



Bending Actuators

Plate Benders

Features

- Free displacement up to +/- 1490 μm
- Blocking force up to 9.5 N
- High stiffness for short response times (<1ms)

Applications

- Optical communication
- Valves
- Industrial equipment
- Haptic feedback

Description

CTS tape cast multilayer piezoelectric bending actuators are ideal for a wide range of applications requiring precise and fast movement in upwards and downwards directions. CTS Plate Benders feature very high displacement in a compact design for applications requiring only low force. The plates are produced with a stroke up to +/- 1490 μm .

Standard Product, add-on or Custom Solution

This document contains information about the CTS standard multilayer plate benders and available add-ons. All the CTS multilayer products can be custom designed to match specific requirements – find more information on www.ctscorp.com or contact your local sales representative.



Specifications

Specification are given for room temperature in cantilever configuration, nominal clamping length (see drawing).

Product	NAC2221	NAC2222	NAC2223	Unit
Length (L)	21.0 +/- 0.45			mm
Width (W)	7.8 +/- 0.15			mm
Height (H)	0.7 +/- 0.10	1.3 +/- 0.10	1.8 +/- 0.10	mm
Operating Voltage, V_{max}	200			V
Free Stroke (+/- 15%)	+/- 210	+/- 140	+/- 100	μm
Blocking Force, 0 to V_{max} (+/- 20%)	1.34	5.0	9.5	N
Capacitance (+/- 15%)	2x110	2x220	2x330	nF
Large Signal Stiffness, typical	6.4	35.7	95.0	N/mm
Unloaded Resonance Frequency, typical	920	1600	2300	Hz
Maximum Operating Temperature	150			$^{\circ}\text{C}$
Material	NCE51F			-
External electrodes	Silver			-

Product	NAC2224	NAC2225	NAC2226	Unit
Length (L)	32.0 +/- 0.65			mm
Width (W)	7.8 +/- 0.15			mm
Height (H)	0.7 +/- 0.10	1.3 +/- 0.10	1.8 +/- 0.10	mm
Operating Voltage, V_{max}	200			V
Free Stroke (+/- 15%)	+/- 560	+/- 375	+/- 260	μm
Blocking Force, 0 to V_{max} (+/- 20%)	0.82	3.00	5.80	N
Capacitance (+/- 15%)	2x160	2x320	2x480	nF
Large Signal Stiffness, typical	1.5	8.0	22.3	N/mm
Unloaded Resonance Frequency, typical	340	620	890	Hz

