

RoaDyn® P650 System 2000

Type 9298B1Q03

Wheel Force Transducer (WFT) for Heavy Passenger Cars, Light Trucks or SUVs

Spinning force and moment wheel force transducer to measure 3 forces and 3 moments, which are acting in the contact patch to the road surface, directly at the wheel during driving. The load capacity of this quartz based instrument allows operation with passenger cars, heavy passenger cars, light trucks or SUVs over their full speed range up to 350 km/h. The wide frequency range and very good linearity allow measurement of either small up to maximal forces or moments as well as structural behavior of tires and vehicle components.

- One instrument for passenger cars, heavy passenger cars, light trucks or SUVs
- Fast and easy installation onto the vehicle
- Two measuring ranges for maximum signal resolution
- Highest available frequency response due to quartz sensing elements
- Patented triple flange design for optimum temperature compensation
- Digital data transfer with inner transmission, or outer transmission
- IP65 sealing allows use in any weather condition
- Durability tested acc. to SAE J328

Description

RoaDyn P650 is a high-performance tool for use on test tracks and on corresponding rolling-road test stands in laboratories. The data provide a reliable basis for both determining and optimizing tire characteristics or suspension tuning, and also for the design of active suspension, traction and braking control systems. The sensor replaces the central part of a rim and can with this be easily mounted to a vehicle without modifications of the wheel hub or the suspension strut. Adapters, which are available for nearly every hub and rim, ensure that the unit can be easily fitted to any car under test.

Quartz force sensors measure three orthogonal force components. These sensors are arranged in a patented triple-flange design with two sensors in push-pull arrangement. This ensures that the unit is insensitive to temperature changes.

Signal amplification and data processing from analog signals into digital output signals, is done with the wheel-electronics, that is positioned in the center of the wheel. The digitized data will be transferred to the inside by the rotor Type 5242A1250 and stator Type 5240A or to the outside, with outer transmission Type 5248A. Three forces F_x , F_y , F_z are provided as single signals



and will be digitized in the wheel electronic, the three moments M_x , M_y , M_z are calculated signals of the on-board electronics Type 9891A, with the angle of rotation in mind.

The combination of piezoelectric quartz force sensors and highly integrated built-in electronics makes the unit rugged, easy to use and gives the highest possible measuring performance.

A complete instrumentation of a car consists of up to four wheel force transducers, a on-board electronics and optionally a data acquisition system. The system is usually powered by 9 ... 18 VDC.

Application

The RoaDyn P650 is suited for measurements of wheel forces and -moments during all kinds of driving manoeuvres for research and development purposes in the automotive- and tire industries as well as tier one suppliers. The design is specially made for flexible use with various cars or rims as well as on tire or vehicle test stands. The availability of mechanical adaptations to various measurement systems offer additional flexibility for the use of RoaDyn P625 and an ideal base for a combined use.

The instrument is suitable for both, analyses on active safety, comfort or handling and also structural analyses on tires or suspension-/vehicle components.

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Technical Data

Measuring range forces (range high)	F_x	kN	-45 ... 45
	F_y	kN	-24 ... 24
	F_z	kN	-45 ... 45
Measuring range forces (range low)	F_x	kN	-15 ... 15
	F_y	kN	-8 ... 8
	F_z	kN	-15 ... 15
Measuring range torques (range high)	M_x	kN·m	-10 ... 10
	M_y	kN·m	-10 ... 10
	M_z	kN·m	-10 ... 10
Measuring range torques (range low)	M_x	kN·m	-3,3 ... 3,3
	M_y	kN·m	-3,3 ... 3,3
	M_z	kN·m	-3,3 ... 3,3
Measuring range temperature sensors	Tlv, T1, T2	°C	-40 ... 125

Maximal Loads

Combined force vector	F_x, F_y, F_z	kN	45
Max. loads for forces and torques		%FS	120
Durability (SAE J238), half axle weight		kN	11,2
Operating temperature range	T	°C	-25 ... 80
Max. speed (≈ 350 km/h)	n	1/min	2 900
Shock resistance		g	50

Accuracy

Crosstalk [typical]	$F_x, F_z \rightarrow F_y$	%	$<\pm 2$ [1]
	$F_x \leftrightarrow F_z$	%	$<\pm 1$ [0,5]
	$F_y \rightarrow F_x, F_z$	%	$<\pm 1$ [0,5]

