

Preloading elements

Set of pretensioning elements for piezoelectric force sensors

Type 9451A, 9455..., 9456S,
9460, 9461, 9465

These standardized pretensioning elements are used for mounting triaxial force sensors Type 9017C ... 9077C / 9018C ... 9078C, and single-component ring force transducers Types 9081C and 9091C.

- Revolutionary Superbolt ring tensioner, for maximum force application with a simple allen key
- Recessed ring nut for minimum overall height
- Elastic preloading bolt, optimized for measuring tensile and compression forces
- Low force shunt

Description

The standardized pretensioning sets for uni- and triaxial force sensors contain everything necessary for optimal installation: bolt, ring nut, centering ring and where necessary with a sliding disk.

For very high preload forces that can no longer be imposed using a wrench, the two sets 9455S and 9456S offer a revolutionary Superbolt tension nut. This allows enormously high forces to be applied with a simple hexagon torque wrench.

Applications

Multicomponent and single-component force sensors have to be mounted under pretension too meet the specified accuracy or to allow the shear forces F_x and F_y to be transferred by static friction from the base and cover plates to the surfaces of the force sensor. The necessary pretension depends on the magnitude of the shear forces to be transferred.

Superbolt mounting

The mounting of the Superbolt tensioner is identical to the mounting of the other pretensioning sets.

Exception for the tightening of the tensioner:

- no sliding washer is needed
- the preload is applied by crosswise tightening the hex screws of the Superbolt tensioner

→ check out the manual for details!



Mounting

Before assembly, the bearing surfaces of the base plate, cover plate and sensor must be carefully cleaned with a degreasing cleaner.

Except for Types 9455S and 9456S, the anti-friction washer between cover plate and nut reduces the friction and hence the tightening torque. The pretensioning bolt must be screwed into the base plate and the thread secured with adhesive.

Lubricating grease Type 1063 must be applied sparingly to the anti-friction surface, the outside surface of the nut and the upper thread of the pretensioning bolt.

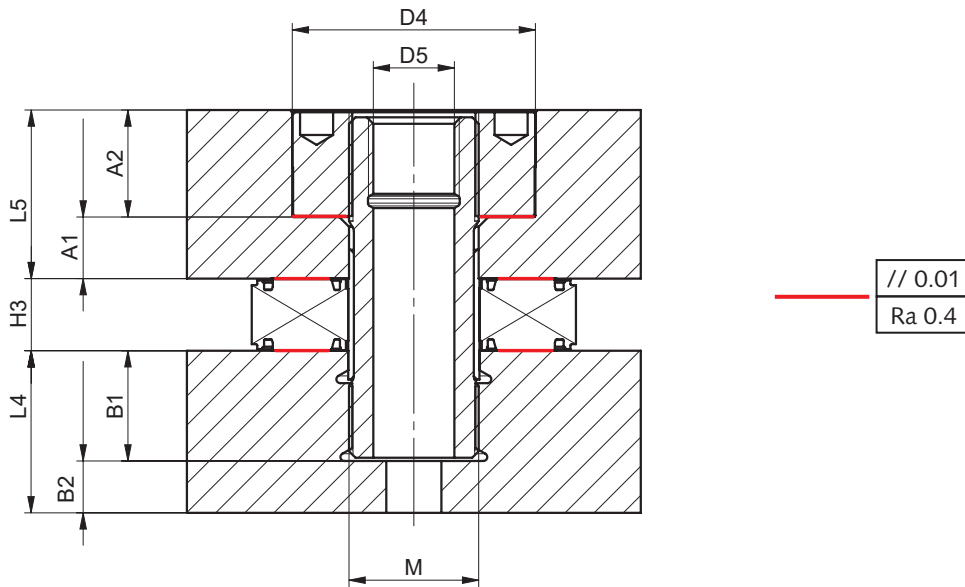
The centering sleeve must be slipped over the pretensioning bolt, then the sensor fitted and oriented with the aid of the alignment surfaces and the connector of the sensor. The cover plate must be slipped on, the anti-friction washer inserted and the nut tightened with the special wrench Type 947x, which has to be ordered separately. Connecting the output of the z-component of the sensor to a charge amplifier allows direct measurement of the pretensioning force.

Superbolt is a registered trade mark of Nord-Lock GmbH

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This information corresponds to the current state of knowledge. Kistler reserves the right to make technical changes. Liability for consequential damage resulting from the use of Kistler products is excluded.

