High Vacuum Stepper Motors

1.8°, two phase hybrid stepper motors

AML's HV stepper motors are designed for use in High Vacuum environments when the Ultra High Vacuum capabilities of AML's D-series UHV motors are not required.



The HV model motors are two phase hybrid stepper motors, available in a range of torque ratings. Standard motors provide 200 full steps per revolution,are suitable for use to $1x10^{-7}$ mbar and working temperatures between -20°C to +200 °C.

SPECIFICATIONS

Model	Holding Torque	Detent Torque	Rotor Inertia	Max. Axial Force (1)	Max. Radial Force (1)	Mass	Current Per Phase	Phase Resistance at 20 °C	Phase Inductance
	mNm	mNm	gcm^2	N	N	g	A	Ω	mH
HV35.1	75	8	10	9	15	271	1.0	3.5	4.2
HV42.2	450	14	68	9	15	560	1.0	6.5	12.3
HV57.1	1,000	30	300	13	40	TBC	1.0	TBC	TBC

Vacuum environment	<1 x 10^{-7} mbar
Operating temperature	-20 °C to +200 °C
Temperature sensor	Type 'K' thermocouple standard
Bakeout temperature	200 °C
Step angle	1.8°
Step angle tolerance	±5%
Lead length	1.5m

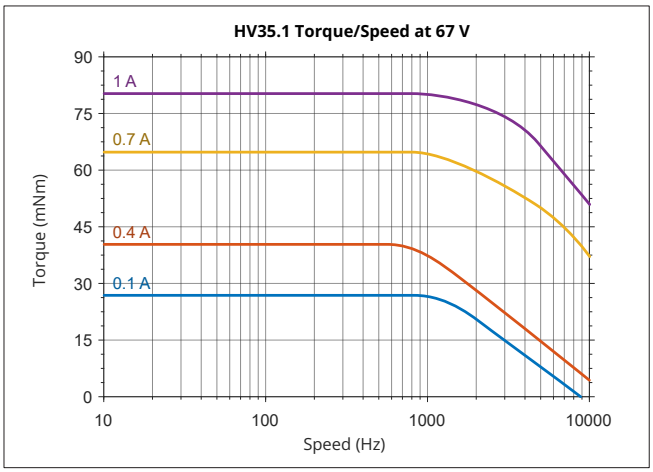
(1) 20 mm from the flange.

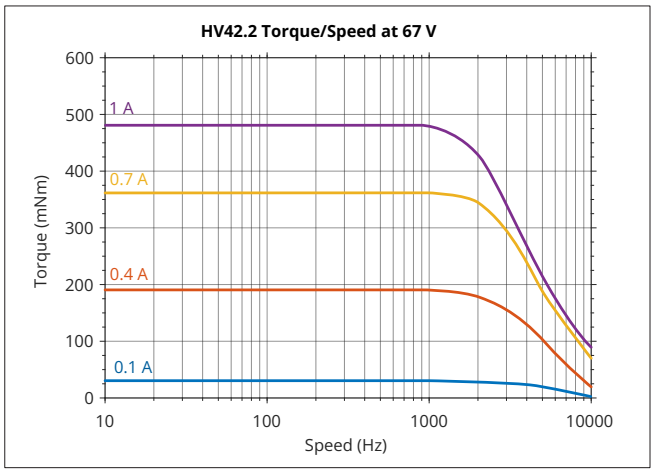
CHARACTERISTICS

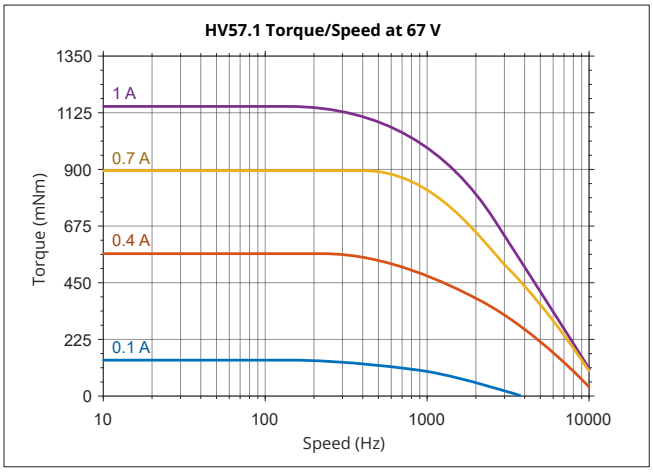
The performance shown on these graphs was obtained using an SMD4 drive configured for 256 step division up to a step frequency of 1000 Hz, and full step mode thereafter. Source voltage is 67 V.

