

# Rotating 4-Component Dynamometer RCD

## for Cutting Force Measurement up to 10 000 1/min

Type 9123C..., 5221B1,  
5223B...

Rotating 4-component dynamometer for measuring of cutting forces and torques on the rotating tool spindle. Transmission of measured data by telemetry hence without wear.

- Cutting force measurement on the rotating edge
- 4-component force/moment measurement
- Data transmission by telemetry
- Internal coolant supply
- Conforming to CE

### Description

The dynamometer consists of a four component sensor fitted under high preload between a baseplate and top plate.

The four components are measured practically without displacement.

It must be taken into account that combined and eccentric loads may reduce the measuring ranges.

The sensor is mounted ground-insulated. Therefore ground loop problems are largely eliminated.

The dynamometer is rustproof and protected against penetration of splashwater and cooling agents.

For each component a 2-range miniature charge amplifier is integrated in the dynamometer. The output voltagages of the charge amplifiers are digitized and transmitted by telemetry to the stator. The remote controlled range switching and an optionally switchable zoom channel allow to use the measuring ranges in an optimal manner.

The voltage is supplied per induction.

A zero point identification (Type 5221B2) is available as an option which allows to correlate the force signals with the tool edge.

The dynamometer is preferably delivered with integrated spindle adapter (according to option). For mounting the cutting tools, tool adapter Type 9163 is available.

### Applications

Investigations of wear and cutting processes near the tool edge during milling and drilling. The acting force vector on one-edged tools can directly be measured. This dynamometer is especially suitable for high speed fine machining.



### Technical Data

#### Dynamometer Type 9123C...

Speed		1/min	max. 10 000
Range 1 FSO	$F_x, F_y$	kN	-5 ... 5 ** -3 ... 3 ***
	$F_z$	kN	-20 ... 20
	$M_z$	Nm	-200 ... 200
Range 2 FSO (switchable)	$F_x, F_y$	N	-500 ... 500
	$F_z$	kN	-2 ... 2
	$M_z$	Nm	-20 ... 20
Overload range 1		%	20
Threshold	$F_x, F_y$	N	<1
	$F_z$	N	<4
	$M_z$	Nm	<0,04
Sensitivity (Range 1)	$F_x, F_y$	mV/N	≈2
	$F_z$	mV/N	≈0,5
	$M_z$	mV/Nm	≈50
Linearity		% FSO	≤±1
Hysteresis		% FSO	≤1
Crosstalk	$F_x \leftrightarrow F_y$	%	≤±2
	$F_z \rightarrow F_{x,y}$	%	≤±3
	$F_{x,y} \rightarrow F_z$	%	≤±3
	$M_z \rightarrow F_z$	1 N/Ncm	≤±0,01
Natural frequency Type 9123Cxx11 measured without telemetry	$f_n$	kHz	≈2,0

Operating temperature range		°C	0 ... 60
Coolant pressure		bar	≤70
Degree of protection			IP67
Weight Type 9123C1111		kg	≈3

