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DPT-C-S/M/L

The Digital Piezo Translator (DPT) is a piezoelectric translation device capable of moving up to 70 μ m with very high linearity and essentially perfect repeatability.

Ordinary piezo electric translators are non-linear and exhibit hysteresis and creep. To overcome these deficiencies a position sensor is built in to each DPT. The output of this sensor controls the voltage on the piezo stack removing the hysteresis, non-linearity and creep. Each DPT is supplied with a calibration curve which can serve as a basis to correct the very small residual non-linearity.

The position sensing circuitry and the piezo drive amplifier have been combined and packaged in the stand-alone CM Control Module, which requires only $\pm 15V$ to operate. This makes the DPT particularly suitable for OEM applications. The Control Module comes complete with analogue input, 14-bit parallel digital interface, status lines and ready signal.

To operate the DPT, the minimum required is a Control Module. For laboratory applications, up to three CM's can be mounted in an AX301 host unit, which provides position display, optional IEEE488, RS232 and parallel interfaces, and allows manual control DPT.

Features

- ▶ Super Invar and Zerodur construction
- ▶ 15, 35 or 70 μ m travel with sub-nanometer resolution
- ▶ 1ms response time (variable)
- ▶ Simple to install and compact for OEM applications

Applications

- ▶ Disk drive head testing
- ▶ Mask / wafer chuck alignment
- ▶ Scanning Probe Microscopy
- ▶ Optical cavity tuning
- ▶ Interferometry

Suggested Controller

- ▶ CM-LN - Low noise
- ▶ CM-LD - Low drift
- ▶ CM-LN-L - Low noise and low drift
- ▶ AX101/301 - CM Host unit



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www.nanopositioning.com



Closed Loop Positioner

DPT-C-S/M/L

Specification

Parameter	Symbol	Value			Units	Comments
Static Physical						
Variant		-S	-M	-L		
Material		Super Invar and Zerodur				
Length		42.2±0.3	76.7±0.3	127.8±0.3	mm	
Diameter		20±0.15			mm	
Mass (without cable and connector)		70	110	170	gms	
Cable length		2040±40			mm	
*Range	$d_{xp,max}$	>15	>35	>70	µm	
Maximum Load		5	5	5	Kg	Note 1
Dynamic Physical (Typical Values)						
Operating temperature		+10 to +50			°C	
Storage temperature		0 to +70			°C	
Operating pressure	-VAC	10 ⁻³ to 10 ⁻⁵			τ	
	-UVAC	10 ⁻³ to 10 ⁻⁹			τ	
Relative humidity		5 to 95 (non-condensing)			%	
Response time	$t_{xs,s}$	1	4.3	25	ms	
*Position noise (1σ)	$\delta X_{p,n}$	1 (0.5 with low noise controller)			nm rms	Note 2
Error Terms						
*Hysteresis (peak to peak)	$\delta_{xp,hyst}$	≤1			nm	
*Linearity Error (peak)	$\delta_{xp,lin}$	≤0.1	≤0.15	≤0.15	%	Note 3
Repeatability		≤1			nm	

Notes

*These parameters are measured and supplied with each mechanism.

1. This is the maximum load for gravity acting in the Z-direction to avoid damage to DPT.
2. The actual position noise of the stage.
3. Percent error over the full range of motion.



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DPT-C-S/M/L

Options

▶ Vacuum Compatible Option

The DPT-C-x can be made vacuum compatible; these special translators are made from very low outgassing materials and can be baked out up to 100°C. For high vacuum options specify -VAC e.g. DPT-C-S-VAC. Specify -UVAC for applications which demand Kapton cables, rather than PTFE. Vacuum operation is not possible for intermediate or partial vacuums due to spark discharge problems.

Vacuums must be better than 0.01 Torr so the system must be switched off during evacuation. A standard DPT-C should not be operated in a vacuum since damage will result. The vacuum compatible DPT-C has 4 BNC connectors for the vacuum feedthrough. Queensgate recommend the ZBNCD-450-4 feedthrough from Cadburn-MDC. Please order the CMFT02PB (2m) airside cable to connect from the feedthrough to the Control Module. The Control Module is not vacuum compatible.

▶ Non Magnetic Option

For translators made entirely from non magnetic materials specify -SS e.g. DPT-C-S-SS. In this case the Invar ends are replaced with stainless steel (AISI 316) end pieces. This increases the coefficient of thermal expansion by $180\text{nm}^{\circ}\text{C}^{-1}$.



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