

Preloading elements

Type 9422A01 ... 9422A51

Preloading screw for measuring load washers

Standardized preloading screws for the installation of force sensor Types 9001 ... 9051 and 9101 ... 9105.

- Elastic preloading screw, optimized for the ideal pretension for compression force measurement.
- Low force shunt.

Description

Preloading elements Type 9022Ax1 consist of an optimized socket head cap preloading screw and a centering sleeve. Further accessories, such as electrically insulating washers or force distributing rings, are available separately.

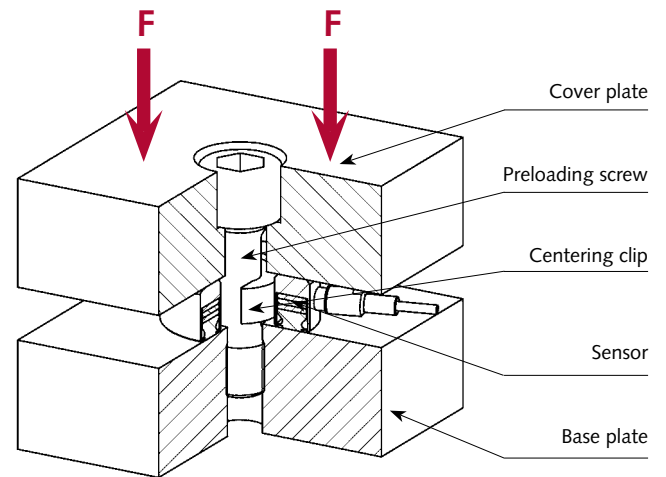
Application

Pretensioning of the measuring load washers for optimized force application in the recommended measurement range. When installed correctly, the measuring load washers provide precise results with high repeat accuracy. In practice, the sensors are mechanically preloaded during installation.

- Bending moments and lateral loads are captured but not measured
- Micro-gaps are closed: this ensures high rigidity and, consequently, a wide frequency range
- Improvement of the linearity

The contact surfaces must be flat and stiff. This is best achieved through grinding. Base plate and cover plate must be thick enough to avoid undesired deformation.

In practice, a plate thickness of twice the height of the sensor has proven to be a general rule of thumb. A plate thickness that is less than the height of the sensor should not be selected if the entire measurement range of the sensor is to be utilized.



Before screwing in the preloading screw, grease is to be applied on the contact surface under the screw head and to the thread of the screw bolt.

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Installation

Force sensors are installed most easily with a central threaded joint.

- Carefully clean all contact surfaces of the sensor and of the base plate and cover plate with a degreasing cleaning agent.
- Grease the screw thread and contact surface under the screw head with special grease 1063.
- Connect sensor to charge amplifier, set sensitivity according to package label or calibration certificate.
- Plug together sensor, centering ring, preloading screw, base plate and cover plate and use the charge amplifier to bring to the desired pretension.
- Adjust the sensitivity; this is performed most precisely by recalibrating on-site. For many measuring tasks, the value stated on the calibration certificate can be used with an accuracy tolerance of $\pm 1\%$.

→ To keep the sensor mounting from sliding due to the lateral loads, the screw pretension must be at least 10 times greater than the acting lateral load.

→ Lateral loads also generally produce a bending moment on the measuring load washer. The limit values specified in the data sheet must not be exceeded.

Scope of delivery

- 1 preloading screw
- 1 centering clip

Example:

A sensor Type 9021 is to be preloaded with 8 kN. There are two ways to achieve this:

- If a charge amplifier, e.g., Type 5015A, is available, the calculated sensitivity for a standard pretension, e.g., -3.846 pC/N (see calibration certificate on page 3), must be set on the amplifier so that the desired preloading force can be set as accurately as possible with the torque wrench
- If no charge amplifier is available, the following torque must be set on the torque wrench: $8 \text{ kN} \times 1.4 \text{ N}\cdot\text{m}/\text{kN} = 11.2 \text{ N}\cdot\text{m}$ (see table)

