

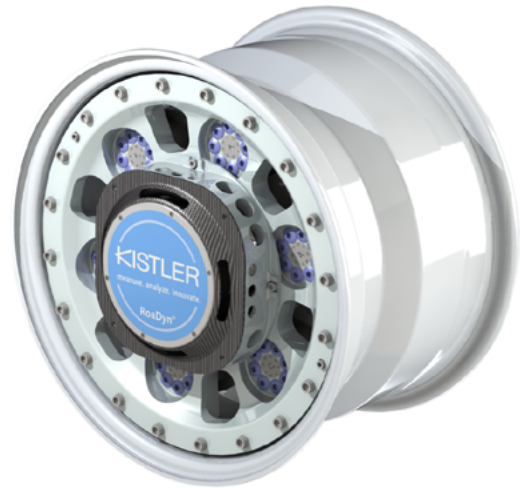
RoaDyn® S660

Type 9248A1

Wheel Force Transducer for Racing, SUVs, Transporters and Light Trucks

Wheel force transducer (WFT) for measuring three forces and three moments on a rotating wheel; a major constituent in modern vehicle development.

- Modular design with replaceable measuring cells and components
- CAD/FEM supported design: optimization of local stresses
- High strength/low WFT weight in combination with high rigidity
- Excellent signal quality due to digitization already in the wheel electronics
- Automatic identification of components by ID chip
- Calibration of the individual load cells as well as of the WFT assembly
- Tested structural fatigue strength e.g. to SAEJ328



Description

The RoaDyn S660 WFT has a modular, versatile design for mounting on hubs and rim geometries. Six 3-component strain gage load cells are connected by adapter parts to a rim and to the vehicle hub. The signals are amplified immediately in the load cells and fed via short cables to the wheel electronics. Here they are filtered, digitized and coded. The data stream is transmitted via a rotor/stator pair to the wheel inner side, transformed in the on-board electronic unit and output to a data acquisition device.

This WFT is designed for exceptionally high forces and moments associated with race cars, SUVs, off-road and light commercial vehicles. Because of often large wheel offsets, the load on the wheels is particularly high, specially with regard to moments. The anticipated stresses are determined using FEM methods, and the design optimized with regard to strength, safety and weight. Dynamic cornering fatigue investigations make it possible to estimate the life of the WFT structure.

Additional signals on the rotating wheel, such as tire pressure, temperature, etc. can be directly connected to the wheel electronics and transmitted along with the wheel signals. Kistler offers optional amplifier modules for this purpose. The wheel electronics is available in versions with 20 ... 24 channels.

Note: see data sheets 5240A_000-561, 5248A_000-562 and 9891A_000-563 for the transmission units and the on-board electronics.

Application

- Measuring operating loads during typical vehicle driving maneuvers
- Input data for the design of new components
- Verification of design loads
- Measuring test stand control data for road simulators
- (Permanent) application as multi-axle force measuring unit in road simulators
- Development of active chassis control systems such as ABS, ESP, etc.
- Investigations of vehicle behavior in specific or critical driving situations
- Input data for fatigue calculations and numeric simulations
- Development of computer models

Usually 4 or 2 WFTs are used. Occasionally measurements with a single WFT are also employed for component or tire development. The various test vehicles require adaptation to new wheel/hub geo-metries. The modular design of the WFTs and proficient support by Kistler application centers has proved successful for this purpose.

At the same time as the WFTs, systems for wheel motion measurement or optical sensors (such as for measuring tire and body slip angle, speed or accelerations) can also be used. Adaptations for applying individual sensors to the measuring wheels are available in the Kistler product range.

The WFT system described above can also be used on a vehicle test stand. Its daily exclusive use on a test stand requires, among other things, special technical characteristics, which have led to the development of a special system. Further information is contained in the data sheet 9248A2_000-696.

