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SlimLine Sensor (SLS)

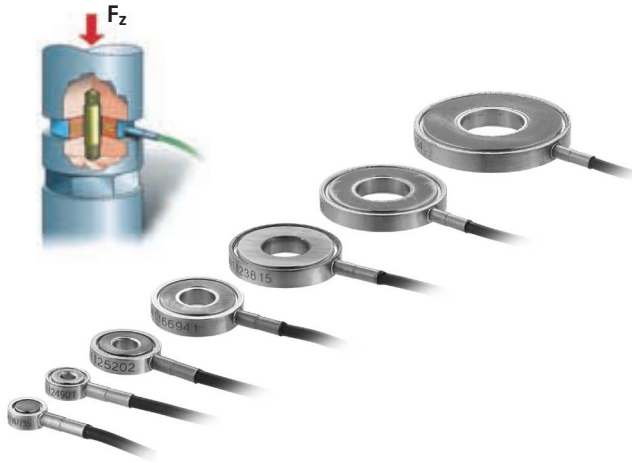
Measurement of dynamic and quasistatic forces

Type 9130B..., 9131B..., 9132B..., 9133B..., 9134B..., 9135B..., 9136B...

Quartz sensor with extremely flat design for measuring dynamic and quasistatic forces. Maximum resolution, high rigidity, extremely small dimensions. Ideal for installation in structures. Welded construction with integrated connecting cable sealed in the case with non-detachable plug connection.

SlimLine sensors are supplied **uncalibrated** and must be calibrated **after** installation.

- **Extremely small size with a wide measuring range**
- **Flexible mounting in structures preferably in force shunt mode**
- **Sealed case (IP 65)**
- **Integrated non-detachable cable with Viton cable covering**

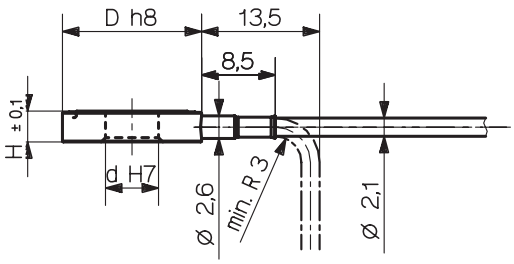


Technical data

Linearity (preloaded)	% FSO	≤±1
Hysteresis (preloaded)	% FSO	≤1
Response threshold	N	<0,01
Operating temperature range	°C	-20 ... 120
Preloading force (recommended)		
Direct connection	% FS	50
Shunt mode	% FS	10
Degree of protection		IP 65
Insulation resistance	Ω	$\geq 10^{13}$

Description

The force F to be measured acts on the sensor through the mounting or preloaded elements. When the sensor is loaded, it produces an electrical charge directly proportional to the force applied. This charge is fed out by an electrode and the integrated cable. The cable is integrated in the case and this assembly is splash-proof. A choice is provided for the plug connection:



KIAG 10-32 UNF pos. int.



Mini-Coax neg.



Basic type	Range	Overload	Sensitivity	Rigidity	External diameter	Internal diameter	Height	Weight
	Fz [kN]	Fz [kN]	[pC/N]	[kN/µm]	D [mm]	d [mm]	H [mm]	m [g]
9130B...	3,0	3,5	–3,5	1,0	8,0	2,7	3,0	6,0
9131B...*	2,5	3,0	–4,0	0,7	7,0	–*	3,0	6,0
9132B...	7,0	8,0	–3,8	1,8	12,0	4,1	3,0	6,0
9133B...	14,0	17,0	–3,8	2,5	16,0	6,1	3,5	6,0
9134B...	26,0	30,0	–3,8	5,6	20,0	8,1	3,5	6,0
9135B...	36,0	42,0	–3,8	7,0	24,0	10,1	3,5	7,0
9136B...	62,0	72,0	–3,8	8,0	30,0	12,1	4,0	14,0

* Basic type 9131B… is designed without a bore [d].

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Basic type	Max. bending moment (Fz = 0) [Nm]	Force per additionally occurring 1 Nm bending moment [kN/Nm]	Preloading force (50 % of the measuring range) [kN]	Preloading force Direct force flux [kN]	Preloading force Force shunt mode [kN]
9130B...	1,50	1,000	1,50	0,75	0,30
9131B...	1,50	0,833	1,25	0,60	0,25
9132B...	5,15	0,676	3,50	1,75	0,70
9133B...	15,00	0,476	7,00	3,50	1,40
9134B...	35,00	0,371	13,00	6,50	2,60
9135B...	62,00	0,290	18,00	9,00	3,60
9136B...	134,00	0,231	31,00	15,50	6,20

