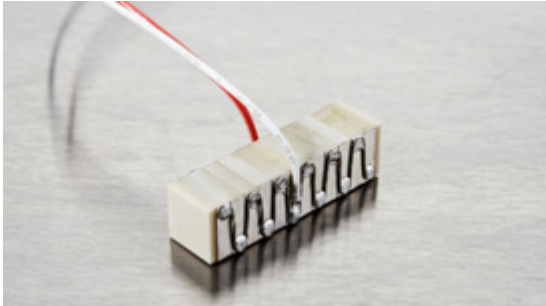


## NAC2022-Hxx



Noliac plate stack actuator NAC2022-Hxx (height in mm – Hxx) is based on the multilayer actuator NAC2022 and can be stacked to match your requirements. The standard range of NAC2022-Hxx is produced in a height between 4-100 mm. The plate stack provides a stroke up to 161.7  $\mu\text{m}$  and blocking force up to 4200 N depending on the height of the stack.

### SPECIFICATIONS

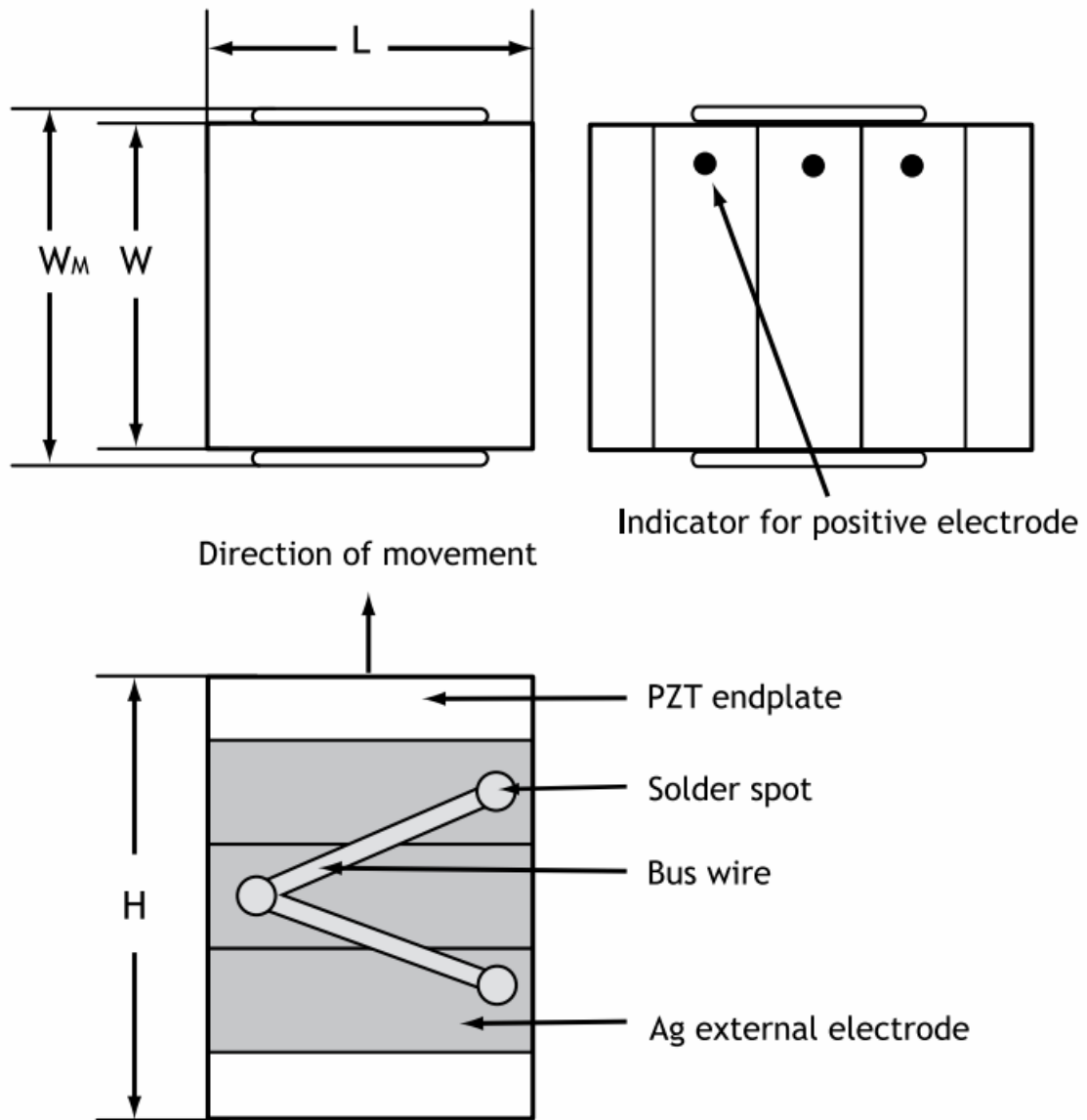
Attributes	Value	Tolerance
Length / outer diameter	10 mm	+0.40/-0.20 mm
Width / inner diameter	10 mm	+0.40/-0.20 mm
Max width / outer diameter max	11.8 mm	
Height	4 — 100 mm	+/-0.2 mm or 1% (whichever is largest)
Operating voltage, max.	200 V	
Free stroke, max.	3.3 — 161.7 $\mu\text{m}$	+/- 15%
Blocking force, max.	4200 N	+/-20%
Capacitance	400-19400 nF	+/- 15%
Stiffness	1273-26 N/ $\mu\text{m}$	+/-20%
Maximum operating temperature	150 °C	
Material	NCE51F	
Unloaded resonance frequency	>248 k - 11 k Hz	
Electrodes	Screen-printed Ag and soldered bus wire (option: glued connections)	