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Preload set	9460	9461	9465	9451A	9455	9455S	9456S
Sensortype	9017	9027	9047	9067	9077 / 9081	9077 / 9081	9091
A1 (min.)	4.5	8	10	14	17/19	16/18	32
A2	6.5	7	15	16	33	36	38
B1	11	16	21	28	34	34	47
B2 (min.)	2	2	2	2	16 ¹⁾	16 ¹⁾	23 ¹⁾
D4	15	18	30	50	75	75	120
D5	-	-	-	-	25	25	48
L4 (min.)	11	15	20	30	50	50	70
L5 (min.)	11	15	25	30	50/52	52/56	70
H3	10	12	14	21	26/22	26/22	28
M	M6x0.75	M8x1	M14x1.5	M20x1.5	M40x2	M40x2	M64x3

all values in Millimeter [mm] if not specified differently

Recommended materials for base and cover plates, heat treated

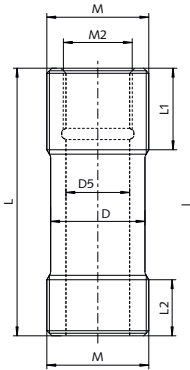
Material	1st recommend.	2nd recommend.	3rd recommend.
W.-Nr.	1.4045*	1.4021*	1.1191
DIN	x22CrNi17	x20Cr13	Ck45
AFNOR	Z15CN16-02	Z20C13	xC45
B.S.	431S29	420S37	M46
JIS	SUS431	SUS420J1	S45C
AISI/SAE	431	420	1045

* Stainless

¹⁾ to fix bottom plate on a structure, only if needed

Overview of set components

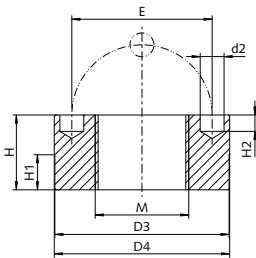
Pretensioning bolt



	9460	9461	9465	9451A	9455	9455S	9456S
Sensor	9017	9027	9047	9067	9077/9081	9077/9081	9091
max. tension [kN]	15	25	85	155	300 ²⁾ / 460 ³⁾	460	730
M	M6x0.75	M8x1	M14x1.5	M20x1.5	M40x2	M40x2	M64x3
M2	-	-	-	-	S28x21	S28x21	M50x2
L	29	40	57	78	105	105	140
L1	5.5	6.5	14	15	32	32	35
L2	6.5	11	14	15	22	22	30
D	4.5	5.9	11	15	37	37	58
D5	-	-	-	-	25	25	48

all values in Millimeter [mm] if not specified differently

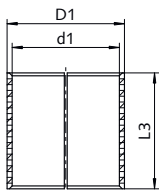
Ring nut



	9460	9461	9465	9451A	9455	9455S	9456S
M	M6x0.75	M8x1	M14x1.5	M20x1.5	M40x2	M40x2	M64x3
D3	14.8	17.8	29.8	49.8	74.5	74	119
D4	15	18	30	50	75	75	120
d2	1.8	2.7	5.2	8.2	10.2	InHex/SW6	InHex/SW8
E	9.4	13	22	38	60	57.5	87
H	5.5	6.5	14	15	32	36 ⁴⁾	37 ⁴⁾
H1	1.1	3	10	8	15	4	5
H2	2.5	3	8.5	5	7	-	-

all values in Millimeter [mm] if not specified differently

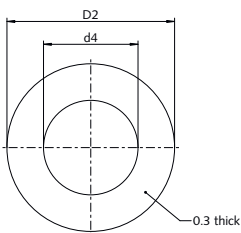
Centering sleeve



	9460	9461	9465	9451A	9455	9455S	9456S
D1	6.5	8	14.1	26.5	40.5	40.5	72
d1	4.5	6	11	22	37	37	58
L3	12	19	20	36	40	40	53

all values in Millimeter [mm] if not specified differently

Sliding washer



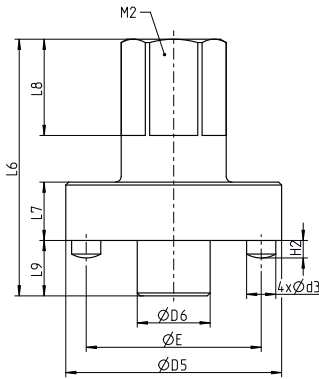
	9460	9461	9465	9451A	9455	9455S	9456S
D2	14.4	17.6	29.6	49.5	74.5	-	-
d4	6.5	10	15	25	42	-	-
Thickness	0.3	0.3	0.3	0.3	0.3	-	-

all values in Millimeter [mm] if not specified differently

- 2) Manually applied with torque wrench
- 3) Hydraulically applied
- 4) Total height of the Superbolt tensioner, consisting of nut and washer, incl. gap of max. 2mm, depending on the applied force.