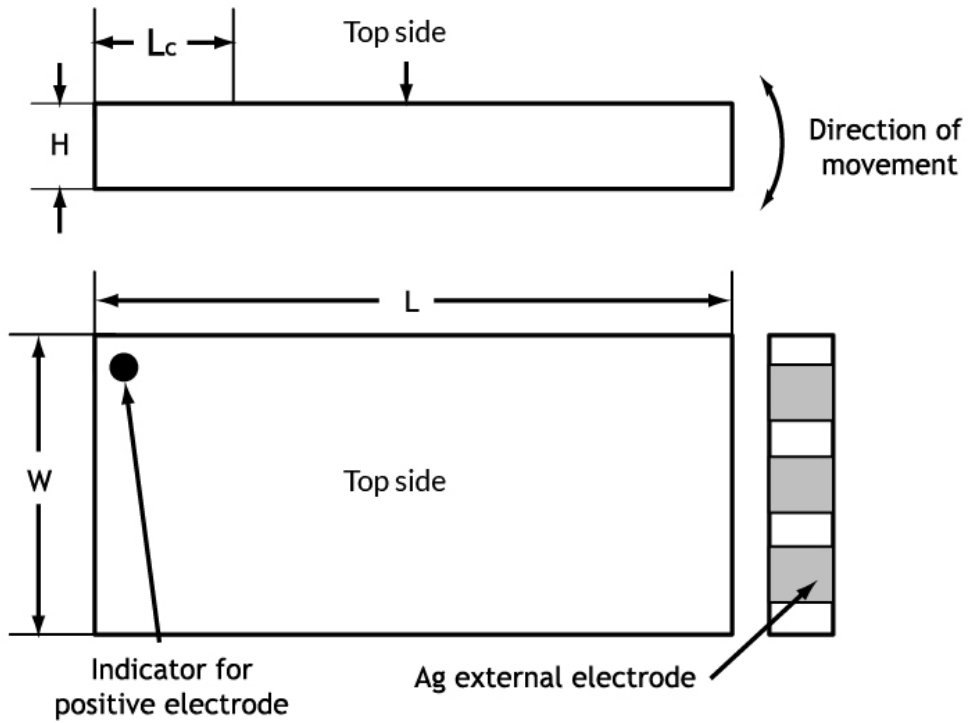


Plate Benders

Maximum Operating Temperature	150	°C
Material	NCE51F	-
External electrodes	Silver	-

Product	NAC2227	NAC2228	NAC2229	Unit
Length (L)	50.0 +/- 1.00			mm
Width (W)	7.8 +/- 0.15			mm
Height (H)	0.7 +/- 0.10	1.3 +/- 0.10	1.8 +/- 0.10	mm
Operating Voltage, V_{max}	200			V
Free Stroke (+/- 15%)	+/- 1490	+/- 1000	+/- 700	μ m
Blocking Force, 0 to V_{max} (+/- 20%)	0.51	1.90	3.60	N
Capacitance (+/- 15%)	2x300	2x600	2x900	nF
Large Signal Axial Stiffness, typical	0.3	1.9	5.1	N/mm
Unloaded Resonance Frequency, typical	130	230	330	Hz
Maximum Operating Temperature	150			°C
Material	NCE51F			-
External electrodes	Silver			-

Drawing



L_c inactive clamping length = 3.5mm

Mounting, Connecting and Driving

Please refer to our online tutorials for recommendations about mounting, connecting and driving plate benders.

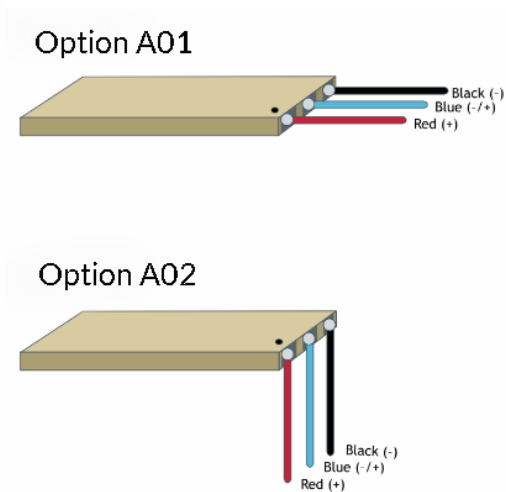
Add-ons

Wire Options

Two standard wire options are available:

	Option A01	Option A02
Wire type	NAC2221, NAC2224, NAC2227	32 AWG MIL-W-16878/6, 7 strands
	NAC2222, NAC2223, NAC2225, NAC2226, NAC2228, NAC2229	28 AWG MIL-W-16878/4, 7 strands
Length	200mm +/-10mm	
Position	Middle of the actuator	
Direction	Perpendicular to the height	Toward the top

We solder a red wire to the positive electrode, black to the negative and blue to the control terminal.



As part of our custom program, we can also supply specific wire types and configurations.

UHV preparation

Ultra high vacuum (UHV) is the vacuum regime characterized by pressures lower than about 10^{-7} pascal or 100 nanopascals ($\sim 10^{-9}$ torr). Extreme cleanliness and low outgassing are essential parameters in sustaining the vacuum level in such systems. Elevated temperature compatibility is often needed since water vapour and other trace gasses are removed from the system during a "bake-out".