Linearity and Hysteresis

Linearity (around circumference) all channels (typ.)	% Range	$<\pm 1$
Hysteresis (around circumference) all channels (typ.)	% Range	$<\pm 1$

Thermal Behavior

Electrical drift				
$F_x/F_z^{1)}$ @ T = 20 °C	$e_{\text{Drift},F_x}(20^\circ)$	N/min	typical 0,4	
F_y @ T = 20 °C	$e_{\text{Drift},F_y}(20^\circ)$	N/min	typical 0,2	

Other Physical Data

Additional mass of fully equipped wheel ²⁾	m	kg	$\approx 4,9$
Mass of RoaDyn P650 digital	m	kg	≈ 9
Max. weight wheel force transducer ³⁾	m	kg	$\approx 16,4$
Natural frequency (free-free)	f_0	Hz	≈ 2 190
Degree of protection	EN60529		IP65
Number of mounting screws on wheel			
Type 9298B1Q03			4/5
Type 9298B2Q03			6
Rim size	inch		14 ... 20

¹⁾ In rotational situation the electrical drift causes an oscillation with an amplitude of the given values.

²⁾ Reference: 7x16"

³⁾ incl. 7x16" rim, rim adaption, hub adaption and P650 digital

The instrument is according to EG regulation 89/EWG C€ conform and complies the EMC regulation for industry and laboratory EN50081-1 (emission) and EN61000-6-2 (immunity).

Dimensions

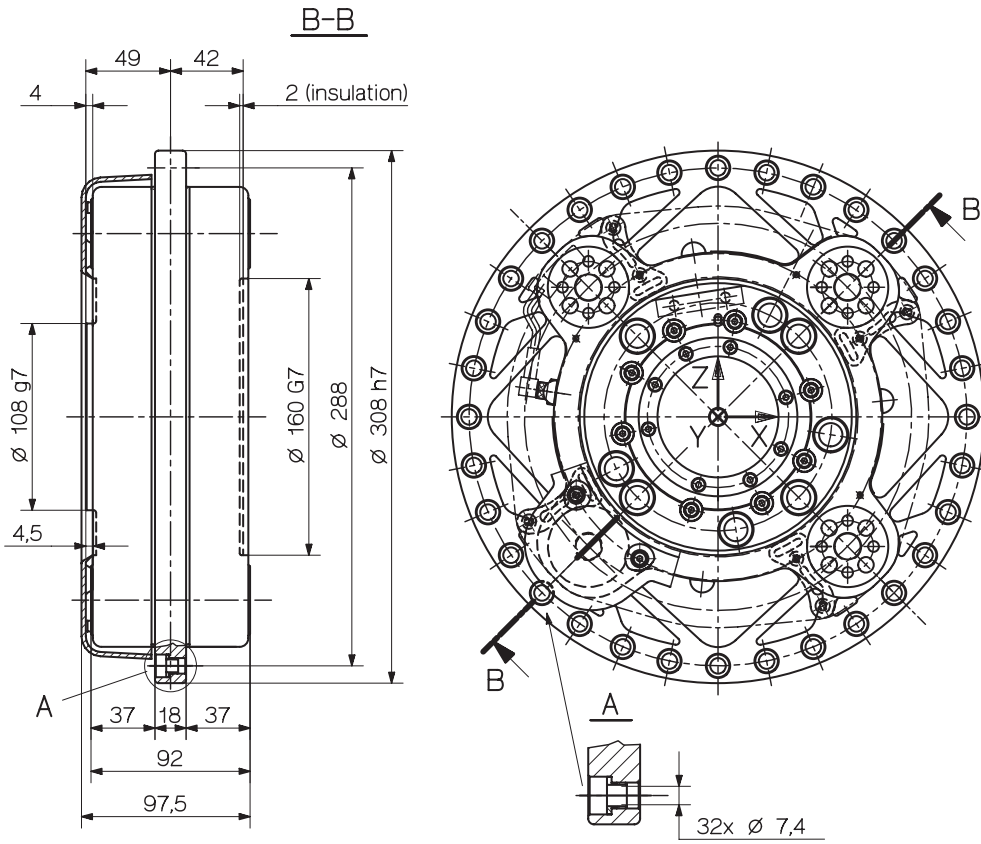










Fig. 1: Dimensions of RoaDyn® P650 System 2000, Type 9298B1Q03

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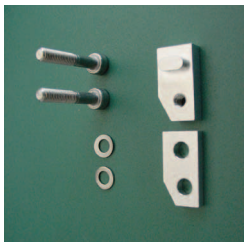
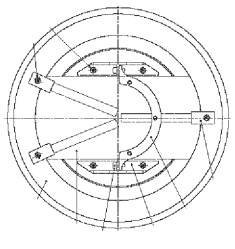

