

RoaDyn® P530

Type 9295A...

Measuring Hub for Tire- and Wheel Test Benches

The measuring hub RoaDyn P530 is the ideal instrument to measure the wheel forces and moments on tires at tire test stands in the lab or on mobile test trailers.

The system measures the three orthogonal forces F_x , F_y and F_z and the torques M_x , M_y and M_z . It is specially suited for the measurement of tire non-uniformity, tire vibration and tire characteristics.

- Holds wheels with rim sizes 13" and larger
- Adapts to standard rims with exchangeable adapters, no special rims necessary
- Bearings with oil-lubrication and -cooling for speeds up to 2 000 min^{-1} at full load
- Solutions for vertical and horizontal arrangement
- Various mechanical interfaces to customer needs available on request
- Easy adaptation to test stands

Description

The RoaDyn P530 measuring hub is a rigid quartz based instrument. The instrument itself is stationary with four 3-component force sensors mounted with high preload between a base and top plate, which holds a spindle (shaft) and bearings that carry the wheel.

The force components are measured practically path-independently. This yields minimal crosstalk between the components and a very high natural frequency of the whole system. The shaft end is led out on the rear side of the dynamometer and is prepared for installation of a braking respectively driving device.

An oil circuit is provided for lubrication and cooling of the bearings, which allows for constant thermal conditions even when large loads are applied.

The mechanical interfaces for mounting onto the tire test stand and for mounting the test rims are adapted to customer specification.

The measuring hub is also available without led-out shaft end. In this case, however, a driving respectively braking torque M_y cannot be applied without special adaptation; the measured M_y then corresponds to the bearing friction only. The dynamometer is proof against corrosion, splash-water and dust. The signals measured are transferred without being processed with an armoured high resistance cable to the standard charge amplifier respectively summing amplifier, which is positioned in the control room of the test stand.



Application

- Measurement of forces and moments caused by tire non-uniformities even at high speeds
- Quasistatic and dynamic tire characteristics measurements
- Vibration measurements for structural analyses on tires
- Universal measuring instrument with laboratory tire testing machines for research and development or quality control

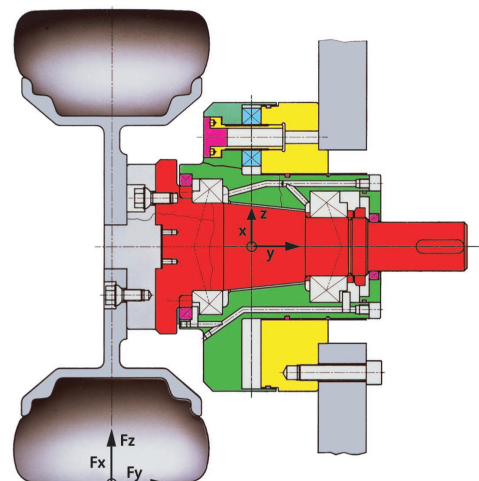


Fig. 1: Cross-section measuring hub P530

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Technical Data

Measuring range	F_x, F_y	kN	-20 ... 20 ¹⁾
	F_z	kN	0 ... 30 ¹⁾
	M_x	kN·m	-7,5 ... 7,5
	M_y	kN·m	-3 ... 3
	M_z	kN·m	-1,3 ... 1,3
Calibrated partial range	F_x, F_y	kN	0 ... 2
	F_z	kN	0 ... 3
Overload	F_x, F_y	kN	-30/30
	F_z	kN	-42/42
Sensitivity	F_x	pC/N	≈-8
	F_y	pC/N	≈-3,7
	F_z	pC/N	≈-8
Linearity	F_x, F_z, F_y	%FSO	≤±0,5
Hysteresis	F_x, F_z, F_y	%FSO	≤0,5
Crosstalk	$F_y \rightarrow F_x, F_z$	%	≤±1,5
	$F_x \leftrightarrow F_z$	%	≤±1,5
	$F_x, F_z \rightarrow F_y$	%	≤±2
Natural frequency	$f_n(x, z)$	Hz	≈2 400
	$f_n(y)$	Hz	≈2 100
Maximum speed		min ⁻¹	≤2 000

Operating temperature range	°C	-20 ... 70
Insulation resistance	Ω	>10 ¹³
Ground insulation	Ω	>10 ⁸
Degree of protection according to DIN40050		IP65
Dimension		
diameter	mm	298
length	mm	337
Weight	kg	72