The SMD4 stepper motor drive is a single-axis bipolar stepper motor drive, intended for use with AML's range of vacuum compatible stepper motors (VCSMs), with maximum performance and minimal heat.

Different drives will produce different speed / torque curves. Drives producing phase currents greater than 1 A RMS may damage the insulation. Reducing the drive voltage may impair high speed performance. Use of the embedded temperature sensor is essential for motor protection.





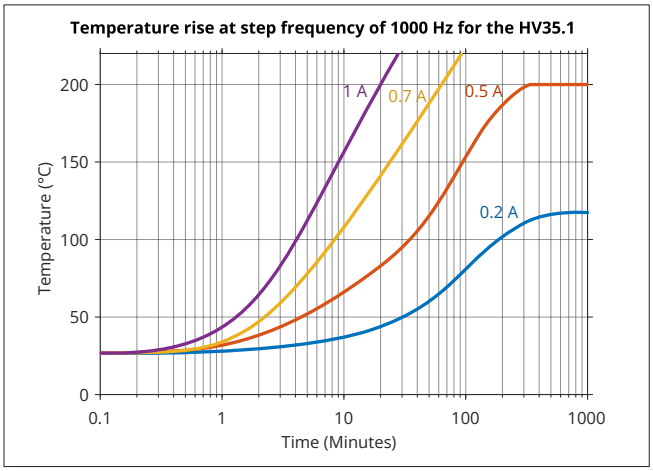


CHARACTERISTICS CONT.

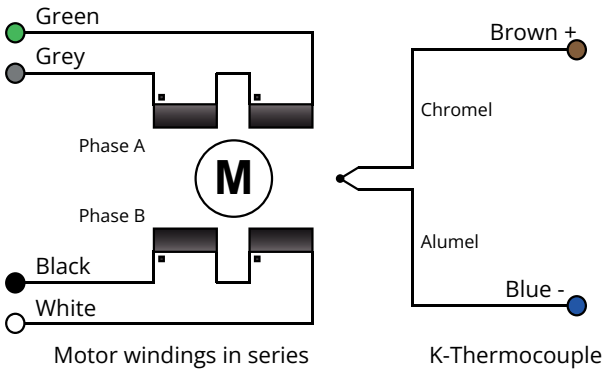
The temperature performance shown on this graph demonstrates the importance of optimised duty cycles and drive current for stepper motors in a vacuum environment. This data was obtained using an SMD4 drive operating at 1000 Hz in full step mode with a source voltage of 67 V.

The absence of convection in a vacuum causes motors to heat up rapidly. For this reason, wherever possible applications should be designed so that the load may be held in a position by the detent torque of the motor, so that power may be removed between periods of motion; to minimise temperature rise and outgassing.

Use of the embedded temperature sensor is essential for motor protection. Irreversible damage of the motor windings will occur if the temperature exceeds the stated maximum operating temperature.



ELECTRICAL CONNECTION



OPTIONAL CONNECTORS

AML offers a range of vacuum compatible connectors, including MLF18 and D-sub types, which can be fitted to any AML stepper motor during manufacture for the price of the connector.





AML STEPPER MOTOR DRIVES

AML offers two stepper motor drives. The SMD3 and SMD4 stepper motor drives are single-axis bipolar stepper motor drives both engineered to drive vacuum-compatible stepper motors with maximum performance and minimal heat. They are optimised for use with AML stepper motors.

SMD3
Single-axis bipolar stepper motor drive.
Compact, cost effective option.