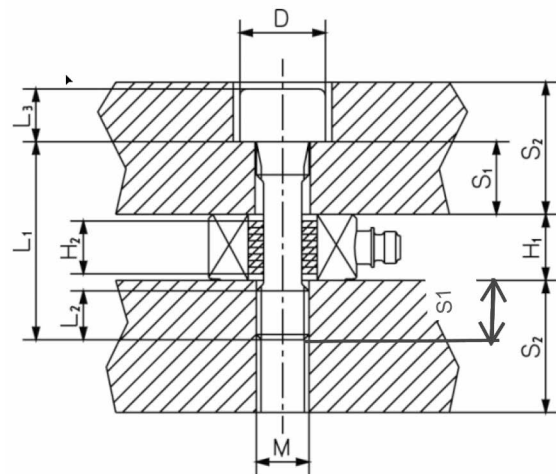


Fig. 1: Detailed dimensions for sensor installation

Sensor type		9422A01	9422A11	9422A21	9422A31	9422A41	9422A51
Thread diameter		M3	M5	M8	M10	M12	M14
Thread pitch	[mm]	0.5	0.5	1.25	1.5	1.75	2
D	[mm]	5.5	8.5	13	16	18	21
L1	[mm]	16	20	30	35	40	45
L2	[mm]	4.2	6.5	10	12	14.3	16.6
L3	[mm]	3	5	8	10	12	14
H1	[mm]	6.5	8	10	11	12	13
H2	[mm]	6	6	8	8	8	9
S1	[mm]	6.5	8	10	11	13	15
S2	[mm]	7	10	16	20	25	30
Force shunt	%	≈7	≈8	≈9	≈9	≈9	≈9
Max. preloading force Fv	[kN]	2.5	5	10	20	30	40
Tightening torque per 1 kN pretension*	[N·m/kN]	0.548	0.83	1.4	1.7	2	2.3
Max. tightening torque*	[N·m]	1.37	4.16	14	34	60	93
Compatible sensors		9001	9011 9101	9021 9102	9031 9103	9041 9104	9051 9105

* Installation aid if no charge amplifier is available. Important: Grease correctly acc. to point 2.

Kalibrierschein Calibration Certificate

Type Kistler 9011A

Serial No. 4440249

Kalibriert durch Calibration Technician	Datum Date	
G. Barilli	05. Jul. 2013	
Referenzgeräte Reference Equipment	Typ Type	Serien-Nr. Serial No.
Gebrauchsnorm Working Standard	Kistler 9331BU	3195150
Ladungskalibrator Charge Calibrator	Kistler 5395A	4183238
Umgebungstemperatur Ambient Temperature	Relative Feuchte Relative Humidity	
°C	%	
25	53	

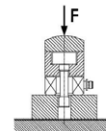
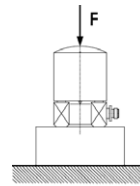
Messergebnisse Results of Measurement

Kalibrierter Bereich ¹⁾ Calibrated Range	Empfindlichkeit Sensitivity	Lin inkl. Hyst Lin incl. Hyst
kN	pC / N	≤ ± %FSO
0 ... 12	-4,057	0,27
0 ... 1,2	-4,010	0,04

1) mit einer Vorlast von 3kN
with a preload of 3kN

Berechnete Empfindlichkeit für eine Standardvorspannung 3 ... 5 kN mit Typ 9422A11
Calculated Sensitivity for a Standard Pretension 3 ... 5 kN with Type 9422A11

pC / N
-3,760



Kistler betreibt die SCS Kalibrierstelle Nr. 049, akkreditiert nach ISO 17025. SCS Kalibrierzertifikate sind auf Bestellung erhältlich.

Kistler operates the SCS Calibration Laboratory No. 049, which is accredited per ISO 17025. SCS Calibration Certificates are available on request.

Bestätigung Confirmation

Das oben durch die Seriennummer identifizierte Gerät entspricht der Vereinbarung der Bestellung und hält die Herstelltoleranzen gemäß den Spezifikationen der Datenblätter ein. Dieses Dokument erfüllt die Anforderungen von EN 10204 Abnahmeprüfzeugnis "3.1". Alle Messmittel sind auf nationale Normale rückverfolgbar. Das Kistler Qualitätsmanagement System ist nach ISO 9001 zertifiziert. Dieses Dokument ist ohne Unterschrift gültig.

The equipment mentioned above and identified by Serial Number complies with the agreement of the order and meets the manufacturing tolerances specified in the data sheets. This document fulfils the requirements of EN 10204 Inspection Certificate "3.1". All measuring devices are traceable to national standards. The Kistler Quality Management System is certified per ISO 9001. This document is valid without a signature.

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