SMD4
VACUUM-COMPATIBLE STEPPER MOTOR DRIVE
SINGLE-AXIS DRIVE

The SMD4 is a single-axis bipolar stepper motor drive that is engineered to drive vacuum-compatible stepper motors with maximum performance and minimal heat.

Ethernet **RS232/485** **USB** **Joystick**

Optimised for vacuum
Single-channel UHV stepper motor driver, ideally suited for use with our range of UHV stepper motors

Maximises motor operating time
Minimise temperature rise and outgassing with advanced drive current profiles

Motor thermal protection
Monitor motor temperature using the thermocouple or RTD inputs. Drive current is removed if temperature exceeds safe   levels

Voltage boost feature
Power using a standard 48 Vdc power supply, and the drive voltage is boosted to 67 Vdc to maximise speed and torque. Power supply included.

Smooth motor operation
Up to 256x micro-step resolution minimises resonances, providing smooth motion

Performance
Current adjustable from 0 A to 1 A RMS in 30 mA steps, with dynamic set-points for acceleration, running and hold currents

Easy remote control from host PC or PLC
Use any interface, USB, Ethernet, RS232 or 485.

RS485 allows you to daisy chain multiple devices together requiring only one RS485 interface on the PC.

Powerful software supplied; control and configure multiple axes at once.

Control other AML products from the same software!

Industry standard, Opto-isolated, step, direction enable interface
Step on rising, falling or both edges.

Interpolation feature; when enabled, one step input is extrapolated out to 256 microsteps reducing step signal bandwidth while preserving smooth motion.

Trigger feature; works like latching mode on the joystick. One step edge toggles motion on/off.

Optional joystick for quick setup
Two button joystick ideal during commissioning or setup.

Press for one step, press and hold for slew. Latching mode; press to toggle motion on/off.

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SPECIFICATIONS

General	
Dimensions	166 mm x 106 mm x 56 mm (excluding connectors and feet)
Weight	0.5 kg
Protection class	IP 20
Temperatures	Operation 10°C to 60°C, Storage -10°C to 85°C
Power supply	48 Vdc ± 5% power supply required. Power supply included.
Power consumption	48 W maximum
Safety compliance	EN 61010-1-2010
EMC complicance	Emissions EN61800-3:2018, EN55032 Class B, 3m (As 61800-3:2018, Table 17, Category C1, first environment) Immunities, EN55035, basic electromagnetic environment

Motor driver	
Type	2 phase bipolar stepper motor driver for 4-lead motors
Phase current	Up to 1 A RMS, adjustable in 30 mA steps
Source voltage	67 Vdc maximum *48 Vdc supply is boosted to 67 Vdc - can be disabled if required*
Resolution	Full, 8, 16, 32, 64, 128, 256 micro-stepping *Stops on full step positions only, micro-stepping is used for control of resonance and smoother step transition*
Step frequency	1 Hz to 15 kHz
Protection	Short to ground and phase to phase

Motor temperature measurement	
Type	Selectable PT100 RTD or K-Type thermocouple
Range	-200°C to 240°C
Accuracy	±15 °C for thermocouple, ±5 % for RTD
Fault detection	RTD: Open and short-circuit Thermocouple: Open circuit only

Operating modes

- Remote - Control and configure via USB, Ethernet or Serial
- Step, Direction Enable (SDE) - For connection to an external motion controller or PLC
- Joystick - Single-step and continous movement triggered via a joystick (supplied separately)
- Bake - Programmed cycle to heat the motor while stopped to drive off adsorbed gasses

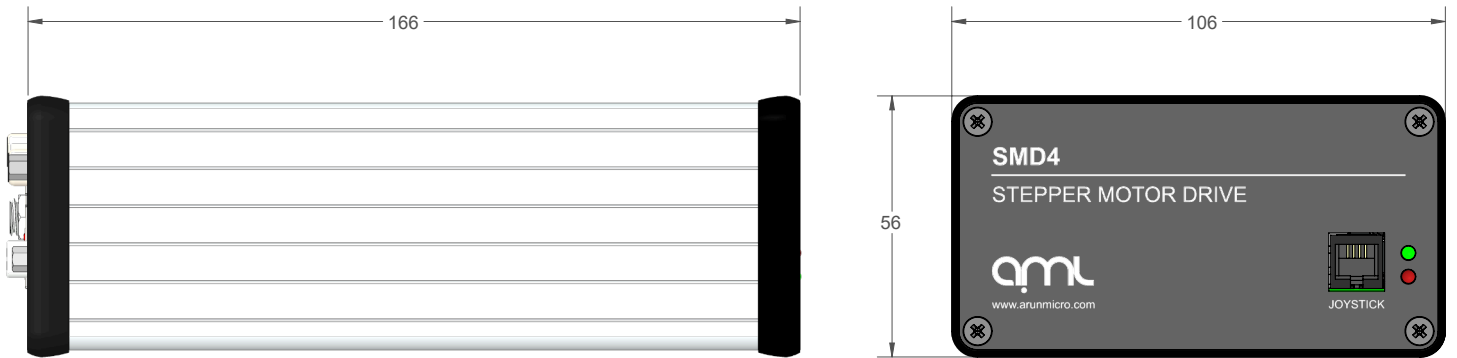| Control interfaces	
USB	USB 2.0 Full Speed via USB-C connector *Virtual COM port and firmware update interface*
Ethernet	10/100 Base-T, auto MDI-X, RJ45 8P8C connector *Telnet (port 11312), Modbus TCP (port 502)*
Serial communication	Selectable RS232 or RS485 mode (shared pins) Dual RJ45 8P8C connectors allow daisy chaining multiple devices in RS485 mode User selectable termination in RS485 mode 115200 default and maximum baud rate