## Stack options

Height	Stroke	Capacitance
4 mm	3.3 $\mu\text{m}$	400 nF
6 mm	6.6 $\mu\text{m}$	790 nF
8 mm	9.9 $\mu\text{m}$	1190 nF
10 mm	13.2 $\mu\text{m}$	1580 nF

12 mm	16.5 $\mu\text{m}$	1980 nF
14 mm	19.8 $\mu\text{m}$	2380 nF
16 mm	23.1 $\mu\text{m}$	2770 nF
18 mm	26.4 $\mu\text{m}$	3170 nF
20 mm	29.7 $\mu\text{m}$	3560 nF
22 mm	33 $\mu\text{m}$	3960 nF
24 mm	36.3 $\mu\text{m}$	4360 nF
26 mm	39.6 $\mu\text{m}$	4750 nF
28 mm	42.9 $\mu\text{m}$	5150 nF
30 mm	46.2 $\mu\text{m}$	5540 nF
32 mm	49.5 $\mu\text{m}$	5940 nF
34 mm	52.8 $\mu\text{m}$	6340 nF
36 mm	56.1 $\mu\text{m}$	6730 nF
38 mm	59.4 $\mu\text{m}$	7130 nF
40 mm	62.7 $\mu\text{m}$	7520 nF
42 mm	66 $\mu\text{m}$	7920 nF
44 mm	69.3 $\mu\text{m}$	8320 nF
46 mm	72.6 $\mu\text{m}$	8710 nF
48 mm	75.9 $\mu\text{m}$	9110 nF
50 mm	79.2 $\mu\text{m}$	9500 nF
52 mm	82.5 $\mu\text{m}$	9900 nF
54 mm	85.8 $\mu\text{m}$	10300 nF
56 mm	89.1 $\mu\text{m}$	10690 nF
58 mm	92.4 $\mu\text{m}$	11090 nF
60 mm	95.7 $\mu\text{m}$	11480 nF
62 mm	99 $\mu\text{m}$	11880 nF
64 mm	102.3 $\mu\text{m}$	12280 nF
66 mm	105.6 $\mu\text{m}$	12670 nF
68 mm	108.9 $\mu\text{m}$	13070 nF
70 mm	112.2 $\mu\text{m}$	13460 nF
72 mm	115.5 $\mu\text{m}$	13860 nF
74 mm	118.8 $\mu\text{m}$	14260 nF
76 mm	122.1 $\mu\text{m}$	14650 nF
78 mm	125.4 $\mu\text{m}$	15050 nF
80 mm	128.7 $\mu\text{m}$	15440 nF
82 mm	132 $\mu\text{m}$	15840 nF
84 mm	135.3 $\mu\text{m}$	16240 nF
86 mm	138.6 $\mu\text{m}$	16630 nF
88 mm	141.9 $\mu\text{m}$	17030 nF
90 mm	145.2 $\mu\text{m}$	17420 nF
92 mm	148.5 $\mu\text{m}$	17820 nF
94 mm	151.8 $\mu\text{m}$	18220 nF
96 mm	155.1 $\mu\text{m}$	18610 nF
98 mm	158.4 $\mu\text{m}$	19010 nF
100 mm	161.7 $\mu\text{m}$	19400 nF

# DRAWINGS



## MOUNT AND CONNECT

### Mounting

The actuators are usually grinded on top and bottom surfaces (perpendicular to the direction of expansion) in order to obtain 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.

