

RoaDyn[®] S530

Type 9289A013A...

Measuring Hub for Tire Test Stands

The RoaDyn S530 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 , acting at the tire contact area or the tire footprint.

Due to implementation of high quality strain gauge load cells, it could also be used for test stand controlling (closed loop control) and long-term measurements such as endurance tests.

- Maximum measuring accuracy during static and dynamic testing
- 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^{-1} at full load
- Alternative grease lubrication for rotational speeds up to 2 000 min^{-1} and short running periods available

Description

The RoaDyn S530 measuring hub is a rigid strain gauge based measuring device. The instrument itself is stationary with four high precision 3-component force sensors mounted between a base and top plate, which holds a spindle (shaft) and bearings that carry the wheel.

The force components are measured practically path-independent. This yields minimal crosstalk between the components and a high natural frequency of the entire system.

The shaft end is led out on the rear side of the measuring hub and is prepared for installation of various additional equipment.

An oil circuit is provided for lubrication and cooling of the bearings, which allows for constant thermal conditions even when large loads are applied and reduces bearing as well as sealing friction to a minimum.



The various mechanical interfaces on the shaft front side allow either direct mounting of a test wheel or mounting test wheels, with different hole pattern, using an intermediate adapter. The dynamometer is proof against corrosion, splash-water and dust.

Application

- Measurement of force and torque resulting from tire non-uniformities, even at high speeds
- Long-term endurance measurement
- Tire wear tests
- Static and 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

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	-3,00 ... 3,00
Max. load	F _x , F _y	kN	-20 ... 20
	F _z	kN	0 ... 30
Calibrated range	F _x	kN	0 ... -20
	F _y	kN	0 ... 20
	F _z	kN	0 ... 30
	M _x	kN·m	0 ... 6
	M _y	kN·m	0 ... 1,5
	M _z	kN·m	0 ... -3
Force application point	R (tire radius)	mm	300
Force calibration	e (wheel offset)	mm	38
	e _D (offset)	mm	62
Load cell radius	R	mm	115,97
Linearity ¹⁾	F _x , F _y , F _z	%FSO	≤±0,5 (≤±0,1)
Crosstalk ²⁾	F _x → F _y , F _z	%	≤±0,5
	F _y → F _x , F _z	%	≤±0,5
	F _z → F _x , F _y	%	≤±0,5
Natural frequency, freely suspended	f ₀ (x, y, z)	Hz	≈1 800

Rotational speed		min ⁻¹	≤2 000
grease lubrication			
oil lubrication		min ⁻¹	≤3 000
Operating temp. range		°C	-20 ... 80
Degree of protection (cable mounted)			IP65 (EN60529)
Output flange socket (ground-insulated)			Fischer, 104 27 pin neg.
Dimensions			see fig. 1
Weight		kg	63

Requirements for Oil Lubrication

Supply pipe		number	2
Pipe diameter	d _i /d _a	mm	6/8
Oil pressure ³⁾	p	bar	≤0,5
Flow, per supply each	\dot{V}		0,5 ... 1
Flow, total	\dot{V}		1 ... 2
Kinematic viscosity	v		20 ... 25
Return pipe		number	2
Pipe diameter	d _i /d _a	mm	8/12
Oil pressure	p	bar	pressure-free