SMD4
All SMD3 features + advanced connectivity (Ethernet, RS232 or 485) and optional encoder module.



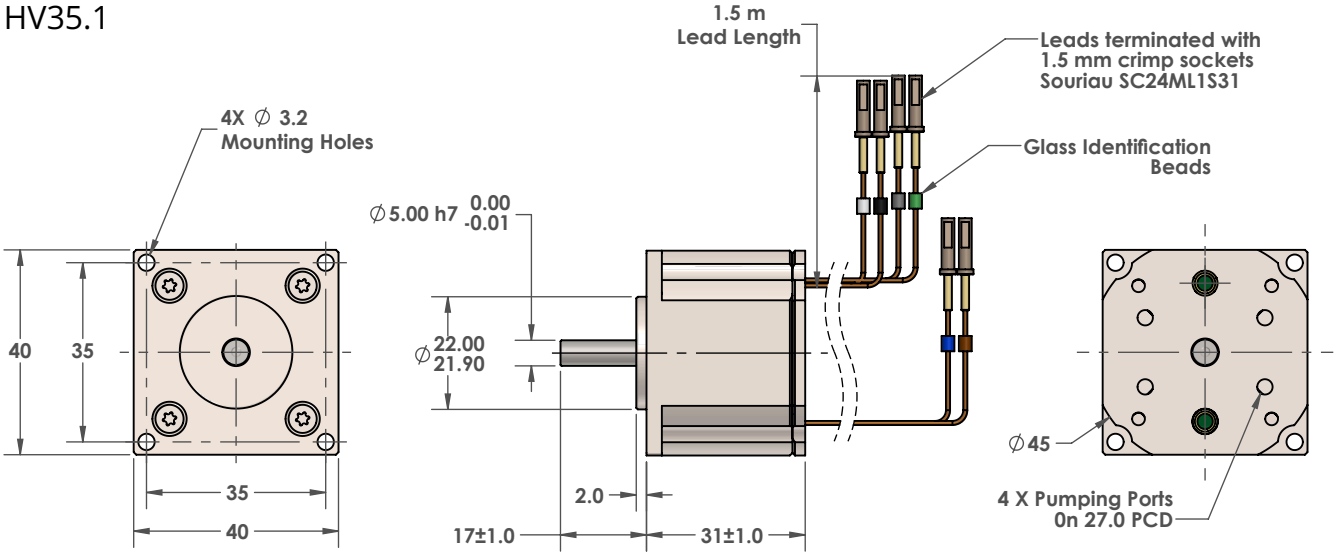


AML manufacture a range of airside cables to connect the SMD3 and SMD4 to your feedthrough of choice.

The AML Device Control Software is a powerful software package supplied with the SMD3 and SMD4 that enables you to control and configure multiple AML devices simultaneously in a single user-friendly graphical interface. Full details can be accessed on the SMD3 and SMD4 user manuals.

