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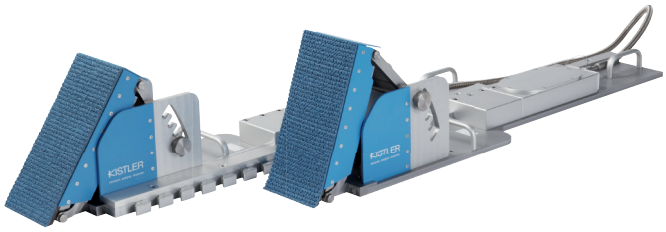
Starting Blocks

Type Z20982

Multicomponent Force Measurement for Sprint Starts

Piezoelectric multicomponent force measuring system for measuring the forces, moments and the center of pressure during a sprint start. The forces are measured separately for each leg.

- Separate measurements for each leg
- Individual adjustment of block position
- Simple adjustment of footplate angle
- Extremely easy to set up
- Integrated electronics



Description

The starting blocks consist of two individually adjustable force plates each equipped with two piezoelectric three-component force sensors. The charge amplifier is integrated into the starting blocks. This portable system is resistant to splash water and ideal for outdoor use.

The starting blocks are equipped with standard spikes and are easy to use on all running tracks. Furthermore, three M8 throug holes on each block allow a fixed installation. The adjustment options correspond to those of competition starting blocks. The footplate angles and the block spacing can be adjusted with just a few simple steps.

The integrated electronics provides a voltage signal at the output. Type 5691A1/5695B1 data acquisition systems or the Type 5233A2 control unit can be used with the starting blocks.

Applications

The starting performance is one of the key factors for a successful sprint race. Important criteria for the quality of a start are the speed at which the athlete leaves the blocks, the direction of force and the push-off and reaction time.

The instrumental starting blocks record the force components for each leg separately. This allows to determine the force vector and to calculate performance-relevant parameters. That helps the coach to reliably assess the technical and physical performance of the athlete and make training more effective.

Technical Data

Starting blocks, Type Z20982

Minimum dimensions	WxHxD	mm	890x360x192
Measuring range	F_x, F_y	kN	–0,625 … 0,625
	F_z	kN	–2,5 … 2,5
Overload (center)	F_x, F_y	kN	–4 … 4
	F_z	kN	–10 … 10
Linearity		%FSO	<±0,2
Hysteresis		%FSO	<0,3
Crosstalk	F_x <–> F_y	%	≤±1,5
	$F_{x,y}$ –> F_z	%	≤±1
	F_z –> $F_{x,y}$	%	≤±1
Natural frequency	f_n (x)	Hz	≈3 400
(rigid support pad,	f_n (y)	Hz	≈2 800
without covering)	f_n (z)	Hz	≈1 900
Operating temperature range		°C	0 … 60
Weight		kg	30
Degree of protection (EN60529)			IP65
Footplate angles		°	50, 55, 60, 65, 70
Maximum relative block spacing		mm	400
Adjustment stages		mm	40
Sensitivity range 2 [1)]	F_{xi}, F_{yi}	mV/N	≈7,8
	F_{zi}	mV/N	≈3,8
Sensitivity range 3 [1)]	F_{xi}, F_{yi}	mV/N	≈3,9
	F_{zi}	mV/N	≈1,9
Drift	F_x, F_y	mN/s	5
	F_z	mN/s	10
Supply voltage		VDC	10 … 30
Current consumption		mA	≈45
Output voltage		V	0 … ±5
Output current		mA	0 … ±2

[1)] Ranges 1 and 4 are not relevant for this application.

