

Press Force Sensor

Typ 9333, 9343, 9363

Single Sensor with three Measuring Ranges (100%, 10% and 1%)

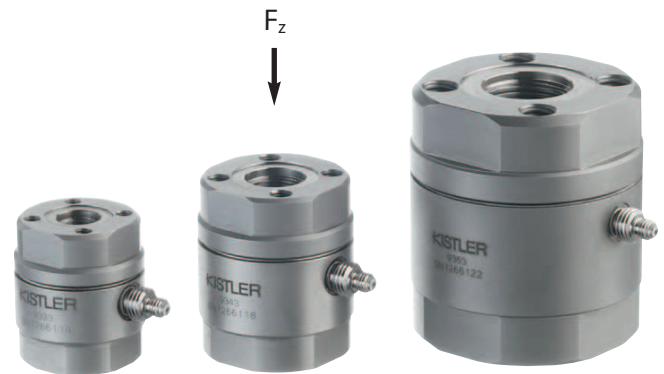
These ready-to-use piezoelectric force sensors are particularly suitable for measuring rapidly changing compression forces in presses. The press force sensors are supplied calibrated and can be mounted in various ways. Three sizes (with maximum measuring range of 50, 70 and 120 kN respectively) are available.

- 3 calibrated measuring ranges (100%, 10% and 1%)
- Compact force sensor ready for easy mounting in connecting rods or plungers
- Double flange for maximum adaptability
- Central bore for ejection tools, etc
- Can be used as force calibration sensor
- Suitable for monitoring joining processes
- SCS calibration (optional)
- Calibration of additional measuring range (optional)

Description

This device is a sensor calibrated in three ranges for measuring compression forces. The forces acting on the sensor produce in its piezoelectric element a proportional electric charge. This is fed via the 10-32 UNF connector and shielded cable to an amplifier for recording of measured values. A protector supplied as standard is very easily screwed onto the side connector for the cable.

The press force sensor has top and bottom flanges that allow it to be mounted flexibly and easily in connecting rods or plungers. It can also be directly mounted at one end, using a fine female thread or the supplied cheese head screw with threaded bush. This minimizes the mounted height of the sensor. If direct mounting is not possible, standard (optional accessory) or customized adapters may be used. A centering seat on both ends allows very accurate coaxial mounting, for example in press-in spindles. A central bore opens up further applications, e.g. with central ejection tools.



Application

The very low profile and rigidity of the press force sensor makes it particularly suitable for measuring rapidly changing compression forces in presses, press-in forces in joining processes, or generally for simply measuring compression forces in test machinery. The elastic characteristics of the machine structure remain largely unchanged. The sensor may be fitted in the moving connecting rod, in the plunger or on the machine table (stationary).

The sensor is suitable for use as a calibration element in calibration measurement. Its compactness and high level of measuring accuracy in all three ranges allow on site calibration of force or strain sensors mounted in the structure of a machine.



Fig. 1: Calibrating element with force distribution cap, flange and cable protector

