

RoaDyn® P106

Type 9294B11

Wheel Torque Transducer up to $\pm 6\,000\text{ N}\cdot\text{m}$

The RoaDyn P106 wheel torque transducer is a universal sensor for measuring the traction torque M_y of small and large cars, SUVs, light trucks and high-performance vehicles up to a maximum of $\pm 6\,000\text{ N}\cdot\text{m}$.

- Two independent measuring ranges (10 and 100 %)
- Automatic identification and configuration of torque measuring wheel
- Adapters for quick and easy mounting on different vehicles
- Setup time less than 15 minutes
- Low additional unsprung mass and low moment of inertia
- Hub and rim adapters can also be used for RoaDyn P6
- PremiumLine available with slip ring or telemetry transmission
- 4 additional temperature channels for simple connection of K-type sensors
- Slip ring version of PremiumLine with additional three resolver signals and three customized signal channels

Description

The measuring system has three main components: wheel torque transducer, data transmission module and on-board electronics (control unit). An analog slip ring system with connecting cable or a wireless digital telemetry transmission system is available for transmitting data from rotating wheel to on-board electronics.

Using the RoaDyn P106 wheel torque transducer to replace the middle part of the rim integrates it into the suspension system in the most effective position for acquiring wheel forces or torques. Mounting on the vehicle is comparable with changing a standard wheel.

The traction torque M_y is measured with piezoelectric quartz sensors. The signals are amplified and conditioned in the electronics system integral with the wheel. On power up the sensor automatically logs onto the control unit and runs an identification routine. All of the sensor data is downloaded automatically and the system is quickly ready for use without further user intervention.

The RoaDyn P1 is available with telemetry or slip ring transmission. The signal is therefore transmitted to the customer's data acquisition system by either with analog (slip ring) or



digital CAN-Bus (telemetry) means. The transmission modules are quickly and easily exchangeable. They transmit other signals in addition to the traction moment M_y . For monitoring purposes, up to four K-type temperature measuring elements can be connected to each wheel. The slip ring version also transmits three resolver signals and three customized signals.

Application

The RoaDyn P106 wheel torque transducer Type 9294B11 was designed and developed in close collaboration with the motor vehicle industry for practical and research applications. The focus is on dynamic stability and traction control, testing and development of ABS systems, investigation of fading effects and brake vibration, power measurements and determination of friction coefficients and coasting characteristics. Other uses include the development of transmissions and chassis control systems, and preparation of government safety tests such as the American FMVSS 135.

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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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Technical Data

RoadDyn P106

Measuring range torque (upper range)	M_y Q	N·m pC	$\pm 6\ 000$ $\pm 231\ 000$
Measuring range torque (lower range)	M_y Q	N·m pC	± 600 $\pm 23\ 100$
Calibration range forces (upper range)	F_x F_y F_z	kN kN kN	0 ... 20 0 ... 12 0 ... 20
Calibration range forces (lower range)	F_x F_y F_z	kN kN kN	0 ... 2,0 0 ... 1,2 0 ... 10
Calibration range torque (upper range) (lever arm R = 300 mm)	M_y	N·m	0 ... 6 000
Calibration range torque (lower range) (lever arm R = 300 mm)	M_y	N·m	0 ... 600
Max. vehicle mass (Durability: SAE J328/Guidelines No. 287, §30 StVZO, Germany)	m	kg	3 500
Max. load for forces	F_x, F_z F_y	kN kN	± 24 ± 15
Max. load for torque	M_x M_y M_z	N·m N·m N·m	$\pm 6\ 000$ $\pm 7\ 200$ $\pm 6\ 000$
Max. combined force vector	F_x, F_y, F_z	kN	25
Operating temperature range	T	°C	-25 ... 80
Max. speed (≈ 250 km/h)	n	min ⁻¹	2 200
Shock resistance		g	50
Thermal zero offset	$e_{TK0, My}$	N·m/K	≤ 2

