

Hand Force Measuring System

Type 9809A

for Ergonomics, Biomechanics and Occupational Health & Safety

Piezoelectric 5-component hand force measuring system with evaluation software for recording the 3 orthogonal force components and the center of pressure. The system is used to accurately record the separate hand forces for evaluating mechanical loads and stresses on the body in the area of ergonomics.

- Complete measuring chain including software
- Very easy to use in both laboratory and field
- Mobile use with data logger
- Direct recording with USB interface
- Versatile mounting

Description

The Type 9809A is a complete hand force measuring system. It consists of two hand force measuring handles with built-in electronics, a USB interface, a data logger with CompactFlash card, the data acquisition and evaluation software, and various connecting cables. All components are accommodated in a system case.

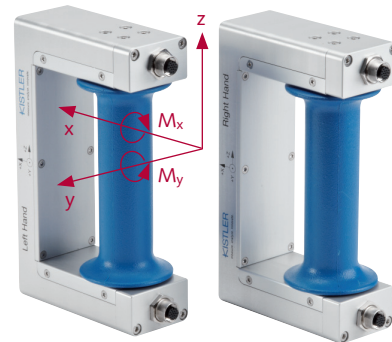
The measuring system can be used very flexibly to determine hand forces in the area of R&D under laboratory or field conditions, and for testing and designing machines or systems.

Application

In many areas of research and industry a need exists for hand forces to be measured to assess mechanical loads and stresses on the body: in the ergonomics sector; recording and testing the operating forces at human-machine interfaces; and for a range of technical design tasks. These forces are exerted during activities such as pushing, pulling, lifting or carrying loads.

The hand force measuring system can be used in the identification of occupational health risks, diagnosis of occupational diseases caused by handling loads over the course of a working life, or very generally for ergonomic and biomechanical load analyses. The determined forces serve as the basis for solving construction, design or relevant health & safety issues.

On the other hand they can be evaluated and interpreted as assembly, adjustment, test or design forces at the human-machine interface.



The hand force measuring system Type 9809A permits both short-term and long-term measurement of the forces in the hands during various activities and is equally suitable for both laboratory and field.

Technical Data

Complete System Type 9809A with Lockable Aluminum Case

Aluminum case with removable wheels	mm	530x400x160
Weight	kg	10,5

Individual (Right/Left) Hand Force Measuring Handle – General Data

Dimensions	WxHxD	mm	50x112x190
Distance of handle axis from mounting surface		mm	80
Width of handle recess		mm	130
Provision for mounting two threaded holes			M8
hole spacing		mm	150
Weight		kg	1,32
Measuring range	F_x, F_y	kN	± 1
	F_z	kN	$\pm 0,5$
Overload capacity	F_x, F_y	kN	-2/2
	F_z	kN	10
	M_z	N·m	15
Linearity		%FS	$< \pm 1$
Hysteresis		%FS	< 1
Operating temperature range		°C	0 ... 50
Degree of protection	EN60562		IP64

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Technical Data (Continuation)

Built-in Charge Amplifier

Nominal output signal			
Sensitivity (FSO = 5 V)			
Sensitivity	F_{xi}, F_{yi}	mV/N	10
	F_z	mV/N	10
Supply voltage	VDC		10 ... 12

Data Logging (Data Logger/USB Interface)

Analog inputs	number		10
Voltage range	V		±5
Resolution (of each channel)	bits		12
Antialiasing filter, 4th order Butterworth	Hz		25
Sampling rate	Hz		50
External trigger	conn.		LEMO EGG.00.304.CLL
Floating normally open contact			
max. continuous current	mA		5
minimum make time	ms		40

Data Logger

Dimensions	WxHxD	mm	69x38x112
Weight (incl. battery)		grams	600
Memory card	CompactFlash	GB	4
Memory requirements		kByte/s	1
Power supply			4 rechargeable batteries Mignon (AA)
Intelligent universal charger for worldwide use (100 ... 240 VAC) incl. motor vehicle connector (12 VDC)			
Current consumption			
Data logger	mA		≈250
Logger + 1 handle	mA		≈300
Logger + 2 handles	mA		≈350
Supply voltage	VDC		4,4 ... 6
Operating temperature range	°C		-10 ... 40
Degree of protection	EN60562		IP60

USB Interface

Dimensions	WxHxD	mm	71x58x112
Weight		grams	330
Interface			USB 2.0
Power supply	via USB		High-Power- Mode
Current consumption			
USB interface	mA		≈250
USB interface + 1 handle	mA		≈300
USB interface + 2 handles	mA		≈350
Supply voltage	VDC		4,4 ... 6