Technical Data

Type 9333 Press Force Sensor

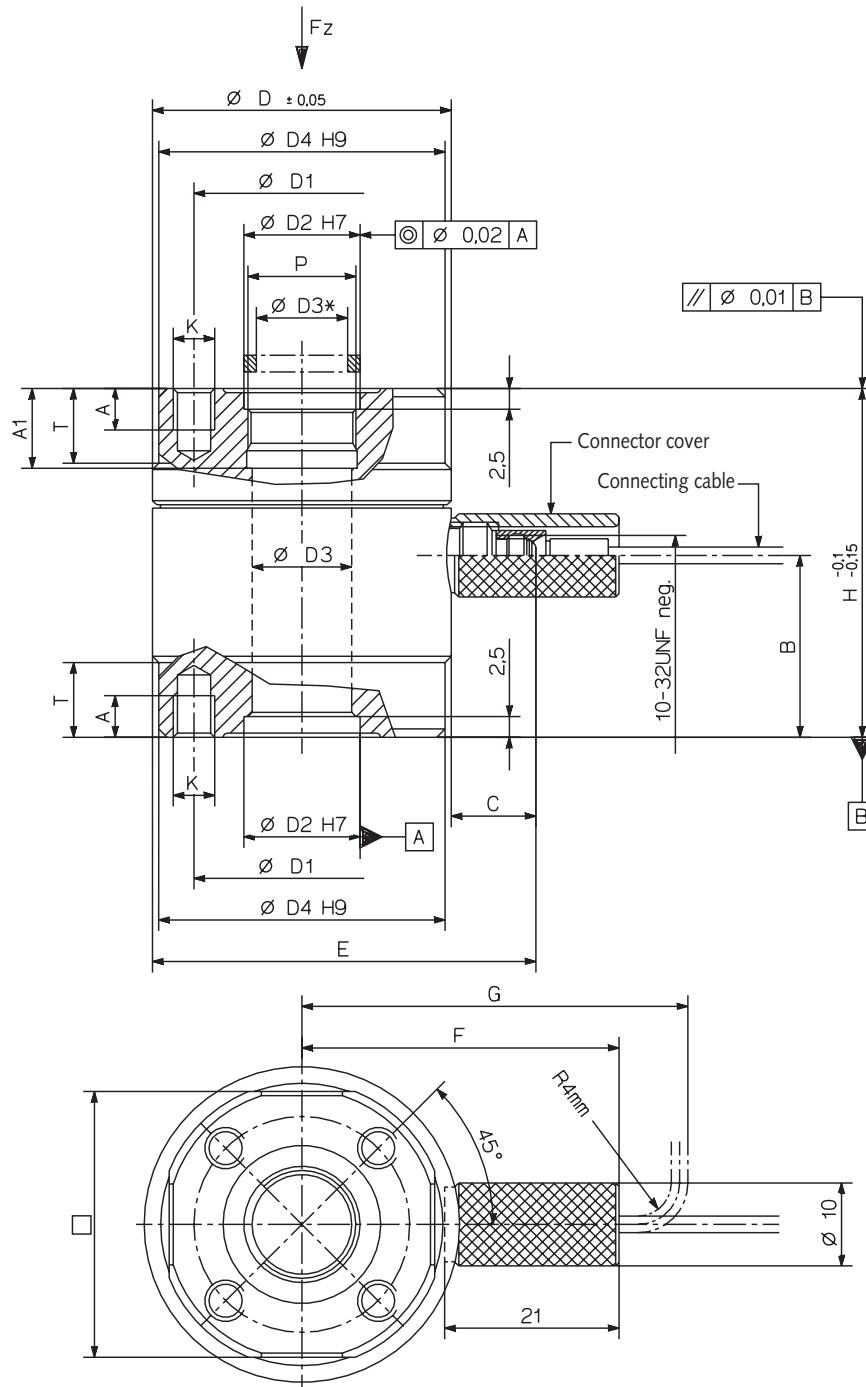
Range Fz	kN	-5 ... 50
Calibrated measuring ranges		
100 %	kN	0 ... 50
10 %	kN	0 ... 5
1 %	kN	0 ... 0,5
Overload	kN	-6/60
Sensitivity	pC/N	≈4
Threshold	N	≤0,02
Linearity	% FSO	±1,0
Hysteresis	% FSO	≤1,0
Max permissible torque		
Mz max (Fx,y, Fz = 0)	Nm	8
Operating temperature	°C	-40 ... 120
Weight	g	127

Type 9343 Press Force Sensor

Range Fz	kN	-10 ... 70
Calibrated measuring ranges		
100 %	kN	0 ... 70
10 %	kN	0 ... 7
1 %	kN	0 ... 0,7
Overload	kN	-12/84
Sensitivity	pC/N	≈4
Threshold	N	≤0,02
Linearity	% FSO	±1,0
Hysteresis	% FSO	≤1,0
Max permissible torque		
Mz max (Fx,y, Fz = 0)	Nm	15
Operating temperature	°C	-40 ... 120
Weight	g	216