Accuracy

Crosstalk, from F_y to M_y Average	$e_{cross, My}(F_y)$	N·m/kN	$\leq \pm 2$
Variation	$e_{cross, My}(F_y)$	N·m/kN	$\leq \pm 2$
Crosstalk, from F_z to M_y Average	$e_{cross, My}(F_z)$	N·m/kN	$\leq \pm 2$
Variation	$e_{cross, My}(F_z)$	N·m/kN	$\leq \pm 1$
Circumferential variation around circumference	S_{My}	% S_{My}	$\leq \pm 1$
Average linearity around circumference	$e_{Lin, My}$	%Range	$\leq \pm 1$
Average hysteresis around circumference	$e_{Hist, My}$	%Range	≤ 1

Other Technical Data

Rim size (other sizes on request)		Inch	14 ... 20
Temperature measuring element (PremiumLine only)	Quantity	Type	K(NiCr-Ni) 4
Mass of RoadDyn P1xy Type 9294B... ($\varnothing 308$ mm)	m	kg	5,0
Natural frequency (free-free) Type 9294B... ($\varnothing 308$ mm)	f_0	Hz	$\approx 1\ 000$
Moments of inertia (calculated)	J_x J_y	kgm ² kgm ²	26×10^{-3} 48×10^{-3}
Degree of protection			IP65 EN60529
Conforms to following directives			89/336/EWG
EMC (interference)			EN61000-6-4: 2001 (EN55011 Class A)
EMC (immunity)			EN61000-6-2: 2001

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Fig. 1: RoadDyn® P106 with slip ring transmission PremiumLine