Example of measuring range change F_z due to the bending moment Mb:
The maximum possible bending moment occurs at 50 % preloading force of the measuring range F_z. The preloaded sensor reduces the measuring range by the bending moment occurring as follows. For example a bending moment of 10,87 Nm is applied to sensor Type 9133B.. . This reduces the measuring range by 10,87 Nm x 0,466 kN/Nm = +/– 5 kN. The applicable useful F_z range +/– 7 kN minus +/– 5 kN is **+/– 2 kN compression-tension force.**

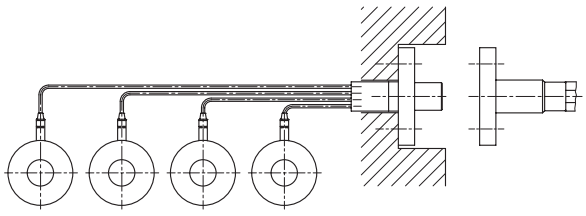
Application
Because of their high rigidity, SlimLine sensors are especially suitable for measuring rapidly changing forces, but quasistatic measurements over several minutes are also possible.

The SlimLine sensor is especially suitable for measuring forces in shunt mode. This means that the sensor is embedded and preloaded in a structure. Its small size is ideal for installation in structures such as force plates, fitting strips and tools. The sensor is used in industrial production processes wherever forces are monitored or measured. Used with a control monitor, this sensor is ideal for quality control and monitoring in large scale industrial production.

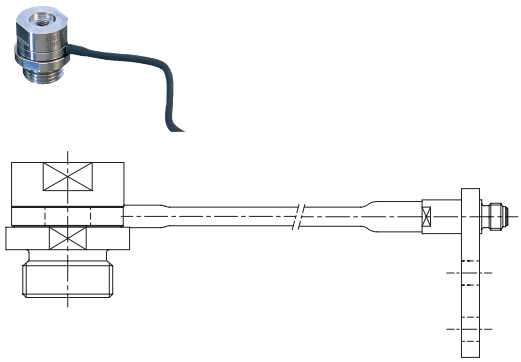
Examples of applications
- Monitoring of press forces, punching forces etc.
- Tool monitoring
- Measurement of large forces in force shunt mode
- Incorporation in dynamometers with small dimensions

Installation
SlimLine sensors can be used preloaded in a structure or with mounting elements. Kistler mounting accessories should preferably be used for installation purposes. Mounting surfaces should wherever possible be ground (Fig. 1). If it is not possible to finish grind the contact surfaces, they must at least be flat and rigid. Mounting causes a force shunt and thus a reduction in sensitivity. **For this reason, the SlimLine sensor is supplied uncalibrated. The sensitivity can be determined only by calibrating the sensor in situ.**

SLS assembly
2, 3 or 4 SlimLine sensors are incorporated in a sealed (IP 65) plug connection with an individually selected cable length. Signals can be recorded as summation signals (parallel connection) or as single signals (series connection). Further information can be obtained from data sheet No. 6.016AA.



SLS quartz force link
SlimLine sensors Types 9133B21 ... 9136B21 are fitted ground-insulated with preloading elements. Calibrated SLS quartz force links Types 9173B ... 9176B are suitable for measuring compression and tension forces. For further information see data sheet DB06.018.



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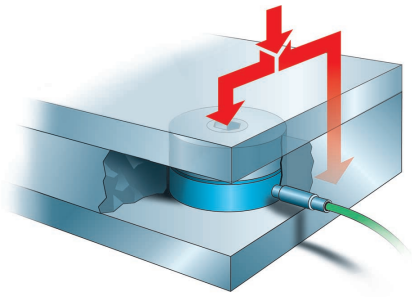
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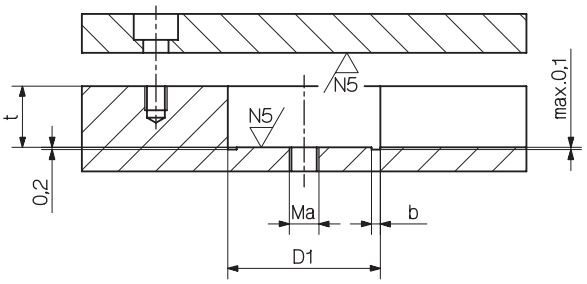
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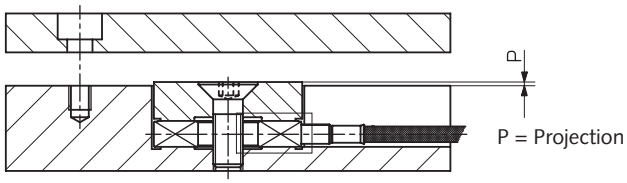
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Force shunt mounting variations

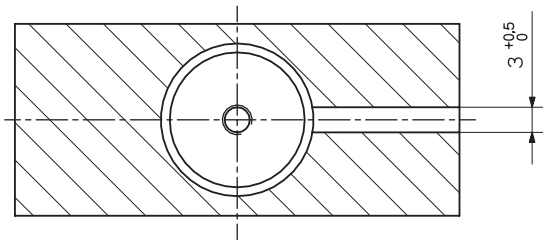
The widest variety of measuring problems can be solved with the SlimLine sensor mounted in force shunt mode.

