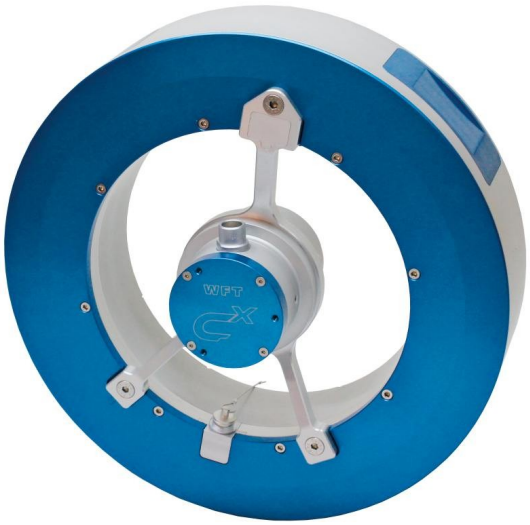
WFT-Cx - 6-Component Wheel Force Transducers

Data Sheet Version 1.2



In motor vehicle development, 6 component wheel force transducers (WFTs) are used to determine and record forces and torques at the wheels during test drives – in all three dimensions, resulting in 3 forces (Fx, Fy, Fz) and 3 torques (Mx, My, Mz). The measurement results generate the data used for computer simulations or as input parameters for test rig systems. The WFT-C^x is a wheel force transducer which is not only completely waterproof, but furthermore provide a higher thermal and mechanic load to perform even in off road tests of cars, SUVs and light trucks in any weather conditions.

A completely revised design with integrated miniature amplifiers leads to an unprecented plus of measurement precision: An optimized arrangement of strain gauges, along with on-site signal processing by integrated miniature amplifiers (one for each strain gauge), results in extremely short cable runs.

For maximal noise suppression, all amplifier inputs are fully differential (incl. bridge excitation). Up to 16 in-built thermal sensors can be used for optimal temperature compensation of strain gauges. The WFT-C^x can be used on small to large cars (minimum wheel size: 14 inches), but also on SUVs and light trucks (maximum hub diameter: 5.5 inches).

Highlights

- Waterproof (IP66, IP67)
- Ideal for brake testing due to excellent heat dissipation
- Removable stator for convenient balancing of wheels
- Online zeroing - system is ready to measure after three turns of the wheel
- Automatic balance of the wheel angular
- Incremental angular resolution with up to 5.000 points = 0.072° resolution
- Working temperature range (sensor): -40°C to +105°C

An optimized sensor design, along with the high thermal conductivity of the sensor material, avoids excessive heating of the measurement body even on heavy break tests. The entire signal processing is designed for a temperature range of -40°C to +105°C. All this results in a much wider range of applications than before, which now also includes braking tests, ride comfort tests and tire tests with the very same WFT configuration. Along with its waterproof design, its remarkable shock resistance of up to 50 g now enables WFT measurements with speed bumps!

Due to mechanically induced nonlinearities, accurate calibration for each wheel on a specially designed test rig is essential. The inhouse calibration test rig at CAEMAX has been enhanced to be able to offer optimal calibration. There, each wheel force transducer‘s profile containing all calibration and correction values necessary for exact online/real time calculation can be exactly determined.

Overview of available variants

Order Code		article number
• H-SEN-CMX-WFT-Cx-AL	Wheel Force Transducer WFT Aluminum without connection unit	1370001
• H-SEN-CMX-WFT-Cx-TI	Wheel Force Transducer WFT Titanium without connection unit	1370002

For more information, contact:
Berlin: +49 - 30 - 46 70 90 - 0 Munich: +49 - 89 - 61 30 49 - 0

Accessories

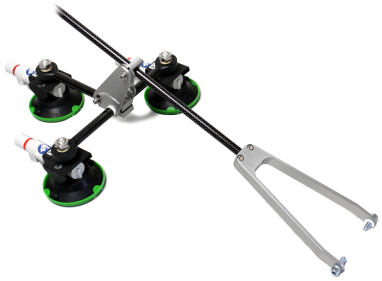
Order Code		article number

- H-SEN-CMX-WFT-Cx-STAT — Telemetry unit for WFT rotated application — 1370003
  Connection unit telemetry type for WFT in rotating applications.