Optional accessories

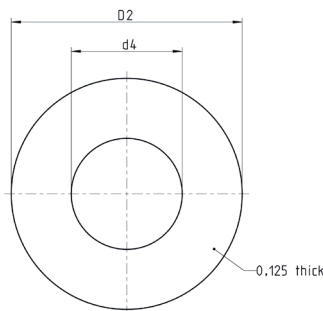
Wrench adapter



	9460	9461	9465	9451A	9455	9455S	9456S
Type	9479	9475	9472	9471	9473	not needed	not needed
M2	6xSW11	6xSW14	6xSW19	6xSW32	6xSW32	-	-
L6	25	25	45	70	88	-	-
L7	12	12	15	30	20	-	-
L8	10	10	20	30	33	-	-
L9	-	-	-	-	19	-	-
d3	1,5	2,5	5	8	10	-	-
H2	2,5	3	6	5	6	-	-
E	9,4	13	22	38	60	-	-
D5	14,5	18	29,6	49	74	-	-
D6	-	-	-	-	25	-	-

all values in Millimeter [mm] if not specified differently

Insulating washer



	9460	9461	9465	9451A	9455	9455S	9456S
Type ⁴⁾	-	-	-	-	9455A1	9455A1	9456A1
Amount					set of 2	set of 2	set of 2
D2	-	-	-	-	87	87	130
d4	-	-	-	-	41.8	41.8	72
Thickness	-	-	-	-	0.125	0.125	0.125

all values in Millimeter [mm] if not specified differently

Ordering key

Type 9460

Length L = 29 mm	-	↑
Length L = please specify in mm	sp	

Type 9451A

Length L = 78 mm	-	↑
Length L = please specify in mm	sp	

Type 9461

Length L = 40 mm	-	↑
Length L = please specify in mm	sp	

Type 9455

Length L = 105 mm	-	↑
Superbolt length L = 105mm	S	
Length L = please specify in mm	sp	

Type 9465

Length L = 57 mm	-	↑
Length L = please specify in mm	sp	

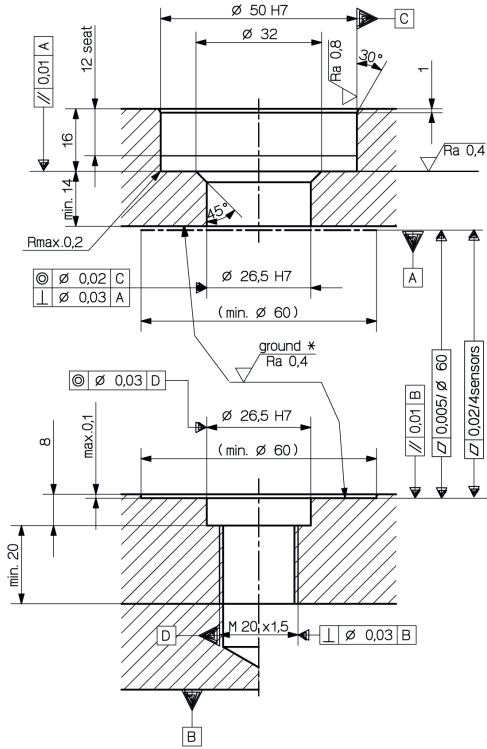
Type 9456

Superbolt length L = 140 mm	S	↑
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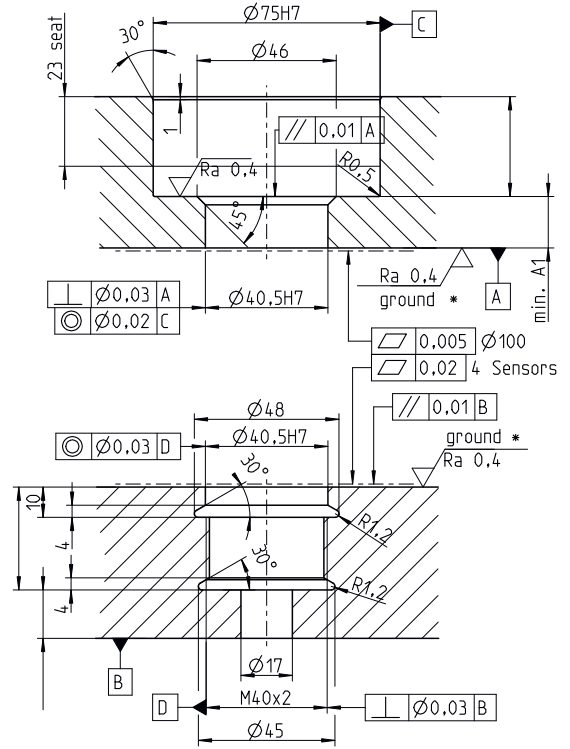
⁴⁾ triaxial force sensors feature ceramic surfaces, so no additional insulation needed