USB Mini-B Connection

Operating temperature range	°C		-10 ... 40
Degree of protection	EN60562		IP60

Software – Minimum System Requirements

Operating system		Windows 2000/XP
Processor		Intel Pentium IV, 1 100 MHz
RAM		1 GB
Available hard disk space		
Installation		23 MB
Virtual RAM		1 GB
USB interface, CD-ROM drive		

The system conforms to EC Directive 2004/108/EC and meets the EMC standards: EN 61000-6-4 (emission), EN 61000-6-2 (immunity), Product Standard EN 61326-1 (classes A&B) and EN 60950-1 Safety (AC adapter).

Produced under license of IFA

The hand force measuring system Type 9809A has been developed by the Institute for Occupational Safety and Health of the German Social Accident Insurance (www.dguv.de/ifa) in cooperation with Kistler.

Software

The HKMS software records force data directly via the USB interface or imports files that have been recorded by the data logger. From the individual force curves, the overall 3D forces and the center of pressure are calculated for different coordinate systems (handle, object and spatial). The measurement files can then be exported in ASCII CSV format. The 3D force vector and the vector position for different coordinate systems allow to calculate the moments with reference to the point of interest in the coordinate system.

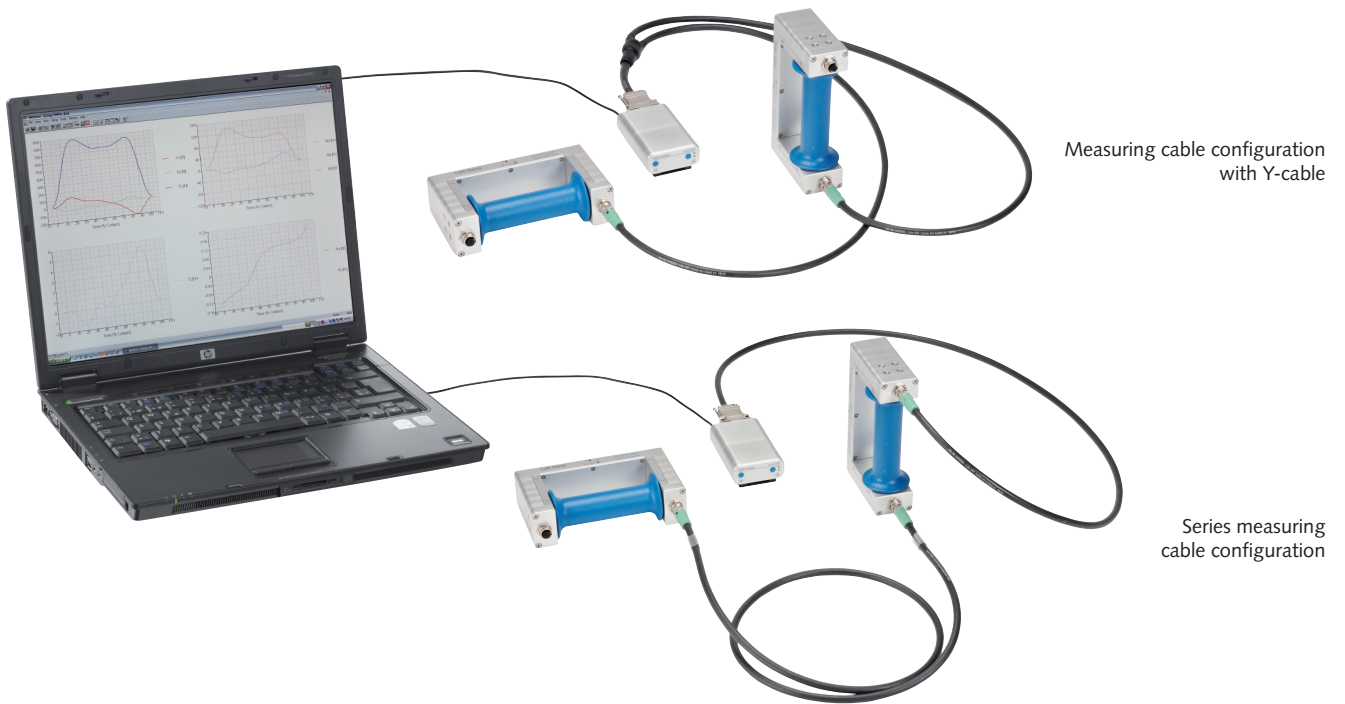


Fig. 1: Measurement setup: USB interface with both measuring cable configurations

