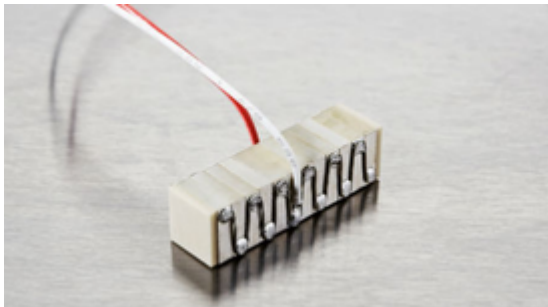


NAC2015-Hxx



Noliac plate stack actuator NAC2015-Hxx (height in mm – Hxx) is based on the multilayer actuator NAC2015 and can be stacked to match your requirements. The standard range of NAC2015-Hxx is produced in a height between 4-100 mm. The plate stack provides a stroke up to 161.7 μm and blocking force up to 4200 N depending on the height of the stack.

SPECIFICATIONS

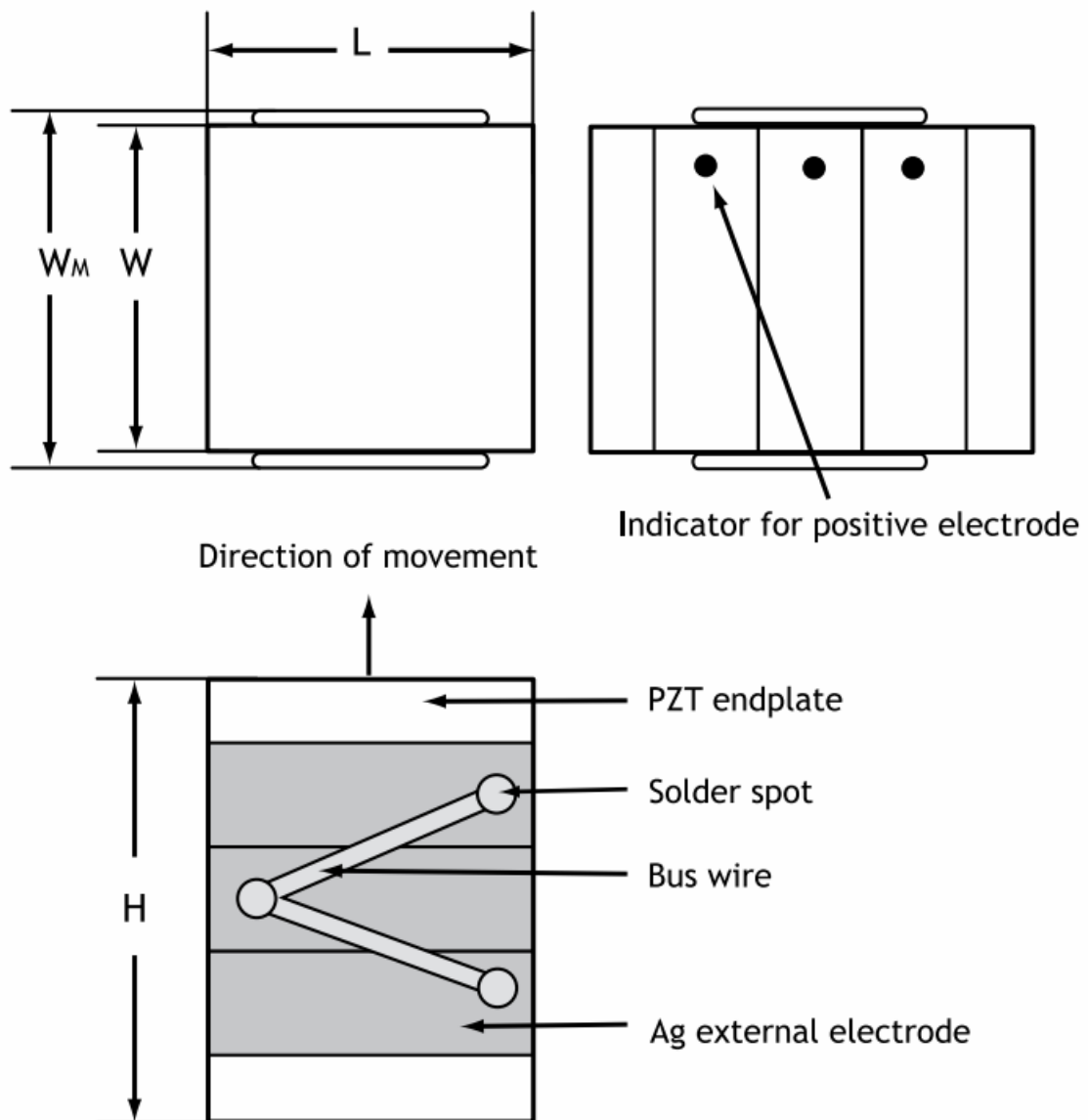
Attributes	Value	Tolerance
Length / outer diameter	10 mm	+0.40/-0.20 mm
Width / inner diameter	10 mm	+0.40/-0.20 mm
Max width / outer diameter max	11.8 mm	
Height	4 — 100 mm	+/-0.2 mm or 1% (whichever is largest)
Operating voltage, max.	150 V	
Free stroke, max.	3.3 — 161.7 μm	+/- 15%
Blocking force, max.	4200 N	+/-20%
Capacitance	680-33500 nF	+/- 15%
Stiffness	1273-26 N/ μm	+/-20%
Maximum operating temperature	150 $^{\circ}\text{C}$	
Material	NCE51F	
Unloaded resonance frequency	>248 k -11 k Hz	
Electrodes	Screen-printed Ag and soldered bus wire (option: glued connections)	
Remarks	-	