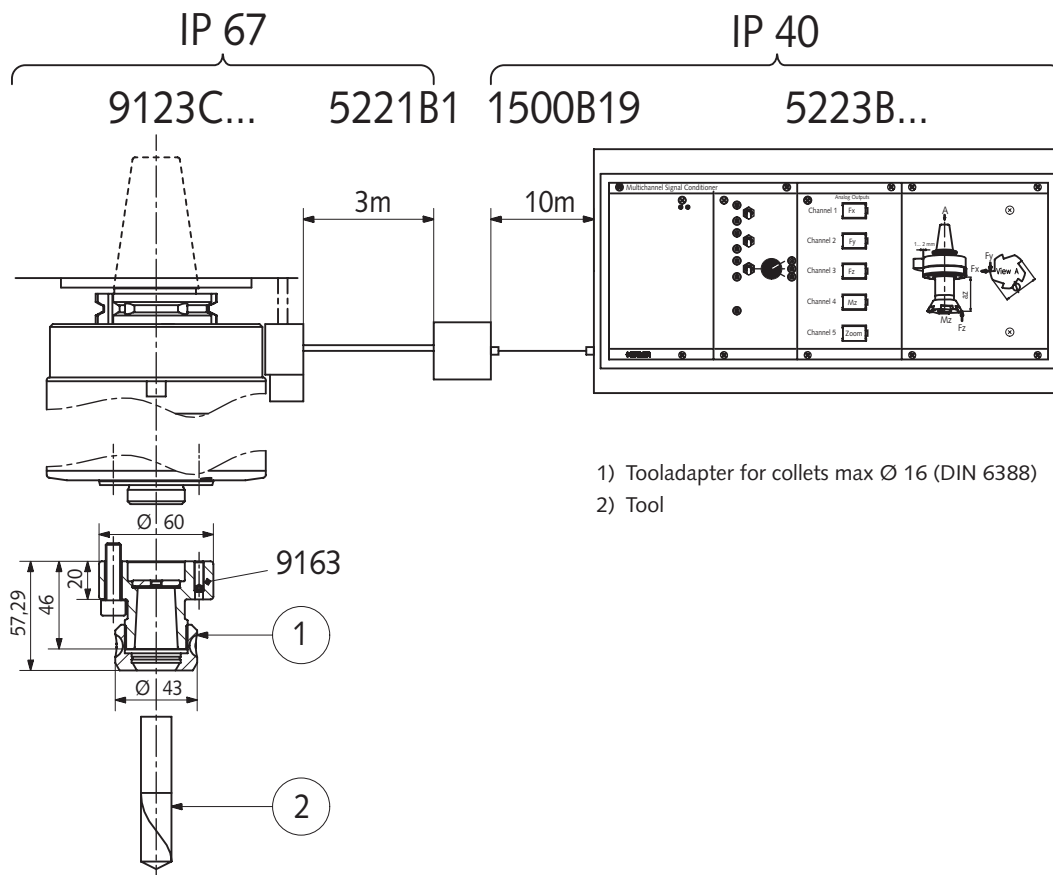
\*\* Force application point on the top plate area  
 \*\*\* Force application point 100 mm above top plate area

**Stator and Multichannel Signal Conditioner  
 Type 5221B1 and Type 5223B...**

Ratio range 1 / range 2			10
Number of channels			5
Number of ranges per channel			2
Cut-off frequency per channel	$f_{\text{cutoff}}$	kHz	1,0
Sampling rate per channel		kHz	7,8
Resolution/tolerance		bit/%	12/±0,025
Signal output (FSO)		V	±10
Output connector (analog signal)			5 x BNC neg. 15 pin D-Sub

Operating temperature range	°C	0 ... 60
Power supply (switchable)	V/AC	230/115
	%	+15/-22
	Hz	48 ... 62
Power consumption	VA	≈30
Dimensions (DIN 41494, part 5)		
Width	TE	63
Height of instrument	HE	4
Height of plug-in	HE	3
With case	mm	340x187x280
Weight Type 5223B...	kg	8
Interface for remote control		RS-232C
Zero point identification (only Type 5223B2)		
Signal output	V	+5
Output connector		BNC neg.

Zoom (window amplifier):  
 The zoom decouples the output signal of an optional channel and amplifies the signal by a factor 10.



- 1) Tooladapter for collets max Ø 16 (DIN 6388)
- 2) Tool

Fig. 1: Rotating cutting force measuring system

000-121e-01.04 (DB06.9123Cm)