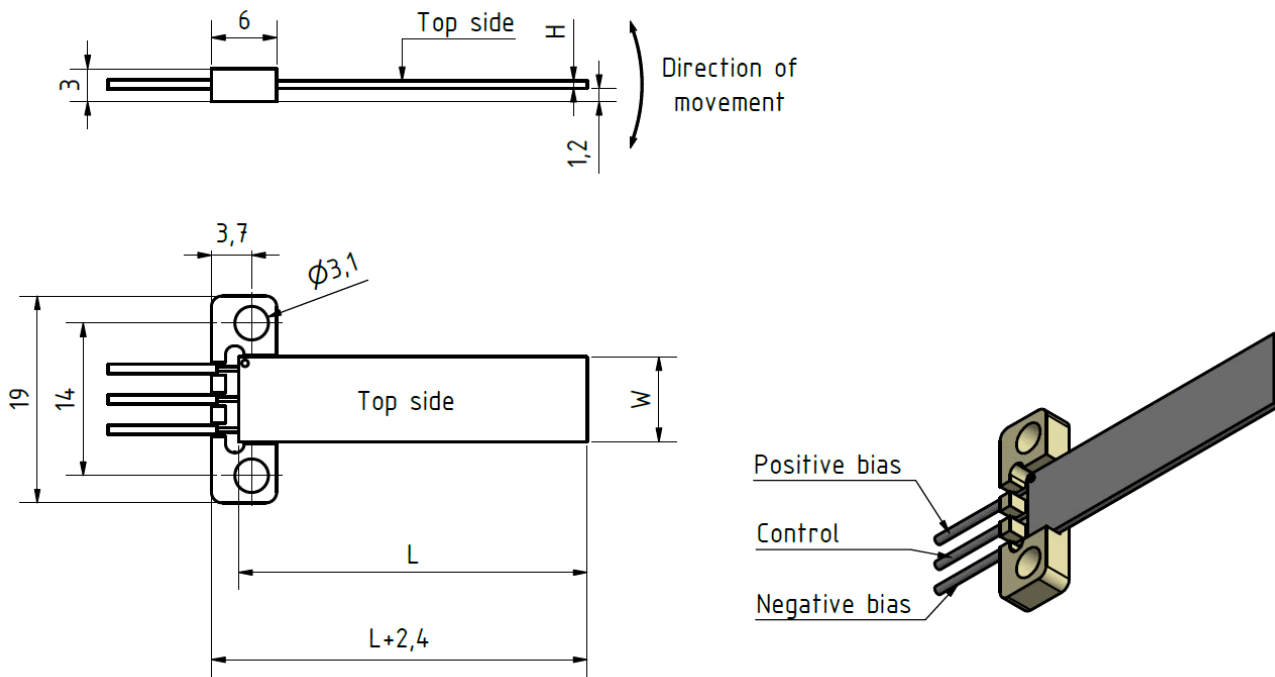
CTS piezoceramic components are designed to support system development and integration of piezo technology in UHV applications. Among many technical capabilities, CTS is competent in producing piezoelectric actuators meeting the demands on temperature compatibility and out gassing levels set by UHV operation.

For low outgassing, Kapton-insulated wires are recommended. In addition, with the UHV preparation the products will undergo a specific cleaning process and be packaged in sealed pouches.

Bender holder

To facilitate integration into experimental setups, CTS offers to fit a holder on standard plate benders. The holder is non-magnetic, compact and easy to mount and dismount. In addition, the bender holder provides strain relief for the wires.

Drawing:



Bending Actuators Product Families

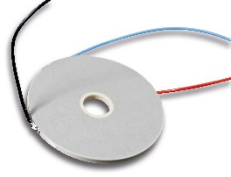


Plate and Ring Benders



2D and Special Benders

Learn more about the different bending actuator product families on www.ctscorp.com.