Stack options

Height	Stroke	Capacitance
4 mm	3.3 μm	680 nF
6 mm	6.6 μm	1370 nF
8 mm	9.9 μm	2050 nF

10 mm	13.2 μm	2740 nF
12 mm	16.5 μm	3420 nF
14 mm	19.8 μm	4100 nF
16 mm	23.1 μm	4790 nF
18 mm	26.4 μm	5470 nF
20 mm	29.7 μm	6160 nF
22 mm	33 μm	6840 nF
24 mm	36.3 μm	7520 nF
26 mm	39.6 μm	8210 nF
28 mm	42.9 μm	8890 nF
30 mm	46.2 μm	9580 nF
32 mm	49.5 μm	10260 nF
34 mm	52.8 μm	10940 nF
36 mm	56.1 μm	11630 nF
38 mm	59.4 μm	12310 nF
40 mm	62.7 μm	13000 nF
42 mm	66 μm	13680 nF
44 mm	69.3 μm	14360 nF
46 mm	72.6 μm	15050 nF
48 mm	75.9 μm	15730 nF
50 mm	79.2 μm	16420 nF
52 mm	82.5 μm	17100 nF
54 mm	85.8 μm	17780 nF
56 mm	89.1 μm	18470 nF
58 mm	92.4 μm	19150 nF
60 mm	95.7 μm	19840 nF
62 mm	99 μm	20520 nF
64 mm	102.3 μm	21200 nF
66 mm	105.6 μm	21890 nF
68 mm	108.9 μm	22570 nF
70 mm	112.2 μm	23260 nF
72 mm	115.5 μm	23940 nF
74 mm	118.8 μm	24620 nF
76 mm	122.1 μm	25310 nF
78 mm	125.4 μm	25990 nF
80 mm	128.7 μm	26680 nF
82 mm	132 μm	27360 nF
84 mm	135.3 μm	28040 nF
86 mm	138.6 μm	28730 nF
88 mm	141.9 μm	29410 nF
90 mm	145.2 μm	30100 nF
92 mm	148.5 μm	30780 nF
94 mm	151.8 μm	31460 nF
96 mm	155.1 μm	32150 nF
98 mm	158.4 μm	32830 nF
100 mm	161.7 μm	33520 nF

DRAWINGS



Mounting

The actuators are usually grinded on top and bottom surfaces (perpendicular to the direction of expansion) in order to obtain flat and parallel surfaces for mounting. The actuators may be mounted either by mechanical clamping or gluing.