¹⁾ typical values in brackets

²⁾ with implemented calibration factors

³⁾ pressure limiting valve recommended

Dimensions

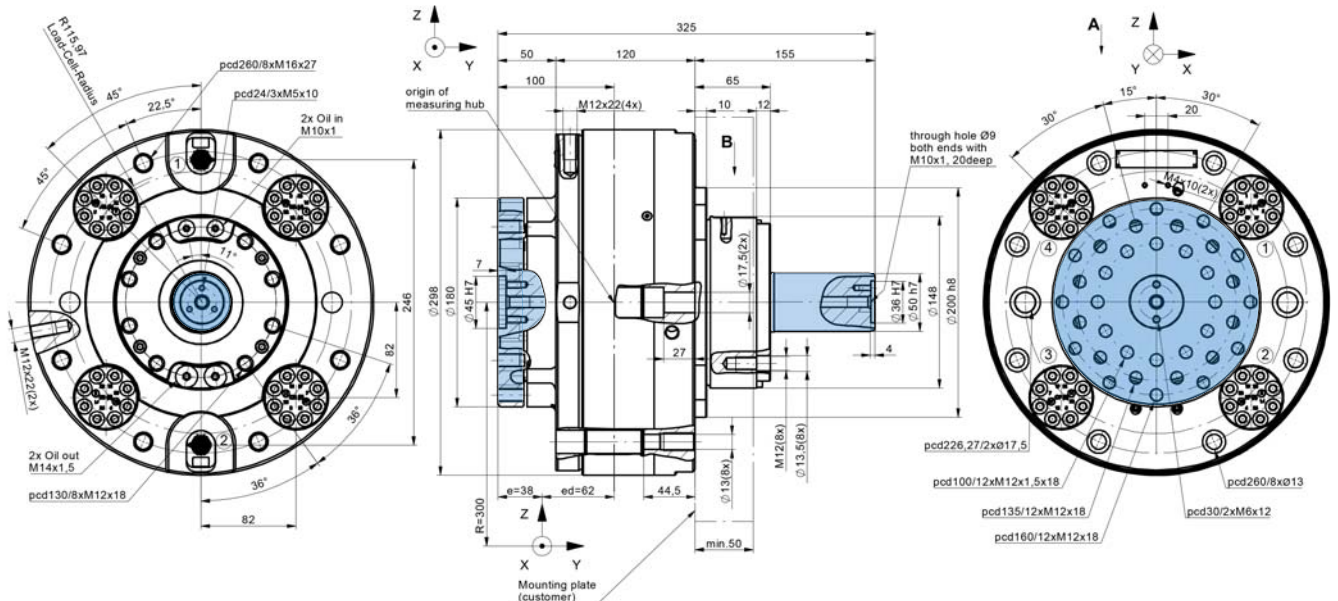


Fig. 1: Dimensions of RoaDyn® S530, Type 9289A013A; rotating parts are highlighted in blue

Test Stand Connection

Measuring hubs of Type 9289A013A can be connected at the front side using 2xM16 and 8xM12 screws, or at the rear side using 8xM12 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).

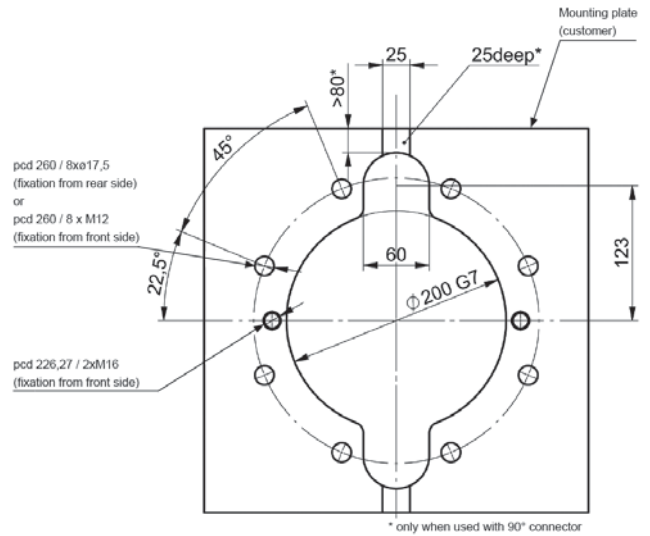


Fig. 2: Test stand connection - dimensions

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.