Technical Data

Measuring range ¹⁾	F _x	kN	-60 ... 60
	F _y	kN	-36 ... 36
	F _z	kN	-60 ... 60
	M _x	kN·m	-7,5 ... 7,5
	M _y	kN·m	-8,5 ... 8,5
	M _z	kN·m	-7,5 ... 7,5
Rotary angle accuracy		°	≈0,1
Weight WFT ²⁾	m	kg	≈18,3

Maximum Loads

Degree of protection			IP64
Operating temperature range aluminum components		°C	<160
Max. speed		km/h	>300
Max. impact accelerations	x	g	50
	y	g	50
	z	g	50

Accuracy

Crosstalk	F _y -> F _x , F _z	%	≤0,5
	F _x <-> F _z	%	≤0,5
	F _x , F _z -> F _y	%	≤0,5
Linearity		% v.E.	≤0,5
Hysteresis		% v.E.	≤0,5

Permitted alternating stress (rotating bending fatigue test)

The requirements according to SAE J328 are exceeded.

500 000 LC at 6,0 kN·m – standard application

500 000 LC at 6,5 kN·m – 15" racing applications

¹⁾ it is assumed that these extreme values do not occur simultaneously. The moments refer to the wheel center.

²⁾ with 6x16" aluminum rim, rotor, wheel electronics, hub adapter, but without ET adapter, wheel bolts and tires

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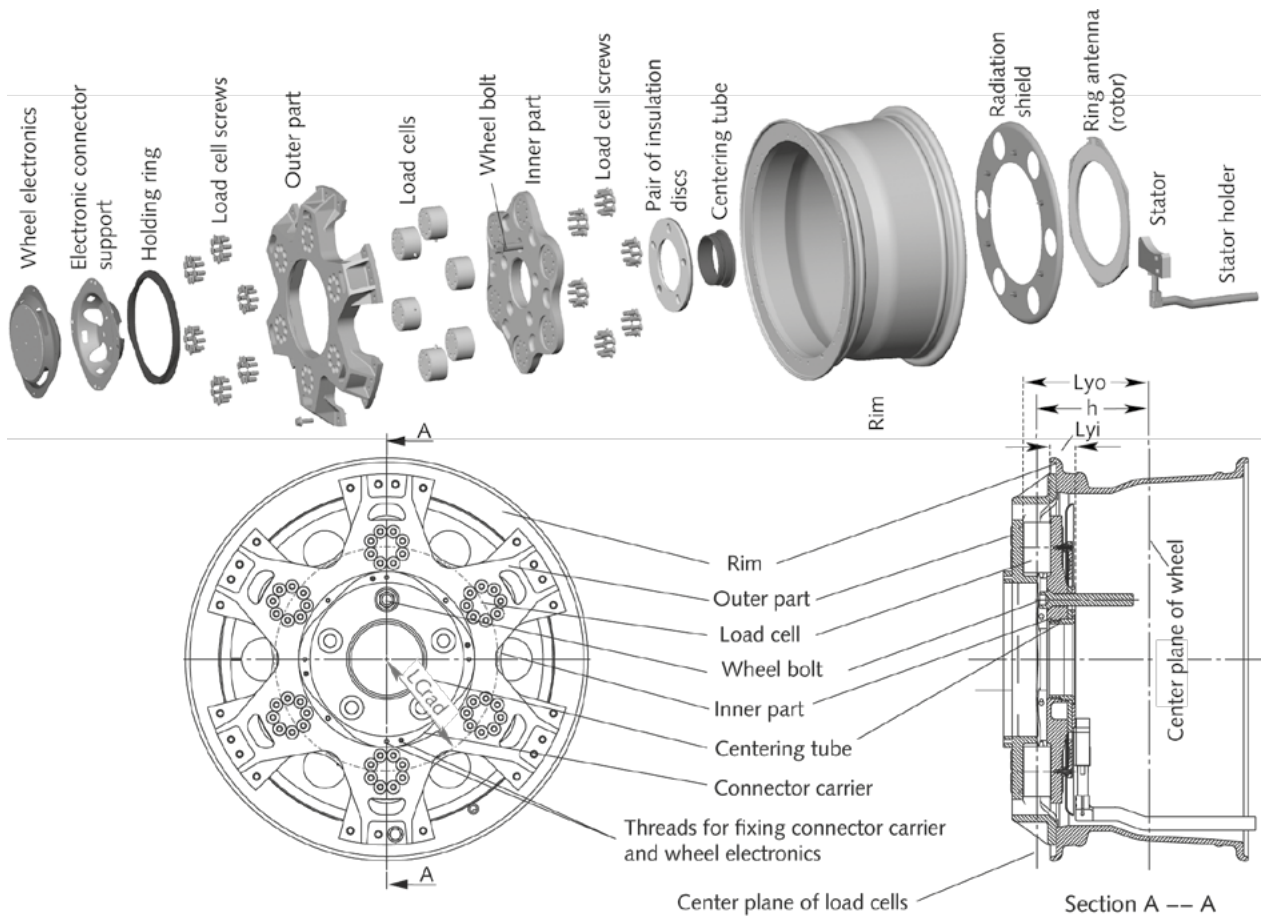