Software	
Compatibility	Windows 7 or later
API	C# API is available

SDE (step, direction enable) interface	
Type	Optocoupled, common cathode
Levels	3.3 Vdc to 5 Vdc maximum *Higher voltages require external current limiting resistor*
Maximum frequency	2 MHz at 50% duty *Maximum full-step rate limited to 7.8 kHz for micro-step resolution of 256.*

Limits	
Quantity	2
Compatible switch types	Mechanical NO or NC (polarity selectable)
Protection	Withstands continuous short to 12 V maximum
Miscellaneous	Source current < 1 mA

Joystick	
Connection	Front panel mounted 4P4C jack with auto-detection of connection state
Input type	Active low, short to ground to activate function
Miscellaneous	Open circuit voltage 3.3 V, source current < 3.5 mA

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MECHANICAL DATA

166

106

56

SMD4

STEPPER MOTOR DRIVE

aml

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JOYSTICK

Notes

All dimensions are in millimetres.

CONNECTIVITY

I/O
Limit switches and opto-isolated step, direction and enable interface.

48 Vdc Power
Power using an industry standard 48 Vdc power supply.

USB Full Speed
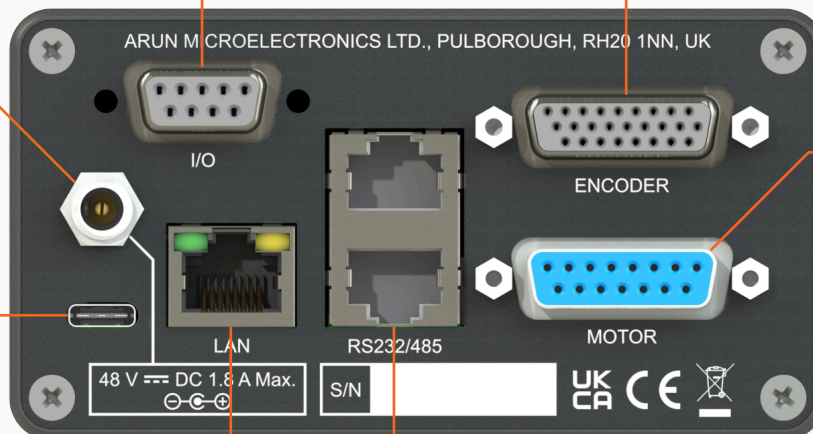PC control, reversible USB-C type connector.

10/100M Ethernet
Configure and control via Ethernet.

Optional Encoder Module
Incremental and BiSS encoder module coming soon.

Motor
15-way D-sub connector.

RS232/485
Use standard patch cables to bus together multiple devices. Dual mode: RS232 or RS485.

ARUN MICROELECTRONICS LTD., PULBOROUGH, RH20 1NN, UK

I/O

ENCODER

MOTOR

LAN

RS232/485

48 V ⎓ DC 1.8 A Max.

S/N

UK CA CE

ACCESSORIES

AML supplies a range of ultra-high vacuum compatible stepper motors, specifically designed for maximum performance and minumum heat. A joystick and power supply is available to use in conjunction with the SMD4 Stepper Motor Drive.
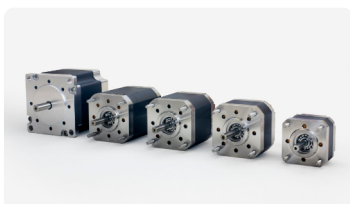
UHV Stepper Motors

Joystick

Power Supply

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SOFTWARE & SCRIPTING

AML Device Control Software

Included with the SMD4 is a powerful software package that allows you to easily configure and control multiple AML devices simultaneously.

