

# RoaDyn P530

Type 9295B...

## Measuring hub for tire test stands

The RoaDyn P530 measuring hub is the ideal instrument for measuring the wheel force and torque on tire test stands in the laboratory as well as on mobile test vehicles. The system measures the orthogonal forces  $F_x$ ,  $F_y$ ,  $F_z$  and torques  $M_x$ ,  $M_y$ ,  $M_z$ . It is uniquely suited for the dynamic measurement of tire non-uniformity, tire vibration, and tire characteristics.

- Maximum measuring accuracy during high dynamic testing
- Suitable for tires of ICE vehicles, EVs, hybrids, NEVs, BEVs and FCEVs
- Fits to wheels with rim size 13 inches or larger; smaller rims may be mounted with a compatible adapter
- Fits to standard rims with interchangeable adapters; custom rims not required
- Bearings with oil lubrication and cooling for rotational speeds up to 3 000 min<sup>-1</sup> at full load
- Alternative grease lubrication for rotational speeds up to 2 000 min<sup>-1</sup> for short running periods available upon request

### Description

The RoaDyn P530 measuring hub is a robust, high-precision instrument equipped with quartz sensors. Four 3-component force sensors are mounted with high preload between two plates. Inside, a rotating shaft with bearings holds the mounted wheel in place.

The path-independent measurement of the force components naturally result in a minimum crosstalk between the components and a resonant frequency of the complete measuring system. The end of the shaft is lead through the rear side of the dynamometer and is prepared for connecting a brake or driving device. It provides an oil circulation for lubrication and cooling of the bearings, resulting in perpetual heat conditions even when high loads are applied.

The mechanical interfaces for mounting on the tire test stand allow front or rear side mounting.

The dynamometer is protected against corrosion, splash water and dust. The measured signals are transmitted to the charge amplifier (with summing amplifier) via a robust high-insulation cable.



### Application

- Measurement of force and moment resulting from tire non-uniformities, even at high speeds (non-uniformity tests)
- Quasistatic, dynamic and highly dynamic measurements of tire characteristics
- Tire vibration measurement
- Universal measuring tool for laboratory tire test stands in the fields of research, development and quality control
- Detection of vibrations and associated noise, which are particularly important in the application of NEVs.

9295B\_000-991e-09\_24

## Technical data

Measuring range	$F_x, F_y$	kN	–20 ... 20
	$F_z$	kN	0 ... 30
	$M_x$	kN·m	–7.86 ... 7.86
	$M_y$	kN·m	–3.00 ... 3.00
	$M_z$	kN·m	–1.24 ... 1.24
Overload	$F_x, F_y$	kN	–30 ... 30
	$F_z$	kN	0 ... 42
Calibrated range	$F_x$ high	kN	0 ... –20
	$F_x$ low	kN	0 ... –2
	$F_y$ high	kN	0 ... 20
	$F_y$ low	kN	0 ... 2
	$F_z$ high	kN	0 ... 30
	$F_z$ low	kN	0 ... 3
Force application point	R (tire radius)	mm	300
Force calibration	e (wheel offset)	mm	38
	$e_D$ (offset)	mm	62
Active cell distance		mm	160
Nominal sensitivity	$F_x$	pC/N	–7.7
	$F_y$	pC/N	–3.9
	$F_z$	pC/N	–7.7
Linearity	$F_x, F_y, F_z$	%FSO	$\leq \pm 0.5$
Crosstalk <sup>1)</sup>	$F_x \rightarrow F_y, F_z$	%	$\leq \pm 2$ ( $\leq \pm 1$ )
	$F_y \rightarrow F_x, F_z$	%	$\leq \pm 2$ ( $\leq \pm 1$ )
	$F_z \rightarrow F_x, F_y$	%	$\leq \pm 2$ ( $\leq \pm 1$ )
Natural frequency, freely suspended	$f_0$ (x, z)	Hz	$\approx 2\,400$
Rotational speed			
	grease lubrication	min <sup>–1</sup>	$\leq 2\,000$
	oil lubrication	min <sup>–1</sup>	$\leq 3\,000$
Operating temp. range		°C	–20 ... 80
Temperature error	y <sup>2)</sup>	N/°C	$\approx 15$
	x, z	N/°C	$\approx 5$
Insulation resistance		$\Omega$	$> 10^{13}$
Ground insulation		$\Omega$	$> 10^8$
Degree of protection			IP65 (EN60529)
Output flange socket (ground-insulated)			Fischer, 9-pin neg.
Dimensions			see page 3
Weight (approx.)		kg	70