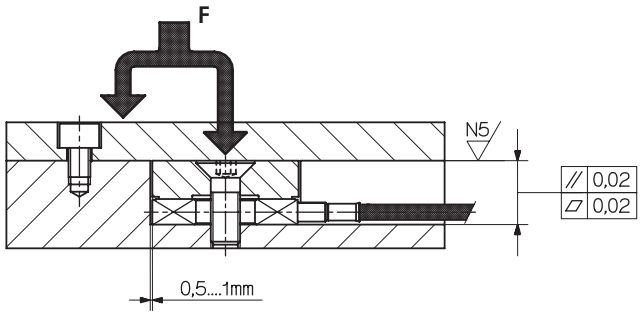






Installation with preloading disk 9410A…





Assembly with preloading.

For SLS sensor Type	Thread Ma	Bore diameter D1 [mm]	Bore depth t [mm]	Undercut b [mm]	Projection P [µm]
9130B...	M2,5	12,5	6,5	1,2	2
9132B...	M2,5	12,5	6,5	1,2	2
9133B...	M3	16,5	7,7	1,2	3
9134B...	M4	20,5	7,7	1,2	3
9135B...	M5	24,5	7,7	1,5	3
9136B...	M6	30,5	9,5	1,5	3

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Direct force flux mounting

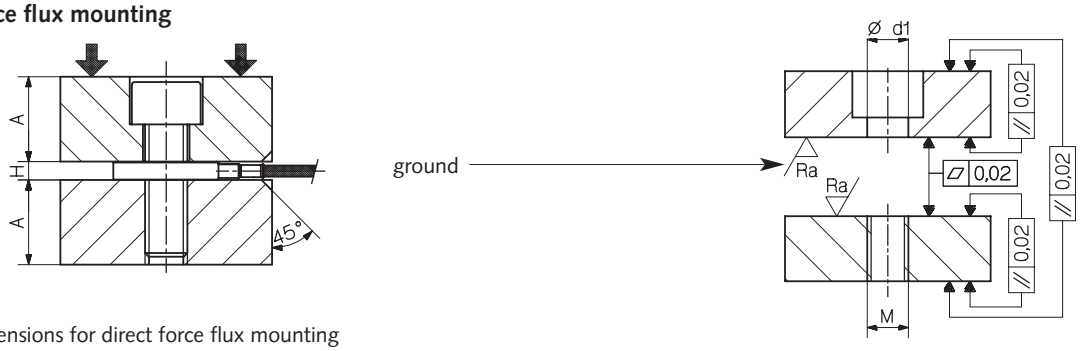
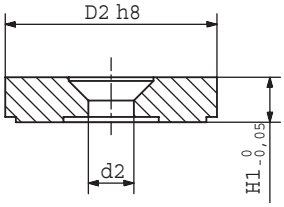


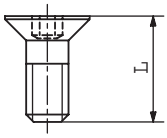
Fig. 1: Dimensions for direct force flux mounting

For SLS sensor Type	Thread M	Bore diameter d1 [mm]	Plate thickness A [mm]
9130B...	M2,5	2,9	8,0
9132B...	M4	4,3	8,0
9133B...	M6	6,4	12,0
9134B...	M8	8,4	16,0
9135B...	M10	10,5	20,0
9136B...	M12	13,0	24,0

Accessories

Preloading disk





One countersunk screw is supplied with each preloading disk

Type	For SLS sensor Type	Thread size	External diameter D2 [mm]	Internal diameter d2 [mm]	Disk thickness H1 [mm]	Screw length L [mm]
9410A1	9130B...	M2	8,0	2,7	3,5	8,0
9410A2	9132B...	M2,5	12,0	2,7	3,5	8,0
9410A3	9133B...	M3	16,0	3,2	4,25	10,0
9410A4	9134B...	M4	20,0	4,3	4,25	10,0
9410A5	9135B...	M5	24,0	5,3	4,25	10,0
9410A6	9136B...	M6	30,0	6,4	5,5	14,0

Order code

Type 913 □ B □□

Sensor basic type	**0 ... 6**
With KIAG UNF 10-32 pos. integrated	**2**
With mini-coax neg.	**3**
Cable length l = 2 m (standard)	**1**
Cable length l = 0,1 … 2 m (please indicate)	**9**

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