Requirements for Oil Lubrication

Inlet pipe	number	2
	di/da	mm 6/8
Oil pressure ²⁾	p	bar ≤0,5
Flow rate/per inlet pipe	\dot{V}	l/min 1
Flow rate/total	\dot{V}	l/min 2
Kinematical viscosity (@40°)	v	mm ² /s 20 ... 25
Outlet pipe	number	2
	di/da	mm 8/12
Oil pressure	p	bar pressureless

¹⁾ with standard force application point at tire radius $R = 300$ mm and press-in depth $e = 38$ mm

²⁾ Pressure-control valve is recommended

Dimensions

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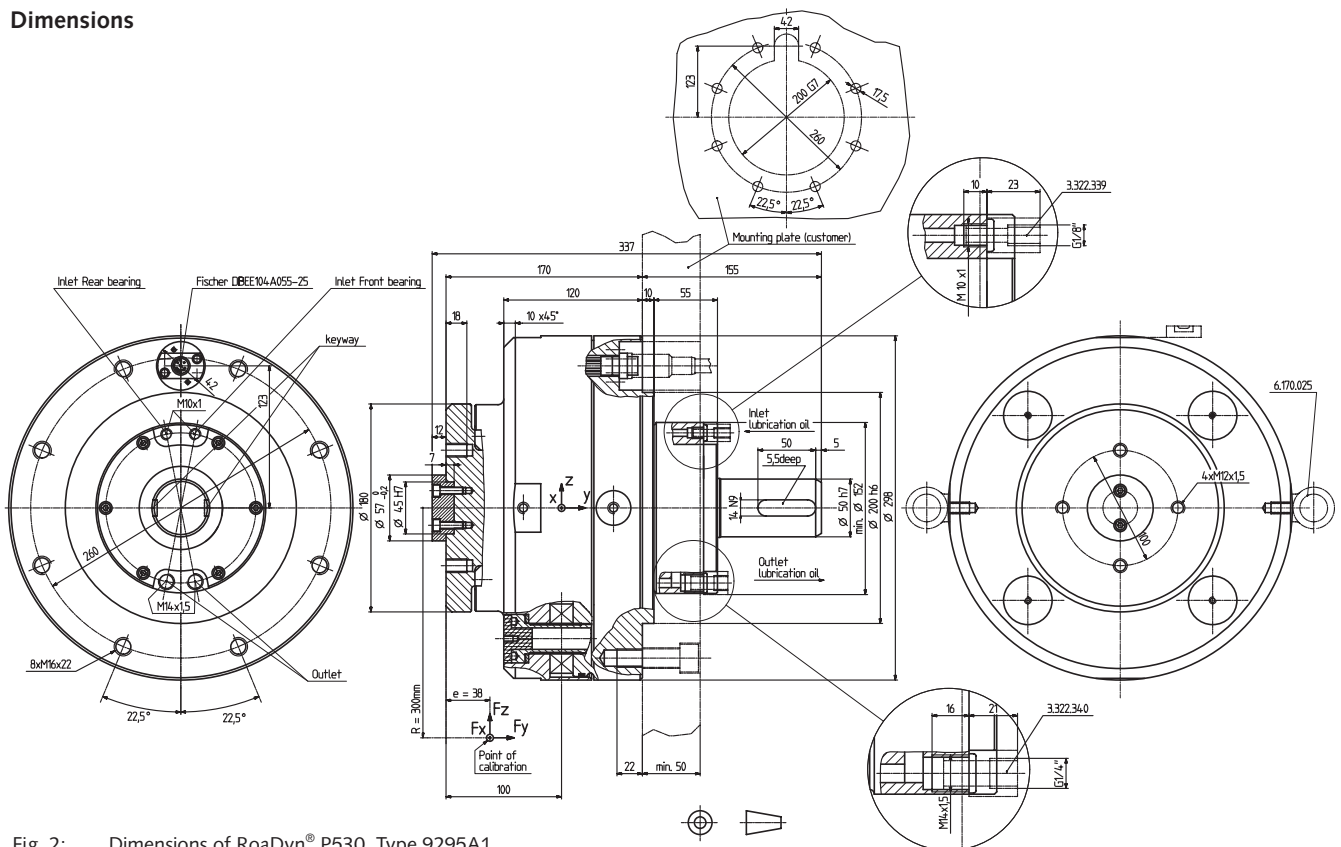
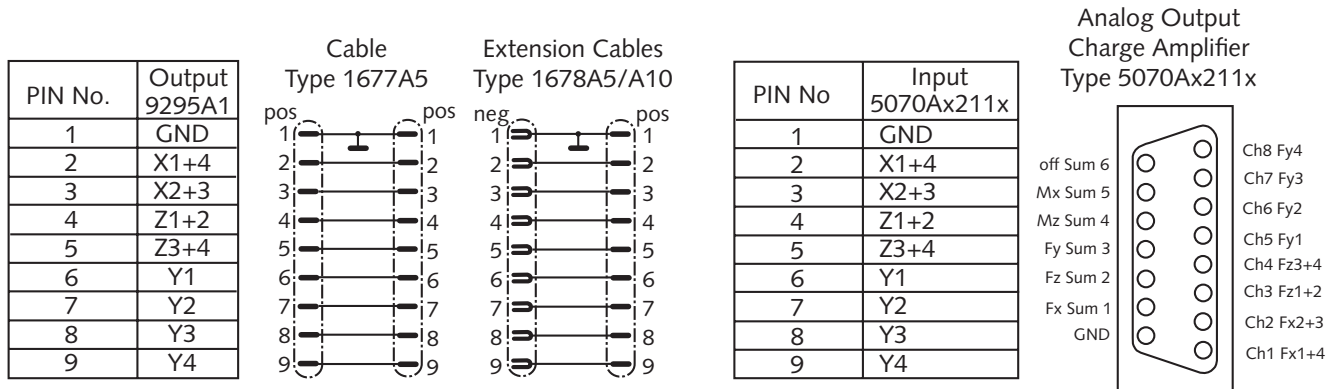
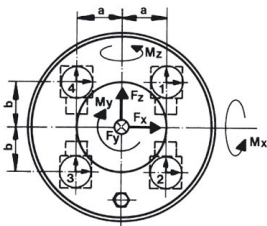