Avoiding short circuit can either be achieved by:

- Adding Kapton foil on the metallic surfaces.
- Having inactive ceramic plates between the actuator and the metal plate.

Stacked actuators are manufactured with top and bottom insulating ceramic end-plates.

If glued, it is important to ensure a very thin glue line between the actuator and the substrate. It is recommended that a pressure, e.g. 2-5 MPa, is applied during the curing process.

To avoid significant loss of performance, the mounting of the actuators should avoid mechanical clamping and/or gluing on the sides of the actuator.

During manufacturing or handling, minor chips on the end-plates can appear. Minor chips cannot be avoided, but such chips do not affect performance.

Electrical connection

External electrodes

The external electrodes are screen printed silver as standard. Other materials, e.g. gold or silver/palladium are available on request. The positive electrode is indicated by a black spot.

Electrical connection to the external electrodes can be achieved by mechanical contacts, soldering, gluing with electrically conductive glues or wire bonding.

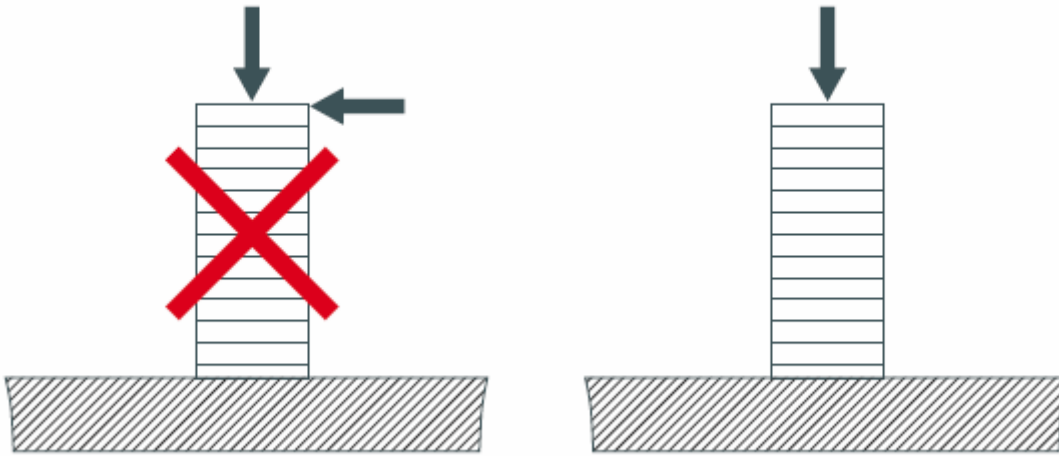
Mechanical connections

Mechanical connections can be arranged by e.g. copper springs contacted to the external electrodes. It is recommended to use external electrodes of gold in order to eliminate oxidation of the electrodes.