## Requirements for oil lubrications

Supply pipe		number	2
Pipe diameter	di/da	mm	6/8
Oil pressure <sup>3)</sup>	p	bar	$\leq 0.5$
Flow / per supply each	$\dot{V}$	l/min	0,5 ... 1
Flow / total	$\dot{V}$	l/min	1 ... 2
Kinematic viscosity	$\nu$	mm <sup>2</sup> /s	20 ... 25
Return pipe		number	2
Pipe diameter	di/da	mm	8/12
Oil pressure	p	bar	pressure-free

<sup>1)</sup> Typical values in brackets

<sup>2)</sup> After warm-up

<sup>3)</sup> Pressure limiting valve recommended

## Dimensions

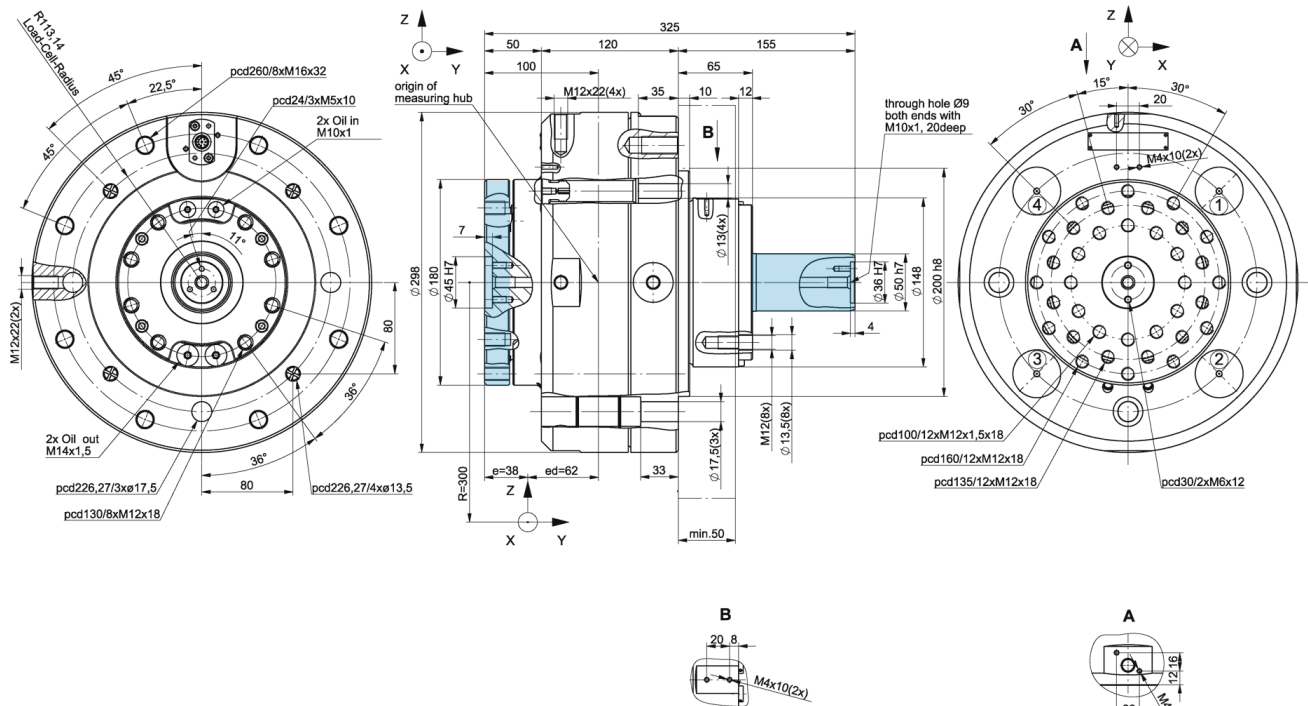


Fig. 1: Dimensions of RoaDyn P530, Type 9295B1, oil lubricated (lubrication system not included); rotating parts are highlighted in blue