Type 9363 Press Force Sensor

Range Fz	kN	-20 ... 120
Calibrated measuring ranges		
100 %	kN	0 ... 120
10 %	kN	0 ... 12
1 %	kN	0 ... 1,2
Overload	kN	-24/144
Sensitivity	pC/N	≈4
Threshold	N	≤0,02
Linearity	% FSO	±1,0
Hysteresis	% FSO	≤1,0
Max permissible torque		
Mz max (Fx,y, Fz = 0)	Nm	90
Operating temperature	°C	-40 ... 120
Weight	g	780



Dimensions in mm

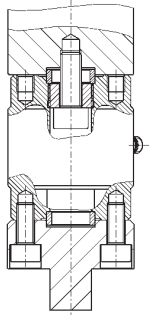
Type	D	D1	D2	D3	D3*	D4	H	A	A1	B	C	□	E	F	G	K	P	T
9333	30	21	10	8,5	8	28,5	34	4	7	16,6	10,1	26	40,1	36	43,5	M4	M9x0,5	8
9343	36	26	14	12	11	34,5	42	5	9	21,7	10,2	32	46,2	39	46,5	M5	M13x1	9
9363	54	40	21	18,5	17	53	60	8	13	32,5	10,4	48	64,4	48	56	M8	M20x1,5	13

* Remains clear with centering rings fitted

Overview of Mounting Examples

Mounting in Plunger

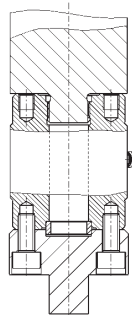
Direct mounting using integral threaded bush with mounting screw



Customized tool adapter

A

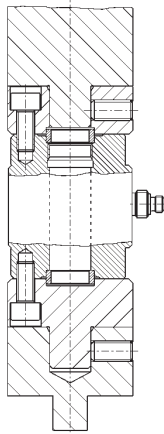
Direct mounting using fine thread provided



Customized tool adapter

B

Straight shank holder with clamping screw

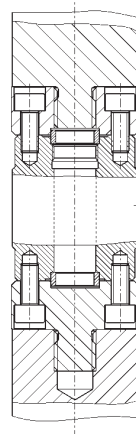


Straight shank, customized tool adapter with clamping screw

C

Mounting in Connecting Rod

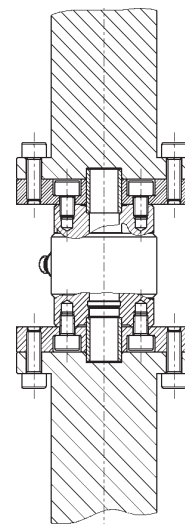
Female thread adapter



Male thread adapter

D

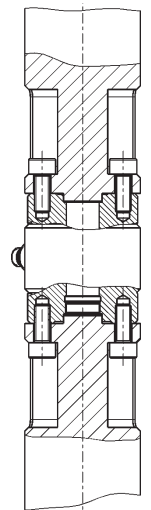
Adapter flange



Adapter flange

E

Direct mounting using integral flange



Direct mounting using integral flange

F

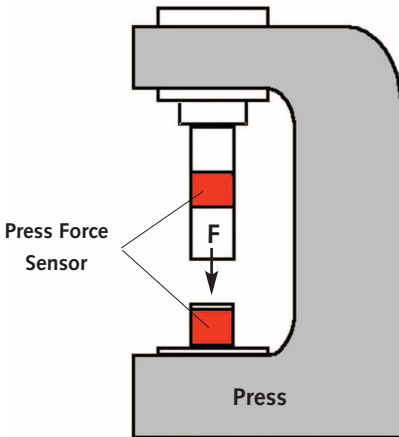
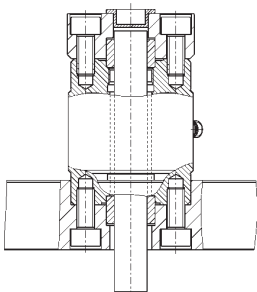


