIRED.



T40HS	T40FM	T40FH	T40MAR	T12HP	T12HS	T12HT	T110/T100
Rotating non-contact							
100 Nm 3 kNm			10 kNm 400 kNm	100 Nm 10 kNm	200 Nm 2 kNm		50 Nm 10 kNm
	15 kNm 80 kNm	100 kNm 300 kNm				500 kNm 1.5 MNm	
35,000/45,000 <sup>1)</sup>	3,000/4,000/ 6,000 <sup>1)</sup>	2,000/3,000 <sup>1)</sup>	1,500 <sup>1)</sup>	10,000/12,000/ 15,000 <sup>1)</sup>	25,000	1,000	10,000/12,000/ 20,000/23,000 <sup>1)</sup>
–	4,000/6,000/ 8,000 <sup>1)</sup>	–	–	12,000/18,000/ 22,000 <sup>1)</sup>	30,000	–	12,000/14,000/ 22,000/25,000 <sup>1)</sup>
0.05	0.1	0.1	0.3	0.015	0.015	0.1	0.03
–	0.05	–	–	0.007	–	–	–
0.05	0.05	0.05	0.1	0.01	0.01	0.1	0.03
–	–	–	–	–	–	–	–
0.05	0.1	0.1	0.1	0.02	0.02	0.1	0.03
±5/±30/±120 kHz	±5/±30/±120 kHz	±5 kHz	±5/±30/±120 kHz	±5/±30 kHz	±5/±30 kHz	±5 kHz	±5/±30/±120 kHz
±10 V	±10 V	±10 V 0.63 – 1.1 mV/V	±10 V	±10 V	±10 V	±10 V	±10 V/4–20 mA
✓	✓	–	✓	–	–	–	Ethernet
–	1024 <sup>3)</sup>	180 <sup>3)</sup>	–	360/720 <sup>3)</sup>	360 <sup>3)</sup>	96	8192 <sup>3)</sup>
✓	✓	–	✓	✓	–	–	–
TMC	TMC	–	TMC	CAN	CAN	CAN	Ethernet
–	–	–	–	Profibus DP	Profibus-DP	–	EtherCAT/Profi- net/Ethernet/IP
–	–	–	–	✓	–	–	–
<ul style="list-style-type: none"> <li>• Very high accuracy</li> <li>• Speed up to 55,000 rpm on request</li> <li>• Digital signal transmission</li> <li>• Highly dynamic</li> <li>• Lightweight titanium body</li> <li>• TIM40 interface module</li> <li>• TIM-EC EtherCAT module</li> <li>• TIM-PN PROFINET module</li> </ul>	<ul style="list-style-type: none"> <li>• Digital signal transmission</li> <li>• Highly dynamic</li> <li>• TIM40 interface module</li> <li>• TIM-EC EtherCAT module</li> <li>• TIM-PN PROFINET module</li> </ul>	<ul style="list-style-type: none"> <li>• Very high torque</li> <li>• Non-rotating version available</li> <li>• TIM40 interface module</li> <li>• TIM-EC EtherCAT module</li> <li>• TIM-PN PROFINET module</li> <li>• Digital signal transmission</li> <li>• Highly dynamic</li> </ul>	<ul style="list-style-type: none"> <li>• Marine certificate</li> <li>• Very high torque</li> <li>• High accuracy and dynamics</li> <li>• Digital signal transmission</li> <li>• Torque Interface Module</li> </ul>	<ul style="list-style-type: none"> <li>• Maximum accuracy</li> <li>• Digital signal transmission</li> <li>• Highly dynamic</li> <li>• Very high resolution</li> <li>• Diagnosis</li> <li>• Extreme values</li> <li>• Temperature measurement</li> <li>• TIM-EC EtherCAT module</li> <li>• TIM-PN PROFINET module</li> </ul>	<ul style="list-style-type: none"> <li>• Very high accuracy</li> <li>• Digital signal transmission</li> <li>• Highly dynamic</li> <li>• Lightweight titanium body</li> <li>• One rotor size</li> <li>• Very high resolution</li> <li>• Diagnosis</li> <li>• Extreme values</li> <li>• Temperature</li> <li>• TIM-EC EtherCAT module</li> <li>• TIM-PN PROFINET module</li> </ul>	<ul style="list-style-type: none"> <li>• Very high torques</li> <li>• High accuracy</li> <li>• Profibus interface</li> <li>• Speed system</li> <li>• Digital signal transmission</li> </ul>	<ul style="list-style-type: none"> <li>• High accuracy</li> <li>• Digital signal transmission</li> <li>• Highly dynamic</li> <li>• Very high resolution</li> <li>• Diagnosis</li> <li>• Temperature</li> <li>• Temperature gradient compensation</li> <li>• One stator fits all</li> </ul>

**We provide exceptional  
sensing and insights to  
create solutions for a  
cleaner, healthier and  
more productive world**

CONTACT US



#### ACCELERATE YOUR PRODUCT INNOVATION

HBK provides integrated solutions and domain expertise across the test and measurement product life cycle, bridging the gap between the physical world of sensors, testing and measurement and the digital world of simulation, modelling software and analysis.

**HBK – Hottinger, Brüel & Kjær**  
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