www.phytron.co.uk/APS

CONTROL

Now available for Arduino !

APS Technology

High performance stepper motor power stage Now as OEM module with sin/cos via SPI

The phytron APS module is a high performance power stage for the operation of stepper motors up to 5 A_{PEAK} at 24 - 70 V_{DC} with a shaft power up to 250 Watts.

While almost any commercially available stepper motor power stage provides the setting of the so-called microstep operation, the generated current settings are too inaccurate to achieve the individual sub-steps and to approach the actual position.

The APS module positions with an actual step resolution of 1/512 (102,400 positions per revolution with an encoder with a 200 step motor). Based on our parameterisable chopper technology and by the use of premium components with low resistance, the APS triggers with optimal timing. So the APS technology creates a current shape close to a perfect sine wave with a minimum of heat loss in the controller. Only this highly accurate output signal enables the loss- and low resonance operation of the motor, the fast execution of each sub-step and the approach to each position.

The compact APS is the core of the 1-STEP-DRIVE (for SIMATIC ET 200®S) SPS module and as a power stage module of our phyMOTION™ available. The APS can be parameterised (run current, stop current, boost current, current delay time etc.) and diagnosed online by a ServiceBus code and is also open for instructions from the CPU in runtime within a parameterisation cycle.

Benefit from our APS power stage technology: EVA-APS board (p.3) or APS-Arduino Shield (p.4).

Specification

Mechanical

Design	Plug-in power stage module also as OEM module
Dimensions (W x H)	60 x 40 mm
Weight	16 g

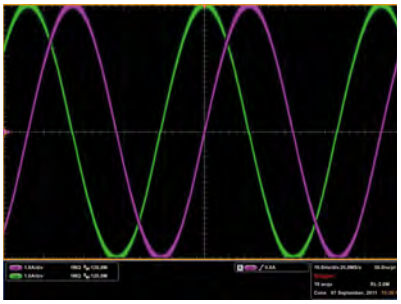
Features

Stepper motors	Suitable for bipolar control of 2 phase stepper motors with 4-, (6-) or 8 lead wiring
Phase current	Up to 5 A_{PEAK} (short circuit-proof, overload protected)
Power supply	24 to 70 V_{DC}
Reverse polarity protection	No

Specification - continuation box next side

In Focus

- OEM power stage module with control pulses/direction or sin/cos presetting via SPI
- For 2 phase stepper motors
- Up to 5 A_{PEAK} at 24 -70 V_{DC}
- Up to 1/512 step resolution
- Up to 500,000 steps/sec
- Online parameterising and diagnostic of the power stage via Serial Periphal Interface (SPI)
- Control via Control pulses/direction or via digital sin/cos (via SPI)
- Free available parameterisation and diagnosis tool ServiceBus-Comm®
- 2 development environments:
  - for industry: EVA-APS board
  - for research: APS-Arduino Shield



Violet = Phase current 1
Green = Phase current 2
1/128-Ministep, 3.5 A_{RMS} (approx. 5.0 A_{PEAK}),
U_B = 60 V

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phytron
Beyond Steppers

Control

Specification

Features (continued)

Motor current adjustment	10 mA current resolution
Step resolutions	Full step, half step, 1/2.5, 1/4, 1/5, 1/8, 1/10, 1/16, 1/20, 1/32, 1/64, 1/128, 1/256, 1/512 microstep
Maximum step frequency	500,000 steps/sec
Physical resolution	Approx. 102,400 positions per revolution (0.0035°/step) with a 200 step motor. An encoder with a counter should be considered for very fine positioning.
Chopper frequency	18, 20, 22 or 25 kHz selectable Patented phytron Chopper technology for a minimal heat loss in the motor and smooth rotation.
Current consumption (max.)	3 A_{DC} at 5 A_{PEAK}
Mechanical output power	Up to the 250 W range
Cable length	Motor: shielded: max. 50 m
Diagnostic LEDs	Opportunity to connect on 2 signal lines with 3.3 V logic level: LED 1 (power stage ready), LED 2 (error)
Hardware error detection	• Overcurrent, short circuit > 10 A • Overtemperature T > 85 °C

Interfaces

Analogue outputs	A, B, C, D, for a 2 phase stepper motor Analogue temperature output: 0 to +90 °C at 480 to 1884 mV
Digital inputs	Control pulses, Motor direction, Boost, Deactivation, Reset SPI bus interface: • digital sin/cos presetting (alternative to Control pulses/Motor direction) • online parameterisation and diagnostic

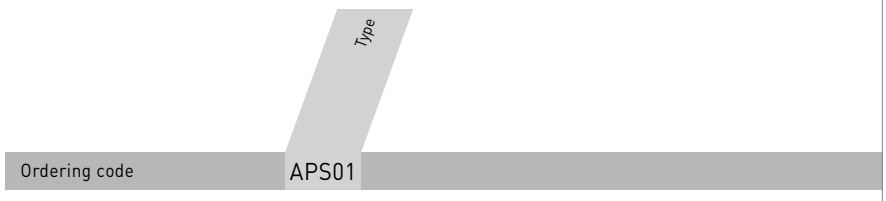
Operating Conditions

Temperature	Operation: 0 to + 60 °C; storage and transport -40 to +70 °C
Relative humidity	Max. 95 % non-condensing

