

stack type actuators

series N

- PZT multilayer stack without housing
- without pre-load
- motion up to 123µm
- high stiffness up to 250N/µm
- flexible mounting
- unlimited resolution
- flexible epoxy insulation to guarantee long life

applications:

 positioning application demanding high accuracy under high load environment conditions, long lifetime permanent movement in industrial applications



Concept

Specials

PZT multilayer stack type actuators are made for industrial applications. They are specially shielded by a flexible insulation material which guarantees the possible hiahest dynamic performance under the toughest requirements. Based on their design, they are well suited for easy integration into specific customer systems. The flexible polymer coating material gives proven the PZT actuators protection against various and harsh environments. The advantage of a flexible insulation versus brittle ceramic insulation is a longer lifetime.

These PZT multilayer stack type actuators have been successfully working for more than 15 Years in a vast number of applications in the fields of nano-metrology, semiconductor, material sciences and scanning applications.

Please ask us for further details for your application.

High quantity volume buyers – please request an additional discount.

PZT multilayer stack can be used in cryogenic applications down to a few Kelvin. They can also be used in vacuum atmosphere conditions as well. The Curie temperature for baking is 150°C. Please see chapters 3.9 and 3.10 in our "piezoline".

The flexible insulation guarantees the highest performance for long term applications. Additional thermal shrink tube insulation protects the cable connection point on the ceramic. Ball tip end plates and flat tungsten carbide and plates are available in different sizes

Mounting/Installation

It is rather important, not to subject the actuator tip to nonaxial forces during the manufacturing process and use.

The standard cable length is 100mm. As an option, flat tungsten carbide or ball tip end plates are available.

Please note, when using under cryogenic conditions (4K), only 10% of the standard motion is available.

The PZT multilayer stacks are not pre-loaded. An external pre-load applied is needed used in dynamic when applications or in application with high accelerations forces. Please note that the acceleration due to ceramic expansion can damage the ceramic if used without a preload. It is very important not to subject the actuator tip to noaxis forces during mounting and use.





technical data:

