

# RoaDyn S5ST measuring hub

Type 9289A253

## for durability and tire characteristics measurement on tire test stands (commercial vehicles)

The 5(6)-component RoaDyn S5ST measuring hub is ideally suited to measure durability and tire characteristics of commercial vehicles on tire test stands. It measures the longitudinal, transverse and vertical forces  $F_x$ ,  $F_y$  and  $F_z$  and the corresponding moments  $M_x$ ,  $M_y$  and  $M_z$  acting at the tire contact area.

- High precision tire characteristics measurements with commercial vehicle tires
- Best suited for rim sizes >16" (smaller rims with appropriate adapter possible)
- Strain gage load cell technology for static and dynamic tire measurements
- Static measurement of vertical force  $F_z$  enables tire test stand controlling (no additional force sensors necessary)
- Modular design
- High rigidity
- Factory calibrated
- Prepared for oil lubrication
- Analog, CAN, EtherCAT and Ethernet output available with the corresponding electronics



### Description

The RoaDyn S5ST measuring hub is a robust, high-precision measuring tool, equipped with four oval strain gage load cells which are mounted between base and top plate. The measuring hub is stationary, i.e. base plate, top plate and load cells are mounted non-rotating at the tire test stand. The measuring hub incorporates a rotary axis (shaft) with predefined hub hole patterns on which the test tire/rim combinations are mounted. This setup guarantees optimum power flow with minimum cross talk between the individual force components and a high natural frequency of the complete measuring system. The shaft end is lead through the back side of the measuring hub and is prepared for installation of a driving or braking device. The inlet and outlet ports for the oil circuit on the back of the measuring hub are intended for lubricating and cooling of the bearings in order to achieve constant heat conditions even with large loads and increased rotational speeds.

The electronics provide the signals from the measuring hub to the customer's DAQ.

### Application

Typical areas of use are measurements of tire characteristics on tire test stands in the laboratory as well as on mobile test vehicles in the fields of durability, non-uniformities, vibrations, braking characteristics, adhesion etc.

### Technical data

#### General technical data

Measuring range <sup>1)</sup>	$F_x$	kN	-60 ... 60
	$F_y$	kN	-40 ... 40
	$F_z$	kN	0 ... 60
	$M_x$	kN·m	-29 ... 29
	$M_y$ <sup>2)</sup>	kN·m	-15 ... 15
	$M_z$	kN·m	-9 ... 9
Calibration range <sup>3)</sup>	$F_x$	kN	0 ... 60
	$F_y$	kN	0 ... 40
	$F_z$	kN	0 ... 60
Linearity	$F_x, F_z, F_y$	%FSO	$\leq \pm 0.5$
Crosstalk <sup>4)</sup>	$F_y \rightarrow F_x, F_z$	%	$\leq \pm 1.0$
	$F_x \leftrightarrow F_z$	%	$\leq \pm 1.0$
	$F_x, F_z \rightarrow F_y$	%	$\leq \pm 1.0$
Natural frequency	$f_n(x, y, z)$	Hz	$\approx 800$
Maximum rotational speed		min <sup>-1</sup>	1,850
Operating temperature range		°C	+5 ... 70
Degree of protection (DIN40050)			IP65

**Technical data (continuation)**

**Size**

Diameter	mm	445
Length	mm	530
Weight	kg	196
Standard pitch circles		
10 pcs. M16x22	∅	195
12 pcs. M16x22	∅	160
5 pcs. M14x1.5x35	∅	112

**Requirements for oil lubrication**

Supply pipe, 1x		"	1/2
Oil pressure, supply pipe	p	bar	≤0.5
Rate of flow	$\dot{V}$	l/min	1 ... 2
Return pipe, 1x		"	3/4
Oil pressure, return pipe	p	bar	pressureless
Oil specification	Typ	ISO VG	68
Kinematic viscosity (@40 °)	n	mm <sup>2</sup> /s	65 ... 75
Pump type <sup>5)</sup>			non-pulsating

- <sup>1)</sup> It is assumed that the extreme values do not occur simultaneously
- <sup>2)</sup>  $M_y$  can only be measured when a brake is installed at the test stand, otherwise  $M_y = 0$
- <sup>3)</sup> Standard force application point at tire radius  $R = 500$  mm and press-in depth  $e = 0$  mm

- <sup>4)</sup> In combination with signal post-processing in customer's data acquisition and Kistler supplied algorithm
- <sup>5)</sup> e.g. gear-wheel pump