Fig. 1: RoaDyn® S660 structure/components for standard applications with in-board transmission



Fig. 2: RoaDyn® S660 structure/components for racing applications

RoaDyn® S660 Measuring Chain Configurations

Wheel Force Transducer	Data Transmission	Connection Cable	On-board Electronics	
Type 9248A1 with wheel electronics Type 5241A2 and rim Type Z39913A...	Type 5240A..., 5242A... In-board transmission unit consisting of rotor and stator	Type 30430A... Connection between stator and on-board electronics	Type 9817A.. KiRoad Performance	Type 18025602 KiCenter
				

Wheel Force Transducer	Data Transmission	Connection Cable	On-board Electronics	
Type 9248A1 with wheel electronics Type 5241A2 and rim Type Z39913A...	Type 5240A... Out-board transmission unit	Type 30430A... Connection between stator and on-board electronics	Type 9817A.. KiRoad Performance	Type 18025602 KiCenter
				

Mounting

Kistler offers weight and strength optimized mechanical structural parts to adapt to the customer's vehicles.

Mounting the Stator with In-Board Transmission

With in-board transmission, a suitable mounting device is mounted on the wheel carrier or suspension strut for the stator. The position of the stator and the location of the support is then established with a gauge.

With the stator installed, mounting a WFT is comparable with that of a production wheel. The stator can also remain mounted on the vehicle if this is running on production wheels. When the WFTs are remounted, measurements can be made again immediately.

With out-board transmission, a support arm must additionally be included in the vehicle setup, to which the cable to the on-board electronics is fixed.

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Included Accessories

• 3-component strain gage load cells, completely encapsulated, 6 per wheel	9190A8B6
• Internal part, 1 per wheel	9729A6
• Connector holder for wheel electronics, 1 per wheel	Z39904
• Outer part, 1 per WFT	9731A6...
• Rim, 1 per WFT	Z39913A...
• Ring antenna (rotor), 1 per WFT	5242A6
• Wheel electronics, 1 per WFT	5241A2...
• Hub adapter package, containing heat-insulation disks, centering sleeve and wheel bolts	9711A3
• Wheel offset adapter, 1 per wheel	9713A...
• KiRoad Performance	9817A...

Optional Accessories

• Precision spirit level, 1 per measuring system	Z30208
• Adjuster gage for stator mounting, 1 per system	Z39911Q
• Load cell tester, 1 per measuring system	5984A
• Tire mounting tool, 1 per measuring system	Z30210
• Key for centering sleeve Type Z39901, 1 per measuring system	Z30205
• 3-channel strain gage bridge amplifier (SGAM)	2237A1
• 3-channel thermocouple amplifier (TCAM)	2237A2

Ordering Code

• RoaDyn® S660 Wheel force transducer (WFT) for racing, SUVs, transporters and light trucks	Type 9248A1
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