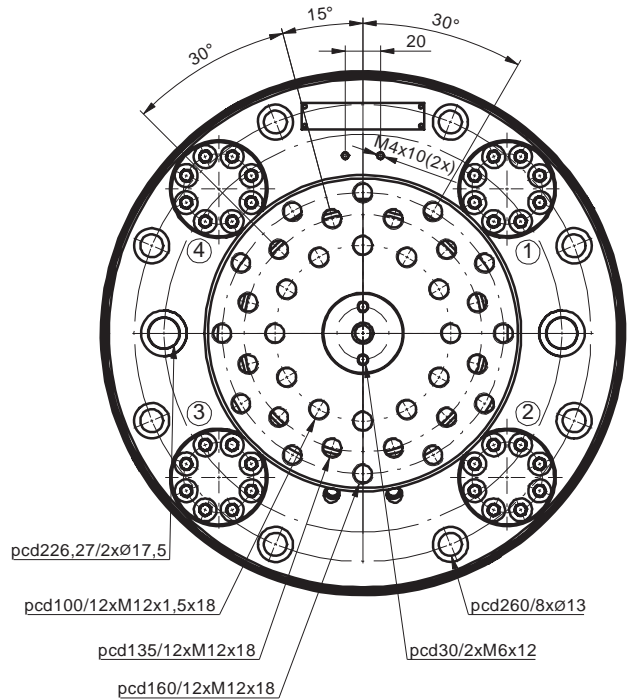


Fig. 3: Test object installation - dimensions

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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. 4).

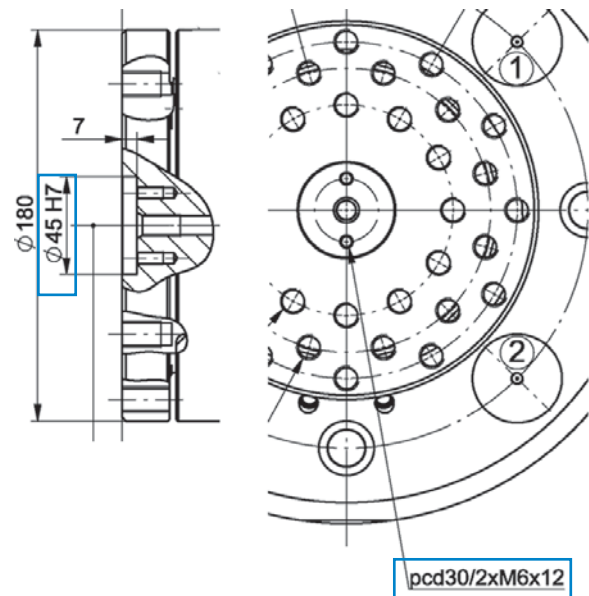


Fig. 4: Wheel centering - dimensions

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. 5).

