



aim arnold intelligente messsysteme



Measuring Wheel For Passenger Cars

ROLS_{4w}

Overview

The measuring wheel system **ROLS_{4w}** has been designed to acquire operating loads as well as to carry out vehicle dynamics tests on passenger cars. It was developed especially under the aspect of easy mounting and handling. A key component here is our innovative stator which is on the inner side of the wheel and particularly easy to install. An optimized version of our proven **ROLS_{mc}** wheel electronics is used for data acquisition. Due to the co-rotating wheel electronics no external calculation unit is needed for signal acquisition, calibration and transformation. All control functions (angular offset, configuration, etc.) as well as the data output are conducted via the CAN-FD interface.

In addition to the wheel forces and moments, the specially developed two-axis accelerometer in the wheel center acquires the x- and z-accelerations.

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Design and Function

All wheel loads are detected in a one-piece measuring element ring consisting of 5 strain gauge-based three component measuring points. Each measuring point is calibrated individually and separately. The complete force flow is introduced from tire and rim ring, via the sensor ring to the wheel hub. Wheel electronics and the innovative stator are located inside the wheel hub.

The 15 bridge signals from the strain gauge measuring points are each amplified and digitally processed individually by the co-rotating electronics with an integrated high performance DSP. In this procedure wheel forces and wheel moments are calculated, by means of calibration information and wheel geometry. Via FPGA-based, capacitive, rotational angle detection, the measured values are transformed into the non-rotating coordinate system. Output of the computed data with 16/24/32 bit resolution takes place via a CAN-FD interface.

Sensor ROLS_{4w} (standard values)

Measuring channel	Measuring range
Fx	20 kN
Fy	15 kN
Fz	20 kN
Mx	4000 Nm
My	4000 Nm
Mz	4000 Nm
Angle encoder	360° and >3600 steps

Measurement/Electronics ROLS_{4w}

Type	Unit	Value
A/D Converter	Bit	SAR 16
Sampling rate	MHz	1, synchronous
Resolution	-	16/24/32Bit
Output format	-	CAN (FD), more on request
Output rate	Hz	250...8000
Output channels	-	Fx, Fy, Fz, Mx, My, Mz, Ang, Asp, Accl_x, Accl_y
Signal processing	-	DSP & FPGA Control of sampling, digital filtering, calibration of input channels, angle detection, calculation of wheel forces, coordinate transformation, output formatting, control of all functions via CAN-FD
Supply voltage	V	10...36
Temperature range	°C	-20...105
Weight measuring wheel*	kg	≈ 17
* Exemplary 17"x7,5"wheel without tire.		

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