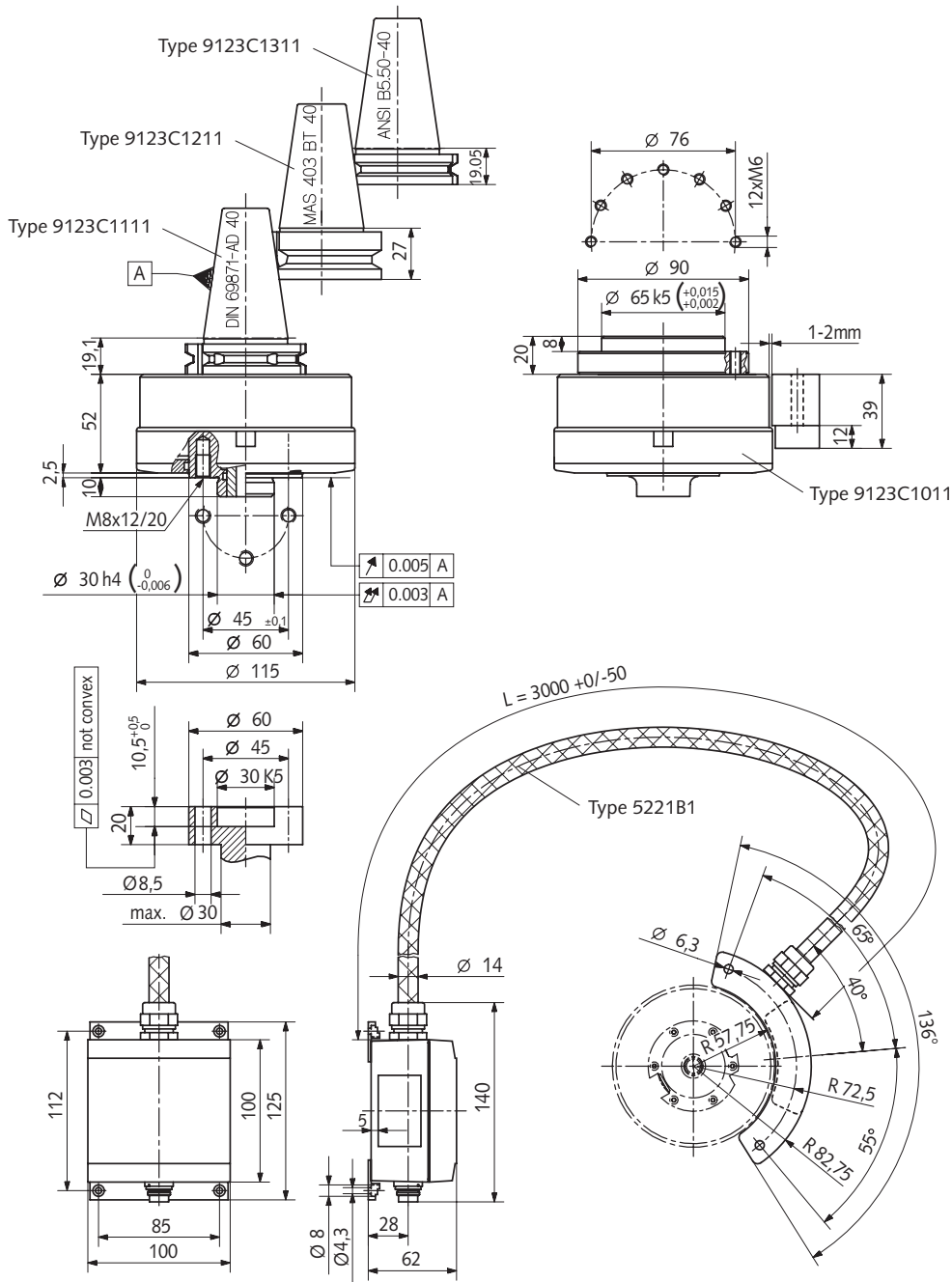


Fig. 2: Dimensions Dynamometer Type 9123C...

**Optional Accessories**

- Stator
- Connecting cable
- Multichannel signal conditioner
- Multichannel signal conditioner with zero point identification
- Tool holder (without collets)

**Type**

- 5221B1
- 1500B19
- 5223B1
- 5223B2
- 9163

**Ordering Key**

**Spindle adapter\***

without spindle adapter	10
DIN 69871-AD 40	11
MAS 403 BT 40	12
ANSI B5,50 - 40	13

9123C   11



\* other spindle adapters on request

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