

Preloading Elements

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

Set of Preloading Elements for Multicomponent and Single-Component Force Sensors

These standardized preloading elements are used for mounting 3-component force sensors Type 9027C ... 9077C and 9018C ... 9078C, and single-component quartz load washers Types 9081B und 9091B.

- Recessed ring nut for minimum overall height
- Elastic preloading bolt, optimized for measuring tensile and compression forces
- Low force shunt

Description

A set of preloading elements consists of a preloading bolt (high-strength, stainless tool steel), a centering sleeve, an anti-friction washer and a nut.

Application

Multicomponent and single-component force sensors have to be mounted under preload 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 preload depends on the magnitude of the shear forces to be transferred.

Mounting

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

The anti-friction washer between cover plate and nut reduces the friction and hence the tightening torque. Before assembly, lubricating grease Type 1063 must be applied sparingly to the anti-friction surface, the outside surface of the nut and the thread of the preloading bolt. The preloading bolt must be screwed into the base plate and the thread secured with Loctite Type 221. The centering sleeve must be slipped over the preloading 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 preloading force.



Technical Data

Type		9461...	9465...	9451A...
for sensor	Type	9027C/ 9028C	9047C/ 9048C	9067C/ 9068C
Inside \varnothing	mm	8,1	14,1	26,5
Preloading bolt				
	Thread	M8x1	M14x1,5	M20x1,5
	Length L	mm	40	57
Preloading force F_v	kN	20/25	60	140
Preloading bolt				
	Proof stress $R_{p0,2}$	N/mm ²	1 250	1 250
	Stress at F_v σ_v	N/mm ²	915	631

Type		9455...	9455...	9456...
for sensor	Type	9077C/ 9078C	9081B ¹⁾	9091B ²⁾
Inside \varnothing	mm	40,5	40,5	72
Preloading bolt				
	Thread	M40x2	M40x2	M64x3
	Length L ³⁾	mm	105	140
Preloading force F_v	kN	300 ⁴⁾ /400 ⁵⁾	325 ⁴⁾	600 ⁵⁾
Preloading bolt				
	Proof stress $R_{p0,2}$	N/mm ²	1 250	1 250
	Stress at F_v σ_v	N/mm ²	520/690	560

¹⁾ One pair of insulating washers can be ordered as an option for ground-isolated mounting (Type 9455A1)

²⁾ One pair of insulating washers can be ordered as an option for ground-isolated mounting (Type 9456A1)

³⁾ Other lengths possible on request

⁴⁾ Maximum preloading force F_v with torque wrench

⁵⁾ Preloading forces can generally only be applied hydraulically. Hydraulic preloading is offered by Kistler as a service.

Overview of Set Components

for Sensor Type	Preloading set Type	consisting of			
		Preloading bolt Type	Centering sleeve Type	Sliding washer Type	Ring nut Type
9027C/9028C	9461...	3.322.269	3.370.037	3.322.271	3.322.272
9047C/9048C	9465...	3.322.403	3.221.317	3.322.405	3.322.404
9067C/9068C	9451A...	3.322.091	3.750.020	3.322.094	3.322.093
9077C/9078C	9455...	3.322.220	3.750.029	3.322.226	3.322.221
9081B	9455...	3.322.220	3.750.029	3.322.226	3.322.221
9091B	9456...	3.322.190	3.750.147	3.322.562	3.322.194