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Configuration of RoadDyn® P650 System 2000

<p>Sensor</p> <p>Type 9298B1Q03</p> 	<p>Transmission unit consisting of rotor, stator and connecting cable to the On-Board Electronics System 2000</p> <p>Type 5240A..., 5242A..., Z30430A...</p> 	<p>On-Board Electronics System 2000</p> <p>Type 9891A...</p> 	<p>Remote Control for On-Board Electronics System 2000</p> <p>Type 5685A...</p> 
<p>Sensor</p> <p>Type 9298B1Q03</p> 	<p>Outer Transmission Unit for System 2000 with Connecting Cable</p> <p>Type 5248A..., Z30430A...</p> 	<p>On-Board Electronics System 2000</p> <p>Type 9891A...</p> 	<p>Remote Control for On-Board Electronics System 2000</p> <p>Type 5685A...</p> 

Accessories

Balancing Adapter (for Rim)	Type Z18432	
Distance Ring (for Balancing Adapter)	Type Z17984Q...	
Hub Adapter	Type 9869A...	
Rim with Rim Adapter	Type 9877A...	
Service Toolbox	Type Z17019	

Sensor-Adaptation (Correvit®)	on request	
Additional Channel Kit	on request	
Slip Fixation (Half Axle Test Rig)	Type Z18588	
Zimmer Mirror Adaptation	on request	
RV3	on request	

Correvit® is a registered trade mark of Kistler Holding AG.

Mounting

The RoaDyn P650 features low mass, high rigidity and low temperature dependence. The modular design allows the original rim size and offset to be maintained by using vehicle-specific adapters and standard rim components.

Rim adapters, which are used to attach BBS rims of various sizes and offsets, also allow to exchange pre-mounted, inflated and balanced tire/rim-base assemblies very quickly.

Hub adapters can be designed to accommodate both 4 and 5 screw fixations, special adaptations for 6 screw fixations are available on request. A second RoaDyn P650 version, which adapts to 6 screw fixations on a standard base is alternatively available, special 4 or 5 screw fixations are also available on request for this type.

The hub adapter is fastened to the hub before the wheel force transducer is attached. Rim adapters and hub adapters are matched to give the desired in- or outset. The assembly therefore, replaces the standard rim.

Accessories Included

- Fixation screws

Optional Accessories

- | | |
|---|----------------------------|
| • Transportation suitcase | Type/Art. No.
7.070.069 |
| • Control unit system 2000 for up to 1 ... 4 wheel force transducers (incl. remote control box) | 9891A... |
| • Rim with rim adapter, pre-balanced dimensions according to customers specification | 9877A... |
| • Hub adapter for 4- oder 5- hole fixation, dimension according to customers specifications | 9869A... |
| • Hub adapter for 6- hole fixation, dimension according to customers specifications | 9869A... |
| • Service toolbox | Z17019 |
| • Stator alignment gage system 2000 | Z17019-10 |
| • Tire (dis-)mounting tool | Z30210 |
| • Balancing adapter for rim | Z18432 |
| • Distance ring for balancing adapter | Z17984Q... |
| • Data acquisition | individual |
| • Correvit SL sensor adapter | Z20261 |
| • RV-4 adapter | on request |
| • Krypton Wheeltracker adaptation | on request |
| • Additional channel kit | on request |
| • Zimmer Autokollimator mirror adaptation | on request |

Ordering Code

- | | |
|---|--------------------------|
| • RoaDyn P650 System 2000 wheel force transducer for heavy passenger cars, light trucks or SUVs | Type
9298B1Q03 |
|---|--------------------------|



Fig. 2: RoaDyn® P650 with digital in-board transmission and RV-4 wheel vector sensor with Correvit®-SF sensor



Fig. 3: RoaDyn® P650 with digital in-board transmission

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This information corresponds to the current state of knowledge. Kistler reserves the right to make technical changes. Liability for consequential damage resulting from the use of Kistler products is excluded.

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