**Dimensions**

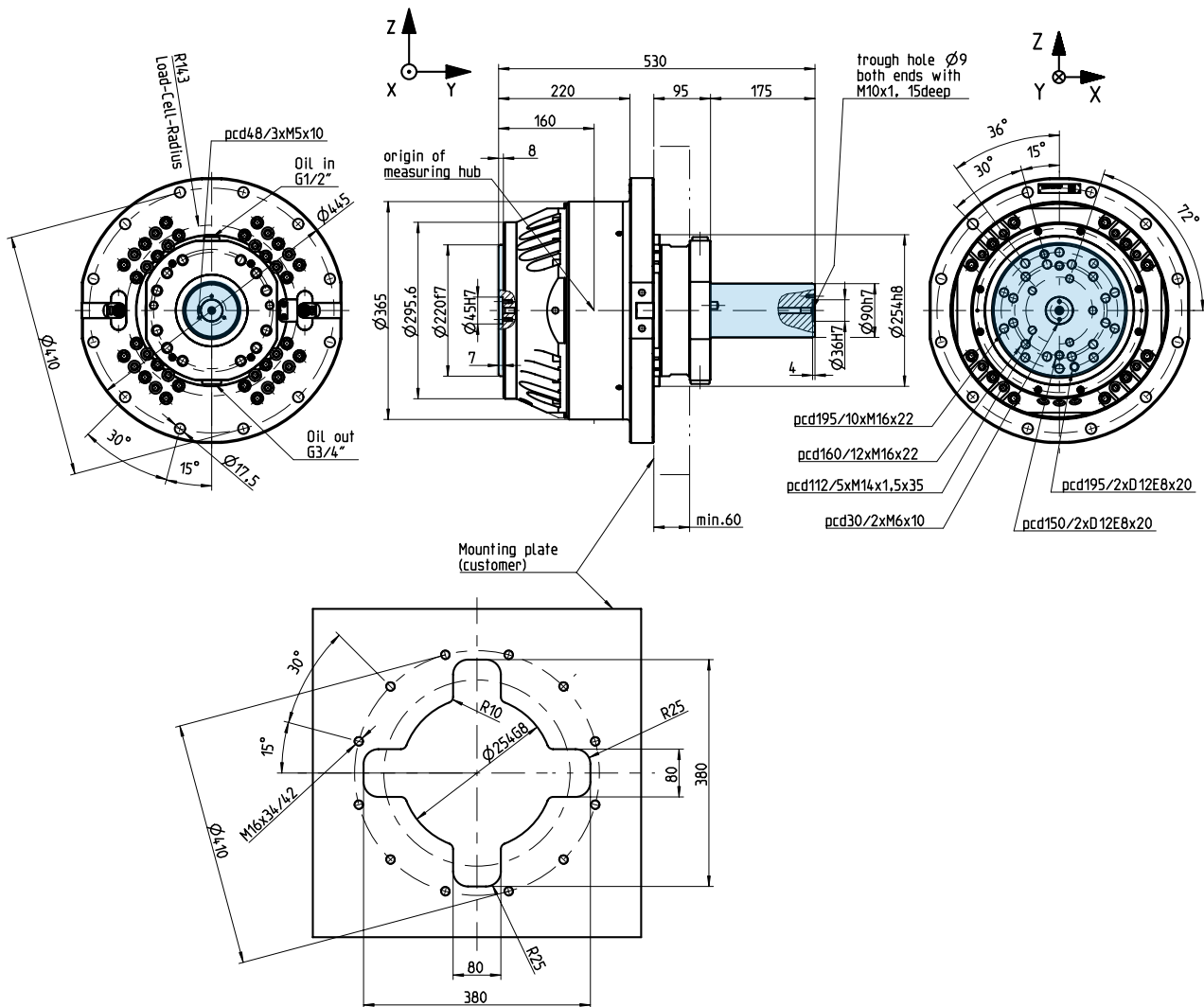


Fig. 1: Assembly drawing RoaDyn S5ST; rotating parts are highlighted in blue

### Measuring Chain

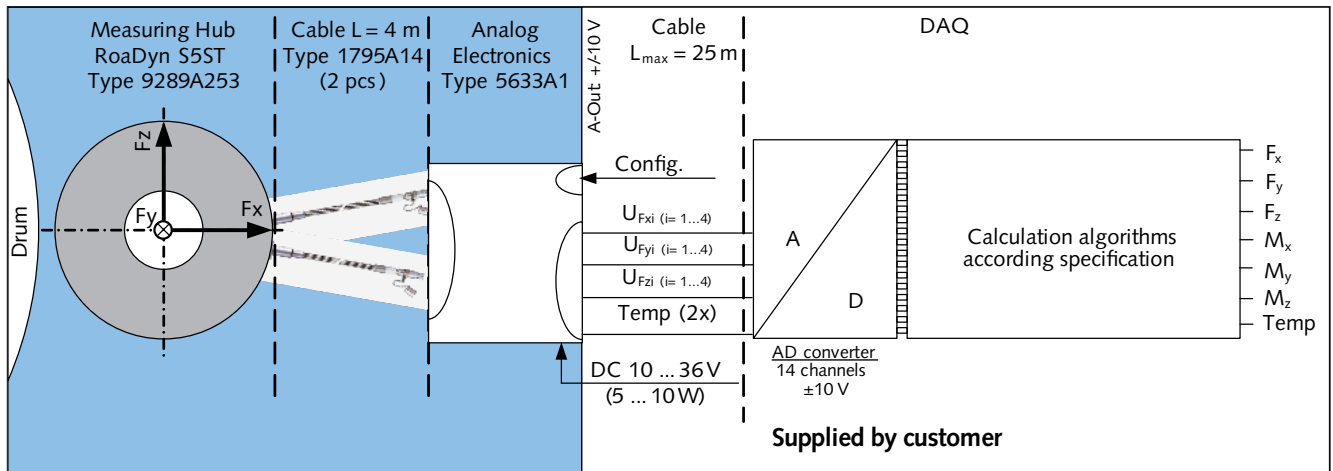


Fig. 2: Analog measuring chain RoaDyn S5ST

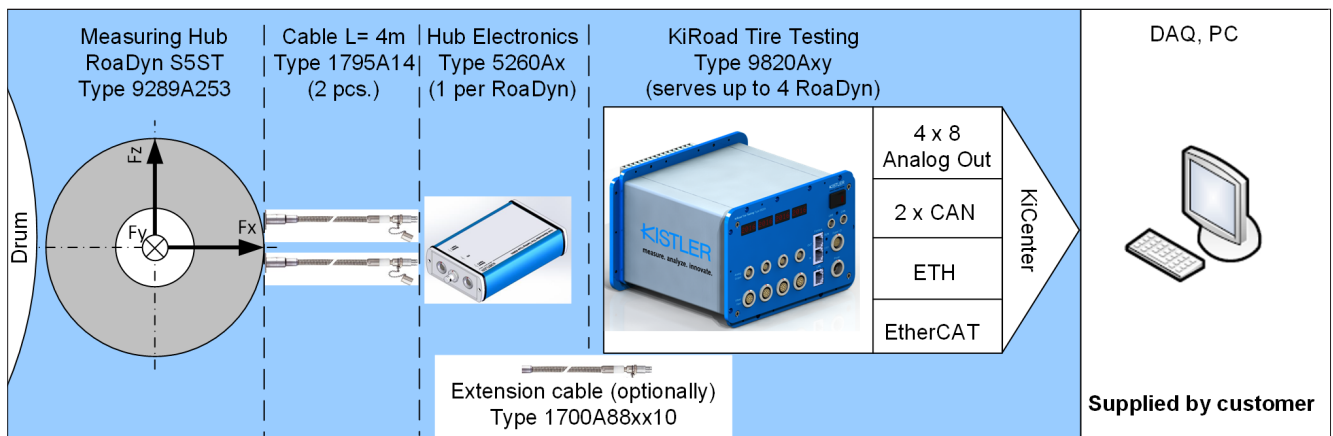


Fig. 3: Digital measuring chain RoaDyn S5ST

### Mounting

The RoaDyn S5ST measuring hub is mounted on the standard pitch circle  $\varnothing 410$  mm on the tire test stand using twelve M16 bolts. The rim/tire combinations are mounted either directly onto the shaft flange with predefined pitch circle diameters or with an adapter flange. Rim centering is done with a customized centering pin (not included in the scope of delivery).

9289A\_000-986e-07.21

<b>Included accessories</b>	<b>Type/art. no.</b>	<b>Ordering code</b>	<b>Type</b>
• 12 pcs. cylinder head screw with hexagon socket M16x60	65017330	• RoaDyn S5ST measuring hub for durability and tire characteristics measurements on tire test stands (commercial vehicles)	<b>9289A253</b>
• 12 pcs. washer D25/M16x3	65017328		
• 1 pcs. eye bolt	6.170.008		
• 2 pcs. allen set screw M16x80	6.160.108		
 <b>Optional accessories</b>	 <b>Type/art. no.</b>	 <b>Other Kistler products for this application</b>	
• Connecting cable measuring hub length = 4 m, straight connector (2 pcs. required)	1795A14	• RoaDyn S220 measuring hub (20 kN) to measure tire rolling resistance of passenger car tires on tire test stands	9289A103
• Connecting cable measuring hub length = 4 m, angle connector (2 pcs. required)	1795A24	• RoaDyn S260 measuring hub (60 kN) to measure tire rolling resistance of truck tires on tire test stands	9289A113
• Analog electronics for tire test stands	5633A1	• RoaDyn P530 measuring hub (30 kN) to measure tire characteristics on tire test stands (passenger car)	9295B...
• Digital electronics KiRoad Tire Testing	9820A...	• RoaDyn S5MT measuring hub (100 kN) for durability and tire characteristics measurement on tire test stand (truck)	9289A263
• Triaxial accelerometer ±5 g	8762A5	• RoaDyn S530 measuring hub for endurance measurement of passenger car tires on tire test stands	9289A013
 <b>Supplied by customer</b>			
• Hydraulic oil pump lubrication system (non-pulsating)			
• DAQ			

9289A\_000-986e-07.21