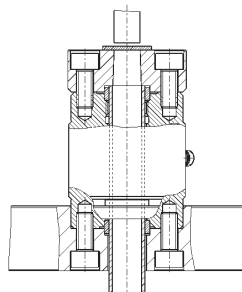
Table Mounting

G



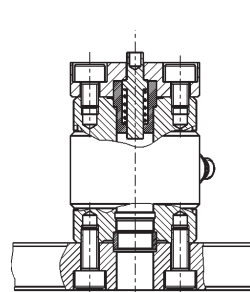
Customized adaptation of deep drawing tool with central ejection tool

H



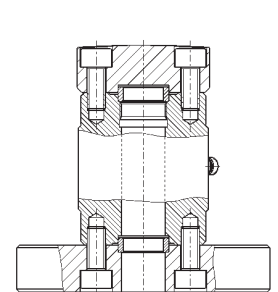
Customized adaptation of punching tool with central ejection bore

I



Customized adaptation of riveting tool

J



Press force sensor with force distributing cap used as calibrating element

000-454e-11.03 (DB06.9333e)

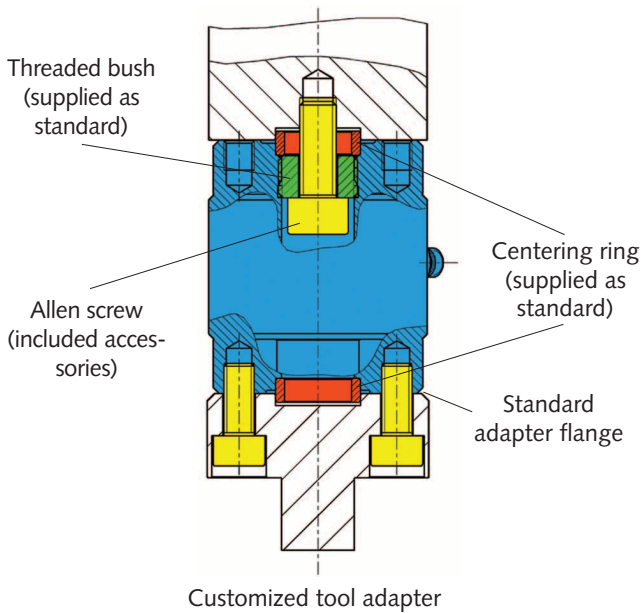
General

Whenever possible the force should be transferred axially. Eccentric force application, bending moments, torques and shear forces are only permissible to a limited extent.

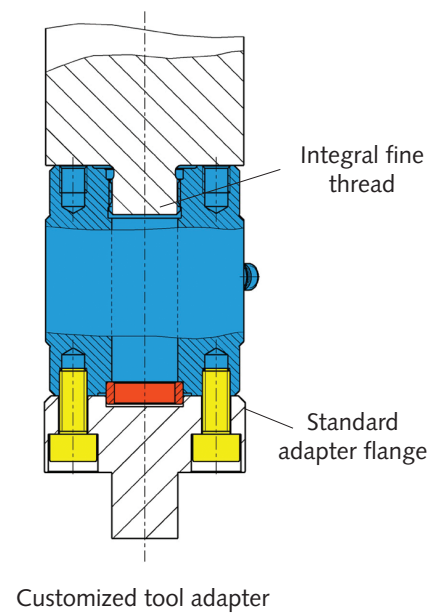
The contact surfaces through which the force is transferred to the press force sensor must be flat, stiff and clean. The centering seats on both ends of the sensor, which use centering rings supplied as standard, allow very accurate coaxial mounting.

The sensor can be mounted directly using the adapter flange on each end, the female thread, the mounting screw with threaded bush, or the adapter module. Special adapter modules can be manufactured for mounting by the customer if required.

