

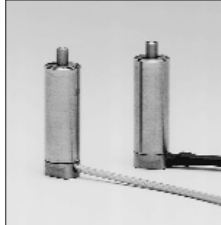
Piezo-mechanical Stack and Ring actuators



Product range and technical data

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Selecting a proper actuator

Guideline:

The main pre-requisite for selecting suitable piezo components is the precise definition of the needed operation profile by the user!

Any supplier of piezo-mechanical components will highly appreciate precise specifications of the requested components beyond “the system shall do as much as possible”.

Putting definite numbers on the needed piezo-parameters is helpful to avoid over-sizing and mismatch. Poorly selected system components are ineffective and therefore expensive.

Please try to analyze the needs for operating your mechanics successfully according to the following:

A, what shift/stroke shall be achieved?

B, what force variation shall be generated by the piezo action?

C, what static preload is acting on the actuator from the beginning?

D, what is the desired maximum operation frequency?

E, what is the desired stroke at maximum frequency (D)?

F, what is the desired max. frequency at maximum stroke (see A)?

G, shortest achievable rise-/fall-time?

H, what external masses shall be attached to the actuator?

A, to C, allow an actuator selection for low dynamic operation according

D, to H, aims for the best match for the designated dynamic operation.

Selecting the amplifier

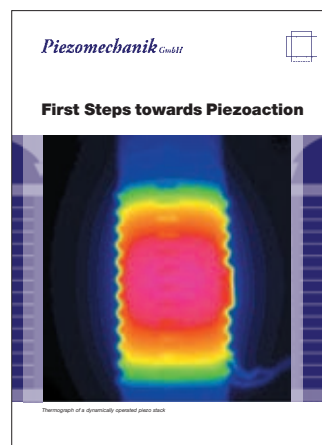
The above selection process results in a piezo-actuator of distinct voltage range and electrical capacitance. Only amplifiers with a matched voltage range should be considered for use.

Do not use amplifiers providing higher voltage!

The dynamic operation profile D, to H, defines the needed current levels (I_{peak} and I_{average}).

When the power consumption of the actuator exceeds the Watt-range, self-heating of the piezo-ceramics can occur.

See brochure: First Steps towards Piezoaction



For details see brochure:
“First Steps towards Piezoaction”

General comments

Low voltage stacks:

Co-fired multilayer actuators (CMA): also called “monolithic” stacks, involve no gluing, but a high temperature sintering of the complete ceramic electrode pile. Operating voltages are up to 200 V. Rectangular cross sections are typical due to the ease of cutting processes in production.

High voltage stacks:

Composite structures made by the stacking of separately finished piezoceramic discs and metal electrode foils that are joined through the use of adhesives. Operating voltages ranging from 500 V thru 1000 V are typical. Cylindrical shapes are most common.

Ring actuators:

A stack with center bore: made with rings instead of discs. This type of actuator is available in both low and high voltage form.

Actuators with integral preload:

PIEZOMECHANIK offers all kinds of piezostacks in a cased version with internal preload. The standard preload shows forces of about 10 – 20% of the maximum load. This design covers a very wide range of applications. Preloaded actuators with casings are much more rugged than the bare ceramic stacks and are more likely to withstand “rough” handling and operation, or the impact of other environmental influences.

On request, PIEZOMECHANIK provides actuators with increased preload levels up to symmetrically acting push-pull arrangements with regard to the force balance.

Dynamic operation:

The real operating frequency of a piezomechanical system is usually held far below the actuator’s resonance frequency

Ask for special low capacitance low voltage actuator’s PSt150hTc

For high dynamic applications

- To reduce power consumption
- To reduce self-heating

Do not misinterpret catalogue data:

Not all operating specifications can be realized at the same time due to simple physical facts.

- Maximum displacement/shift/stroke and maximum force generation /max. blocking force cannot be generated at the same time, only either-or.
- The maximum actuator shifts (strokes) shown in data sheet are only valid under constant load conditions (no force variation!).
- Two values for stroke are stated in the data sheet
A, for unipolar activation 0 V /+U_{max}
B, for semibipolar operation -U_{min} /+U_{max}
The semi-bipolar operation increases the open-loop stroke of a stack by 20 – 30%.
Any kind of stack actuator is suitable for semibipolar operation at room temperature.

Example:

Piezostack PSt 150/5x5/20

Unipolar operation 0 V/ +150 V: stroke 20 µm e.g. with a PIEZOMECHANIK LE 150 unipolar power amplifier

Semi-bipolar operation -30 V/+150 V: stroke 27 µm with a PIEZOMECHANIK SVR 150 amplifier

1. Stack type piezo actuators

1.1 Low voltage actuators with preloaded casings VS

PSt 150/4 /... VS9

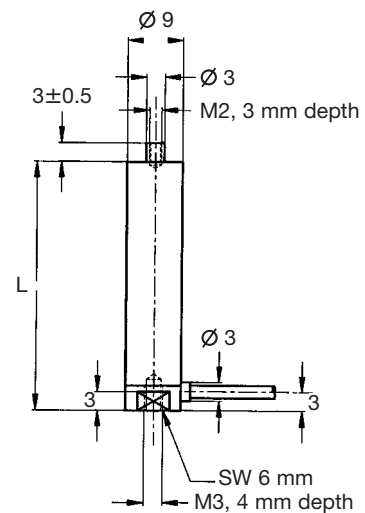
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = approx. 40 N

Max. load force: 300 N

Max. force generation: 300 N

Open loop sensitivity at 1 mV amplifier noise for actuator PSt 150/4/7 VS9: approx. 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
PSt 150/4/7 VS9	13/9	19	170	25	40
PSt 150/4/20 VS9	27/20	28	340	12	30
PSt 150/4/40 VS9	55/40	46	700	6	20
PSt 150/4/60 VS9	80/60	64	1000	4	12

Standard configuration:

Tapped hole in moving end

Electrical connection: 1 m coaxial cable RG 178 with BNC connector

Options:

Coaxial cable RG 178 with LEMO connectors 00250 or 0S250

Moving end with spherical end piece **VbS**

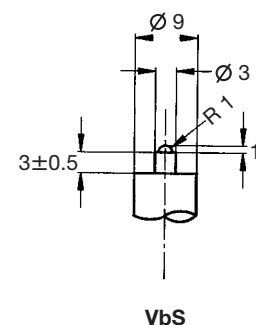
UHV compatibility

Accessories see section 3

Stroke A/B A: for -30 V thru +150 V

B: for 0 V thru +150 V

Max. force generation: for -30 V thru +150 V



PSt 150/5/... VS10



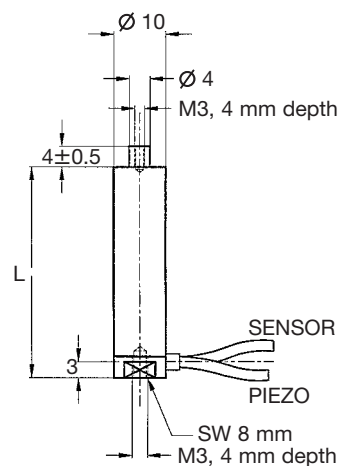
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = approx. 150 N

Max. load force: 800 N

Max force generation: 800 N

Open loop sensitivity at 1 mV amplifier noise for actuator PSt 150/5/7 VS10: 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
PSt 150/5/7 VS10	13/9	19	350	50	40
PSt 150/5/20 VS10	27/20	28	800	25	30
PSt 150/5/40 VS10	55/40	46	1600	12	20
PSt 150/5/60 VS10	80/60	64	2400	8	15
PSt 150/5/80 VS10	105/80	82	3200	6	12
PSt 150/5/100 VS10	130/100	100	4000	5	10

Standard configuration:

Tapped hole in moving end

Electrical connection: 1 m coaxial cable RG 178 with BNC connector

Options:

Coaxial cable RG 178 with LEMO connectors 00250 or 0S250

Moving end with spherical end piece **Vbs**

Moving end with threaded pin **VAg**

Moving end plane **pF**

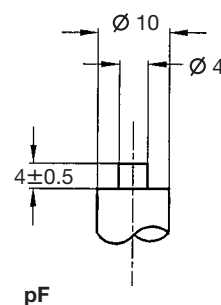
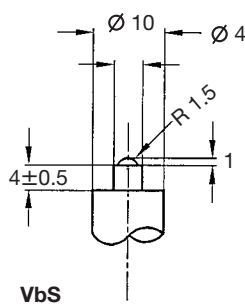
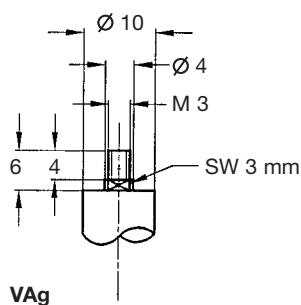
Thermostable modification

Low temperature modification

UHV compatibility

Position detection

Accessories see section 3



PSt 150/7/... VS12



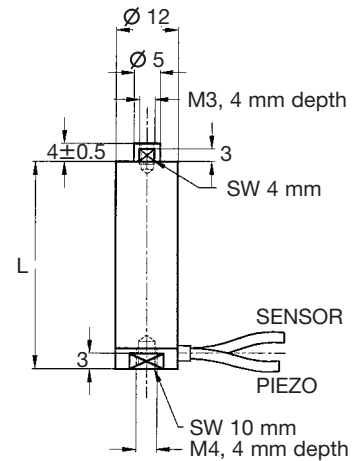
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 300 N

Max. load force: 1800 N

Max. force generation: 1800 N

Open loop sensitivity at 1 mV amplifier noise for actuator PSt 150/7/7: 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance μF	stiffness N/ μm	resonance frequency kHz
PSt 150/7/700 VS12	013/9	19	0.7	120	40
PSt 150/7/20 VS12	27/20	28	1.8	60	30
PSt 150/7/400 VS12	55/40	46	3.6	25	20
PSt 150/7/60 VS12	80/60	64	5.4	15	15
PSt 150/7/800 VS12	105/80	82	7.2	12	12
PSt 150/7/100 VS12	130/100	100	9	10	10
PSt 150/7/120 VS12	160/120	118	11	8	8
PSt 150/7/140 VS12	190/140	136	13	7	6
PSt 150/7/160 VS12	210/160	154	15	6	5

Standard configuration:

Tapped hole in moving end

Electrical connection: 1 m coaxial cable RG 178 with BNC connector

Options:

Coaxial cable RG178 with LEMO connectors
00250 or 0S250

Moving end with spherical end piece **VbS**

Moving end with threaded pin **VAg**

Moving end plane **pF**

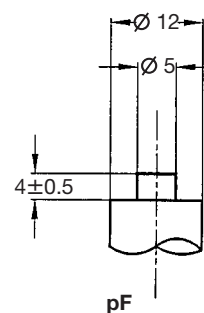
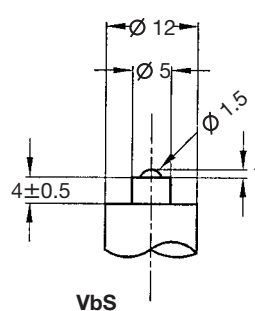
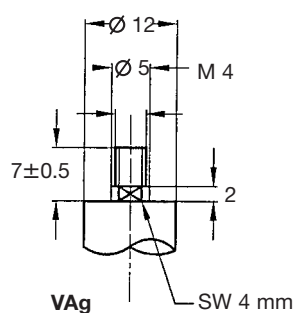
Thermostable modification

Low temperature modification

UHV compatibility

Position detection

Accessories see section 3



PSt 150/10/... VS15



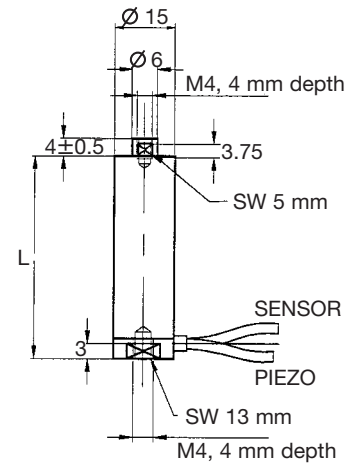
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = approx. 400 N

Max. load force: 4000 N

Max. force generation: 3500 N

Open loop sensitivity at 1 mV amplifier noise for actuator PSt 150/10/7 VS15: 0.05 Nanometer.



Type	max. stroke μm	length mm	el. capacitance μF	stiffness N/ μm	resonance frequency kHz
PSt 150/10/20 VS15	27/20	28	3.6	120	30
PSt 150/10/40 VS15	55/40	46	7.2	60	20
PSt 150/10/60 VS15	80/60	64	11	35	14
PSt 150/10/80 VS15	105/80	82	14	25	12
PSt 150/10/100 VS15	130/100	100	18	20	10
PSt 150/10/120 VS15	160/120	118	21	15	8
PSt 150/10/140 VS15	190/140	136	25	14	7
PSt 150/10/160 VS15	210/160	154	28	13	6
PSt 150/10/180 VS15	240/180	172	33	11	5
PSt 150/10/200 VS15	270/200	190	37	10	4

Standard configuration:

Tapped hole in moving end

Electrical connection: 1 m coaxial cable RG 178 with BNC connector

Options:

Coaxial cable RG 178 with LEMO connectors
00250 or 0S250

Moving end with spherical end piece **Vbs**

Moving end with threaded pin **VAg**

Moving end plane **pF**

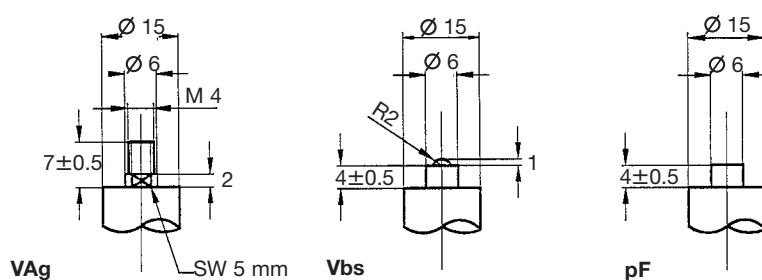
Thermostable modification

Low temperature modification

UHV compatibility

Position detection

Accessories see section 3



PSt 150/14/... VS20



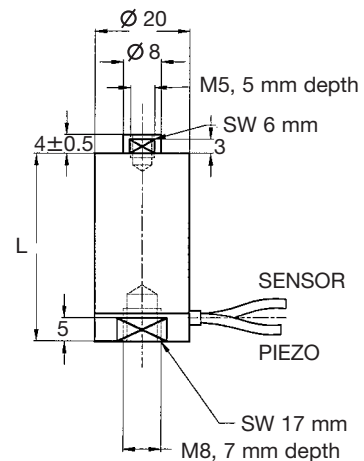
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = approx. 1000 N

Max. load force: 7000 N

Max. force generation: 7000 N

Open loop sensitivity at 1 mV amplifier noise for actuator PSt 150/14/20: approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance μF	stiffness N/ μm	resonance frequency kHz
PSt 150/14/20 VS20	27/20	35	7	250	30
PSt 150/14/40 VS20	55/40	53	14	120	20
PSt 150/14/60 VS20	80/60	71	22	70	14
PSt 150/14/80 VS20	105/80	89	30	50	12
PSt 150/14/100 VS20	130/100	107	39	40	10
PSt 150/14/120 VS20	160/120	125	47	35	8
PSt 150/14/140 VS20	190/140	143	55	30	7
PSt 150/14/160 VS20	210/160	161	63	25	6
PSt 150/14/180 VS20	240/180	179	71	22	5
PSt 150/14/200 VS20	270/200	197	80	20	4

Standard configuration:

Tapped hole in moving end

1 m coaxial cable RG 178 with BNC connector

Options:

Coaxial cable RG178 with LEMO connectors
00250 or 0S250

Coaxial cable RG 316 for power applications

Moving end with spherical end piece **Vbs**

Moving end with threaded pin **VAg**

Moving end plane **pF**

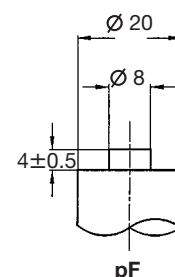
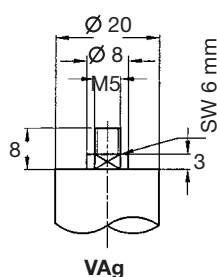
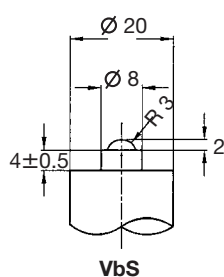
Thermostable modification

Low temperature modification

UHV compatibility

Position detection

Accessories see section 3



PSt 150/20/... VS25



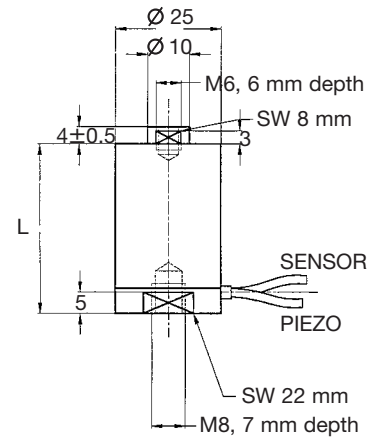
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = approx. 1500 N

Max. load force: 14000 N

Max. force generation: 11000 N

Open loop sensitivity at 1 mV amplifier noise for actuator PSt 150/20/20 VS25: approx. 0.1 Nanometer



Type	max. stroke µm	length mm	el. capacitance µF	stiffness N/µm	resonance frequency kHz
PSt 150/20/20 VS25	25/20	37	11	500	28
PSt 150/20/40 VS25	50/40	57	22	250	18
PSt 150/20/60 VS25	75/60	77	33	160	13
PSt 150/20/80 VS25	95/80	97	44	100	11
PSt 150/20/100 VS25	120/100	117	55	80	9
PSt 150/20/120 VS25	150/120	137	66	65	7
PSt 150/20/140 VS25	175/140	157	77	55	6
PSt 150/20/160 VS25	200/160	177	88	50	5
PSt 150/20/180 VS25	230/180	197	100	45	4
PSt 150/20/200 VS25	250/200	217	110	40	3

Standard configuration:

Tapped hole in moving end

Electrical connection: 1 m coaxial cable RG 178 with BNC connector

Thermostable modification

Low temperature modification

UHV compatibility

Position detection

Options:

Coaxial cable RG178 with LEMO connectors 00250 or 0S250

Coaxial cable RG 316 for power applications

Modified end pieces on request

Accessories see section 3

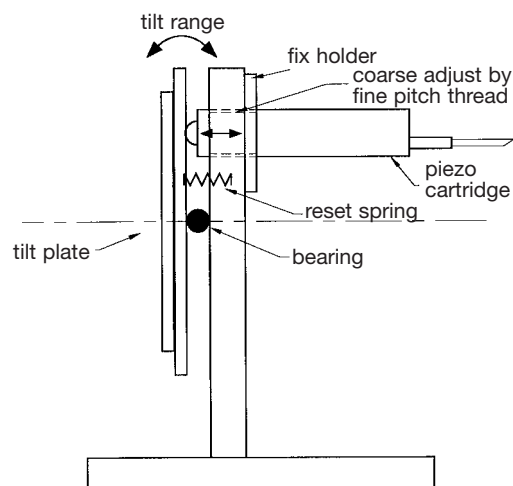
Stroke A/B A: for -30 V thru +150 V
B: for 0 V thru +150 V

Max. force generation: for -30 V thru +150 V

1.2 Piezocartridges: Low voltage actuators in casings with front mount threading



Stack actuators in cartridge-version offer elegant design features by simple attachment of an actuator to the mechanics using a front mounting thread. Using this thread a coarse adjustment for the system is provided. Piezocartridges can retrofit conventional lead screws. Mechanical arrangements for adjusting purposes can be very simply upgraded by using piezocartridges.



Schematic of a mirror mount based on piezo cartridges for coarse adjust by mounting screw and ultra fine adjustment by piezo action.

The stiffness of piezo cartridges is reduced compared to a normally mounted stack because of the force transmission from mounting plate to moving end via stack + casing, and in addition by the quality the screw mount. A lock nut is provided to increase attaching force.

Piezocartridges can therefore withstand high loads, but force generation is reduced due to the lower stiffness. Most applications (e.g. for adjusting purposes) use constant loading.

