CVCA1 – CRYO VOICE COIL ACTUATOR 1





Features

- Electromagnetic force actuator
- UHV compatible (completely sealed by welding)
- Contactless: no friction or wear
- Compact and robust design
- 5K to 375K operational range
- Dynamic operation
- Push-pull capacity
- Electrical connection via standard 1mm contacts
- Compatible with industrial motion controllers
- Coil to magnet alignment tool included

Description / Applications

The Cryo Voice Coil Actuator (CVCA) is an electromagnetic linear force actuator for cryogenic operation. The all-welded titanium construction with integrated power feedthrough pins hermetically encapsulates the coil making it also UHV compatible. The contactless nature of a voice coil actuator makes it especially suited for applications requiring smooth accurate positioning over the full stroke or for high lifetime applications like wafer probing.

Specifications

General info						
Type of motion			Linear			
Dimensions			See drawings below			
Operational environmental conditions			5 K to 375 K, ambient to UHV			
Weight of coil assembly (stator)			41 g			
Weight of magnet assembly (mover)			48 g			
Max. allowable coil temperature			140 °C (180 °C wire specification)			
Motion						
Travel range			6 mm (-2,5 to +3.5)			
Radial clearance			0,35 mm both directions			
Materials						
Coil assembly			Titanium			
Magnet assembly			Magnetically soft steel and magnets, nickel plated			
Electromechanical characteristics [1]			**10 K [2]**	**50 K**	**77 K**	**300 K (air)**
Coil resistance	R	Ohm	0,043	0,18	0,43	3,58
Voltage at peak force	V_{Fp}	V	0,09	0,35	0,81	7,06
Current at peak force	I_{Fp}	A	2,08	1,92	1,88	1,5
Back EMF constant	k_{BEMF}	V/m/s	3,83	4,17	4,26	4
Coil inductance	L	mH	0,62 @ 100Hz			
Force sensitivity	k_f	N/A	3,83	4,17	4,26	4
Actuator constant	k_a	N/√W	18,47	9,81	6,43	2,07
Max continuous force [3]	F_{ss}	N	8	5	4,5	3
Peak force [4]	F_p	N	>8	>8	8	6
Power at peak force [5]	P_p	W	0,19	0,67	1,55	8,4
Power at max. continuous force [5]	P_{ss}	W	0,19	0,26	0,49	2,1
Power at 1N continuous force [5]	-	W	0,003	0,01	0,024	0,23
Electrical time constant [6]	τ_E	ms	14,4	3,44	1,44	0,17
Mechanical time constant [7]	τ_M	ms	0,14	0,5	1,14	10,7
Thermal resistance coil assembly [8]	R_{stator}	K/W	789	139	113	79
Thermal resistance magnet assembly [8]	R_{mover}	K/W	1,22	1,22	1,22	1,22
Model specific information						
-V, -HV or -UHV			Level of vacuum compatibility, see the glossary on the homepage for details			
Electronics						
Controller/driver			Current amplifier			
Notes						

[1] At zero position, [2] Actual initial coil temperature at 10 K tests was approx. 50 K because of thermal resistances, 10 K values from analysis. [3] At 100 K coil temperature rise, [4] Allowed for 10 seconds. Values ≤50 K limited by used current amplifier. [5] $P = (F/k_a)^2$, [6] L/R, [7] $(m_{mover}*R)/(k_f*k_{BEMF})$, [8] Theoretical from FEA. Coil assembly is based on radiation between windings and conduction through bobbin.

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Ordering Information

Available Models

CVCA1-UHV	Cryo Voice Coil Actuator 1

Available Options

None	Default delivery condition is Ultra High Vacuum compatible

Accessories

None

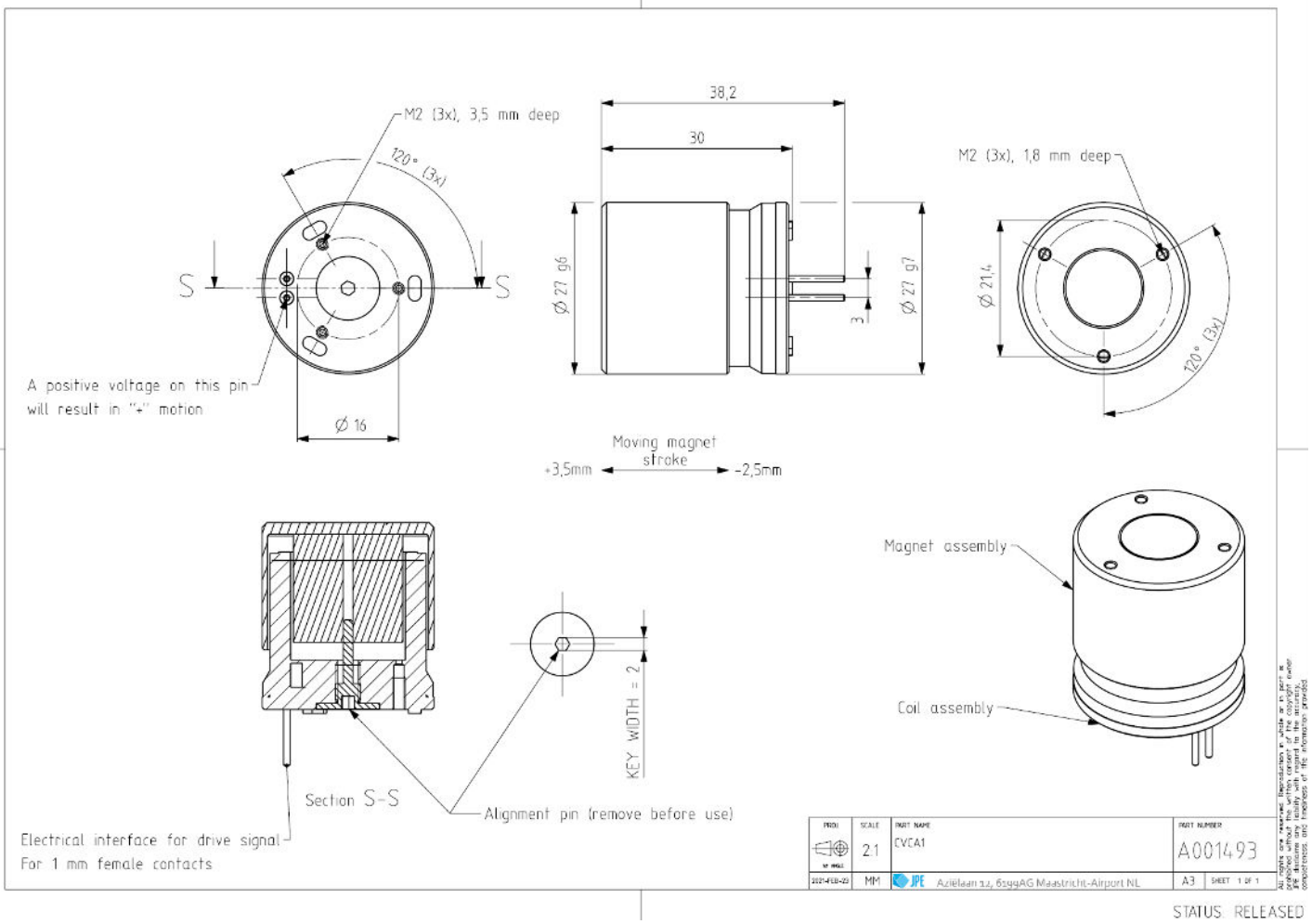
Mechanical and electrical information

Download 3D step files and manuals from:
https://www.jpe-innovations.com/cryo-nano-products/

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Drawings



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