Example A: Direct Mounting Using Integral Mounting Screw and Threaded Bush

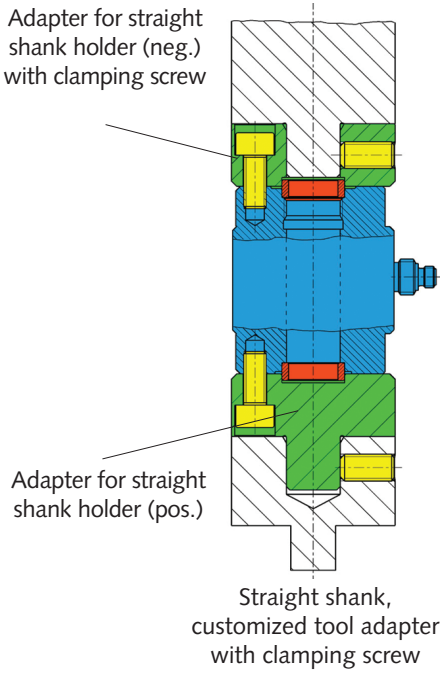


Example B: Direct Mounting Using Integral Fine Thread

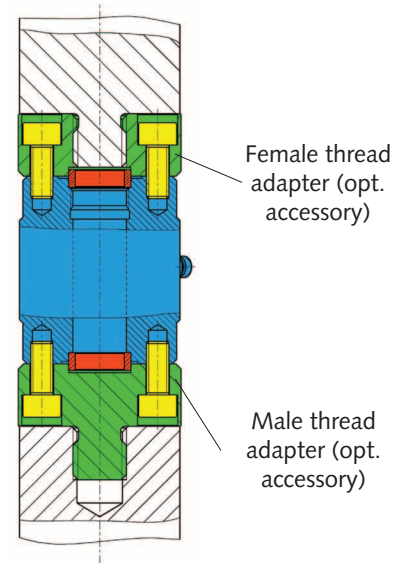


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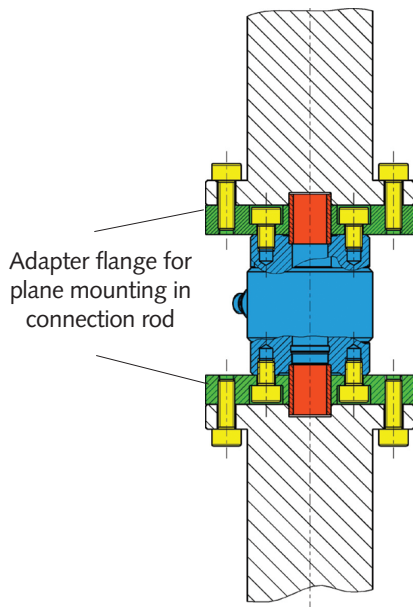
Example C: Mounting Using Adapter with Straight Shank Holder



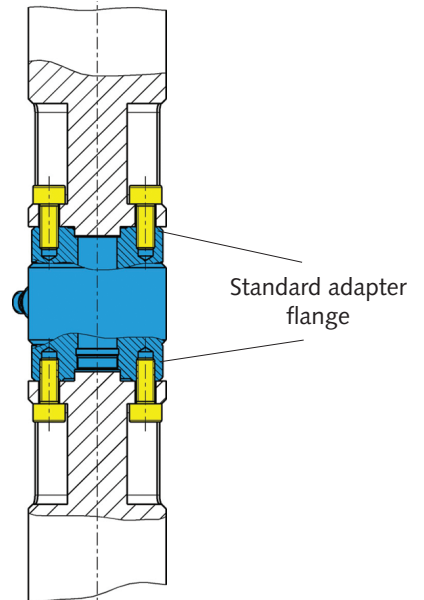
Example D: Mounting Using Threaded Adapter



