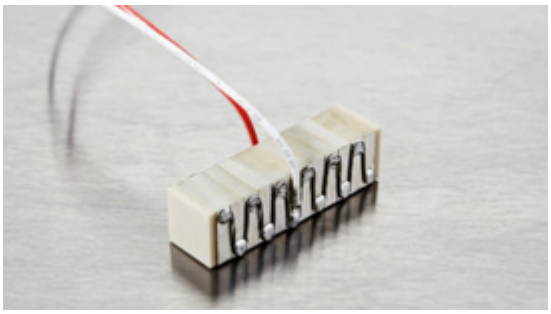
NAC2023-Hxx



Noliac plate stack actuator NAC2023-Hxx (height in mm – Hxx) is based on the multilayer actuator NAC2023 and can be stacked to match you requirements. The standard range of NAC2023-Hxx is produced in a height between 4-150 mm. The plate stack provides a stroke up to. 244.2 µm and blocking force up to 9450 N depending on the height of the stack.

SPECIFICATIONS

Attributes	Value	Tolerance
Length / outer diameter	15 mm	+0.50/-0.30 mm
Width / inner diameter	15 mm	+0.50/-0.30 mm
Max width / outer diameter max	16.8 mm	
Height	4 — 150 mm	+/-0.2 mm or 1% (whichever is largest)
Operating voltage, max.	200 V	
Free stroke, max.	3.3 — 244.2 µm	+/- 15%
Blocking force, max.	9450 N	+/-20%
Capacitance	870-64600 nF	+/- 15%
Stiffness	2864-39 N/µm	+/-20%
Maximum operating temperature	150 °C	
Material	NCE51F	
Unloaded resonance frequency	>248 k - 7 k Hz	
Electrodes	Screen-printed Ag and soldered bus wire (option: glued connections)	
Remarks	-	