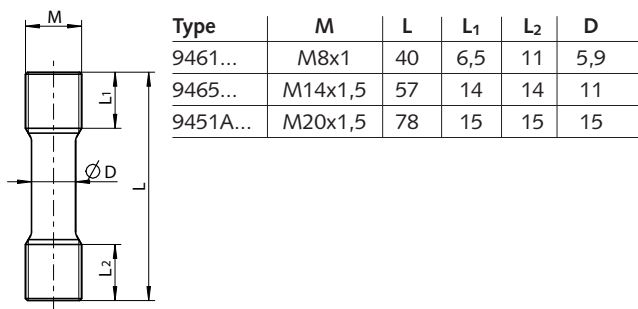


Fig. 1: Preloading bolt

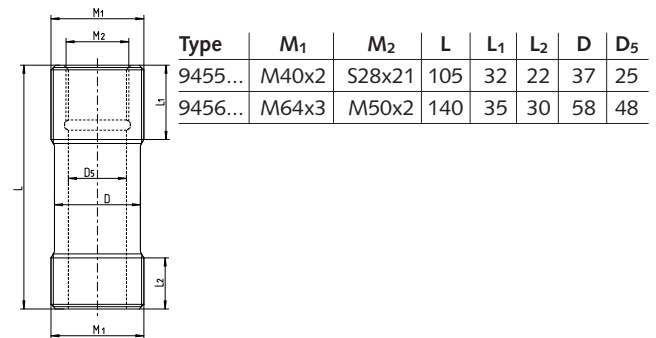


Fig. 2: Preloading bolt Type 9455/9456

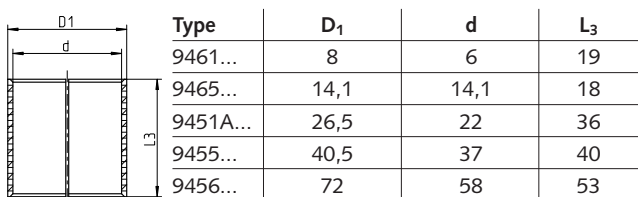


Fig. 3: Centering sleeve

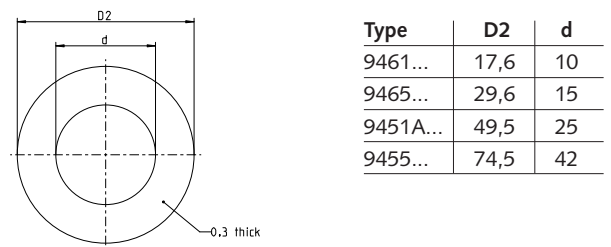


Fig. 4: Sliding washer

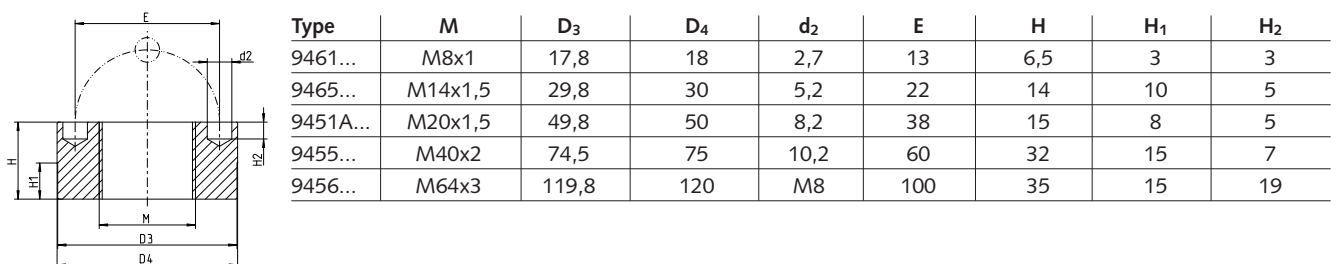
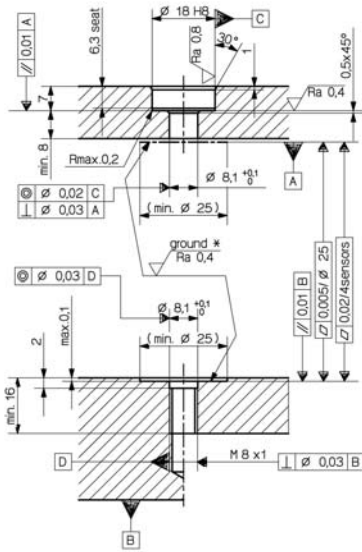


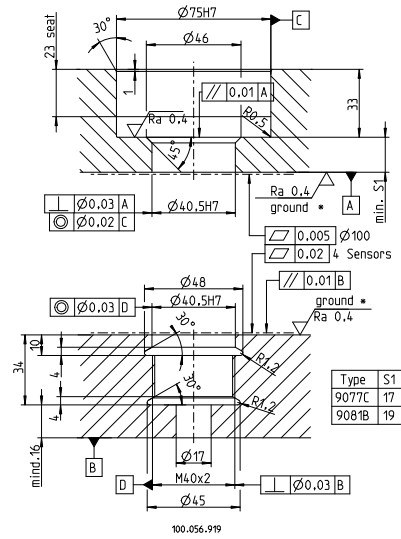
Fig. 5: Ring nut

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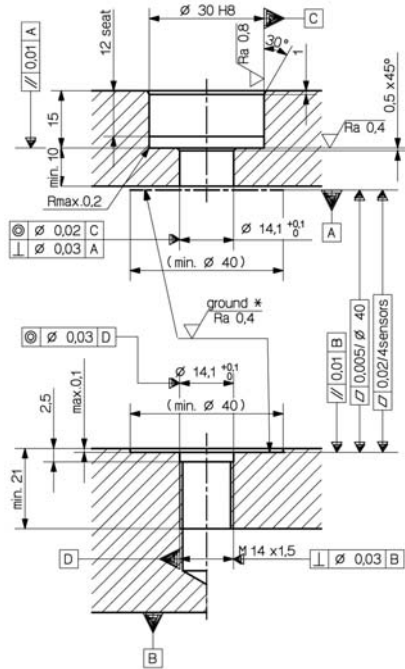
Preparing the Mounting Surfaces and the Bore in the Base and Cover Plates



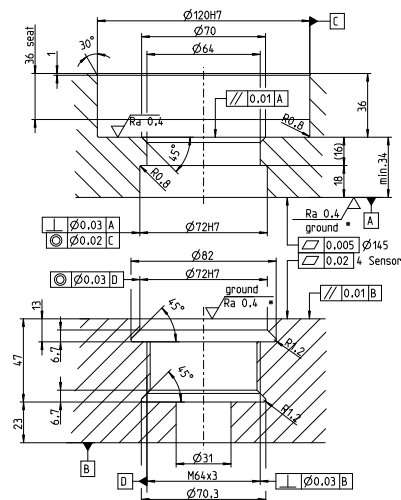
Type 9461...