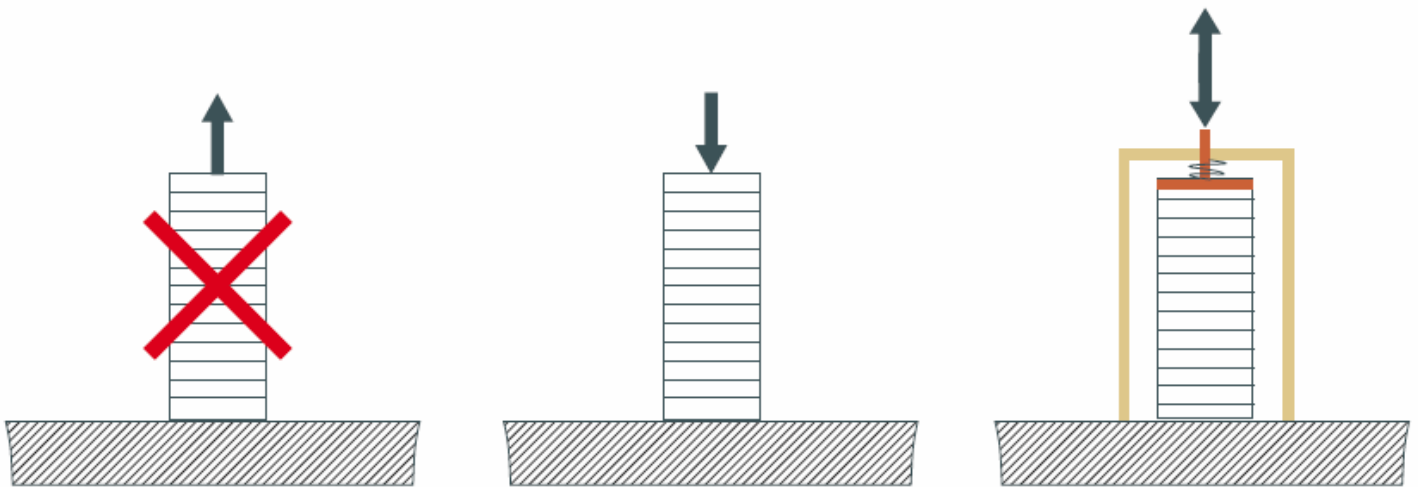
Soldering

Soldering electrical wires to the screen-printed silver electrode makes an excellent and time-stable connection. In order to avoid challenges with wetting the solder on the silver surface, always clean the external electrodes with a glass brush or steel wool.

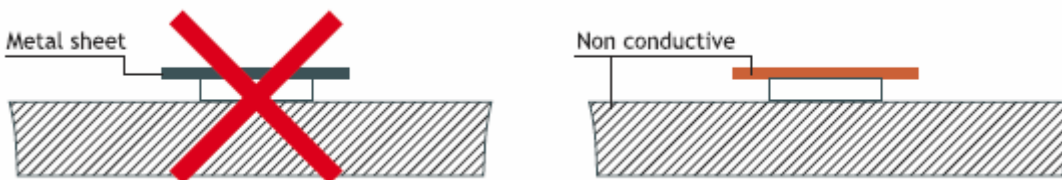
The actuators may only be stressed axially. Tilting and shearing forces must be avoided.



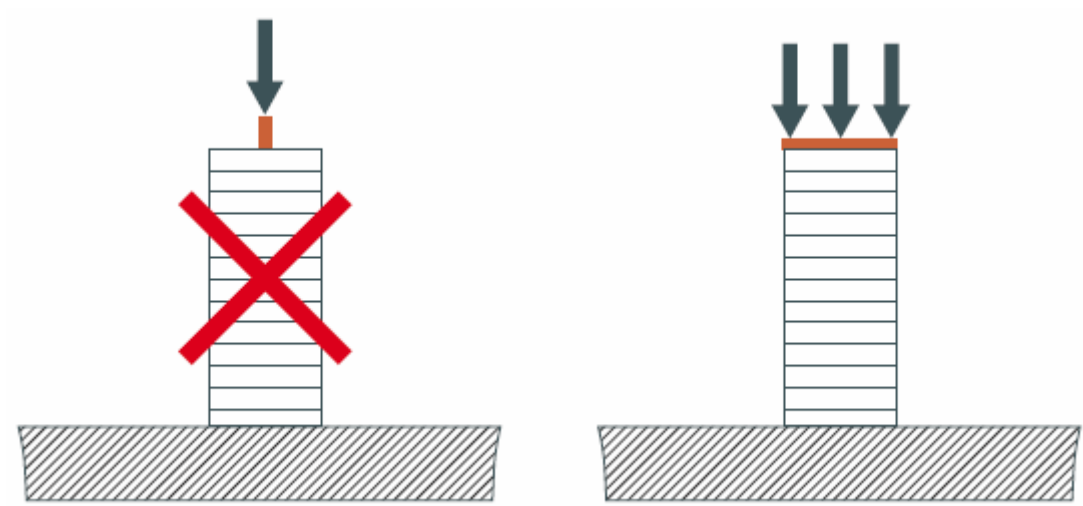
The actuators without preload are sensitive to pulling forces. It is recommended to apply a pre-load in order to optimize the performances of the actuators.