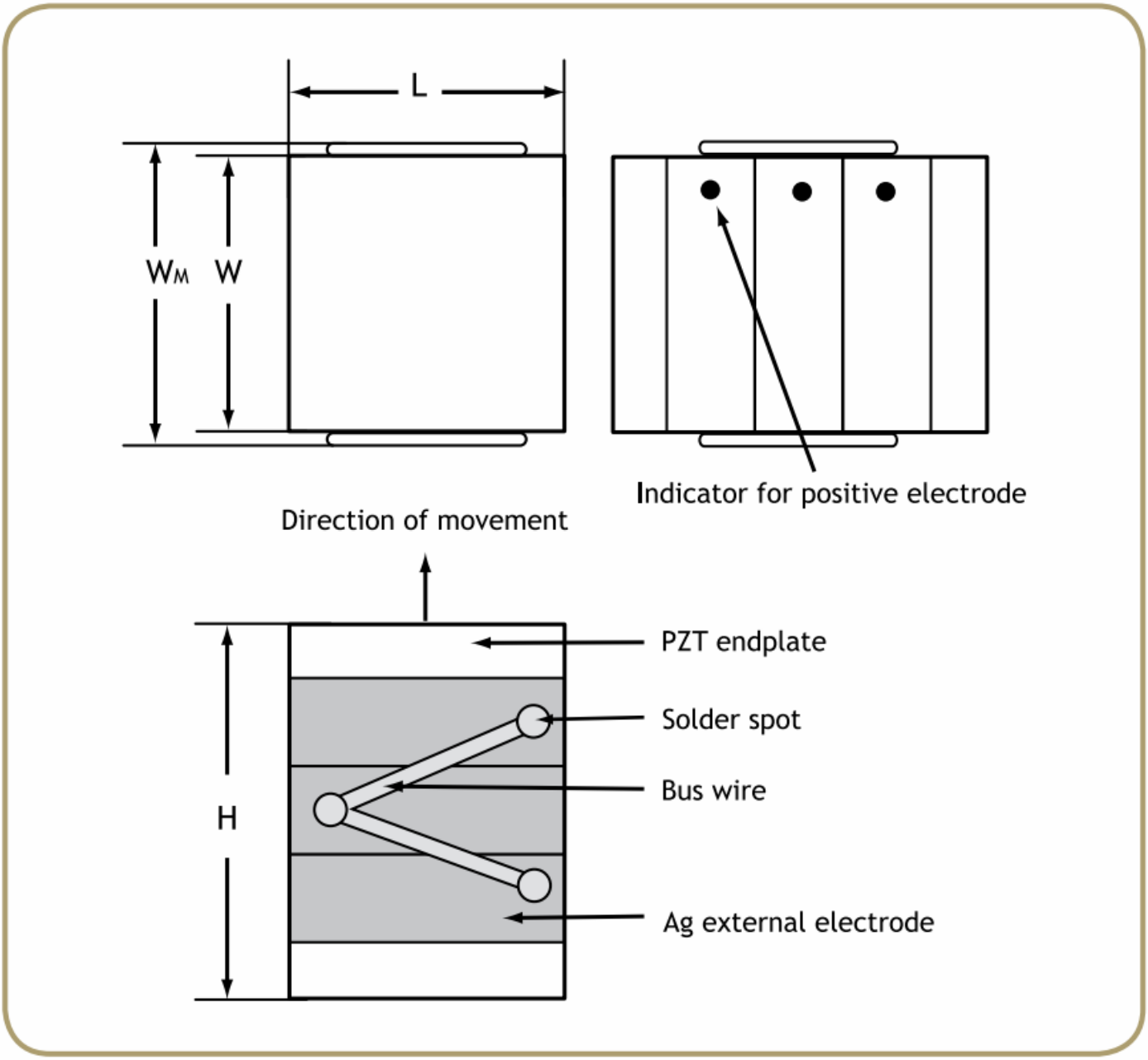
Stack options

Height	Stroke	Capacitance
4 mm	3.3 µm	870 nF
6 mm	6.6 µm	1750 nF
8 mm	9.9 µm	2620 nF

10 mm	13.2 µm	3490 nF
12 mm	16.5 µm	4370 nF
14 mm	19.8 µm	5240 nF
16 mm	23.1 µm	6110 nF
18 mm	26.4 µm	6980 nF
20 mm	29.7 µm	7860 nF
22 mm	33 µm	8730 nF
24 mm	36.3 µm	9600 nF
26 mm	39.6 µm	10480 nF
28 mm	42.9 µm	11350 nF
30 mm	46.2 µm	12220 nF
32 mm	49.5 µm	13100 nF
34 mm	52.8 µm	13970 nF
36 mm	56.1 µm	14840 nF
38 mm	59.4 µm	15710 nF
40 mm	62.7 µm	16590 nF
42 mm	66 µm	17460 nF
44 mm	69.3 µm	18330 nF
46 mm	72.6 µm	19210 nF
48 mm	75.9 µm	20080 nF
50 mm	79.2 µm	20950 nF
52 mm	82.5 µm	21830 nF
54 mm	85.8 µm	22700 nF
56 mm	89.1 µm	23570 nF
58 mm	92.4 µm	24440 nF
60 mm	95.7 µm	25320 nF
62 mm	99 µm	26190 nF
64 mm	102.3 µm	27060 nF
66 mm	105.6 µm	27940 nF
68 mm	108.9 µm	28810 nF
70 mm	112.2 µm	29680 nF
72 mm	115.5 µm	30560 nF
74 mm	118.8 µm	31430 nF
76 mm	122.1 µm	32300 nF
78 mm	125.4 µm	33170 nF
80 mm	128.7 µm	34050 nF
82 mm	132 µm	34920 nF
84 mm	135.3 µm	35790 nF
86 mm	138.6 µm	36670 nF
88 mm	141.9 µm	37540 nF
90 mm	145.2 µm	38410 nF
92 mm	148.5 µm	39290 nF
94 mm	151.8 µm	40160 nF
96 mm	155.1 µm	41030 nF
98 mm	158.4 µm	41900 nF
100 mm	161.7 µm	42780 nF
102 mm	165 µm	43650 nF
104 mm	168.3 µm	44520 nF

106 mm	171.6 µm	45400 nF
108 mm	174.9 µm	46270 nF
110 mm	178.2 µm	47140 nF
112 mm	181.5 µm	48020 nF
114 mm	184.8 µm	48890 nF
116 mm	188.1 µm	49760 nF
118 mm	191.4 µm	50630 nF
120 mm	194.7 µm	51510 nF
122 mm	198 µm	52380 nF
124 mm	201.3 µm	53250 nF
126 mm	204.6 µm	54130 nF
128 mm	207.9 µm	55000 nF
130 mm	211.2 µm	55870 nF
132 mm	214.5 µm	56750 nF
134 mm	217.8 µm	57620 nF
136 mm	221.1 µm	58490 nF
138 mm	224.4 µm	59360 nF
140 mm	227.7 µm	60240 nF
142 mm	231 µm	61110 nF
144 mm	234.3 µm	61980 nF
146 mm	237.6 µm	62860 nF
148 mm	240.9 µm	63730 nF
150 mm	244.2 µm	64600 nF

DRAWINGS


L
WM
W
Indicator for positive electrode
Direction of movement
PZT endplate
Solder spot
Bus wire
H
Ag external electrode

MOUNT AND CONNECT

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.