Standard configuration:

Casing: stainless steel

Electrical connection: 1 m coaxial cable RG 178 with BNC connector

Stroke A/B A: for -30 V thru +150 V
 B: for 0 V thru +150 V

Max. force generation: for -30 V thru +150 V

Options:

Coaxial cable RG178 with LEMO connectors

00250 or 0S250

Position detection

Thermostable

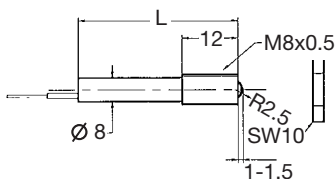


FPSt 150/4/... M8x0.5

(no internal prestress)

Maximum load: 150 N

Open loop sensitivity at 1 mV amplifier noise for actuator FPSt 150/4/20: approx. 0.1 Nanometer



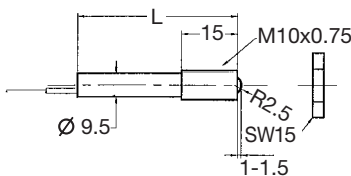
Type	max. stroke μm	length mm	el. capacitance nF
FPSt 150/4/20 M8	27/20	22	340
FPSt 150/4/40 M8	55/40	40	700
FPSt 150/4/60 M8	80/60	58	1000

FPSt 150/5/... M10x0.75

(no internal prestress)

Maximum load 600 N

Open loop sensitivity at 1 mV amplifier noise for actuator FPSt 150/5/20: approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF
FPSt 150/5/20 M10	27/20	23	800
FPSt 150/5/40 M10	55/40	41	1600
FPSt 150/5/60 M10	80/60	59	2400
FPSt 150/5/80 M10	105/80	77	3200
FPSt 150/5/100 M10	130/100	95	4000

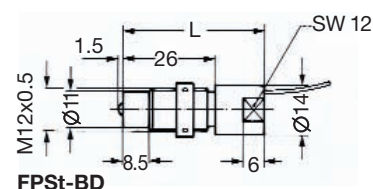
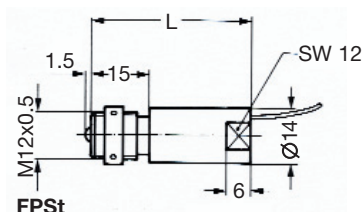
FPSt 150/5/... M12x0.5(-BD) (former versions MPSt(-BD))

(no internal prestress)

For retrofitting translation stages MRL 80.25 and Newport mirror mounts SL

Maximum load: 600 N

Open loop sensitivity at 1 mV amplifier noise for actuator FPSt 150/5/20 : approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF
FPSt 150/5/20 M12 (BD)	27/20	25	800
FPSt 150/5/30 M12 (BD)	40/30	34	1200
FPSt 150/5/40 M12 (BD)	60/40	43	1600
FPSt 150/5/60 M12 (BD)	80/60	61	2400
FPSt 150/5/80 M12 (BD)	105/80	79	3200
FPSt 150/5/100 M12 (BD)	130/100	97	4000
FPSt 150/5/120 M12 (BD)	160/120	115	4800
FPSt 150/5/140 M12 (BD)	190/140	133	5600

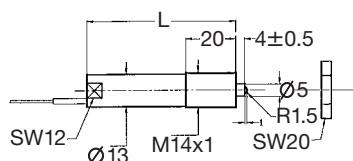


FPSt 150/7/... M14x1

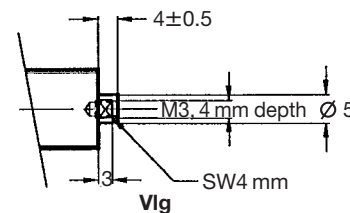
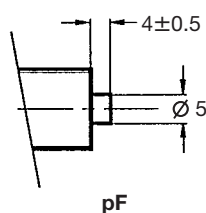
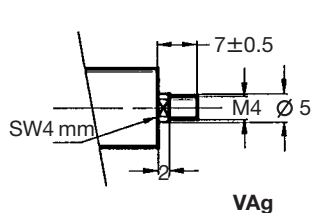
Prestress force = max. tensile force = 200 N

Maximum load: 1500 N

Open loop sensitivity at 1 mV amplifier noise for actuator FPSt 150/7/20: approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance μF
FPSt 150/7/20 M14	27/20	28	1.8
FPSt 150/7/40 M14	60/40	46	3.6
FPSt 150/7/60 M14	80/60	64	5.4
FPSt 150/7/80 M14	105/80	82	7.2
FPSt 150/7/1000 M14	130/100	100	9
FPSt 150/7/120 M14	160/120	118	11
FPSt 150/7/140 M14	190/140	136	13
FPSt 150/7/>140 M14	>140	on request	



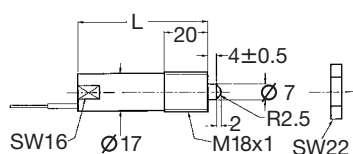
FPSt 150/10/... M18x1

(with internal prestress)

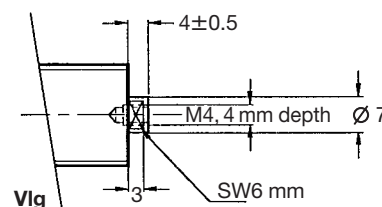
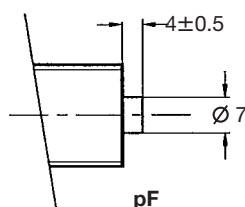
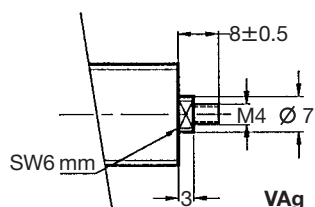
Prestress force = max. tensile force = 400 N

Maximum load: 3000 N

Open loop sensitivity at 1 mV amplifier noise for actuator FPSt 150/10/20: approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance μF
FPSt 150/10/20 M18	27/20	28	3.6
FPSt 150/10/40 M18	55/40	46	7.2
FPSt 150/10/60 M18	80/60	64	11
FPSt 150/10/80 M18	105/80	82	14
FPSt 150/10/100 M18	130/100	100	18
FPSt 150/10/120 M18	160/120	118	21
FPSt 150/10/140 M18	190/140	136	25
FPSt 150/10/>140 M18	>140	on request	



1.3 Low voltage electrostrictive stacks



Operating voltage 0 V thru +150 V, arbitrary polarity

Bare stacks: on request

Stacks with preloaded casings VS

Est 150/5/... VS10

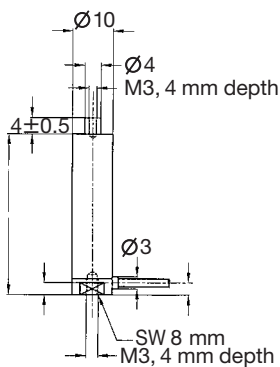
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 150 N

Maximum compressive load: 500 N

Open loop sensitivity for Est 150/5/6 VS10

at 1 mV amplifier noise: approx. 0.05 Nanometer



VS 10

Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm
Est 150/5/6 VS10	6	19	600	50
Est 150/5/12 VS10	12	28	1200	25
Est 150/5/18 VS10	18	37	1800	16
Est 150/5/25 VS10	25	46	2400	12

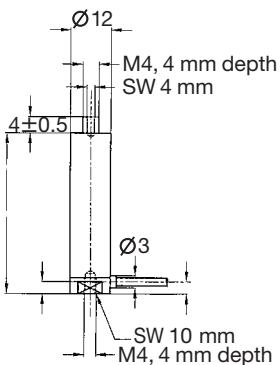
Est 150/7/... VS12

General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 200 N

Maximum compressive load: 1000 N

Open loop sensitivity for Est 150/7/6 VS12 at 1 mV amplifier noise: approx. 0.05 Nanometer



VS 12

Type	max. stroke μm	length mm	el. capacitance μF	stiffness N/ μm
Est 150/7/6 VS12	6	19	2	100
Est 150/7/12 VS12	12	28	4.2	50
Est 150/7/18 VS12	18	37	6.3	33
Est 150/7/25 VS12	25	46	8.4	25
Est 150/7/40 VS12	40	64	12.6	20

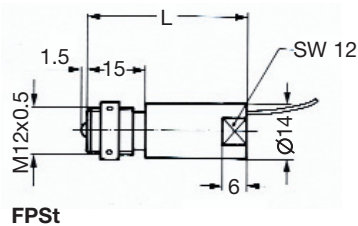


Electrostrictive stacks, frontmount cartridges versions

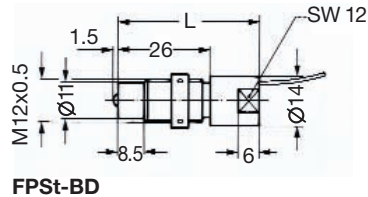
FES_t 150/5/... M10x0.75 on request

FES_t 150/5/... M12x0.5(-BD)

Maximum load: 500 N
Open loop sensitivity for 1 mV amplifier noise
with FES_t 150/5/12 M12: approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF
FES _t 150/5/12 M12 (BD)	12	31	1200
FES _t 150/5/18 M12 (BD)	18	40	1800
FES _t 150/5/25 M12 (BD)	25	48	2400
FES _t 150/5/40 M12 (BD)	40	67	3600



1.4 High voltage stack actuators



Bare stacks without casing

Configuration: discretely stacked elements

Endfaces piezo ceramic, electrically insulated

Potential free operation possible

Surface coating

General data: see brochure: "First Steps towards Piezoaction"



Stroke A/B:

PSt 500: A: -100 V thru +500 V

B: -0 V thru +500 V

Max. force generation: for -100 V thru +500 V

PSt 1000: A: -200 V thru +1000 V

B: -0 V thru +1000 V

Max. force generation: for -200 V thru +1000 V

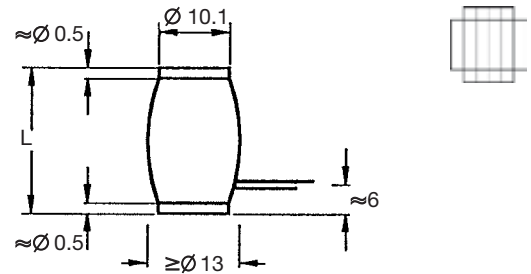
PSt 500/10/... and PSt 1000/10/...

Maximum load: 5000 N

Maximum force generation: 4000 N

Open loop sensitivity for 5 mV amplifier noise at

PSt 500/10/5: approx. 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
PSt 500/10/5	12/7	9	80	260	50
PSt 500/10/15	24/18	18	180	130	30
PSt 500/10/25	35/25	27	340	90	25
PSt 500/10/40	55/40	36	440	55	20
PSt 500/10/60	80/60	54	680	40	15
PSt 500/10/80	105/80	72	880	30	10
PSt 1000/10/5	12/7	9	20	300	60
PSt 1000/10/15	24/18	18	45	150	40
PSt 1000/10/25	35/25	27	85	100	30
PSt 1000/10/40	55/40	36	110	75	25
PSt 1000/10/60	80/60	54	170	50	20
PSt 1000/10/80	105/80	72	220	35	15
PSt 1000/10/>100	>/100	on request			

Options:

Spherical endface **bS**, R = 5 mm

(order code e.g. PSt 500/10/25 bS)

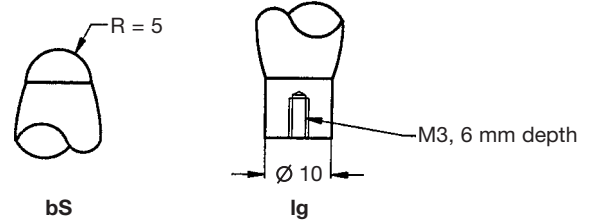
When not otherwise stated, the half sphere will be applied to the moving end.