Example E: Mounting Using Adapter Disk/Flange

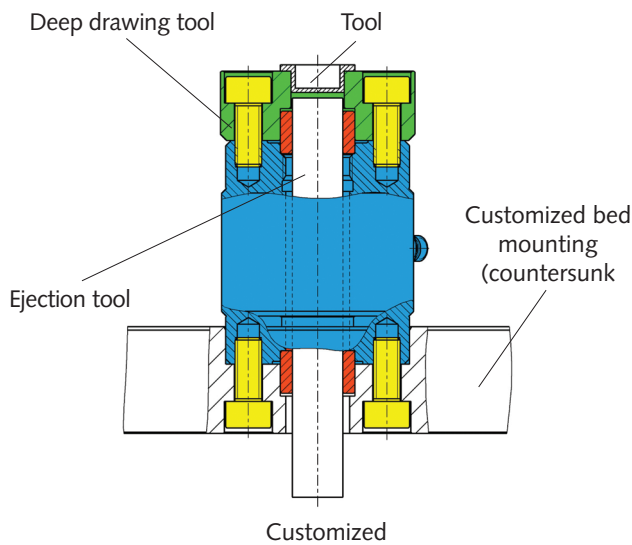


Example F: Direct Mounting Using Integral Flange

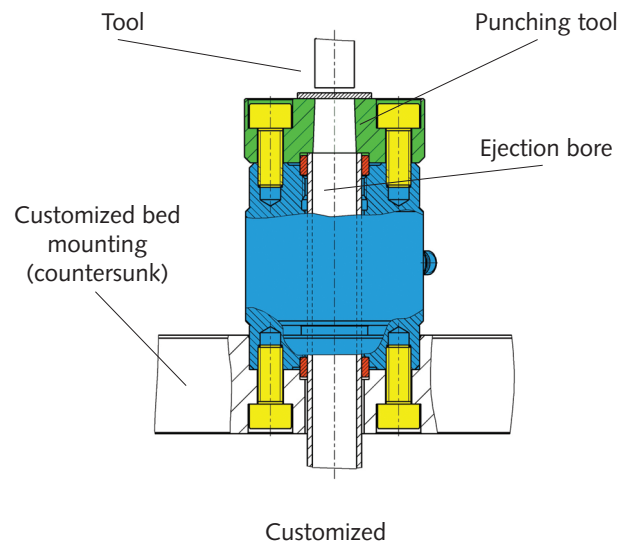


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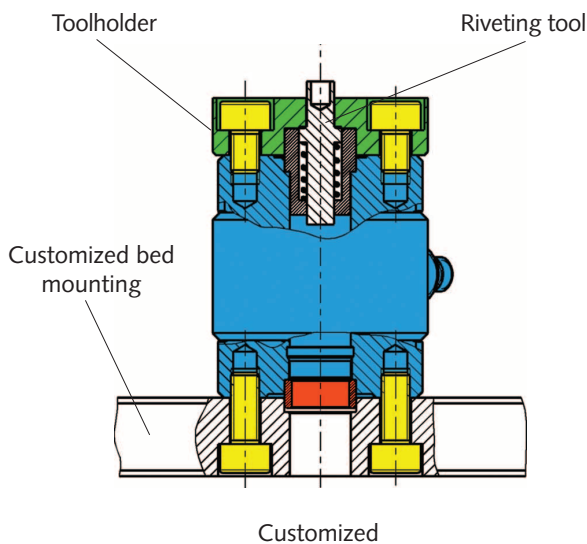
Example G: Adaptation of Deep Drawing Tool with Central Ejection Tool



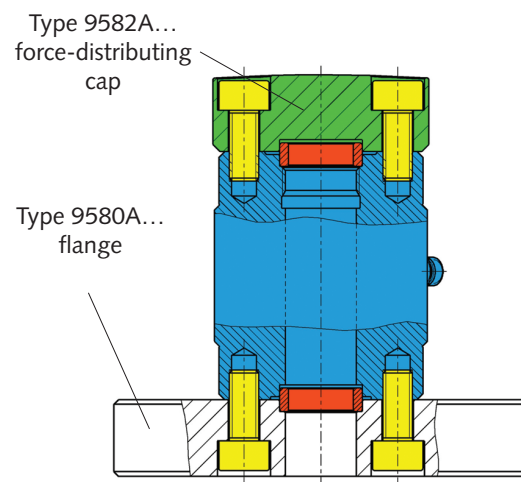
Example H: Adaptation of Punching Tool with Central Ejection Bore



