

XY200M: A new design of XY piezo stage for nano-positioning applications !

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The **XY200M** is an **XY piezo stage** coming from **CEDRAT TECHNOLOGIES** lab and which was **newly designed** according to space needs defined with CNES (the French space agency). This XY stage benefits from the **heritage** of a former XY stage developed for ESA (European Space Agency) in the frame of **Rosetta / Midas space mission** which will launch in the beginning of 2003. It is based on two pairs of **APA200M**, Amplified Piezo Actuators displaying **200 µm of stroke** each, arranged in **cross configuration** around a **central ring** (see figures 1 & 2). The mechanism allows a **displacement of +/- 100 µm** along the **two orthogonal X and Y axis** with **very low parasitic motions** (out of plane displacements and rotations around the Z direction, see figure 4 - data sheet). In order to achieve the two

X and Y displacements, each pair of **APA200M** is electrically driven in **push pull configuration**, so the device only requires two output channels from the standard driving electronics **LA75A-2** of **CEDRAT TECHNOLOGIES**. In the context of this R&T CNES project, the aim was to **space evaluated** this concept of self **thermo-mechanically centred stage**. For instance this device **passed the launch vibrations test** with a payload mass of 0.1 kg without neither clamping or latching mechanism. The **central ring motion** can be **precisely controlled** using either **strain gages** (SG option, figure 2) or **capacitive sensors**

(CS option, figure 1). Taking benefit of the **innovations** brought in this **space version**, **CEDRAT TECHNOLOGIES** decided to **upgrade** its **industrial standard version** of the **XY200M** (see figure 4, technical data sheet of the standard derived from the space version) in order to offer the **state of the art** to its **customers**. Applications targeted are **nanopositioning of lenses, mirrors and CCD or LCD sensors, 2D scanning...**

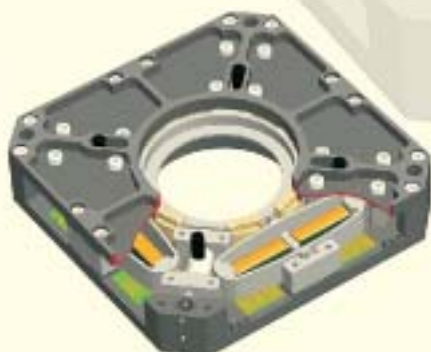


Figure 1: 3D view (I-DEAS) of the XY200M space version stage with Capacitive Sensor option.



Figure 2: XY200M-SG space version stage with Strain Gages option - Opened top view.

Figure 3: XY200M-SG space version stage with Strain Gages option - Side view.



References	Unit	XY200M
Notes		
Sensor options		SG, CS
Max. no load displacement	µm	200
Max out of plane Z displacement	µm	1.00
Max. parasitic Z rotation	µrad	10
Max. parasitic XY rotation	µrad	50
Voltage range	V	- 20 ... 150
Stiffness	N/µm	0.52
Height	mm	22.0
Dimensions	mm	100*100
Resolution	nm	20.0
Mass	g	180
Unloaded resonance frequency (in the actuation's direction)	Hz	500
Response time	ms	1.40
Capacitance (per electrical port)	µF	6.30

Figure 4: Technical data sheet of the XY200M