Fig. 2: RoadDyn® P106 on hybrid vehicle

Dimensions

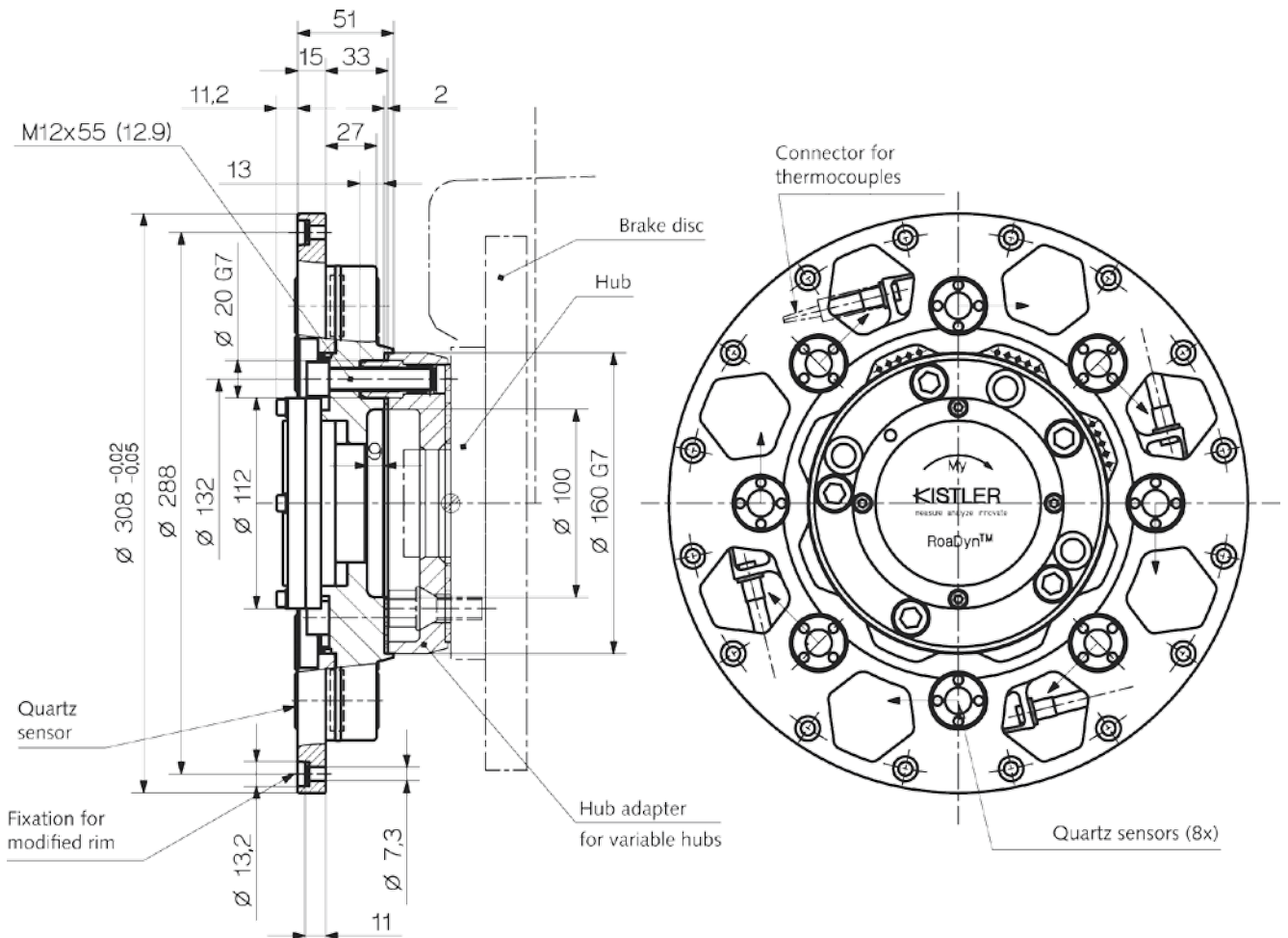


Fig. 3: Dimensions of RoaDyn® P106

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Configurations

	RoaDyn P106 Type 9294B211	Slip Ring BaseLine Type 9875	Fixing Arm BaseLine Type 9899	Connection Cable BaseLine Type 1767A7	Control Box BaseLine Type 5693	Available Measurement signals
Measuring chain RoaDyn BaseLine P106 with slip ring transmission module						Torque M_y
Measuring chain RoaDyn PremiumLine P106 with slip ring transmission module					 Control Unit PremiumLine Type 9867A...	Torque M_y 4 x Temperature on measuring wheel 3 x Resolver signals 1 x Temperature pcb 3 x customized signals
Measuring chain RoaDyn PremiumLine P106 with telemetry transmission module					Control Unit PremiumLine Type 9813A2	Torque M_y 4 x Temperature on measuring wheel 1 x Temperature pcb 1 x Battery voltage



Fig. 4: RoaDyn® P106 with slip ring transmission

Accessories

Wheel Balancing Adapter for Rim Type Z18432	Distance Ring for Wheel Balancing Adapter Type Z17984Q...	Hub Adapter Type 9869A...	Rim Ring with Hub Adapter Type 9877A...	Toolbox (Kit) Type Z18475
				

Included Accessories

- Mounting screws M12
- Mounting screws M7

Type/Art. No.

- 6.120.147
- 5.210.327

Ordering Key

- RoaDyn® P106
Wheel torque transducer
up to ±6 000 N·m

Type 9294B11

Optional Accessories

- | | Type/Art. No. |
|---|----------------------|
| • Slip ring module BaseLine | 9875 |
| • Connection cable BaseLine | 1767A7 |
| • Fixing arm BaseLine | 9899 |
| • Control box BaseLine | 5693 |
| • Slip ring module PremiumLine | 9873 |
| • Connection cable PremiumLine | 1763B7 |
| • Fixing arm PremiumLine | 9881 |
| • On-board electronics module PremiumLine for slip ring module | 9867A... |
| • Control box PremiumLine | 5683 |
| • Telemetry module PremiumLine | 9811A |
| • On-board electronics module PremiumLine for telemetry module | 9813A2 |
| • Rim with rim adapter (customized) | 9877A... |
| • Hub adapter 4-, 5-, 6-hole (customized) | 9869A... |
| • Transportation box for one RoaDyn P106 | 7.070.070 |
| • Transportation box for on-board electronics PremiumLine Type 9867A... | 7.070.071 |
| • Maintenance and service toolbox for RoaDyn P106 | Z18475 |
| • Basic tool service kit for RoaDyn P106 | Z20608 |
| • Wheel balancing adapter | Z18432 |
| • Distance ring for wheel balancing adapter for offset compensation | Z17984Q... |

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