Threaded piece for fix end (tapped hole M3): **lg**

Materials HP, HS/HT on request

Low temperature modification

UHV modification

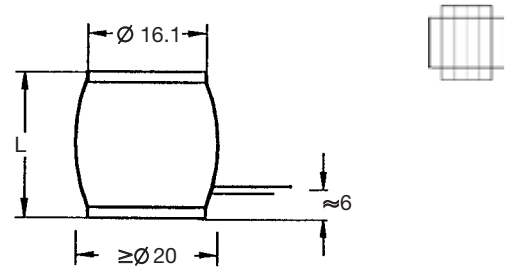


PSt 1000/16/...

Maximum load: 15000 N

Maximum force generation: 12000 N

Open loop sensitivity for 10 mV amplifier noise at
PSt 1000/16/5: approx. 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
PSt 1000/16/5	12/7	9	60	800	60
PSt 1000/16/20	27/20	18	150	400	40
PSt 1000/16/40	55/40	36	360	200	25
PSt 1000/16/60	80/60	54	540	120	20
PSt 1000/16/80	105/80	72	720	90	15
PSt 1000/16/>100	>/100	on request			

Options:

End pieces for fixed and moving end on request

Materials HP, HS/HT on request

Low temperature modification

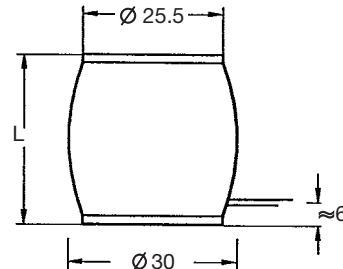
UHV modification

PSt 1000/25/...

Maximum load: 35000 N

Maximum force generation: 25000 N

Open loop sensitivity for 10 mV amplifier noise at
PSt 1000/25/5: approx. 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
PSt 1000/25/5	12/7	9	140	1800	60
PSt 1000/25/20	27/20	18	350	900	40
PSt 1000/25/40	55/40	36	800	450	25
PSt 1000/25/60	80/60	54	1250	300	20
PSt 1000/25/80	105/80	72	1700	200	15
PSt 1000/25/>100	>/100	on request			

Options:

End pieces for fixed and moving end on request

Materials HP, HS/HT on request

Low temperature modification

UHV modification

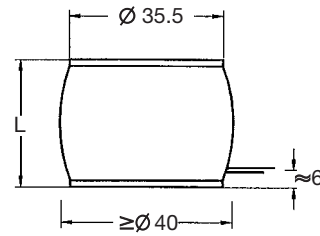
PSt 1000/35/...

Maximum load: 70000 N

Maximum force generation: 50000 N

Open loop sensitivity for 10 mV amplifier noise at

PSt 1000/35/5: approx. 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
PSt 1000/35/5	12/7	9	300	4000	60
PSt 1000/35/20	27/20	18	800	2000	40
PSt 1000/35/40	55/40	36	1600	1000	25
PSt 1000/35/60	80/60	54	2500	600	20
PSt 1000/35/80	105/80	72	3300	450	15
PSt 1000/35/>100	>/100	on request			

Options:

End pieces for fixed and moving end on request

Materials HP, HS/HT on request

Low temperature modification

UHV modification

1.5 High Voltage Actuators with casing and internal prestress



Stroke A/B:

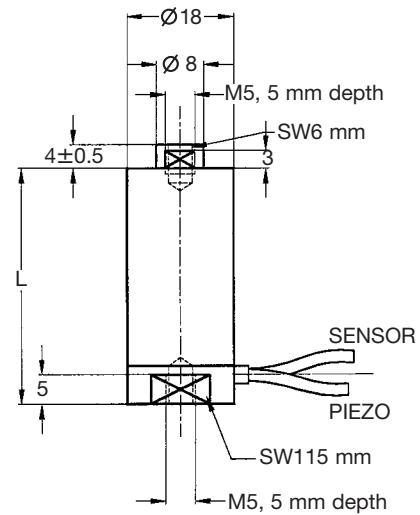
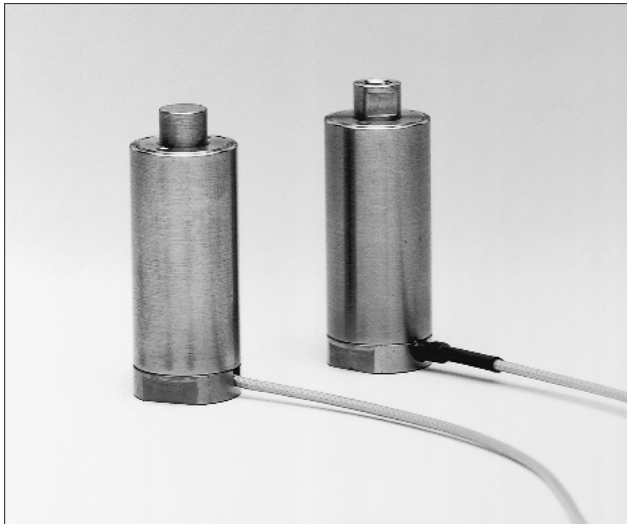
PSt 500: A: -100 V thru +500 V
B: -0 V thru +500 V

Max. force generation: for -100 V thru +500 V

PSt 1000: A: -200 V thru +1000 V
B: -0 V thru +1000 V

Max. force generation: for -200 V thru +1000 V

PSt 500/10/...VS18 and PSt 1000/10/...VS18



General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 700 N

Maximum load: 5000 N

Maximum force generation: 4000 N

Open loop sensitivity at 5 mV amplifier noise for actuator PSt 500/10/5: approx. 0.05 Nanometer

Type	max. stroke µm	length mm	el. capacitance nF	stiffness N/µm	resonance frequency kHz
PSt 500/10/5 VS18	12/70	24	80	260	35
PSt 500/10/20 VS18	27/20	33	180	120	27
PSt 500/10/25 VS18	35/25	42	340	90	22
PSt 500/10/40 VS18	55/40	51	440	55	18
PSt 500/10/60 VS18	80/60	69	680	40	16
PSt 500/10/80 VS18	105/80	87	880	30	15
PSt 500/10/100 VS18	130/100	105	175	25	12



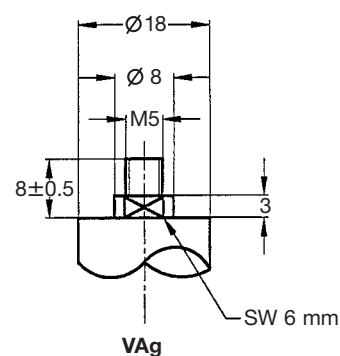
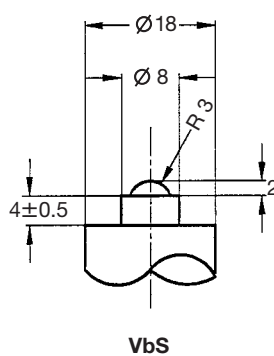
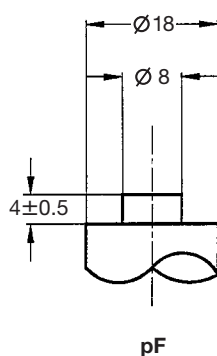
Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
PSt 1000/10/5 VS18	12/7	24	20	300	40
PSt 1000/10/20 VS18	27/20	33	45	150	35
PSt 1000/10/25 VS18	35/25	42	85	100	30
PSt 1000/10/40 VS18	55/40	51	110	75	27
PSt 1000/10/60 VS18	80/60	69	170	50	23
PSt 1000/10/80 VS18	105/80	87	220	35	20
PSt 1000/10/100 VS18	130/100	105	270	30	15
PSt 1000/10/125 VS18	160/125	125	330	25	10
PSt 1000/10/150 VS18	200/150	145	390	17	5
PSt 1000/10/200 VS18	260/200	185	510	10	3

Standard configuration:

Coaxial cable RG 178, 1 m with connectors BNC or LEMO 0S250

Options:

Piezomaterials HP, HS/HT
 Thermostable modification for power applications
 Low temperature modification
 UHV modification
 Position sensor
 Negative polarity
 Accessories: see section 3
 Mechanical end pieces



PSt 1000/16/... VS 25



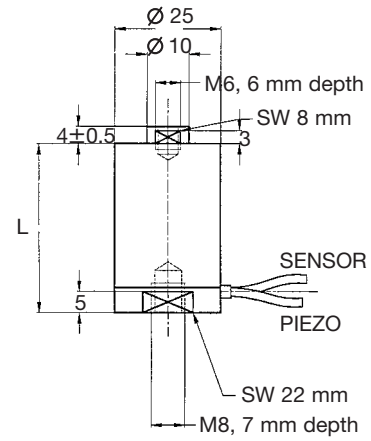
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 1500 N

Maximum load: 15000 N

Maximum force generation: 12000 N

Open loop sensitivity at 10 mV amplifier noise for actuator PSt 1000/16/5 VS25: approx. 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
PSt 1000/16/5 VS25	12/7	26	60	800	40
PSt 1000/16/20 VS25	27/20	35	150	400	35
PSt 1000/16/40 VS25	55/40	53	360	200	30
PSt 1000/16/60 VS25	80/60	71	540	120	27
PSt 1000/16/80 VS25	105/80	89	720	90	23
PSt 1000/16/100 VS25	130/100	107	900	75	20
PSt 1000/16/125 VS25	160/125	127	1100	60	15
PSt 1000/16/150 VS25	200/150	147	1400	50	7
PSt 1000/16/200 VS25	260/200	187	1900	35	4
PSt 1000/16/ >200 VS25	> 200	on request			

Standard configuration:

Coaxial cable RG 178, 1.5 m with connector LEMO 0S250

Options:

Coaxial cable RG 316 for power applications

Piezomaterials HP, HS/HT

Thermostable modification for power applications

Low temperature modification

UHV modification

Position sensor

Negative polarity

Accessories: see chapter 3

Mechanical end pieces for moving end: on request

PSt 1000/25/... VS35



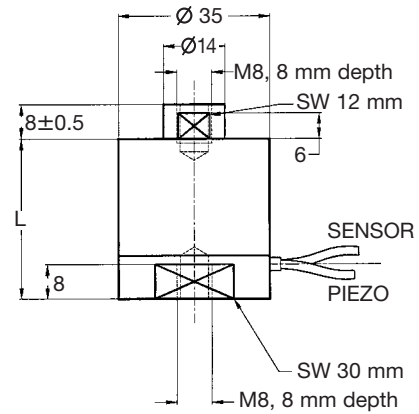
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 4000 N

Maximum load: 35000 N

Maximum force generation: 25000 N

Open loop sensitivity for 10 mV amplifier noise for actuator PSt 1000/25/5 VS35: approx. 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/μm	resonance frequency kHz
PSt 1000/25/7 VS35	12/7	33	140	1800	40
PSt 1000/25/20 VS35	27/20	42	350	900	35
PSt 1000/25/40 VS35	55/40	60	800	450	30
PSt 1000/25/60 VS35	80/60	78	1250	300	27
PSt 1000/25/80 VS35	105/80	96	1700	200	23
PSt 1000/25/100 VS35	130/100	114	2150	180	20
PSt 1000/25/125 VS35	160/125	134	2500	150	15
PSt 1000/25/150 VS35	200/150	154	3100	120	7
PSt 1000/25/200 VS35	260/200	194	3700	90	4

Standard configuration:

Coaxial cable RG 178, 1.5 m with connector LEMO 0S250

Options:

Coaxial cable RG 316 for power applications

Piezomaterials HP, HS/HT

Thermostable modification for power applications

Low temperature modification

UHV modification

Position detection

Negative polarity

Accessories: see chapter 3

Mechanical end pieces for moving end: on request

PSt 1000/35/... VS45



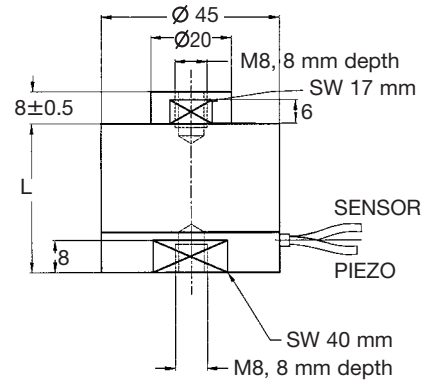
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 6000 N

Maximum load: 70000 N

Maximum force generation: 50000 N

Open loop sensitivity at 10 mV amplifier noise for actuator PSt 1000/35/7 VS 45: approx. 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/μm	resonance frequency kHz
PSt 1000/35/7 VS45	12/70	33	300	4000	37
PSt 1000/35/20 VS45	27/20	42	800	2000	33
PSt 1000/35/40 VS45	55/40	60	1600	1000	38
PSt 1000/35/60 VS45	80/60	78	2500	600	25
PSt 1000/35/80 VS45	105/80	96	3300	450	21
PSt 1000/35/100 VS45	130/100	114	4100	350	18
PSt 1000/35/125 VS45	160/125	134	4900	300	14
PSt 1000/35/150 VS45	200/150	154	5700	220	7
PSt 1000/35/200 VS45	260/200	194	6500	150	4

Standard configuration:

Coaxial cable RG 178, 1.5 m with connector LEMO 0S250

Options:

Coaxial cable RG 316 for power applications

Piezomaterials HP, HS/HT

Thermostable modification for power applications

Low temperature modification

UHV modification

Position sensor

Negative polarity

Accessories: see chapter 3

Mechanical end pieces for moving end: on request

Stroke A/B:

PSt 500: A: -100 V thru +500 V

B: -0 V thru +500 V

Max. force generation: for -100 V thru +500 V

PSt 1000: A: -200 V thru +1000 V

B: -0 V thru +1000 V

Max. force generation: for -200 V thru +1000 V

2. Ring Actuators (stack type hollow cylinders)

2.1 Low voltage ring actuators without casing

HPSt 150/14-10/xx

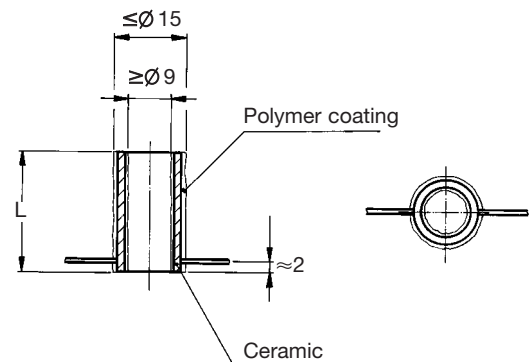


Stroke A/B: A: for -30 V thru +150 V

B: for 0 V thru +150 V

Max. force generation: for -30 V thru +150 V

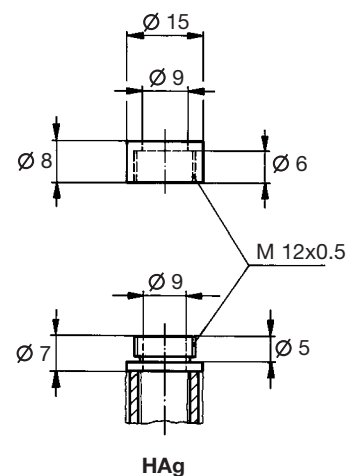
Maximum force generation: 4500 N
Open loop sensitivity for 1 mV amplifier noise for actuator HPSt 150/14-10/12: approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance μF	stiffness N/ μm	resonance frequency kHz
HPSt 150/14-10/12	16/12	13.5	2.6	250	45
HPSt 150/14-10/25	32/25	27	5.2	120	22
HPSt 150/14-10/40	50/40	on request			
HPSt 150/14-10/55	70/55	on request			

Options:

Threaded end pieces **HAg**
(together with 1 screw cap)
Optics adaptor 0A 1/2" (see section 3)



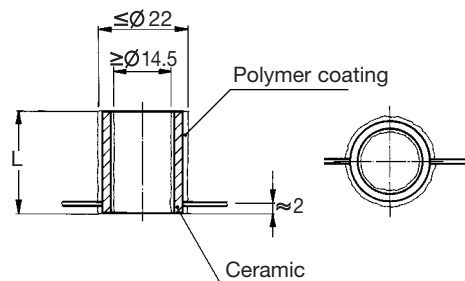


HPSt 150/20-15/xx

Maximum load: 11000 N

Maximum force generation: 8000 N

Open loop sensitivity for 1 mV amplifier noise for actuator HPSt 150/20-15/12: approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance μF	stiffness $\text{N}/\mu\text{m}$	resonance frequency kHz
HPSt 150/20-15/12	16/12	13.5	5	450	45
HPSt 150/20-15/25	32/25	27	10	230	22
HPSt 150/20-15/40	50/40	40.5	15	150	15
HPSt 150/20-15/55	70/55	54	20	100	10

Options:

Threaded end pieces **HAg**

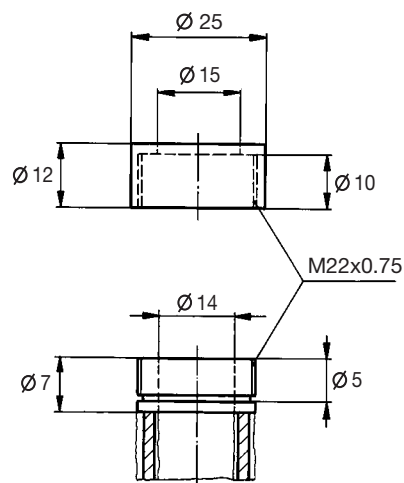
(together with 1 screw cap)

Optics adaptor 0A 1 " (see section 3)

Stroke A/B: A: for -30 V thru +150 V

B: for 0 V thru +150 V

Max. force generation: for -30 V thru +150 V



2.2 Low voltage ring actuators with internally prestressed casings



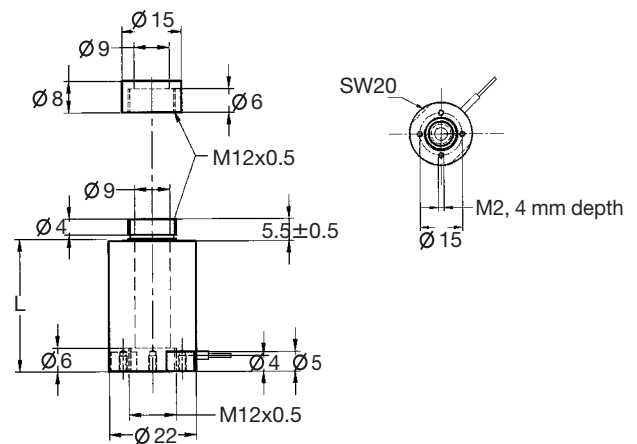
HPSt 150/14-10/... VS22

Prestress force = max. tensile force = 400 N

Maximum load: 6000 N

Maximum force generation: 4500 N

Open loop sensitivity for 1 mV amplifier noise for actuator HPSt 150/14-10/12 VS22: approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance μF	stiffness N/μm	resonance frequency kHz
HPSt 150/14-10/12 VS22	16/12	31	2.6	250	30
HPSt 150/14-10/25 VS22	32/25	44	5.2	120	20
HPSt 150/14-10/40 VS22	50/40	58	7.8	70	14
HPSt 150/14-10/55 VS22	70/50	71	11	50	9

Standard configuration:

Coaxial cable RG 178 length 1 m with BNC connector

Options:

Coaxial cable RG 178 length 1 m with LEMO 00250 or 0S250 connector

UHV compatibility

Low temperature application

Thermostable modification

Position sensor

Optics adaptor 0A ½": see section 3

Adaptor rings AR: see section 3

Stroke A/B: A: for -30 V thru +150 V

B: for 0 V thru +150 V

Max. force generation: for -30 V thru +150 V



HPSt 150/20-15/... VS35

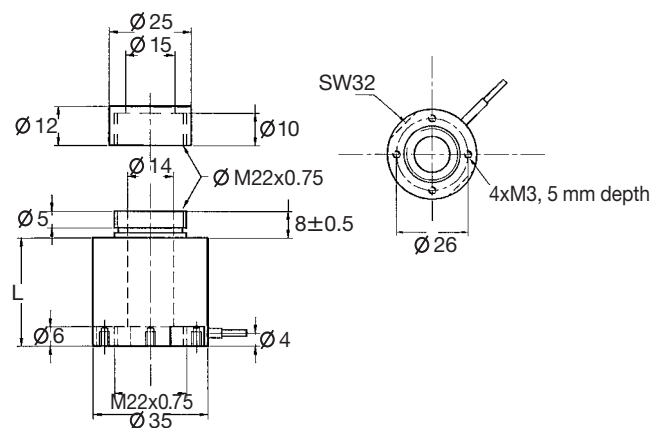
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 700 N