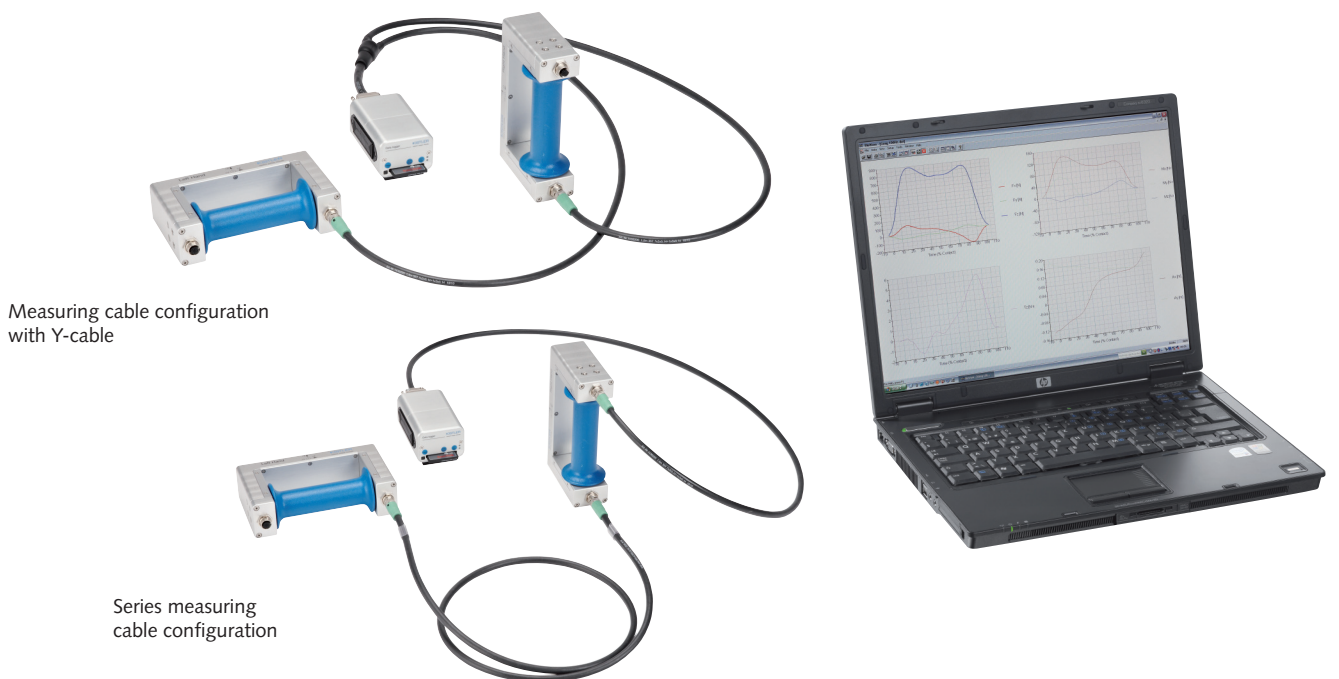


Fig 2: Measurement setup: data logger with both measuring cable configurations

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Fig. 3: System case with all components (without PC)

Included Accessories

• Left hand force measuring handle	9809A100
• Right hand force measuring handle	9809A200
• Data logger	7.690.078
• USB interface	7.690.079
• Aluminum case, 530x400x160	3.070.362
• Connecting cable Speedcon 17 pole pos./Speedcon 17 pole pos., l = 1,5 m	5.590.342
• Connecting cable D-Sub 15 pole pos./2 x Speedcon 17-pole pos., l = 1,3 m	7.620.496
• Connecting cable D-Sub 15 pole pos./Speedcon 17pole pos., l = 1,5 m	7.620.495
• Charger 100 ... 240 VAC / 12 VDC incl. 4x AA/AAA with max. 1,45 V	5.311.106
• USB cable, type A – Mini-B, l = 1,8 m	5.590.346
• PC memory card: CompactFlash, 4.0 GB	5.211.532
• 4 x hex. socket grub screws M8x60 DIN 913	6.160.104
• 4x wing nuts, M8, with threaded bushing	6.240.116
• Manuals	–
• CD with HKMS software	–

Optional Accessories

- None

Ordering Code

- Hand force measuring system
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