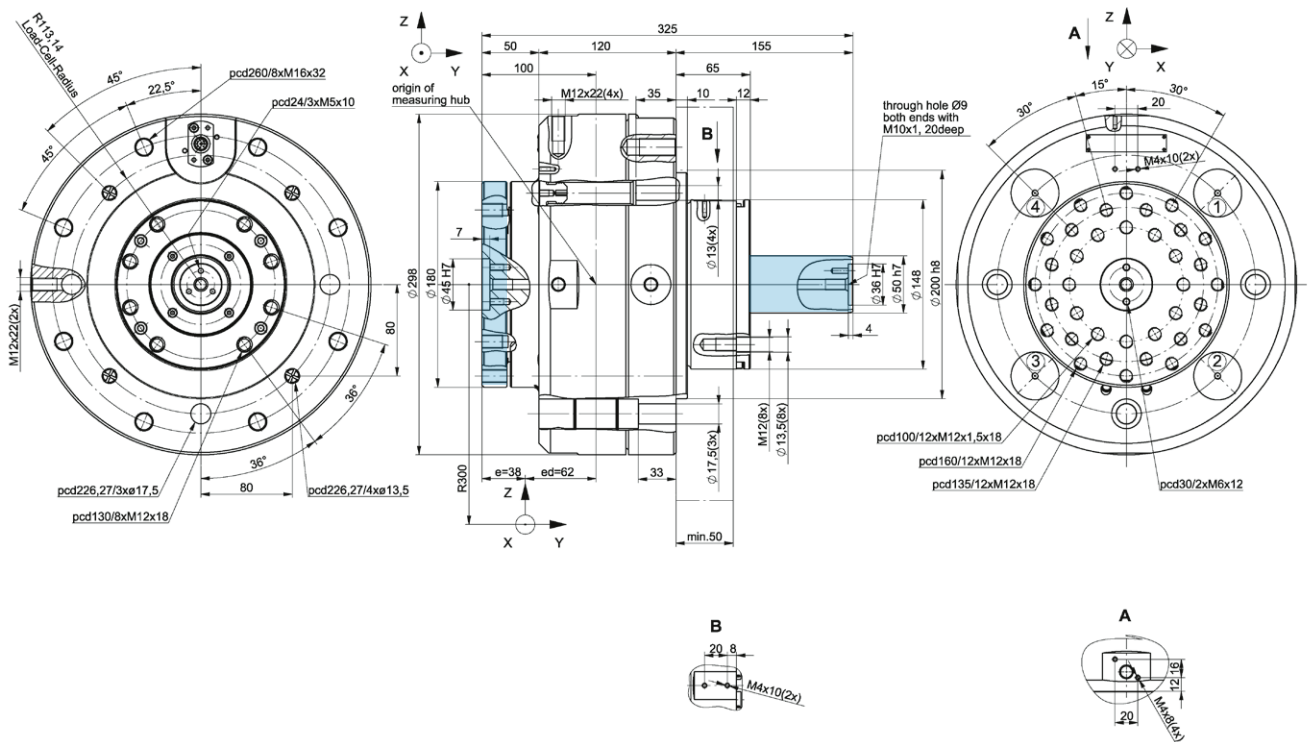


Fig. 2: Dimensions of RoaDyn P530, Type 9295B2, grease lubricated; rotating parts are highlighted in blue

### Test stand connection

Measuring hubs of Type 9295B1 and Type 9295B2 can be connected at the front side using 3xM16 and 4xM12 screws, or at the rear side using 8xM16 screws (scope of delivery). Fig. 3 shows the corresponding geometry. When using the 90° angle plug, an additional slot must be cut (width 25 mm, depth 25 mm, length >80 mm).