Fig. 2: Dimensions of RoadDyn® P530, Type 9295A1

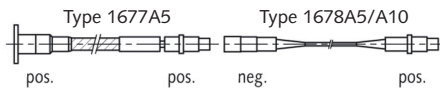
Example: 5-Component Force and Torque Measurement F_x, F_y, F_z, M_x, M_z with 8-Channel Charge Amplifier with 6-Component Summing



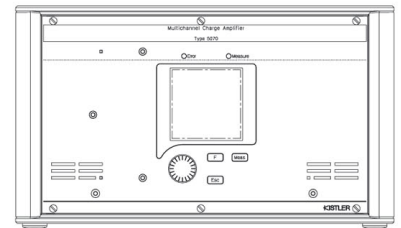
RoaDyn Measuring-Hub Type 9295A1



Cable



Charge Amplifier Type 5070Ax211x



8 output signals from the charge amplifier
5 output signals from the summing calculator

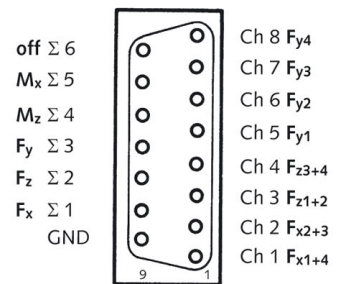
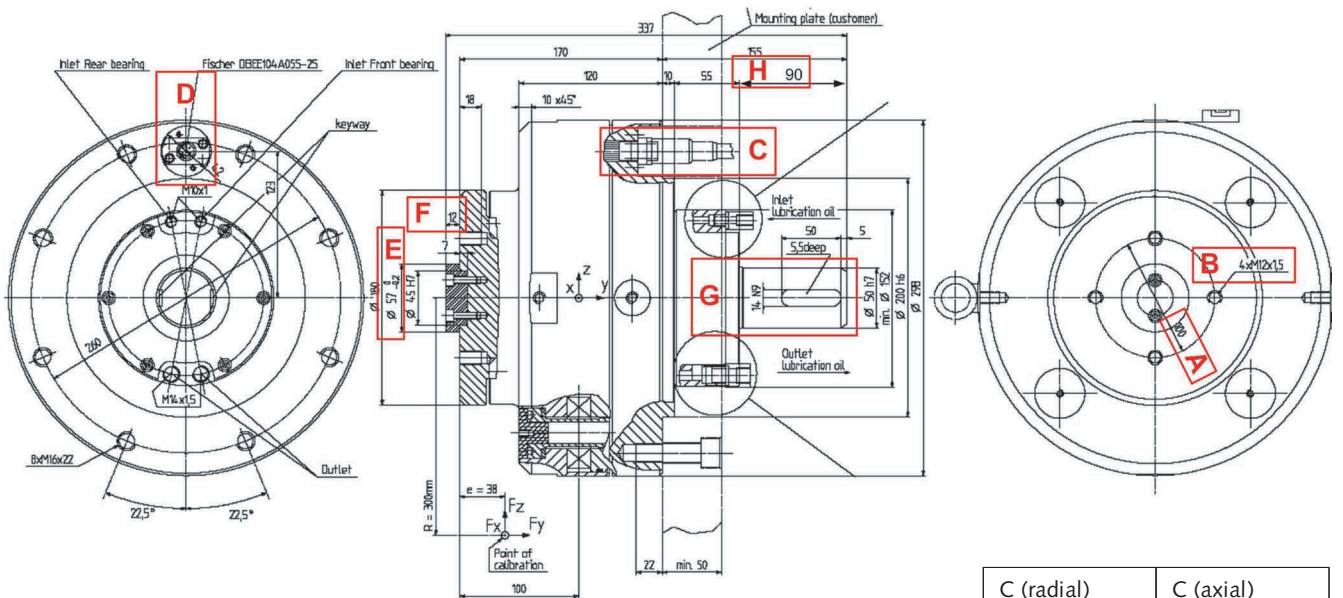