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series N/5		unit	N 2/5	N 4/5	N 6/5				
part. no.			P-211-00	P-212-00	P-213-00				
motion (±10%)*		µm-	2	4	6				
capacitance	e (±20%)**	μF	0.1	0.2	0.3				
resolution**	*open loop	nm	0.004	0.008	0.012				
stiffness		N/µm	250	125	83				
blocking for	се	Ν	500	500	500				
operating v	oltage	V		-20+120					
dimensions	length L	mm	5	7	9				
	diameter D	mm	5	5	5				
series N/S	3.5	unit	N 8/S3.5	N 16/S3.5	N 25/S3.5	N 35/S3.5			
part. no.			P-214-40	P-216-40	P-217-40	P-218-40			
motion (±10)%)*	μm-	9	20	30	41			
capacitance	e (±20%)**	μF	0.4	0.8	1.2	1.6			
resolution**	*open loop	nm	0.018	0.04	0.06	0.08			
stiffness		N/µm	46	21	14	10			
blocking for	ce	Ν	420	420	420	420			
operating voltage		V	-20+130						
dimensions	length L	mm	9	18	27	36			
	width W	mm	5.5	5.5	5.5	5.5			
	height H	mm	7.5	7.5	7.5	7.5			
series N/S5		unit	N 8/S5	N 16/S5	N 25/S5	N 35/S5	N 50/S5	N 80/S5	N 100/S5
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part. no.			P-201-40	P-202-40	P-203-40	P-204-40	P-205-40	P-206-40	P-207-40
part. no. motion (±10)%)*	μm-	P-201-40 9	P-202-40 20	P-203-40 30	P-204-40 41	P-205-40 61	P-206-40 82	P-207-40 103
part. no. motion (±10 capacitance)%)* e (±20%)**	μm- μF	P-201-40 9 0.8	P-202-40 20 1.8	P-203-40 30 2.4	P-204-40 41 3.6	P-205-40 61 5.4	P-206-40 82 7.2	P-207-40 103 9.0
part. no. motion (±10 capacitance resolution**)%)* e (±20%)** *open loop	μm- μF nm	P-201-40 9 0.8 0.018	P-202-40 20 1.8 0.04	P-203-40 30 2.4 0.06	P-204-40 41 3.6 0.08	P-205-40 61 5.4 0.12	P-206-40 82 7.2 0.16	P-207-40 103 9.0 0.2
part. no. motion (±10 capacitance resolution** stiffness)%)* ∋ (±20%)** *open loop	μm- μF nm N/μm	P-201-40 9 0.8 0.018 94	P-202-40 20 1.8 0.04 42	P-203-40 30 2.4 0.06 28	P-204-40 41 3.6 0.08 20	P-205-40 61 5.4 0.12 14	P-206-40 82 7.2 0.16 10	P-207-40 103 9.0 0.2 8
part. no. motion (±10 capacitance resolution** stiffness blocking for	0%)* e (±20%)** *open loop	μm- μF nm N/μm N	P-201-40 9 0.8 0.018 94 850	P-202-40 20 1.8 0.04 42 850	P-203-40 30 2.4 0.06 28 850	P-204-40 41 3.6 0.08 20 850	P-205-40 61 5.4 0.12 14 850	P-206-40 82 7.2 0.16 10 850	P-207-40 103 9.0 0.2 8 850
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v	0%)* e (±20%)** *open loop ce oltage	μm- μF nm N/μm N V	P-201-40 9 0.8 0.018 94 850	P-202-40 20 1.8 0.04 42 850	P-203-40 30 2.4 0.06 28 850	P-204-40 41 3.6 0.08 20 850 -20+130	P-205-40 61 5.4 0.12 14 850	P-206-40 82 7.2 0.16 10 850	P-207-40 103 9.0 0.2 8 850
part. no. motion (±10 capacitance resolution** stiffness blocking for operating ve dimensions	0%)* e (±20%)** *open loop cce oltage length L	μm- μF nm N/μm N V mm	P-201-40 9 0.8 0.018 94 850 9	P-202-40 20 1.8 0.04 42 850 18	P-203-40 30 2.4 0.06 28 850 27	P-204-40 41 3.6 0.08 20 850 -20+130 36	P-205-40 61 5.4 0.12 14 850 0 54	P-206-40 82 7.2 0.16 10 850 72	P-207-40 103 9.0 0.2 8 850 108
part. no. motion (±10 capacitance resolution** stiffness blocking for operating ve dimensions	0%)* e (±20%)** *open loop rce oltage length L width W	μm- μF nm N/μm N V mm mm	P-201-40 9 0.8 0.018 94 850 9 7 7	P-202-40 20 1.8 0.04 42 850 18 7	P-203-40 30 2.4 0.06 28 850 27 7	P-204-40 41 3.6 0.08 20 850 -20+130 36 7	P-205-40 61 5.4 0.12 14 850 0 54 7	P-206-40 82 7.2 0.16 10 850 72 7	P-207-40 103 9.0 0.2 8 850 108 7
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions	0%)* e (±20%)** *open loop ce oltage length L width W height H	μm- μF nm N/μm N V mm mm mm	P-201-40 9 0.8 0.018 94 850 9 7 9 7 9	P-202-40 20 1.8 0.04 42 850 18 7 9	P-203-40 30 2.4 0.06 28 850 27 7 9	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9	P-205-40 61 5.4 0.12 14 850 0 54 7 9	P-206-40 82 7.2 0.16 10 850 72 7 9	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions	0%)* e (±20%)** *open loop ce oltage length L width W height H 10	μm- μF nm N/μm N V mm mm mm mm	P-201-40 9 0.8 0.018 94 850 9 7 9 7 9 N 