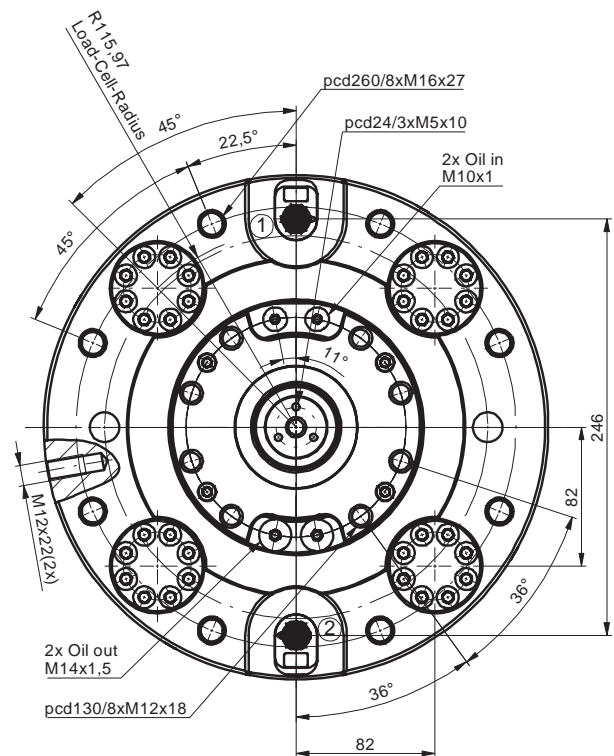


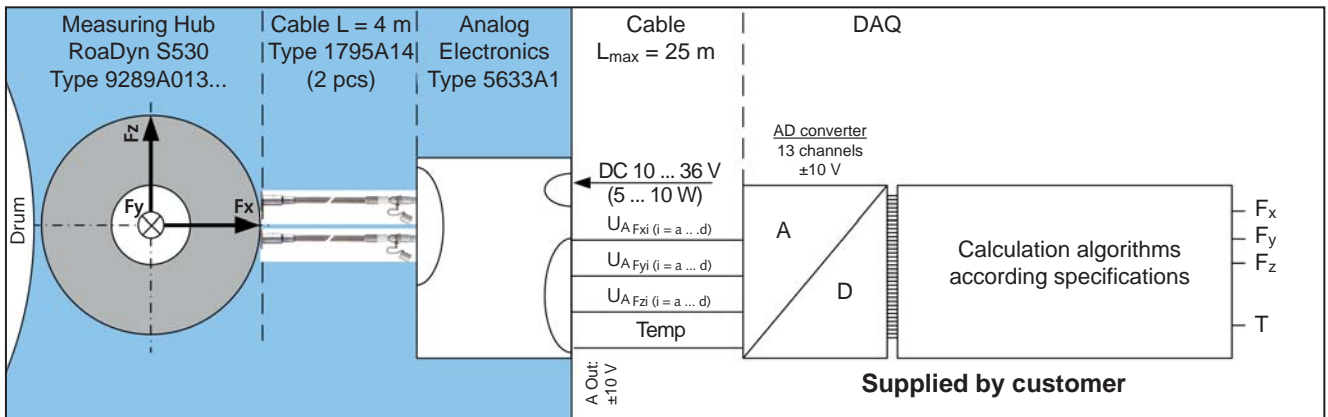
Fig. 5: Brake installation - dimensions

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).

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Measuring Chain



Included Accessories

- Ring bolts, 2 pcs., M12 Ordering No. 65013149
- Oil connection adapter, 2 pcs., M10x1 / G 1/8 65003244*
- Oil connection adapter, 2 pcs., M14x1,5 / G 1/4 65003245*
- Sealing ring, 2 pcs., 10,2/15,9x1 65007701*
- Sealing ring, 2 pcs., 14,5/17,9x1,5 65007703*
- Hoisting block, 1 pc. 55144802
- ISK screw for hoisting block, 1 pc., M12x45 65012849
- Fixing screw, 8 pcs., M16x70 65012819
- Fixing screw, 4 pcs., M12x60 65012870

* only for 9289A013A1

Optional Accessories

- Connection cable, low impedance l = 4 m (straight connector) Ordering No. 1795A14
- Connection cable, low impedance l = 4 m (90° connector) 1795A24
- Analog electronics 24 channels 5633A1

Oil lubrication system and DAQ are not included in the scope of delivery.

Additional Kistler Products for this Application

- RoaDyn P530 measuring hub for high dynamic measurement of passenger car tires on test stands Type/Art. No. 9295B
- RoaDyn S220 measuring hub for rolling resistance measurement of passenger car tires on test stands 9289A103
- RoaDyn S260 measuring hub for rolling resistance measurement of truck tires on tire test stands 9289A113
- RoaDyn S5ST (60 kN) measuring hub for tire characteristics measurement of truck tires on tire test stands 9289A253
- RoaDyn S5MT (100 kN) measuring hub for tire characteristics measurement of truck tires on tire test stands 9289A263

Ordering Key

RoaDyn S530, oil lubricated	1
RoaDyn S530, grease lubricated	2

Type 9289A013A

Ordering Example

Type 9289A013A1

Measuring hub RoaDyn S530, oil-lubricated

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