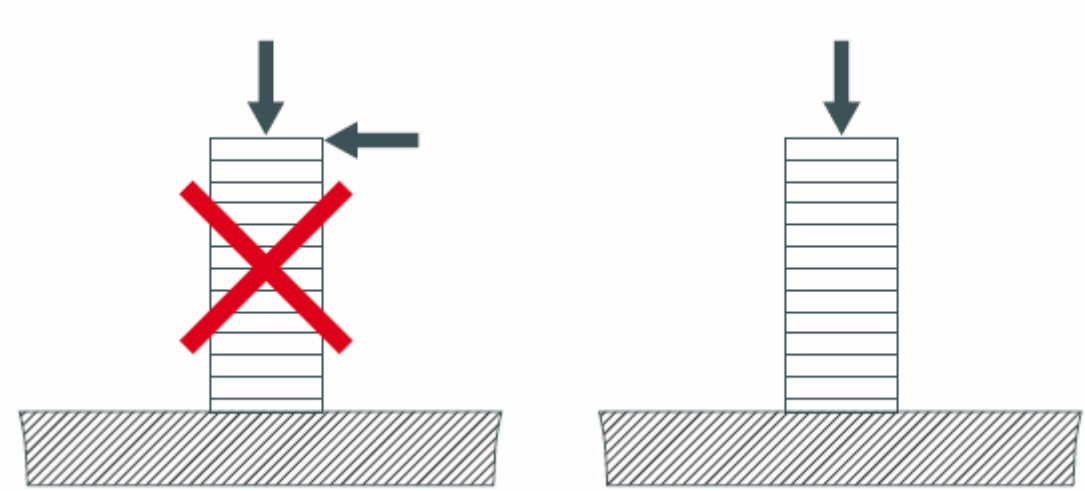
Mechanical connections

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.

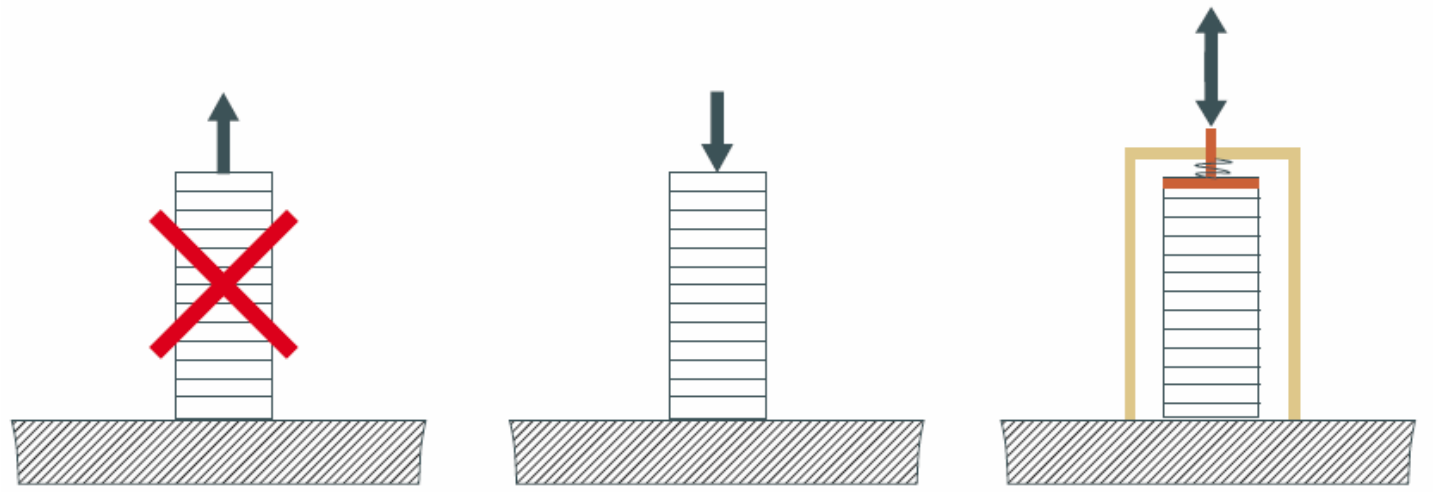
Soldering

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.

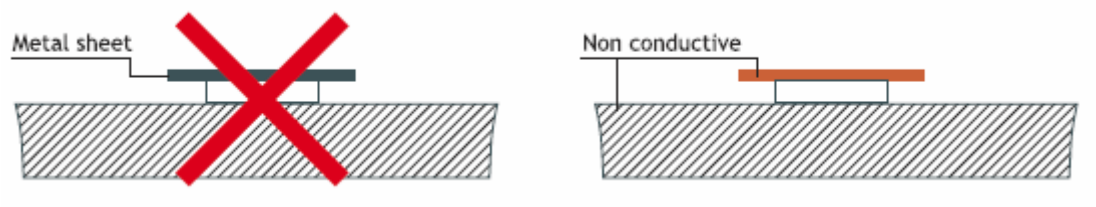
The actuators may only be stressed axially. Tilting and shearing forces must be avoided.



