

# WFT-C - 6-Component Wheel Force Transducers

We drive in all weather conditions...

Data Sheet Version 1.0

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.

With the WFT-C<sup>X</sup>, CAEMAX presents a new generation of wheel force transducers which are 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 unprecedent 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. Along with the high incremental angular resolution of 0.072°, this guarantees the best accuracy possible.

The new WFT-C<sup>X</sup> 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
- Measurement range: Fx, Fz = ±45 kN, Fy = ±25 kN, Mx, My, Mz = 8.75 kNm
- Angular resolution 0.072°
- Working temperature range (sensor): -40°C to +150°C
- Convenient parametrization with software RemusLAB

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.

Besides convenient channel parametrization, CAEMAX's data acquisition software RemusLAB offers online display of measurement data in physical units. Measurement data from the WFT can be stored in one file with further measurement data from other sources — synchronously!

For over 20 years, the MOPS measurement amplifier has been proving its reliability based on its optimal signal processing and modular expandability due to 'plug and play'. It offers possibilities other measurement systems can only dream of: Programmable, continuous amplification from 1 ... 10000, continuously programmable active lowpass filters with Bessel or Butterworth characteristics from ca. 3 Hz - 20 kHz, autozero over twice the measurement range, a new CAN module and much more. Moreover, CAEMAX's new wheel force transducers WFT-Cx are fully supported.

Order Code	article number
WT/CMX-WFT-Cx	1380xxx
WT/CMX-WFT-Cx-TEL	1380xxx
MOPS/WFT-TTI-BAS-base	1380xxx
<b>Optional</b>	
MOPS/WFT-TTI-BAS-2ch	Second 2-channel WFT telemetry controller extension for 6-component WFT TTI
MOPS/WFT-TTI-BAS-16ch	16 channel analog output module $\pm 5$ V or $\pm 10$ V extension for 6-component WFT TTI
MOPS/WFT-TTI-BAS-CAN	CAN signal output extension for 6-component WFT TTI
1380xxx	
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1380xxx	

## Technical Specs - WFT-C

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Wheel Force Transducer		
Parameter	Value	Remarks
Measurement range	$F_x, F_z = \pm 45 \text{ kN}$ , $F_y = \pm 25 \text{ kN}$ , $M_x, M_y, M_z = 8.75 \text{ kNm}$	
Sampling rate	up to 5 kHz	
Angle resolution	0.072°	
Non-linearity	<0.2%	of applied load
Hysteresis	<0.2% FS	
Crosstalk	<0.2%	of applied load
Material	aluminum	
Weight	8.05 kg	w/o adapters
Rim diameter	min. 14" (356 mm)	
Hub diameter	max. 5.5"	with hub adapter
Protection class	IP67	
Operating temperature	-40°C to 105°C	
Mechanical load	stress analysis according to BMW QV 36026	
Shock tolerance	50 g, with mechanical breakage protection	
max. revolution speed	2300 rpm (approx. 278 km/h)	
Security	mechanical breakage protection	



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