Detailed specifications of top and bottom plates

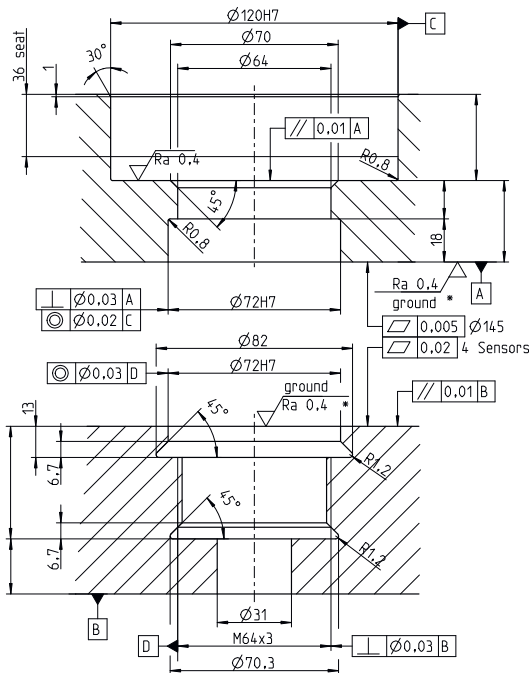
Type 9451A...



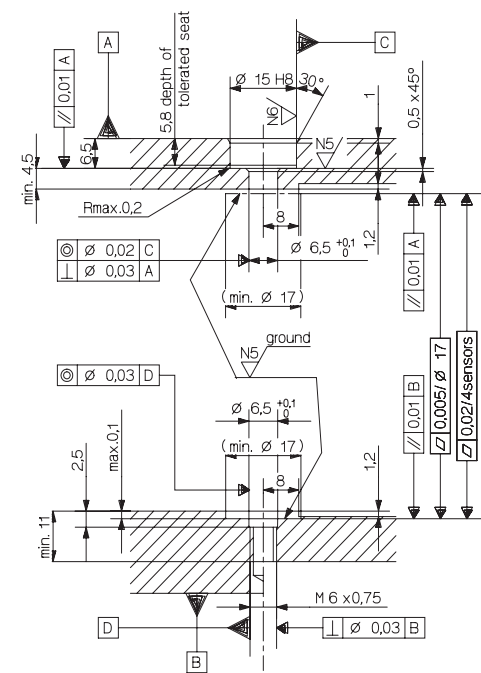
Type 9455...



Type 9456S

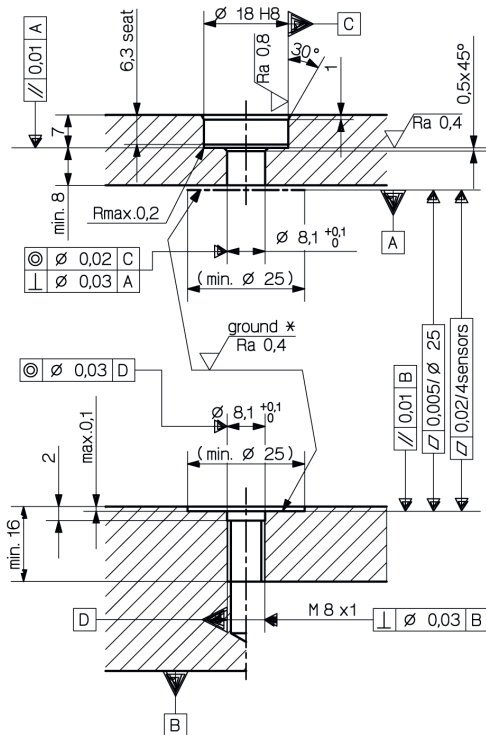


Type 9460...

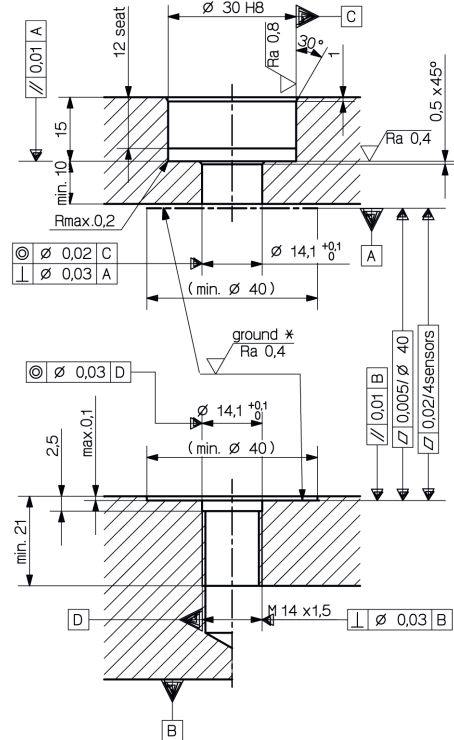


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Type 9461...



Type 9465...



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