Type 9455...



Type 9465...

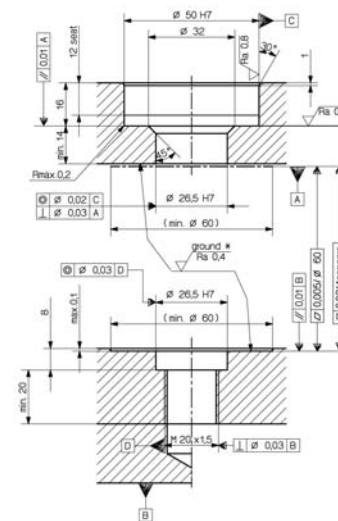


Type 9456...

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



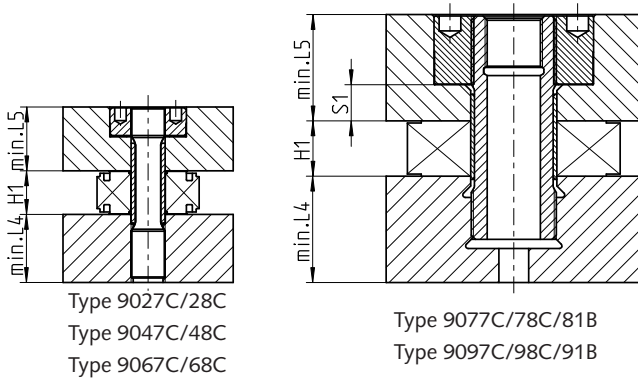
Type 9451A...

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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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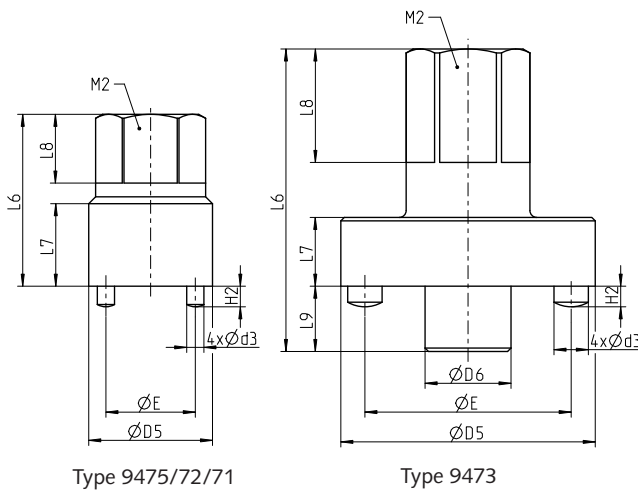
Dimensions



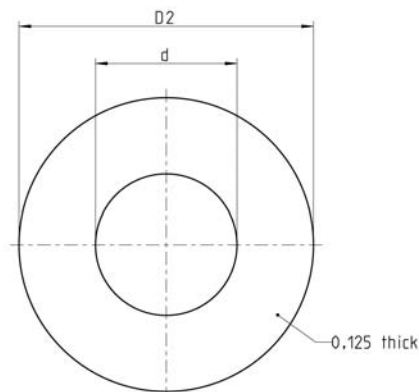
Type	H1	min. L4	min. L5
9027C/9028C	12	15	15
9047C/9048C	14	20	25
9067C/9068C	21	30	30
9077C/9078C	26	50	50
9081B	22	50	50
9091B	28	70	70

Wrench Adapter

Type	for preloading set Type	M2	L6	L7	L8	L9	d3	H2	E	D5	D6
9475	9461...	6x SW14	25	12	10	–	2,5	3	13	18	–
9472	9465...	6x SW19	45	15	20	–	5	6	22	29,6	–
9471	9451A...	6x SW32	70	30	30	–	8	5	38	49	–
9473	9455...	6x SW32	88	20	33	19	10	6	60	74	25



Insulating Washer



Optional Accessories

- Wrench adapter for preloading set Type 9461...
- Wrench adapter for preloading set Type 9465...
- Wrench adapter for preloading set Type 9451A...
- Wrench adapter for preloading set Type 9455...
- One pair of insulating washers for Type 9081B
- One pair of insulating washers for Type 9091B

For preloading set Type	Insulating washer Type	D2	d
9455...	9455A1	87	41,8
9456...	9456A1	129,9	72

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Ordering Key

Type 9461

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

Type 9465

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

Type 9451A

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

Type 9455

Length L = 105 mm	-
Length L = please specify in mm	sp

Type 9456

Length L = 140 mm	-
Length L = please specify in mm	sp

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