Example I: Adaptation of Riveting Tool



Example J: Calibrating Element with Force Distributing Cap and Flange



For mounting as a calibration element, the press force sensor can be directly adapted by the customer with a Type 9582A... force distributing cap (optional accessory). Alternatively, as shown, it can be fitted with an additional Type 9680A... flange (optional accessory) for easy mounting on the bed of the machine.

000-454e-11.03 (DB06.9333e)

Ordering Key

Press Force Sensor

Accessories Included

- Connector protector 3.414.366
- Threaded bush 3.640.797
- M4x12 cheese head screw 6.120.102
- Centering ring (2x) 3.420.179

Press Force Sensor

Accessories Included

- Connector protector 3.414.366
- Threaded bush 3.640.798
- M6x18 cheese head screw 6.120.122
- Centering ring (2x) 3.420.180

Press Force Sensor

Accessories Included

- Connector protector 3.414.366
- Threaded bush 3.640.799
- M10x25 cheese head screw 6.120.066
- Centering ring (2x) 3.420.181

Type 9333

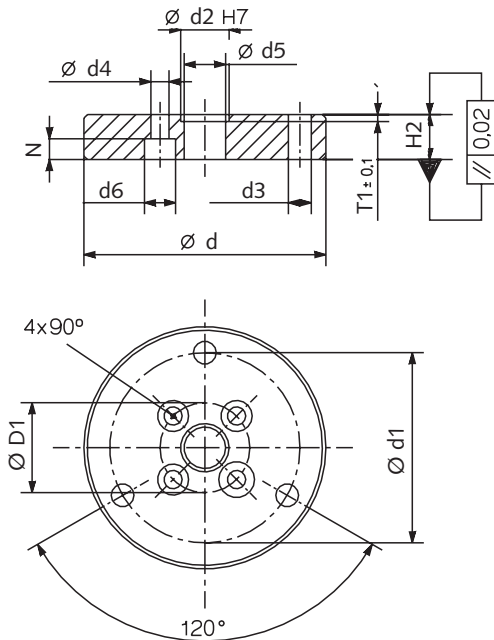
9343

9363

Optional Accessories

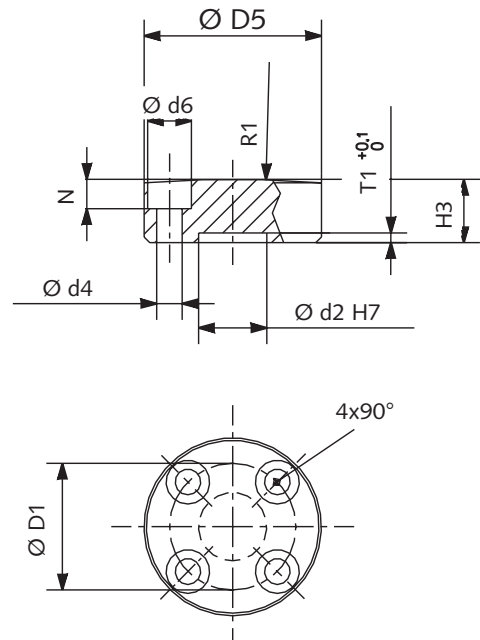
- | | |
|--|-----------|
| • Connecting cable, 10-32UNF pos.-BNC pos. | 1631C... |
| • Connecting cable, 10-32UNF pos.-TNC pos. | 1633C... |
| • Connecting cable, 10-32UNF pos. -10-32UNF pos. | 1635C... |
| • Connecting cable, 10-32UNF pos. int. – BNC pos. | 1939A... |
| • Connecting cable, 10-32UNF pos. int. – TNC pos. | 1941A... |
| • Connecting cable, 10-32UNF pos. – 10-32UNF pos., with metal sheath | 1957A... |
| • Viton-Connecting cable, 10-32UNF pos. int. – 10-32UNF pos. int. oil leak-proof | 1983AC... |
| • Flange | 9580A... |
| • Force distributing cap | 9582A... |
| • Female thread adapter | 9584A... |
| • Male thread adapter | 9586A... |
| • SCS calibration | 9950... |