Maximum load: 11000 N

Maximum force generation: 8000 N

Open loop sensitivity for 1 mV amplifier noise for actuator HPSt 150/20-15/12 VS35: approx. 0.1 Nanometer



Type	max. stroke μm	length mm	el. capacitance μF	stiffness $\text{N}/\mu\text{m}$	resonance frequency kHz
HPSt 150/20-15/12 VS35	16/12	31	5	450	30
HPSt 150/20-15/25 VS35	32/25	44	10	230	20
HPSt 150/20-15/40 VS35	50/40	58	15	150	17
HPSt 150/20-15/55 VS35	70/50	71	20	100	15

Standard configuration:

Coaxial cable RG 178 length 1 m with BNC connector

Options:

Coaxial cable RG 178 length 1m with LEMO 00250 or 0S250 connector

UHV compatibility

Low temperature application

Thermostable modification

Position detector

Optics adaptor 0A 1": see section 3

Adaptor rings AR: see section 3

Stroke A/B: A: for -30 V thru +150 V

B: for 0 V thru +150 V

Max. force generation: for -30 V thru +150 V

2.3 High voltage ring actuators without casing



Technology: discrete stacking

Endfaces PZT ceramics

Endfaces completely electrically insulated, surface insulation coating

Wiring by 2 pigtails

General data: see brochure: "First Steps towards Piezoaction"



Stroke A/B:

PSt 500 A: -100 V thru +500 V
 B: 0 V thru +500 V

Max. force generation: for -100 V thru +500 V

PSt 1000 A: -200 V thru +1000 V
 B: 0 V thru +1000 V

Max. force generation: for -200 V thru +1000 V

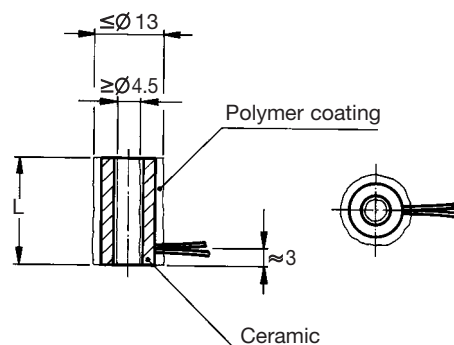


HPSt 500/10-5/... und HPSt 1000/10-5/...

Maximum load: 3500 N

Maximum force generation: 2800 N

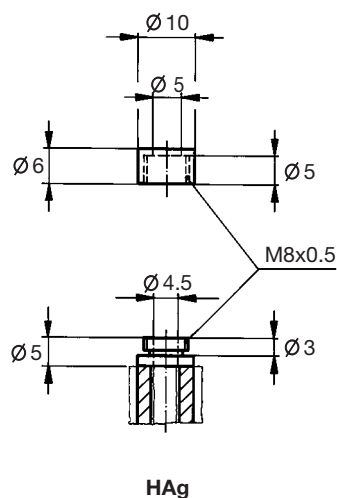
Open loop sensitivity for 5 mV amplifier noise for actuator HPSt 500/10-5/5: approx. 0.05 Nanometer



Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
HPSt 500/10-5/5	12/7	9	65	200	40
HPSt 500/10-5/15	25/17	18	180	100	25
HPSt 500/10-5/25	35/25	27	260	70	20
HPSt 500/10-5/40	55/40	36	350	50	15
HPSt 500/10-5/> 40	> 40	on request			
HPSt 1000/10-5/5	13/8	9	15	210	50
HPSt 1000/10-5/15	25/17	18	40	110	35
HPSt 1000/10-5/25	35/25	27	65	75	25
HPSt 1000/10-5/40	55/40	36	90	55	20
HPSt 1000/10-5/60	80/60	54	140	35	15
HPSt 1000/10-5/>60	> 60	on request			

Options:

Threaded end pieces **HAg** (together with 1 screw cap)



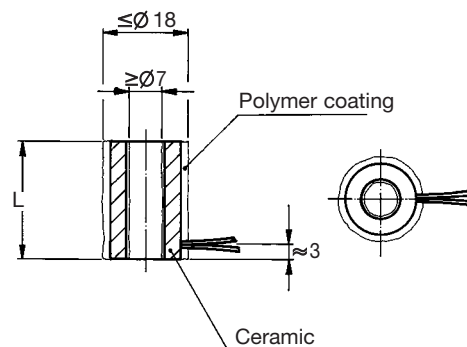


PSst 500/15-8/... und PSst 1000/15-8/...

Maximum load: 9000 N

Maximum generation force: 5500 N

Open loop sensivity for 5 mV amplifier noise for
actuator HPSt 500/15-8/5: approx. 0.05 Nanometer



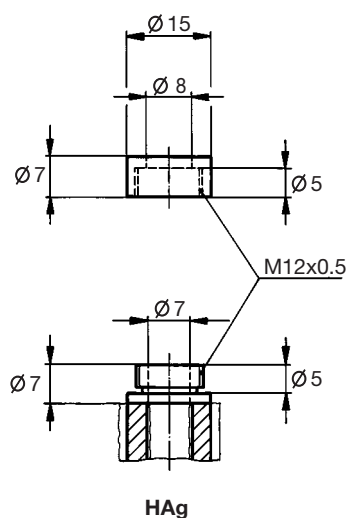
Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
HPSt 500/15-8/5	12/7	9	140	550	40
HPSt 500/15-8/20	27/20	18	360	280	25
HPSt 500/15-8/25	35/25	27	520	180	20
HPSt 500/15-8/40	55/40	36	720	130	15
HPSt 500/15-8/60	80/60	54	1100	90	12
HPSt 500/15-8/80	105/80	72	1500	60	10
HPSt 500/15-8/L>80	> /80	on request			
HPSt 1000/15-8/5	12/7	9	35	600	50
HPSt 1000/15-8/20	27/20	18	90	300	35
HPSt 1000/15-8/25	35/25	27	130	200	25
HPSt 1000/15-8/40	55/40	36	180	150	20
HPSt 1000/15-8/60	80/60	54	270	100	15
HPSt 1000/15-8/80	105/80	72	360	70	12
HPSt 1000/15-8/>80	> 80	> 72	on request		

Options:

Threaded end pieces **HAg** (together with 1 screw cap)

Optics adaptor 0A 1/2" (see section 3)

Piezo ceramics: HP, HS/HT





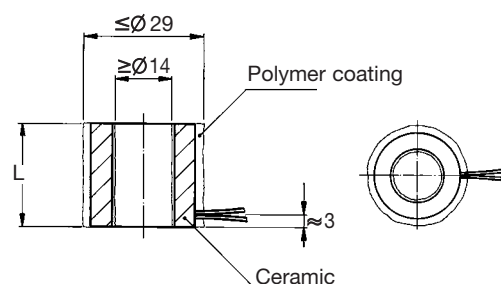
HPSt 1000/25-15/...

Maximum load: 22000 N

Maximum force generation: 13000 N

Open loop sensitivity for 10 mV amplifier noise for actuator HPSt 1000/25-15/5: approx. 0.05

Nanometer



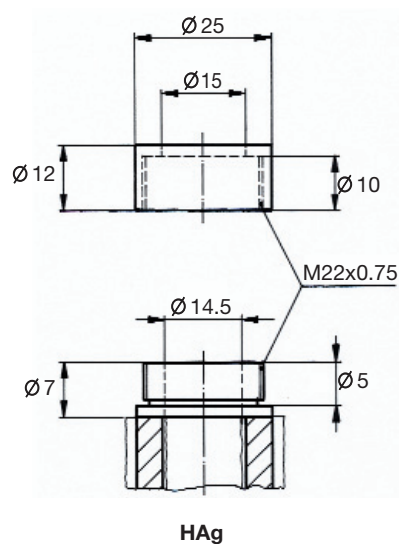
Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
HPSt 1000/25-15/5	12/7	9	85	1200	50
HPSt 1000/25-15/20	27/20	18	210	600	35
HPSt 1000/25-15/25	35/25	27	310	400	25
HPSt 1000/25-15/40	55/40	36	420	300	20
HPSt 1000/25-15/60	80/60	54	650	180	15
HPSt 1000/25-15/80	105/80	72	900	130	12
HPSt 1000/25-15/> 80	> /80	> 72	on request		

Options:

Threaded end pieces **HAg** (together with 1 screw cap)

Optics adaptor 0A 1" (see section 3)

Piezo ceramics: HP, HS/HT





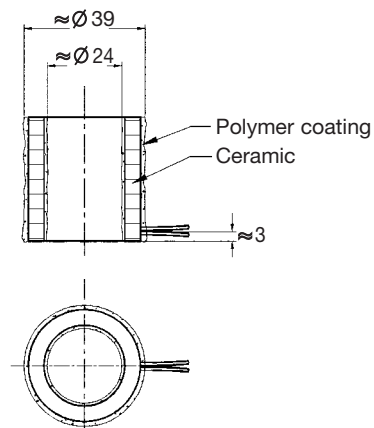
HPSt 1000/35-25/...