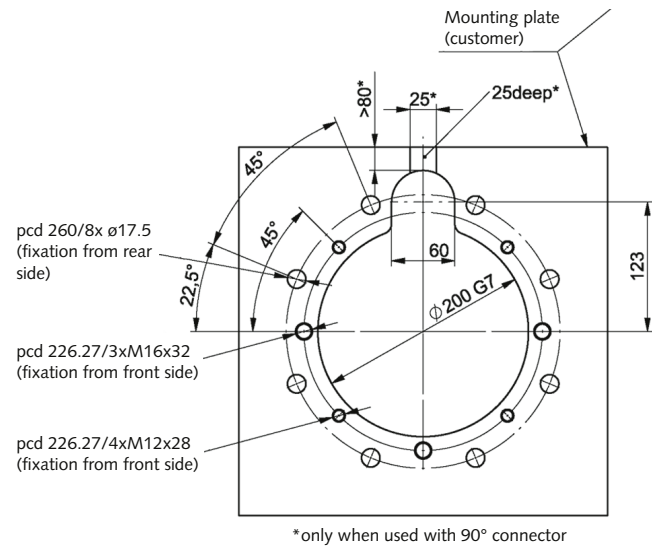


Fig. 3: Test stand connection - dimensions

### Mounting the test object

The test object is mounted on the front side of the shaft, either directly or by using an appropriate adapter. The designated hole patterns are at 100, 135, and 160 mm on the pitch circle diameters.

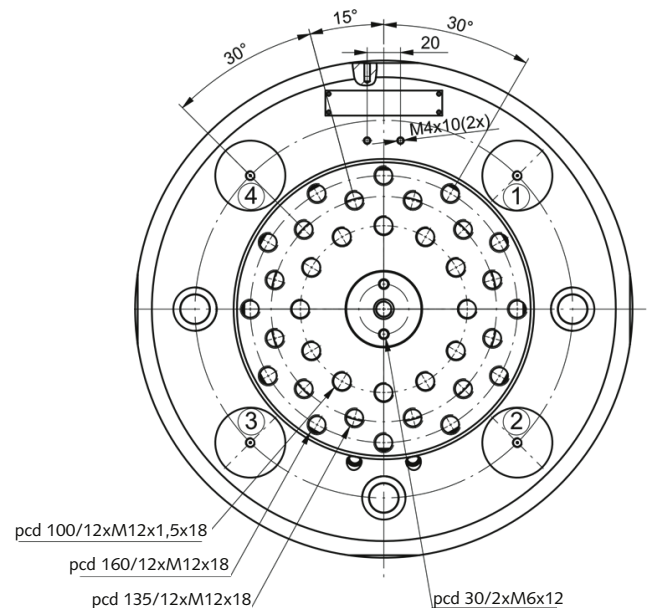


Fig. 4: Test object installation - dimensions

### Wheel centering

If the test object is mounted directly on the shaft, it is possible to mount an additional centering pin on the front side of the shaft ( $\varnothing 45$  H7, 2xM6). This configuration may also be used for centering an intermediate adapter (see Fig. 5).

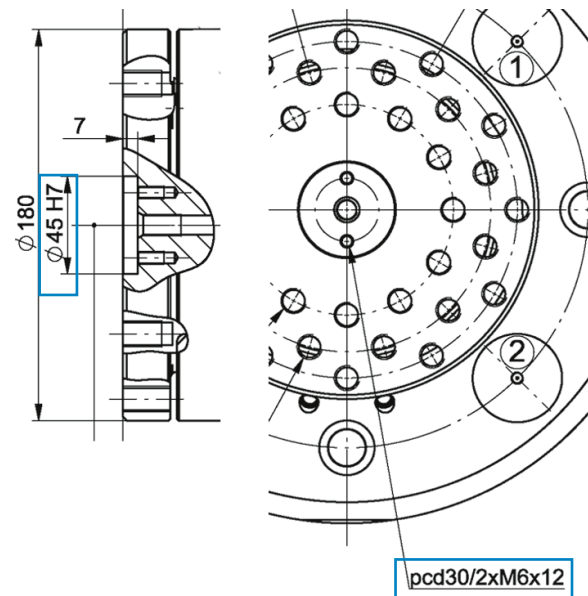


Fig. 5: Wheel centering - dimensions

### Mounting a brake

For mounting a brake, the rear side of the measuring hub provides 8xM12 on a pitch circle of 130 mm (see Fig. 6).