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Dimensions

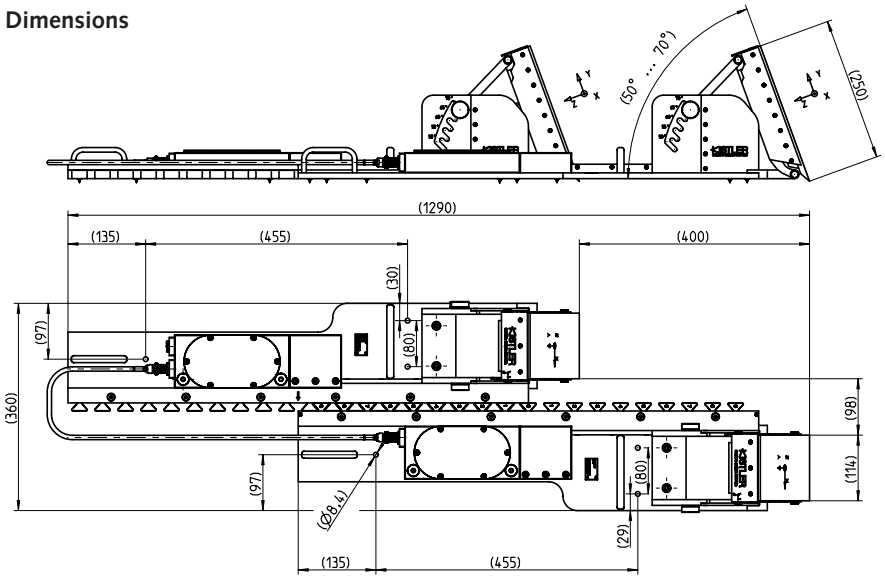

Fig. 1: Dimensions starting blocks Type Z20982

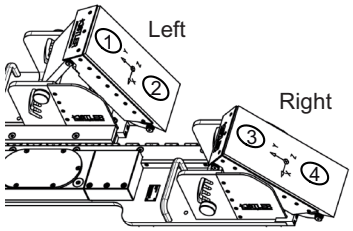

Fig. 2: Sensor arrangement

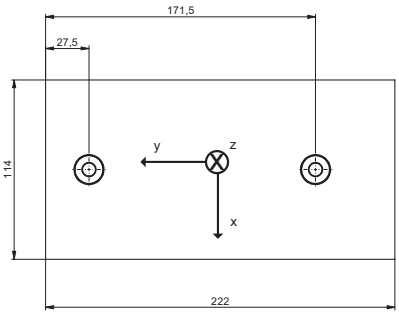

Fig. 3: Dimensions cover plate

Typical Measuring Chains

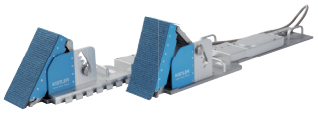			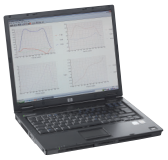
Starting blocks Type Z20982	Connection cable Type 1758A...	DAQ system (USB 2.0) Type 5691B1	Laptop (provided by user) with Kistler BioWare®

Fig. 4: Configuration of a typical measuring chain with DAQ system with BioWare®

			Ch 1 = F_x 1+2 Ch 5 = F_z 1 Ch 2 = F_x 3+4 Ch 6 = F_z 2 Ch 3 = F_y 1+2 Ch 7 = F_z 3 Ch 4 = F_x 3+4 Ch 8 = F_z 4
Starting blocks Type Z20982	Connection cable Type 1760A...	External Control Unit (8xBNC neg.) Type 5233A2	DAQ system provided by user (8 analog channels)

Fig. 5: Configuration of a typical measuring chain with customer DAQ system

Included Accessories	**Type/Art. No.**
• Connection cable, 8 leads	1681B1

Optional Accessories	**Type/Art. No.**
• Connection cable for Type 5695B...	1700A105B…
• DAQ system with BioWare® (USB 2.0)	5695B1
• Connection cable for Type 5691A...	1758A…
• DAQ system with BioWare® (USB 2.0)	5691A1
• Connection cable for Type 5233A...	1760A…
• External Control Unit (BNC out)	5233A2

Ordering Code

• Starting blocks – Multicomponent Force Measurement for Sprint Starts	**Type Z20982**