20/S10	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10	P-205-40 61 5.4 0.12 14 850 0 54 7 9 N 100/S10	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions series N/S ^o part. no.	0%)* e (±20%)** *open loop ce oltage length L width W height H 10	μm- μF nm N/μm N V mm mm mm mm	P-201-40 9 0.8 0.018 94 850 9 7 9 7 9 N 20/S10 P-232-40	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10 P-233-40	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10 P-234-40	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10 P-235-40	P-205-40 61 5.4 0.12 14 850 54 7 9 N 100/S10 P-236-40	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10 P-237-40	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions series N/S ^o part. no. motion (±10	0%)* e (±20%)** *open loop cce oltage length L width W height H 10 0%)*	μm- μF nm N/μm N V mm mm mm mm unit	P-201-40 9 0.8 0.018 94 850 9 7 9 7 9 N 20/S10 P-232-40 20	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10 P-233-40 41	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10 P-234-40 61	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10 P-235-40 82	P-205-40 61 5.4 0.12 14 850 54 7 9 N 100/S10 P-236-40 103	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10 P-237-40 123	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions series N/S ^o part. no. motion (±10 capacitance	0%)* (±20%)** *open loop ce oltage length L width W height H 10 0%)* (±20%)**	μm- μF nm N/μm N V mm mm mm mm unit	P-201-40 9 0.8 0.018 94 850 9 7 9 7 9 N 20/S10 P-232-40 20 7.2	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10 P-233-40 41 14.4	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10 P-234-40 61 18.2	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10 P-235-40 82 25.4	P-205-40 61 5.4 0.12 14 850) 54 7 9 N 100/S10 P-236-40 103 31.0	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10 P-237-40 123 36.4	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions series N/S ^o part. no. motion (±10 capacitance resolution**	0%)* e (±20%)** *open loop ce oltage length L width W height H 10 0%)* e (±20%)** *open loop	μm- μF nm N/μm N V mm mm mm mm unit μm- μF nm	P-201-40 9 0.8 0.018 94 850 9 7 9 N 20/S10 P-232-40 20 7.2 0.04	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10 P-233-40 41 14.4 0.08	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10 P-234-40 61 18.2 0.12	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10 P-235-40 82 25.4 0.16	P-205-40 61 5.4 0.12 14 850) 54 7 9 N 100/S10 P-236-40 103 31.0 0.21	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10 P-237-40 123 36.4 0.25	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions series N/S ² part. no. motion (±10 capacitance resolution** stiffness	0%)* e (±20%)** *open loop ce oltage length L width W height H 10 0%)* e (±20%)** *open loop	μm- μF nm N/μm N V mm mm mm mm mm unit μm- μF nm	P-201-40 9 0.8 0.018 94 850 9 7 9 7 9 7 9 N 20/S10 P-232-40 20 7.2 0.04 175	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10 P-233-40 41 14.4 0.08 85	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10 P-234-40 61 18.2 0.12 57	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10 P-235-40 82 25.4 0.16 42	P-205-40 61 5.4 0.12 14 850 54 7 9 N 100/S10 P-236-40 103 31.0 0.21 34	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10 P-237-40 123 36.4 0.25 28	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions series N/S ^o part. no. motion (±10 capacitance resolution** stiffness blocking for	0%)* ⇒ (±20%)** *open loop cce oltage length L width W height H 10 0%)* ⇒ (±20%)** *open loop cce	μm- μF nm N/μm N V mm mm mm mm mm unit μm- μF nm N/μm N	P-201-40 9 0.8 0.018 94 850 9 7 9 N 20/S10 P-232-40 20 7.2 0.04 175 3500	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10 P-233-40 41 14.4 0.08 85 3500	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10 