

6-Component Wheel Force Transducers (WFT)



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 WFTs are wheel force transducers which are not only waterproof, but furthermore provide a higher thermal and mechanic load to perform even in off road tests of cars in any weather conditions.

The entire signal processing system relies on extremely short signal lead lengths. Each strain gauge signal is digitized individually, all channels are recorded simultaneously. The WFTs 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 comfortable wheel mounting and convenient balancing of wheels
- Online zeroing system is ready to measure after six turns of the wheel
- Automatic balance of the wheel angular
- Incremental angular resolution of 0.072 ° (with up to 5.000 points per turn)

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 100 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 no.
H-SEN-CMX-WFT-Cx-AL	WFT-C ^x Wheel Force Transducer Aluminium without connection unit	13700001
H-SEN-CMX-WFT-Cx-TI	WFT-C ^x Wheel Force Transducer Titanium without connection unit	13700002
H-SEN-CMX-WFT-Cx-ST	WFT-C ^x Wheel Force Transducer Steel without connection unit	13700031
H-SEN-CMX-WFT-Cxs-AL	WFT-C ^{xs} Wheel Force Transducer Aluminium without connection unit	13700033

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Technical Data Sheet

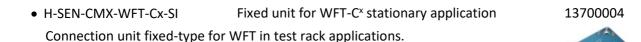


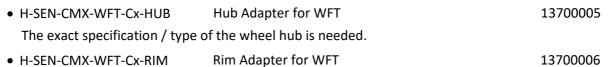
Accessories

Order Code article no.

• H-SEN-CMX-WFT-Cx-STAT Telemetry unit for WFT-C^x rotated application 13700003

Connection unit telemetry type for WFT-C^x in rotating applications.





Rim Adapter for WFT (specification of the wheel rim is needed)

• H-SEN-CMX-WFT-Cx-SCR Bolts for WFT hub & rim adapter 13700007 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 13700008
 H-SEN-CMX-WFT-Cx-MK Torque arm (carbon) with 3 suction cups 13700010

Torque arm (carbon) with 3 adjustable suction caps

• H-CAB-LEM-WFT-6m	Connection cable between Wheel Force	13700012
	Transducer and Control Unit, 6 m	
• H-CAB-LEM-WFT-12m	Connection cable between Wheel Force	13700013
	Transducer and Control Unit, 12 m	
• M-SEN-CMX-WFT-TTI-BAS	Control Unit incl. WFT telemetry interface	13700014
Telemetry Control Unit incl. W	FT telemetry interface (TTI) for connecting of two	Wheel Force
Transducers. 4 slots available f	or further modules. Larger housings upon request.	

• M-VST-CMX-TTI-STD WFT telemetry interface 13700015
Additional WFT telemetry interface (TTI) for connecting two 6-component WFTs occupies 2 slots.

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Optional extension

M-KOM-CMX-WFT-CAN CAN output module 13700016
 CAN output module for WFT telemetry control unit, for two WFTs; occupies 1 slot

 M-DAC-CMX-DAC-K16 16-channel analog output module 13700017

16-channel analog output module; simultaneous or asynchronous output; \pm 5 V or \pm 10 V; occupies 1 slot.

Optional service

D-SEN-CMX-WFT-Cx-KAL Wheel Force Transducer calibration 13700028
 Calibration of one Wheel Force Transducer WFT incl. crosstalk compensation.
 Recommended every year.

www.imc-tm.com



Technical Specs

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Parameter	WFT-C ^x			WFT-C×s	Remarks	
Material	Aluminium	Titan	Steel	Aluminium		
Measurement principle		temperature compensated strain gauge application				
Measurement ranges						
Forces	$F_{x'}, F_{z} = \pm 45 \text{ kN}$	F _x , F	_z = ±60 kN	F _x , F _z =±25 kN		
	F _v =±25 kN	F	= ±30 kN	F _y = ±20 kN		
Torsional	M_{x} , $M_{z} = \pm 8.75 \text{ kNm}$	M _x , N	, I _z = ±10 kNm	M_{x} , M_{z} = ±6 kNm		
moment	$M_{y} = \pm 8.75 \text{ kNm}$	M _y = ±10 kNm		M _y =±6 kNm		
Sampling rate	up to 10 kHz				per channel with CRFX/WFT- 2 module	
Angle resolution		0.072 °				
Accuracy		<0.2	2 %		of the measured value	
Hysteresis	<0.2 %				of the range	
Crosstalk	<0.2 %				of the measured value	
Temperature drift						
Low pass filter		cut-off frequency: 1200 Hz				
Revolution speed	ma					
Weight	approx. 7.5 kg	approx. 10.5 kg	approx. 17.5 kg	approx. 5.9 kg	w/o adapters	
	317.5 mm				outer diameter (OD)	
Dimension		203.0	mm		inner diameter (ID)	
(w/o adapter)		76.0 mm 61.5 mm		61.5 mm	height	
Rim diameter	min. 14" (356 mm)					
Hub diameter	max. 5.5"				with hub adapter	
Protection class	IP66, IP67					
Operating temperature Sensor Electronics	-40 °C to 150 °C -40 °C to 105 °C					
Mechanical load	stress analysis according to BMW QV 36026					
Acceleration						
Security	m					
Mounting bolts	32					
Adaption	custom specific adaption for every vehicle possible					