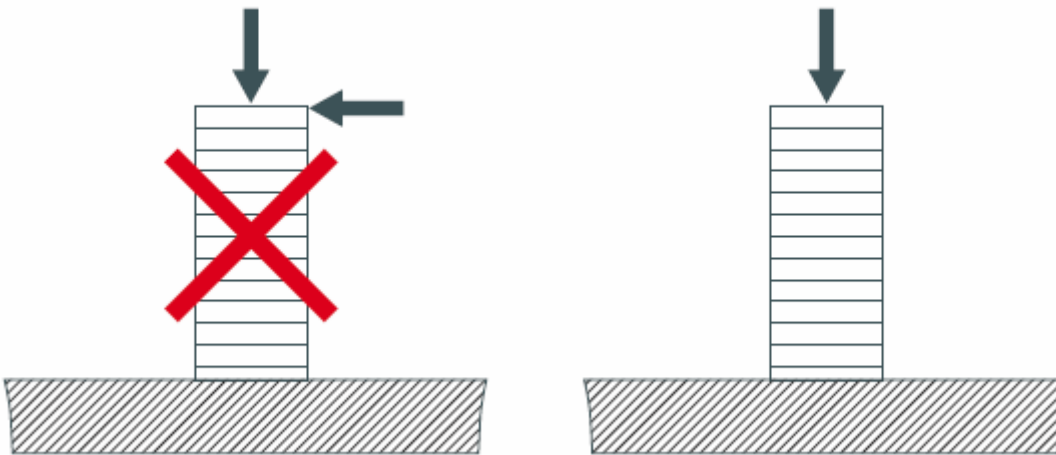
If glued, it is important to ensure a very thin glue line between the actuator and the substrate. It is recommended that a pressure is applied during the curing process.

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

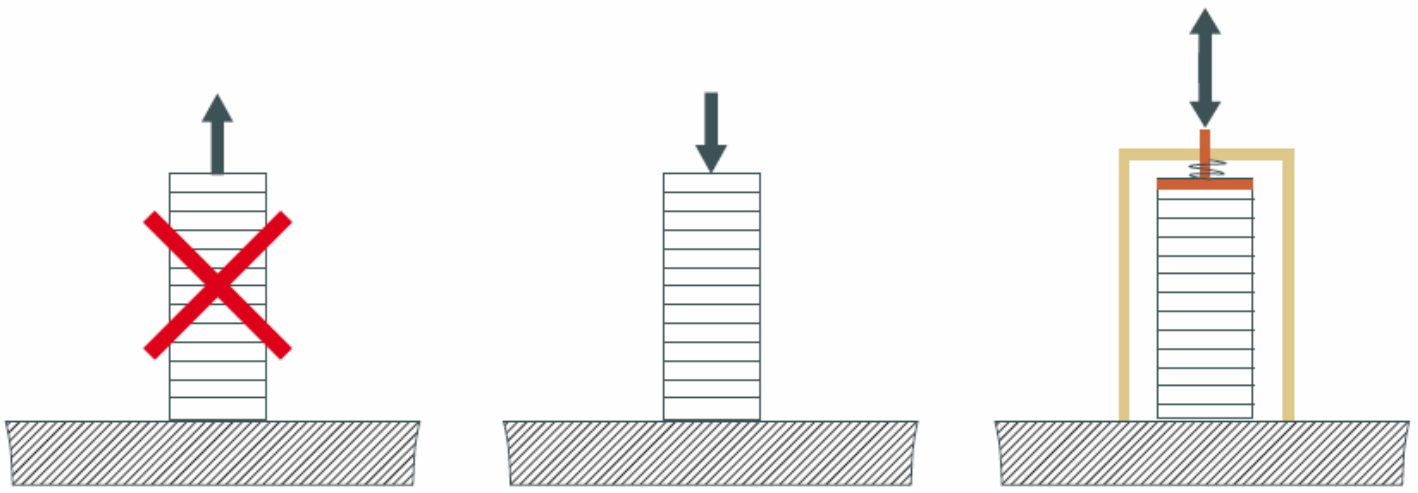
During manufacturing or handling, minor chips on the end-plates can appear. Minor chips cannot be avoided, but such chips can affect performance.

### Electrical connection

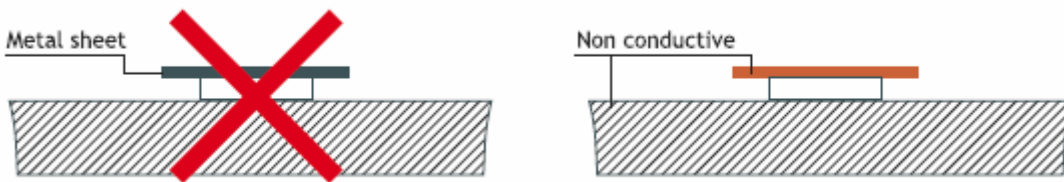
The actuators may only be stressed axially. Tilting and shearing forces must be avoided.