Flange



for Type	Type	D1	d	d1	d2	d3	d4	d5	d6	H2	T1	N
9333	9580A0	21	62	50	10	5,5	4,3	8,5	7,5	11	2	5
9343	9580A1	26	70	55	14	6,6	5,3	12	9	13	2	6
9363	9580A2	40	100	78	21	13,5	8,4	18	14	22	2	9

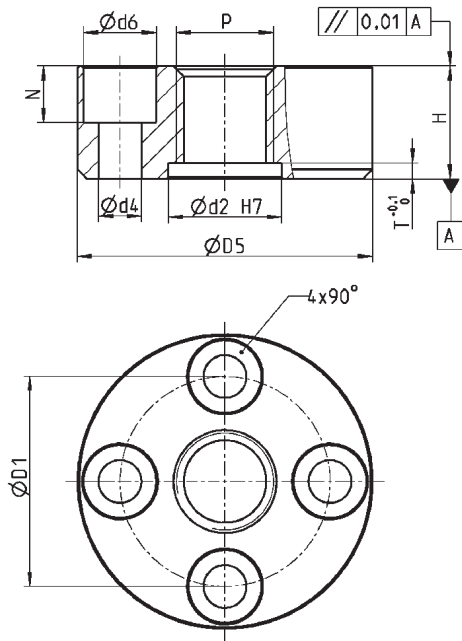
Force Distributing Cap



for Type	Type	D1	D5	d2	d4	d6	H3	T1	N	R1
9333	9582A0	21	30	10	4,3	7,5	11	2	5	250
9343	9582A1	26	36,5	14	5,3	9	13	2	6	300
9363	9582A2	40	56	21	8,4	14	22	2	9	350

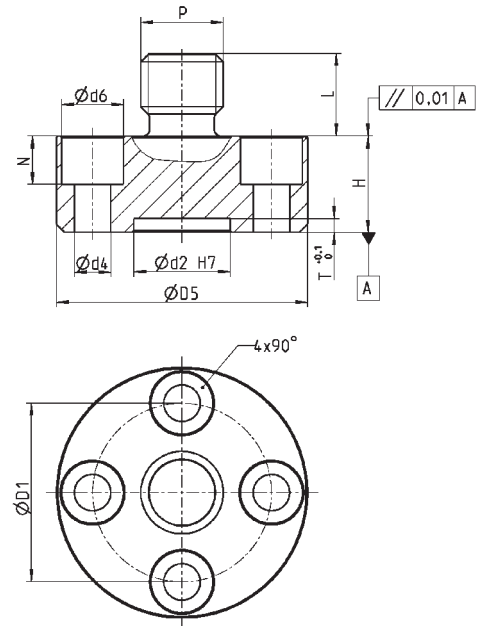
000-454e-11.03 (DB06.9333e)

Female Thread Adapter



for Type	Type	D1	D5	d2	d4	d6	H	N	P	T
9333	9584A0	21	30	10	4,3	7,5	11	5	M8	2
9343	9584A1	26	36,5	14	5,3	9	14	7	M12	2
9363	9584A2	40	56	21	8,4	14	21	9	M18	2

Male Thread Adapter



for Type	Type	D1	D5	d2	d4	d6	H	N	M	L	T
9333	9586A0	21	30	10	4,3	7,5	11	5	M8	9	2
9343	9586A1	26	36,5	14	5,3	9	14	7	M12	12	2
9363	9586A2	40	56	21	8,4	14	21	9	M18	19	2

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