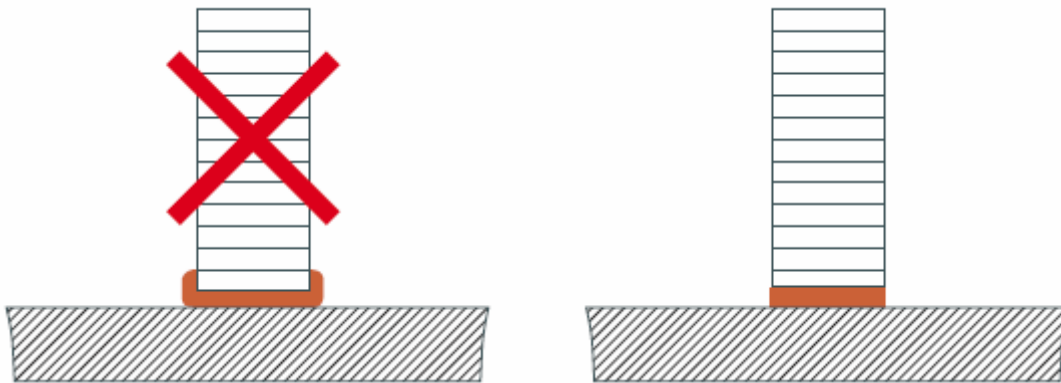
For linear actuators it is recommended not to use a metal plate on top and bottom in order to avoid short circuit.



The force must be applied on the full surface of the actuator in order to assure a good load distribution.



Epoxy glues are well suited for gluing piezoceramics.



WIRES

When you order actuators from Noliac, you can have wires fitted to save time and money. However, you should consider these parameters, when you select a wire for connection:

- Operation voltage
- Intensity of current
- Operating temperature
- Environment for example vacuum

We recommend Teflon wires

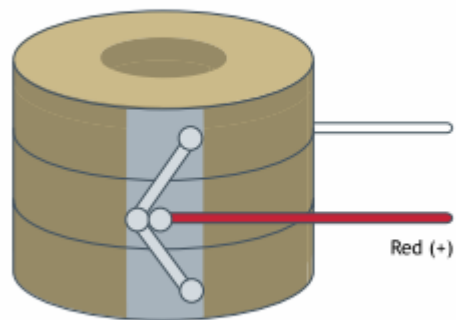
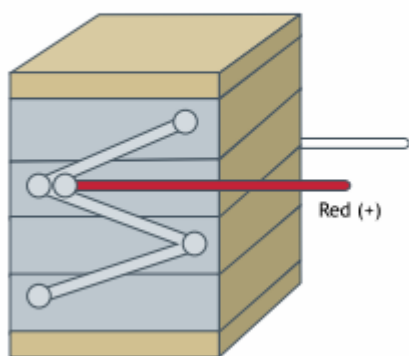
Teflon wires can stand temperatures above 200 °C, whereas PVC wires only resist temperatures up to 80 °C. In tough operating conditions or in vacuum, it is recommended always to use Teflon isolated wire to guarantee the proper performance of PZT-elements.

Wire thickness (AWG)

The wire thickness (AWG) is determined by the current that has to be transmitted to and from the PZT-element. The required current is determined by the capacitance of the PZT-element, the maximum driving frequency and the maximum voltage U_p .

	Option A01	Option A02	Option C
Type	28 AWG Teflon	28 AWG Teflon	Custom
Length	200 +/- 10mm	200 +/- 10mm	To be defined
Position	Middle of the actuator	Middle of the actuator	To be defined
Direction	Perpendicular to the height	Toward top	To be defined

Type A01



Type A02