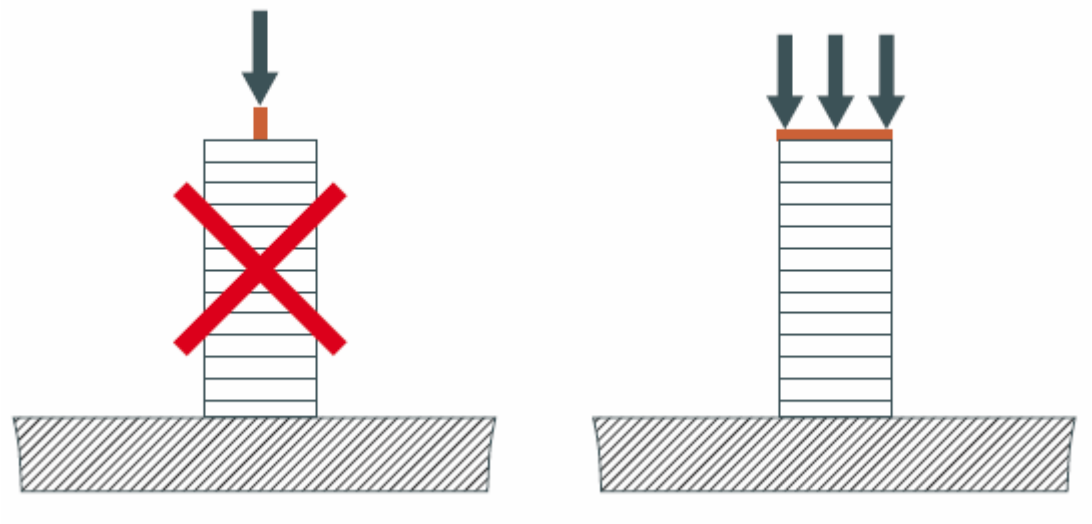
The actuators without preload are sensitive to pulling forces. It is recommended to apply a pre-load in order to optimize the performances of the actuators.



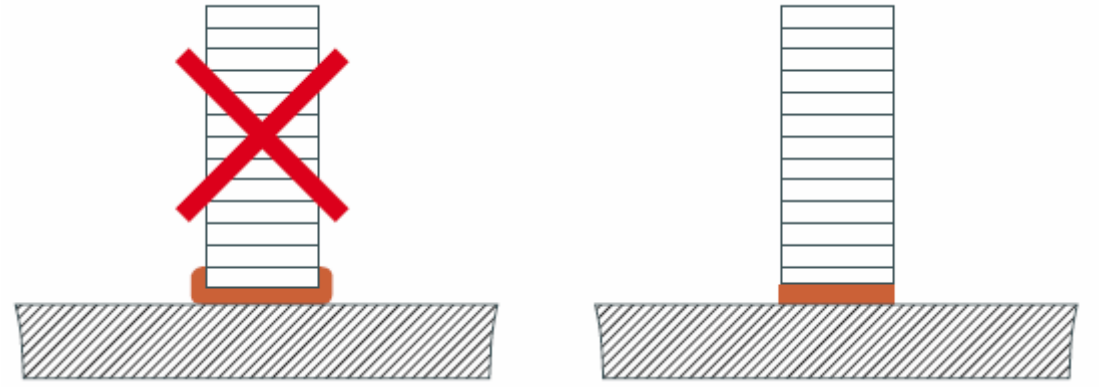
For linear actuators it is recommended not to use a metal plate on top and bottom in order to avoid short circuit.



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:

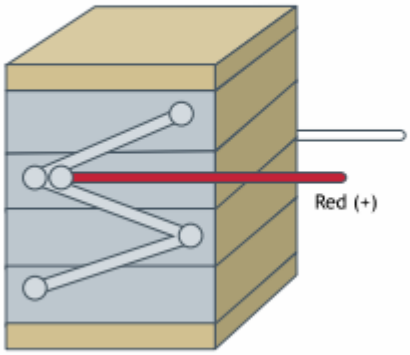
- Operation voltage
- Intensity of current
- Operating temperature
- Environment for example vacuum

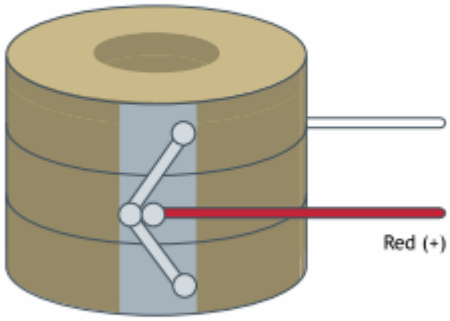
We recommend Teflon wires
Teflon wires can stand temperatures above 200 ºC, whereas PVC wires only resist temperatures up to 80 ºC. In tough operating conditions or in vacuum, it is recommended always to use Teflon isolated wire to guarantee the proper performance of PZT-elements.

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 Up-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