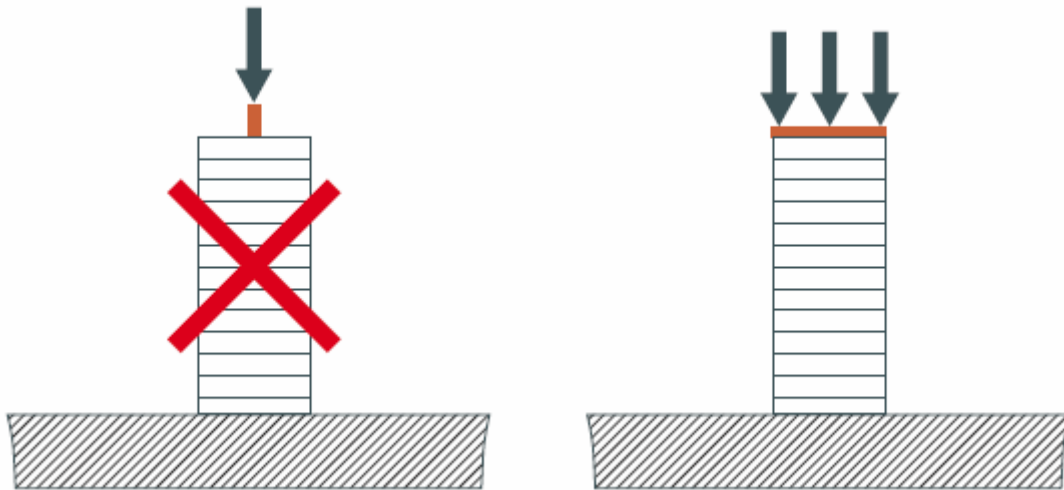
The actuators without preload are sensitive to pulling forces. It is recommended to apply a pre-load in order to optimize the performances of the actuators.



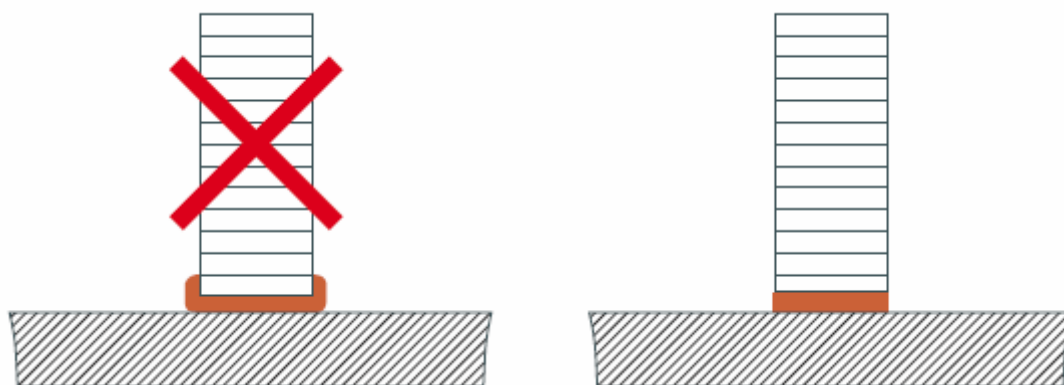
For linear actuators it is recommended not to use a metal plate on top and bottom in order to avoid short circuit.



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

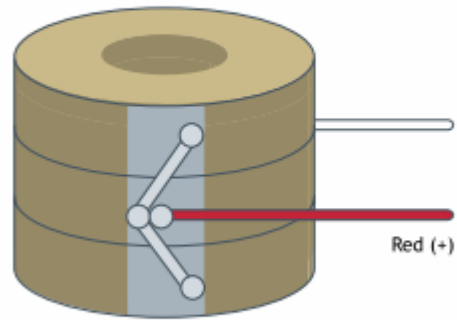
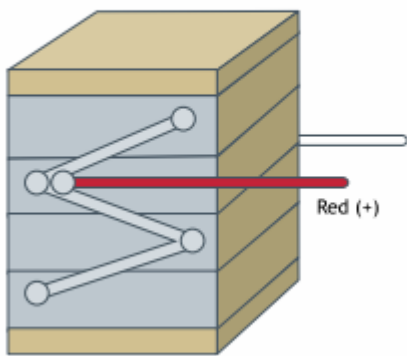
Teflon wires can stand temperatures above 200 °C, whereas PVC wires only resist temperatures up to 80 °C. In tough operating conditions or in vacuum, it is recommended always to use Teflon isolated wire to guarantee the proper performance of PZT-elements.

### 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  $U_{p-p}$ .

	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