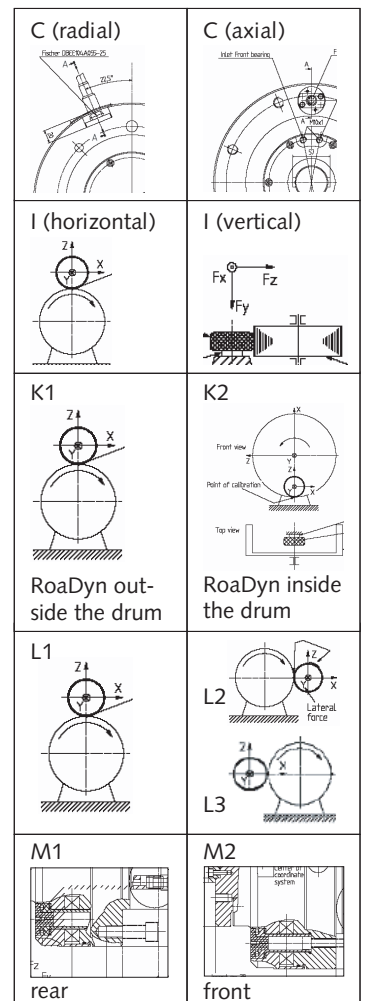
Fig. 3: Typical measuring chain

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Checklist for RoaDyn® P530 Parameters



Nr.	Symb.	Name	Dimensions/mm	
			Standard	
1	A	Pitch circle diameter (p.c.d.)	100	
2	B	Number of screws/Thread size	4x/M12x1,5	
3	C	Orientation of connector (radial/axial)	axial	
4	D	Position of connector (0° → at the top)	0°	
5	E	Diameter of wheel centering	∅57	
6	F	Length of wheel centering	12	
7	G	Shaft end at rear side (yes/no)	yes	
8	H	Length of shaft end (if existing)	90	
9	I	Direction of rotating axis (horizontal/vertical)	horizontal	
10	J	Lubrication (oil/grease)	oil	
11	K	Type of test-stand (K1/K2)	K1	
12	L	Mounting position (L1/L2/L3)	L1	
13	M	Front or rear mounting	M1	



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Mounting

The measuring hub is mounted from the rear with eight M16 screws, arranged on $\varnothing 260$ mm in the tire test stand. The pitch circle for mounting holes can be manufactured according to customer requirements. Mounting from the front is also available on request.

Rims can directly be mounted onto the shaft flange. Centering is done with a centering pin. The mounting thread and the centering bolt are adapted to customer requirements. Moreover, mounting by means of an intermediary adapter is possible.

Ordering Key

Standard RoaDyn P530	1
Special versions; various sizes, load ranges, fixations or types of bearings on special request	Q...

Type 9295A



Accessories Included

- Mounting material

Type

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Optional Accessories

- High resistant data cable
- Extension cable (l = 5 m/10 m)
- Multi channel amplifier (or alternative products with customer specification)
- Complete hydraulic supply unit, adjusted to RoaDyn P530

Type/Art.No.

1677A5
1678A5/A10
5070Ax211x

on request

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