- H-SEN-CMX-WFT-Cx-SI — Fixed unit for WFT stationary application — 1370004
  Connection unit fixed-type for WFT in test rack applications.

- H-SEN-CMX-WFT-Cx-HUB — Hub Adapter for WFT — 1370005
  The exact specification / type of the wheel hub is needed.
- H-SEN-CMX-WFT-Cx-RIM — Rim Adapter for WFT — 1370006
  Rim Adapter for WFT (specification of the wheel rim is needed)
- H-SEN-CMX-WFT-Cx-SCR — Bolts for WFT hub & rim adapter — 1370007
  Mounting bolts (set of 32) for mounting WFT to hub adapter and rim adapter
- H-SEN-CMX-WFT-Cx-CASE — Transportation case for WFT-C^x — 1370008
- H-SEN-CMX-WFT-Cx-MK — Torque arm (carbon) with 3 suction cups — 1370010
  Torque arm (carbon) with 3 adjustable suction caps

  H-SEN-CMX-WFT-Cx-SK (1370009): Torque arm (carbon) with 1 adjustable suction cap



- H-CAB-LEM-WFT-6m — Connection cable between Wheel Force Transducer and Control Unit, 6 m — 1370012
- H-CAB-LEM-WFT-12m — Connection cable between Wheel Force Transducer and Control Unit, 12 m — 1370013
- M-SEN-CMX-WFT-TTI-BAS — Control Unit incl. WFT telemetry interface — 1370014
  Telemetry Control Unit incl. WFT telemetry interface (TTI) for connecting of two Wheel Force Transducers. 4 slots available for further modules. Larger housings upon request.
- M-VST-CMX-TTI-STD — WFT telemetry interface — 1370015
  Additional WFT telemetry interface (TTI) for connecting two 6-component WFTs occupies 2 slots.

Optional extension

- M-KOM-CMX-WFT-CAN — CAN output module — 1370016
  CAN output module for WFT telemetry control unit, for two WFTs. Occupies 1 slot
- M-DAC-CMX-DAC-K16 — 16-channel analog output module — 1370017
  16-channel analog output module; simultaneous or asynchronous output; ± 5 or ± 10V .Occupies 1 slot.

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Optional service

- D-SEN-CMX-WFT-Cx-CAL Wheel Force Transducer calibration 1370028
  Calibration of one Wheel Force Transducer WFT incl. crosstalk compensation.
  Recommended every year.

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Technical Specs - WFT-Cx

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Parameter	Value		Remarks
Material	**Aluminium**	**Titan**	
Measurement principle	temperature compensated strain gauge application		
Measurement ranges Forces Torsional moment	 Fx, Fz = ±45 kN Fy = ±25 kN Mx, My, Mz = 8,75 kNm	 Fx, Fz = ±60 kN Fy = ±30 kN Mx, My, Mz = 10 kNm	
Protection class	IP67		
Sampling rate	up to 5 kHz		per channel
Angle resolution with 5000 increments	0.072°		equal to 5000 increments
Accuracy	<0.2% FS		of the measured value
Hysteresis	<0.2% FS		
Crosstalk	<0.2% FS		of the measured value
Low pass filter	6-pol Butterworthfilter		cut-off frequency: 1200 Hz
Weight	<7.9 kg	ca. 10.5 kg	w/o adapters
Rim diameter	min. 14" (356 mm)		
Hub diameter	max. 5.5"		with hub adapter
Operating temperature	-40°C to 105°C		
Mechanical load	stress analysis according to BMW QV 36026		
Acceleration	max. 50 g		
Max. revolution speed	max. 2300 rpm (ca. 278 km/h)		
Security	mechanical breakage protection		

General		
Parameter	**Value**	**Remarks**
Dimension (w/o adapter)	317.5 mm 203 mm 76 mm	outer diameter (OD) inner diameter (ID) height
Temperature drift	0.005% / °C	
Mounting bolts	32	
Adaption	custom specific adaption for every vehicle possible	

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