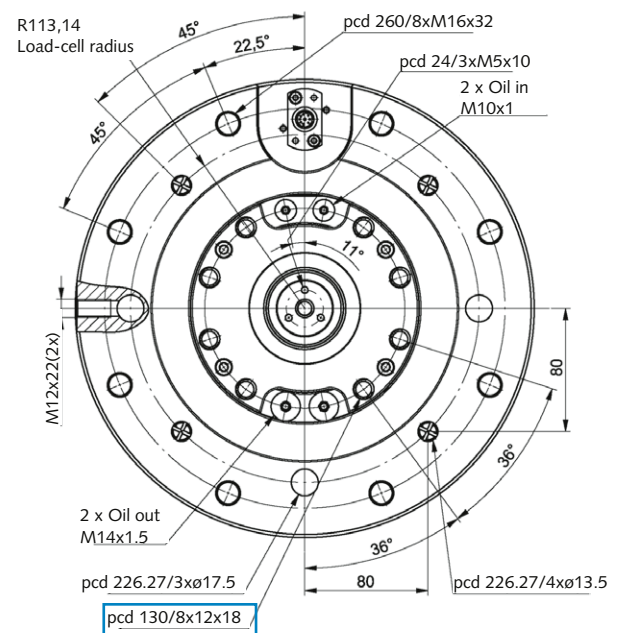







Fig. 6: Brake installation - dimensions

### Other mechanical interfaces

The shaft provides a through-going bore (M10x1 at the ends), which can be used for feedthrough of cables or compressed air (see Fig. 2). It is possible to mount a rotary encoder or a slip ring for compressed air or additional signals on the rear side of the shaft (centering  $\varnothing 36$  H7, 3xM5 pcd 24 mm).

### Measuring chain

Measuring hub RoaDyn P530 Type 9295B...	Connection cable (straight plug) Type 1677A5 (l = 5 m) Type 1677Asp (l = 1 ... 20 m)	Extension cable Type 1678A5 (l = 5 m) Type 1678A10 (l = 10 m) Type 1677Asp (l = 1 ... 20 m)	Charge amplifier Type 5167Ax1	Customer's data acquisition
				not included
	or			
	Connection cable (90° plug) Type 1679A5 (l = 5 m) Type 1679Asp (l = 1 ... 20 m) 			

#### Included accessories

- Ring bolts, 2 pcs. M12
- Oil connection adapter, 2 pcs M10x1
- Oil connection adapter, 2 pcs M14x1.5
- Sealing ring, 2 pcs. 10.2/15.9x1
- Sealing ring, 2 pcs. 14.5/17.9x1,5
- Hoisting block, 1 pc
- ISK screw for hoisting block, 1 pc M12x45
- Fixing screw, 8 pcs M16x70
- Fixing screw, 4 pcs M12x55/36

#### Type/art. no.

65013149  
 65003244\*  
 65003245\*  
 65007701\*  
 65007703\*  
 55088555  
 65012849  
 65012819  
 65012798

#### Ordering key

RoaDyn P530, oil lubricated	1
RoaDyn P530, grease lubricated	2

 Type 9295B ☐

\* only for 9295B1

#### Ordering example

Measuring hub RoaDyn P530, oil-lubricated

Type 9295B1

#### Optional accessories

- Connection cable, 8-core with flexible stainless steel hose, straight plug
- Connection cable, 8-core with flexible stainless steel hose, 90° plug
- Extension cable
- Multichannel charge amplifier

#### Type/art. no.

1677A5/Asp  
 1679A5/Asp  
 1678A5/  
 A10/Asp  
 5167Ax1

#### Additional Kistler products for this application

- RoaDyn S220 measuring hub for rolling resistance measurement of passenger car tires on tire test stands
- RoaDyn S260 measuring hub for rolling resistance measurement of truck tires on tire test stands
- RoaDyn S530 measuring hub for endurance measurement of passenger cars tires on tire test stands
- RoaDyn S55T (60 kN) measuring hub for measurement of truck tires on tire test stands
- RoaDyn S5MT (100 kN) measuring hub for measurement of truck tires on tire test stands

#### Type/Art. No.

9289A103  
 9289A113  
 9289A013  
 9289A253  
 9289A263