View or modify the configuration of attached SMD4 devices using the straightforward graphical user interface. Configure device options such as operation mode, motor currents and limits using the device properties panel. Once configured, the SMD4 can be operated standalone, without needing to be connected to a PC.
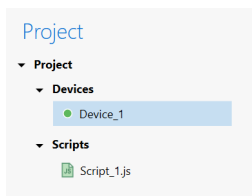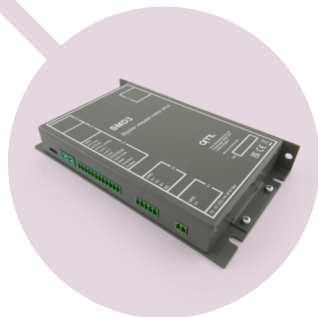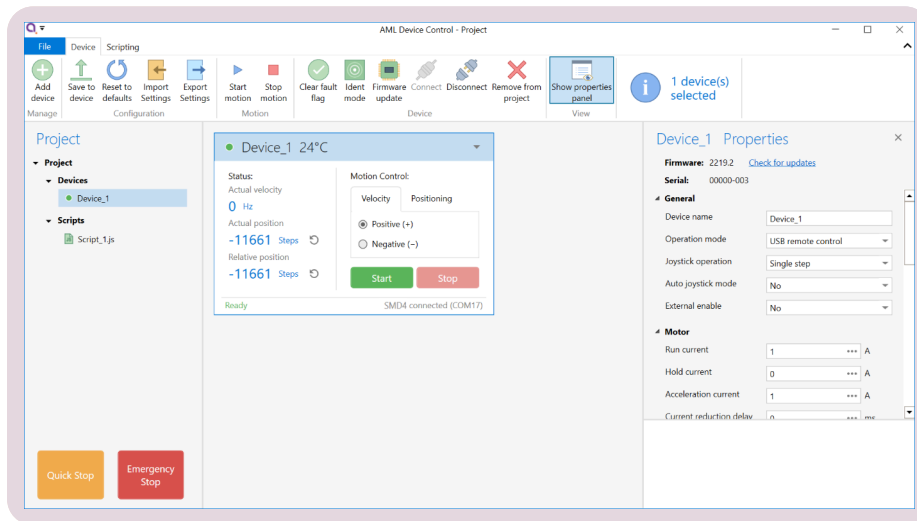

Manage multiple AML devices. Custom labels can be assigned to each device, for example, the different axes of a goniometer can be referenced (e.g. 'Base X', 'Base Y', 'Tilt #1', Sample Rotate"). Devices can be added and removed from a project easily. Connected devices are automatically recognised by the "Add Device" window.

Movements can be commanded with the click of a button, using the device controller window; easily toggle between velocity and absolute or relative positioning modes. Sequences can be programmed and executed on multiple connected SMD4 devices using the user-friendly scripting editor.

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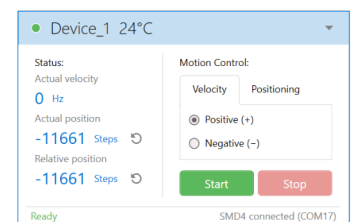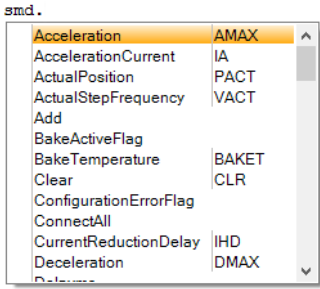
The software includes an easy to use script editor, that allows for sequences to be programmed and executed on multiple connected SMD4 devices, as well as system level operations such as adding and removing SMD4 devices from the project.

The scripting language used is JavaScript; this is powerful, easy to use and extensively documented. A global 'smd' object is made available from which you perform all interactions with the SMD4s. Type 'smd.' and an auto completion popup appears, showing all available commands, as well as help documentation for each. Press the enter key to select an option, then provide any arguments required.

Projects and scripts can be saved to file; quickly reconfigure the system by loading different projects. The default layout of the software is shown below.

Ribbon
Buttons for device and scripting actions, and access to the "File" menu.

Device properties panel
View and edit configuration for selected device(s).

Project panel
Add, remove and select devices or scripts. Re-arrange items by dragging.

System work area
Controller windows for each device will appear here. They can be re-arranged by dragging.

The fully-featured version of our Device Control software is free to download from our website:
https://arunmicro.com/documents/software/

ORDERING INFORMATION

Order Code	
SMD4	Stepper Motor Drive

Related Products	
SMD3JOY	Joystick (compatible with SMD4)
CAB-D15D9	SMD4 Cable, 3m, D-Sub 15 Male to D-Sub 9 Female
CAB-D15MLF	SMD4 Cable, 3m, D-Sub 15 Male to MLF18
CAB-3D15MLF	SMD4 Cable, 3m, 3X D-Sub 15 Male to MLF18

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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.

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