Maximum load: 35000 N

Maximum force generation: 20000 N

Open loop sensitivity for 10 mV amplifier noise for actuator HPSt 1000/35-25/5: approx. 0.05

Nanometer

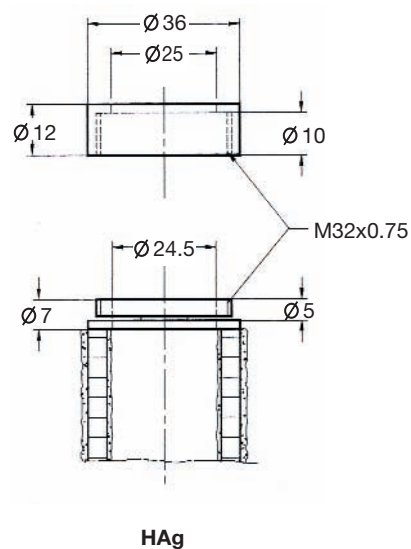


Type	max. stroke μm	length mm	el. capacitance nF	stiffness N/ μm	resonance frequency kHz
HPSt 1000/35-25/5	12/70	9	120	2000	50
HPSt 1000/35-25/20	27/20	18	300	1000	35
HPSt 1000/35-25/25	35/25	27	450	700	25
HPSt 1000/35-25/40	55/40	36	600	500	20
HPSt 1000/35-25/60	80/60	54	900	350	15
HPSt 1000/35-25/80	105/80	72	1300	250	12
HPSt 1000/35-35/100	130/100	90	1800	160	10
HPSt 1000/35-25/>100	> /100	> 90	on request		

Options:

Threaded end pieces **HAg** (together with 1 screw cap)

Piezo ceramics HP, HS/HT



2.4 High voltage ring actuators, with internally prestressed casing VS



HPSt 500/10-5/... VS18 and HPSt 1000/10-5/... VS18

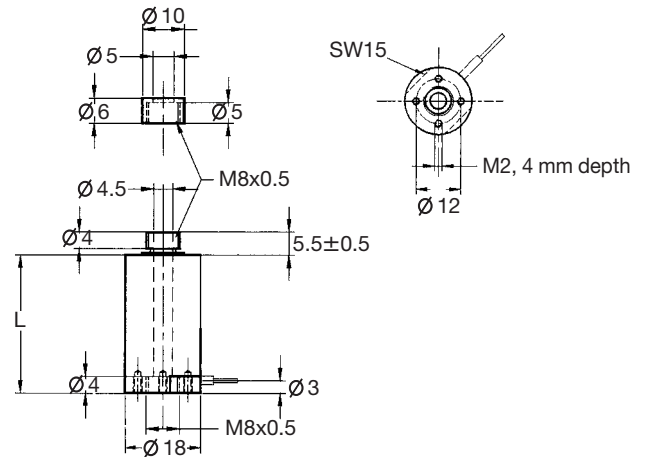
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 200 N

Maximum load: 3500 N

Maximum force generation: 2800 N

Open loop sensitivity for 10 mV amplifier noise for actuator PSt 1000/10-5/7 VS18: approx. 0.05 Nanometer



Type	max. stroke µm	length mm	el. capacitance nF	stiffness N/µm	resonance frequency kHz
HPSt 500/10-5/7 VS18	12/7	24	65	200	30
HPSt 500/10-5/20 VS18	27/20	33	180	100	25
HPSt 500/10-5/25 VS18	35/25	42	260	70	20
HPSt 500/10-5/40 VS18	55/40	51	350	50	15
HPSt 500/10-5/>40 VS18	> /40	on request			
HPSt 1000/10-5/7 VS18	12/7	24	15	210	35
HPSt 1000/10-5/20 VS18	27/20	33	40	110	27
HPSt 1000/10-5/25 VS18	35/25	42	65	75	22
HPSt 1000/10-5/40 VS18	55/40	51	90	55	20
HPSt 1000/10-5/60 VS18	80/60	69	140	35	17
HPSt 1000/10-5/>60 VS18	> /60	on request			

Standard configuration:

Coaxial cable RG 178 length 1.5 m with connectors BNC or LEMO 0S250 1 screw cap for top

Options:

UHV compatibility

Low temperature application

Thermostable modification

Negative polarity

Piezo ceramics: HP, HS/HT

Adaptor rings AR: see section 3

HPSt 500/15-8/... VS22 and HPSt 1000/15-8/... VS22



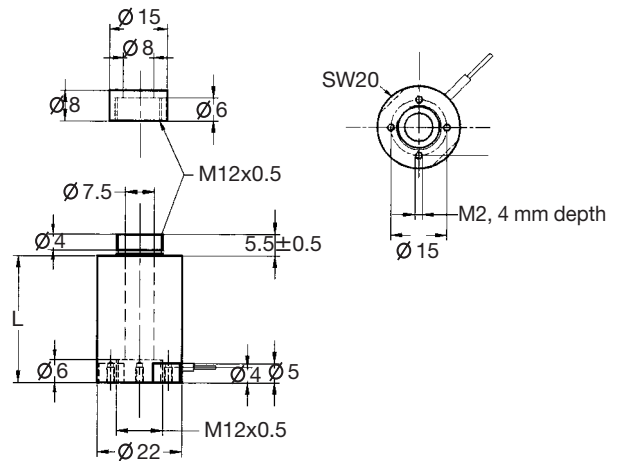
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 400 N

Maximum load: 9000 N

Maximum force generation: 5500 N

Open loop sensitivity for 5 mV amplifier noise for actuator HPSt 500/15-8/7 VS22: approx. 0.05 Nanometer



Type	max. stroke µm	length mm	el. capacitance nF	stiffness N/µm	resonance frequency kHz
HPSt 500/15-8/7 VS22	13/8	26	140	550	30
HPSt 500/15-8/20 VS22	27/20	35	360	280	25
HPSt 500/15-8/25 VS22	35/25	44	520	180	20
HPSt 500/15-8/40 VS22	55/40	53	720	130	15
HPSt 500/15-8/60 VS22	80/60	71	1100	90	12
HPSt 500/15-8/80 VS22	105/80	89	1500	60	10
HPSt 500/15-8/>800 VS22	>/80	on request			
HPSt 1000/15-8/7 VS22	13/8	26	35	600	35
HPSt 1000/15-8/20 VS22	27/20	35	90	300	27
HPSt 1000/15-8/25 VS22	35/25	44	130	200	22
HPSt 1000/15-8/40 VS22	55/40	53	180	150	17
HPSt 1000/15-8/60 VS22	80/60	71	270	100	14
HPSt 1000/15-8/80 VS22	105/80	89	360	70	12
HPSt 1000/15-8/>80 VS22	> /80	on request			

Standard configuration:

Coaxial cable RG 178 length 1.5 m with connectors BNC or LEMO 0S250

Options:

UHV compatibility

Low temperature application

Thermostable modification

Negative polarity

Piezo ceramics: HP, HS/HT

Positions sensor

Optics adaptor 0A1/2": see section 3

Adaptor rings AR: see section 3

HPSt 1000/25-15/... VS35



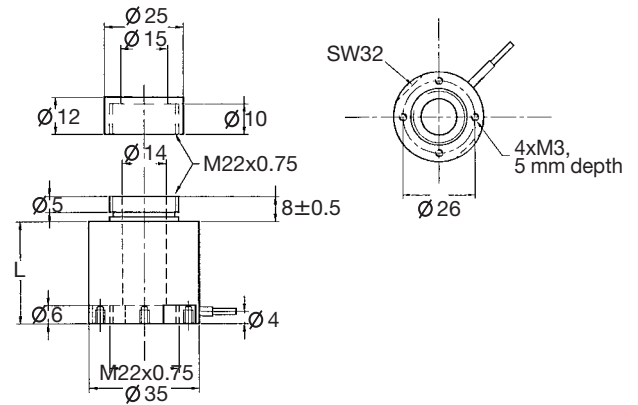
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 2000 N

Maximum load: 22000 N

Maximum force generation: 13000 N

Open loop sensitivity for 10 mV amplifier noise for actuator PSt 1000/25-15/7 VS35: approx. 0.05 Nanometer



Type	max. stroke µm	length mm	el. capacitance nF	stiffness N/µm	resonance frequency kHz
HPSt 1000/25-15/7 VS35	13/8	26	85	1200	40
HPSt 1000/25-15/20 VS35	27/20	35	210	600	30
HPSt 1000/25-15/25 VS35	35/25	44	310	400	25
HPSt 1000/25-15/40 VS35	55/40	53	420	300	25
HPSt 1000/25-15/60 VS35	80/60	71	650	180	20
HPSt 1000/25-15/80 VS35	105/80	89	900	130	15
HPSt 1000/25-15/>80 VS35	> / 80	on request			

Standard configuration:

Coaxial cable RG 178 length 1.5 m with connectors BNC or LEMO 0S250

Options:

Coaxial cable RG 316 for power application

UHV compatibility

Low temperature application

Thermostable modification

Negative polarity

Piezo ceramics: HP, HS/HT

Position sensor

Optics adaptor 0A 1": see section 3

Adaptor rings AR: see section 3

HPSt 1000/35-25/...VS45



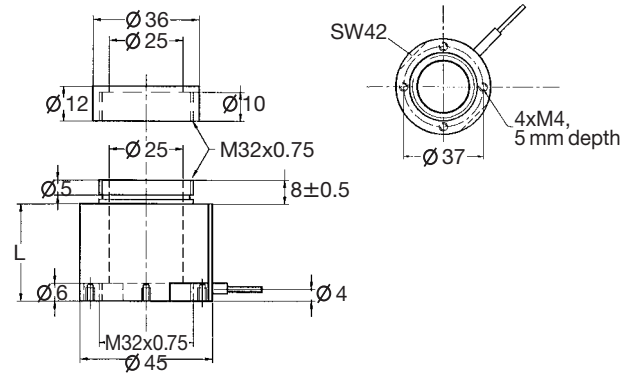
General data: see brochure: "First Steps towards Piezoaction"

Prestress force = max. tensile force = 3000 N

Maximum load: 35000 N

Maximum force generation: 20000 N

Open loop sensitivity for 10 mV amplifier noise for actuator HPSt 1000/35-25/7 VS45: approx. 0.05 Nanometer



Type	max. stroke µm	length mm	el. capacitance nF	stiffness N/µm	resonance frequency kHz
HPSt 1000/35-25/7 VS45	12/70	26	120	2000	40
HPSt 1000/35-25/20 VS45	27/20	35	300	1000	30
HPSt 1000/35-25/25 VS45	35/25	44	450	700	25
HPSt 1000/35-25/40 VS45	55/40	53	600	500	20
HPSt 1000/35-35/60 VS45	80/60	71	900	350	15
HPSt 1000/35-25/80 VS45	105/80	89	1300	250	12
HPSt 1000/35-25/100 VS45	130/100	107	1800	160	10
HPSt 1000/35-25/>100 VS45	/> 100	on request			

Standard configuration:

Coaxial cable RG 178 length 1.5 m with connectors BNC or LEMO 0S250

Options:

Coaxial cable RG 316 for power applications

UHV compatibility

Low temperature modification

Thermostable modification

Position sensor

Negative polarity

Piezo ceramics: HP, HS/HT

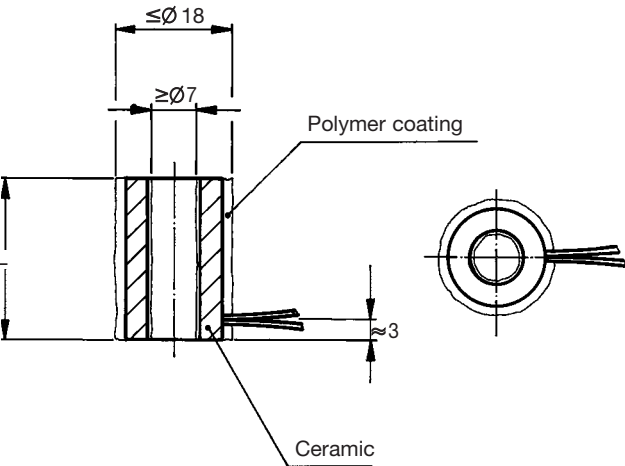
2.5 Electrostrictive low voltage ring actuators

General data: see brochure: "First Steps towards Piezoaction"



HES_t 150/15-8/... bare rings, without casing

Maximum force load: 5000 N



Type	max. stroke	length	el. capacitance	stiffness
	µm	mm	µF	N/µm
HES _t 150/15-8/2	2	3	4	1500
HES _t 150/15-8/4	4	6	8	750
HES _t 150/15-8/6	6	9	12	500
HES _t 150/15-8/12	12	18	22	250

Mechanical end piece **HAg** as Piezo ring actuators HPSt.../15-8/...
Optics adaptor 0A 1/2": see chapter 3



HES_t 150/15-8/... VS 22 casing with internal prestress

Prestress force = max. tensile force = 400 N

Maximum load: 5000 N

Open loop sensitivity for 1 mV amplifier noise for actuator

HES_t 150/15-8/6 VS22: 0.05 Nanometer



Type	max. stroke	length	el. capacitance	stiffness
	μm	mm	μF	$\text{N}/\mu\text{m}$
HES _t 150/15-8/6 VS22	6	26	12	500
HES _t 150/15-8/12 VS22	12	35	22	250
HES _t 150/15-8/>12 VS22		on request		

Standard configuration:

Coaxial cable RG 178 length 1 m with BNC connector

Options:

UHV compatibility

Optics adaptor 0A 1/2": see section 3

Adaptor rings AR: see section 3

3. Accessories

3.1 Electricals

Supply coaxial cables: one side connector, other side free for attaching piezocomponents such as bare stacks etc.

Cable type RG 178 (PTFE), thickness 1.8 mm: length 1.5 m

Connectors available: BNC, LEMO 0S250

Cable type RG 316 (PTFE), thickness 2.5 mm: length 1.5 m

for power applications

Connectors available: BNC, LEMO 0S250



Extension cables:

Connector system LEMO 0S250, length 2 m/4 m/6 m

Cable types RG 178 or RG 316 (see above)

Connecting adaptors for matching different connecting systems plug (from electronics)/Cable's connector LEMO 0S 250/BNC (this adaptor is used to match amplifiers with LEMO output to a component, having a BNC connector)

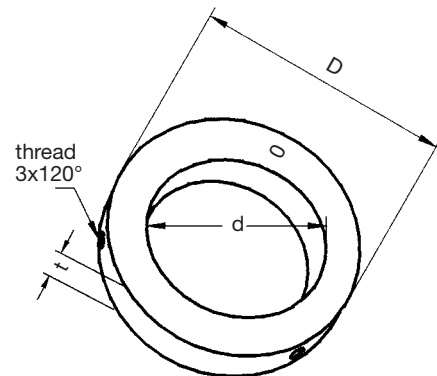
BNC/LEMO 0S250

BNC/LEMO 00250

3.2 Mechanics

Adaptor rings

The adaptor rings are normally used to match the diameter of actuators with casing to mirror mounts, defined for a distinct mirror's diameter. An often used combination are ring actuators (e.g. with casing VS22), which are adopted to 2" mirror mount system. The proper adaptor ring is an AR (51/22).



Designation AR X/Y X external diameter, Y internal diameter (corresponds to actuator's casing's diameter), T thickness of ring (all dimensions in mm)

AR	25/10	t	5
AR	25/12	t	5
AR	25/18	t	5
AR	50/18	t	7
AR	50/20	t	7
AR	50/22	t	7
AR	50/25	t	7
AR	50/35	t	7

AR	31/12	t	7
AR	31/22	t	7
AR	31/25	t	7
AR	51/18	t	7
AR	51/20	t	7
AR	51/22	t	7
AR	51/22	t	7
AR	51/35	t	7

3.3 Optic adaptor for ring actuators

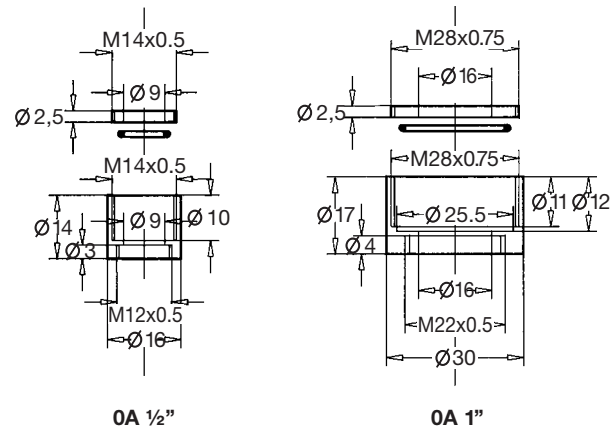
Ring actuators are often used within optical arrangements for precise adjustment of transmissive optical components e.g. within laser resonators or tunable etalons. The optic adaptors allow the simple mounting and changing of circular optics with the standard diameters 1/2" and 1".

Optic adaptor OA 1/2"

This element allows mounting of optics with diameter 1/2" up to a thickness of 8 mm. It can be simply attached using the M12x0.5 thread to all the corresponding ring actuators with a HAg M12x0.5 end piece (bare rings) such as the HPSt 150/14-10/..., HPSt 500/15-8/..., HPSt 1000/15-8/... or the equivalent cased types with a VS22 casing.

Optic adaptor OA 1"

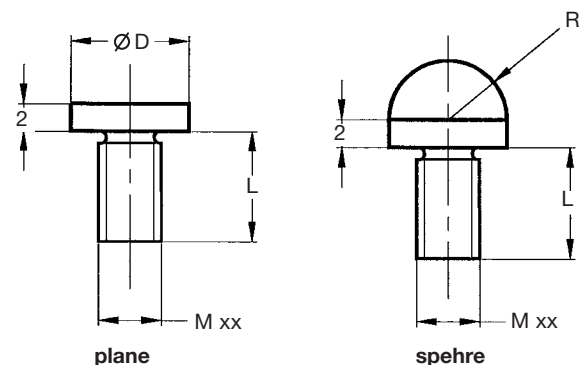
This element allows mounting of optics with diameter 1" up to a thickness of 8 mm. It can be simply attached using the M22x0.5 thread to all the corresponding ring actuators with a HAg M22x0.75 end piece (bare rings) such as the HPSt 150/25-15/... or the equivalent cased types with a VS35 casing.



3.4 Screw in front adaptor SE (For stacks with casings VS)

The adaptors have a threaded pin for simple attachment to the standard front pieces VS with tapped hole and provide a plane or spherical front to match the actuator for various uses. For example small mirrors can be glued onto the plane faces.

Designation: SE xx plane and SE x sphere, where xx represents the casing's diameter, where it is mounted to (e.g. 12 for VS 12).

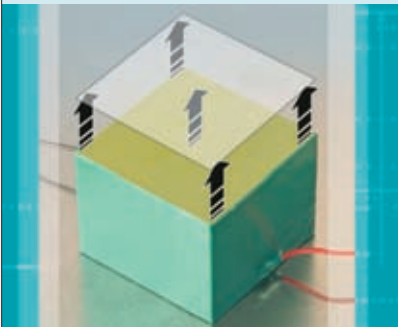


Type	Mx (mm)	D (mm)	L (mm)	R (mm)
SE9	2.3	5	3	2.5
SE10	3	6	3	2.5
SE12	3	7	4	3.5
SE15	4	8	4	3.5
SE18/20	5	10	4	4

Magnetic front pieces

Based on the above described front adaptors, MA components with magnetic plane face are offered for VS10 and VS12 casings (designation MA10 / MA12). Small ferromagnetic components can be easily attached to the moving pin of stack actuators.

Low voltage co-fired multilayer stacks, rings and chips for actuation
(without casing)

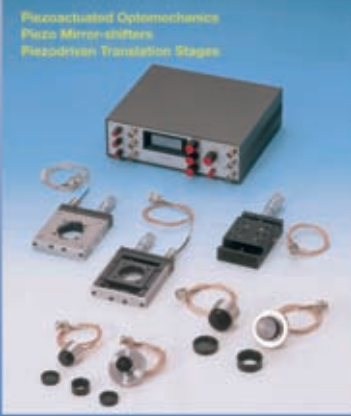


Low voltage actuators with casings, high voltage actuators Check main catalogue

Piezomechanik GmbH

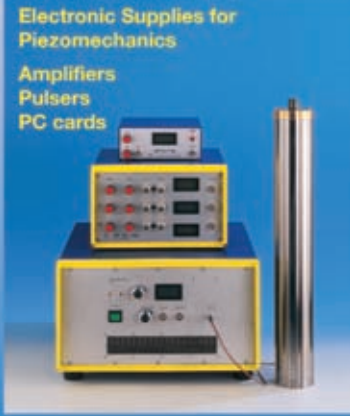
Piezomechanik GmbH

Piezoelectric Optomechanics
Piezo Mirror-shifters
Piezodriven Translation Stages



Piezomechanik GmbH

Electronic Supplies for Piezomechanics
Amplifiers
Pulsers
PC cards



Piezomechanik GmbH

Position Feedback control electronics
PosiCon.an
for piezoactuators
(low voltage and high voltage actuators)



Piezomechanik GmbH

Piezo Vibrations and Piezo Shakers



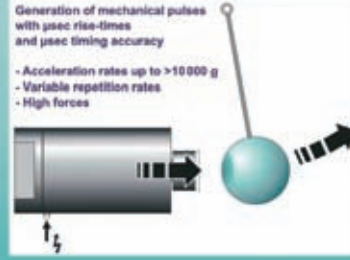
Generating

- High Forces
- High Acceleration Rates
- High Frequencies

within the audio and ultrasonic range

Piezomechanik GmbH

Piezo Impactors/Accelerators (PIA) for Shock and Impact Generation



Generation of mechanical pulses with μ sec rise-times and μ sec timing accuracy

- Acceleration rates up to $>10\,000\text{ g}$
- Variable repetition rates
- High forces