P-234-40 61 18.2 0.12 57 3500	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10 P-235-40 82 25.4 0.16 42 3500	P-205-40 61 5.4 0.12 14 850 0 54 7 9 N 100/S10 P-236-40 103 31.0 0.21 34 3500	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10 P-237-40 123 36.4 0.25 28 3500	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions series N/S ^o part. no. motion (±10 capacitance resolution** stiffness blocking for operating v	0%)* (±20%)** *open loop ce length L width W height H 10 0%)* (±20%)** *open loop ce oltage	μm- μF nm N/μm N P mm mm mm mm mm μm- μF nm N/μm N N	P-201-40 9 0.8 0.018 94 850 9 7 9 N 20/S10 P-232-40 20 7.2 0.04 175 3500	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10 P-233-40 41 14.4 0.08 85 3500	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10 P-234-40 61 18.2 0.12 57 3500 -20.	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10 P-235-40 82 25.4 0.16 42 3500 +130	P-205-40 61 5.4 0.12 14 850 54 7 9 N 100/S10 P-236-40 103 31.0 0.21 34 3500	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10 P-237-40 123 36.4 0.25 28 3500	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions series N/S ^o part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions	2%)* (±20%)** *open loop ce oltage length L width W height H 10 0%)* (±20%)** *open loop ce oltage length L vice oltage	μm- μF nm N/μm N mm mm mm mm mm mm μm- μF nm N/μm N/μm N V mm	P-201-40 9 0.8 0.018 94 850 9 7 9 7 9 N 20/S10 P-232-40 20 7.2 0.04 175 3500	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10 P-233-40 41 14.4 0.08 85 3500	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10 P-234-40 61 18.2 0.12 57 3500 -20. 54	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10 P-235-40 82 25.4 0.16 42 3500 +130 72	P-205-40 61 5.4 0.12 14 850 54 7 9 N 100/S10 P-236-40 103 31.0 0.21 34 3500 90	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10 P-237-40 123 36.4 0.25 28 3500	P-207-40 103 9.0 0.2 8 850 108 7 9
part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions series N/S ² part. no. motion (±10 capacitance resolution** stiffness blocking for operating v dimensions	2%)* (±20%)** *open loop ce oltage length L width W height H 10 0%)* (±20%)** *open loop ce oltage length L width W	μm- μF N/μm N/μm N mm mm mm unit μm- μF nm N/μm N/μm N V mm	P-201-40 9 0.8 0.018 94 850 9 7 9 7 9 N 20/S10 P-232-40 20 7.2 0.04 175 3500	P-202-40 20 1.8 0.04 42 850 18 7 9 N 40/S10 P-233-40 41 14.4 0.08 85 3500	P-203-40 30 2.4 0.06 28 850 27 7 9 N 60/S10 P-234-40 61 18.2 0.12 57 3500 -20. 54 12	P-204-40 41 3.6 0.08 20 850 -20+130 36 7 9 N 80/S10 P-235-40 82 25.4 0.16 42 3500 +130 72 12	P-205-40 61 5.4 0.12 14 850 54 7 9 N 100/S10 P-236-40 103 31.0 0.21 34 3500 90 12	P-206-40 82 7.2 0.16 10 850 72 7 9 N 120/S10 P-237-40 123 36.4 0.25 28 3500 108 108 12	P-207-40 103 9.0 0.2 8 850 108 7 9

typical value measured with NV 40/3
typical value for small electrical field strength
please see piezoline



series N – round shape size stack type actuator

- top and bottom plate: round ceramics (Al₂O₃, diameter 5mm)
- isolation by thermal shrinking tube, resulting overall diameter less then 6mm

series N – rectangular shape size stack type actuator:

- epoxy isolation of the stack itself
- additional isolation by thermal shrinking tube (also for fastening the cables)
- outlet of the cable about 5mm below the end of the stack
- standard version without top and plates

further options:

-different top/end plates available (please see table below)

-vacuum version

-cryogenic temperature version

top/end plates

part no.	Z-299-25	Z-299-45	Z-299-65	Z-299-28	Z-299-47
material	AI_2O_3	tungsten carbide	tungsten carbide	Al ₂ O ₃	tungsten carbide
drawing		1,5	A Contraction of the second se	1,5	1,5



Series N:

Please pay attention to our "notes for mounting", which are available as download on our homepage.