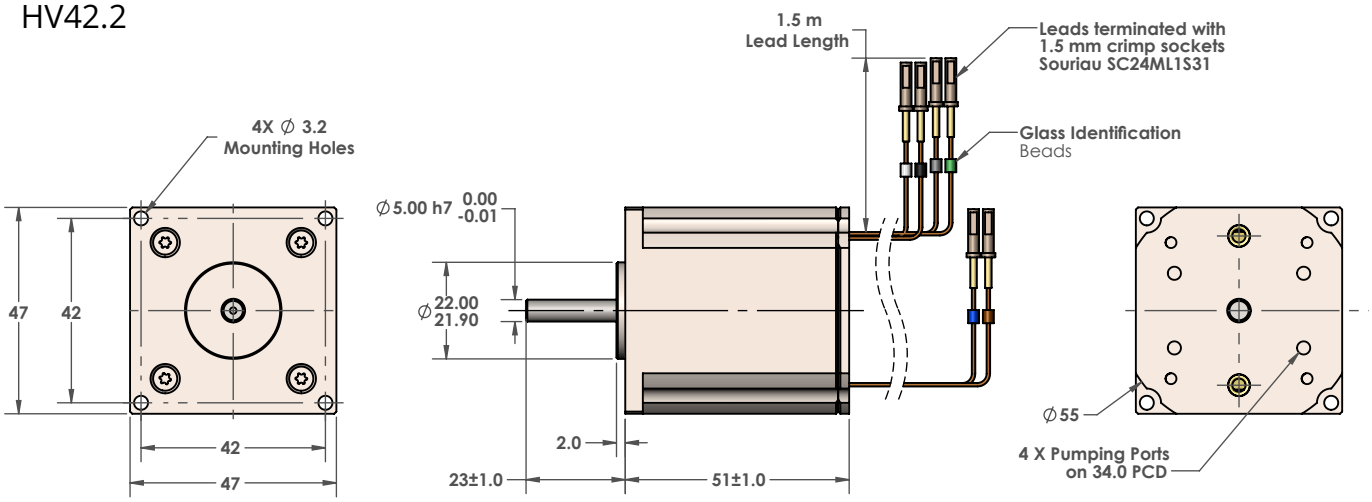
DIMENSIONS

HV35.1

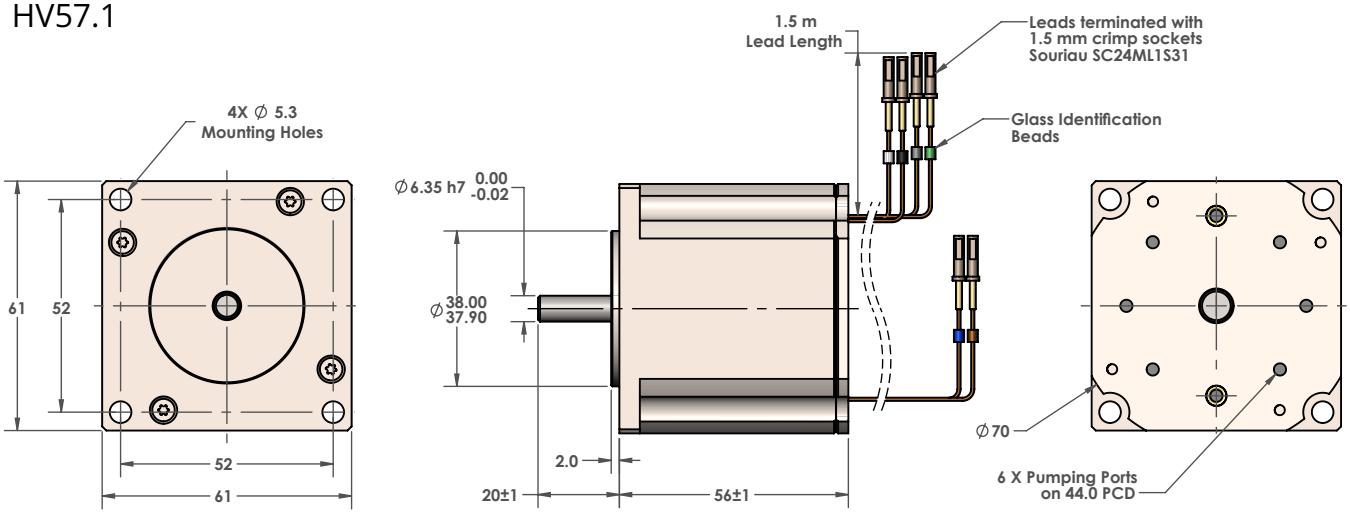


DIMENSIONS CONT.

HV42.2



HV57.1



ORDERING INFORMATION

Order Code	
HV35.1	75 mNm High Vacuum Stepper Motor
HV42.2	450 mNm High Vacuum Stepper Motor
HV57.1	1,000 mNm High Vacuum Stepper Motor

Related Products	
SMD3	Stepper motor drive
SMD4	Stepper motor drive with advanced connectivity
MLF18VCF	In-vacuum bakeable female connector, 18-way
VCxxDF	D-sub 9/15-way female in-vacuum connector

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AML pursues a policy of continuous improvement and reserves the right to make detail changes to specifications without consultation. E and OE.