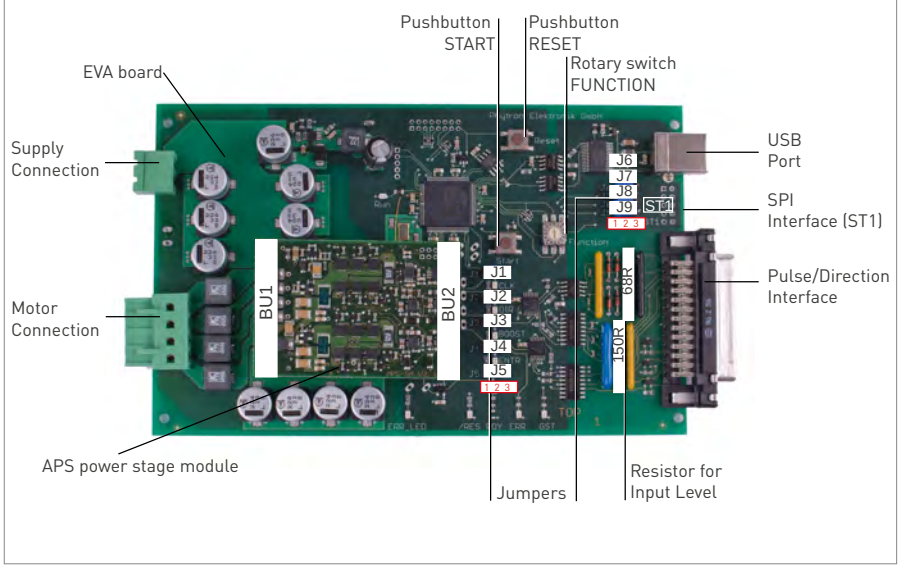
Development Environment

EVA-APS	Evaluation board for industry
APS-Arduino Shield	Application platform for research, hobby and art

Ordering Code



Evaluation board for APS Power Stage: EVA-APS



Functions

EVA-APS is an evaluation board for application development of the APS power stage and can be ordered as a bundle with the APS power stage.

- Online parameterising and diagnostics via USB
- Control via Control Pulses/Direction
- Two operating modes
- Input signals defined by jumpers
- Customised SPI interface
- ServiceBus-Comm software included

Operation/Connection

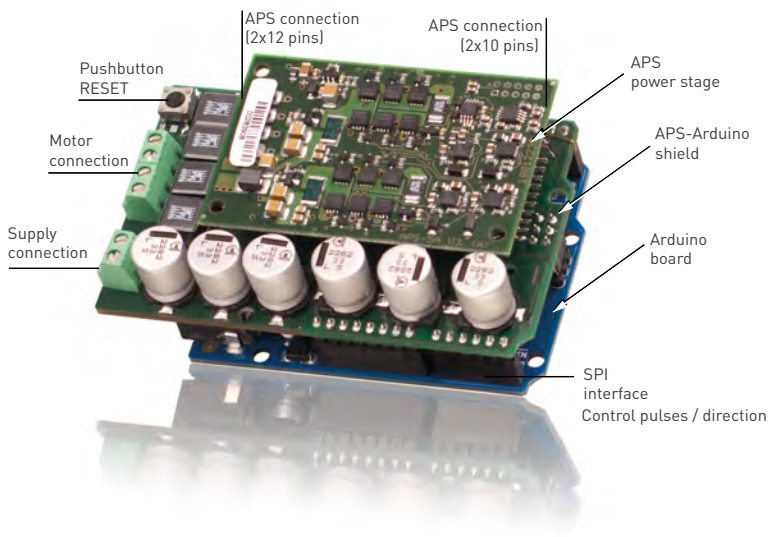
Motor voltage supply	24 V_{DC} to 70 V_{DC} Input range of supply of the power stages and to generate internal logic voltages
USB interface	For parameterising the APS power stage
Analogue outputs (motor)	A, B, C, D for a 2 phase stepper motor
SPI interface (ST1)	10-pole (2x5), pads for mounting a customised connector
Control pulses/direction interface	25-pole SUB-D connector female, opto-decoupled
PCB connectors 2x10 and 2x12 pins	2 mm grid; 0.5 mm pin Pins: 2x10 and 2x12 for APS power stage connection
2 Program pushbuttons	START: for motor running RESET: Reset of the settings
1 Rotary switch (Function)	Setting of the operating mode
9 Jumpers	For input signal specification

Ordering Code

Ordering code	Type
	EVA-APS (incl. APS)

Control

APS-Arduino Shield



Description

APS-Arduino shield is a development environment for the use of the APS power stage in research, prototyping, model making and art installations.

- APS power stage parameterising and diagnostics via SPI interface
- Control pulses/direction signal comes from the digital pins of the Arduino
- Download of the demo program and description from the phytron website
- Learn more about Arduino: www.arduino.cc

Operation/Connection

Motor voltage supply	24 V_{DC} to 70 V_{DC} Input range of supply of the power stage
Analogue outputs (motor)	A, B, C, D for a 2 phase stepper motor
SPI interface	For parameterising and diagnostics of the power stage
Control pulses/direction interface	Control pulses/direction signal from the digital pins of the Arduino
PCB connectors (APS) 2x10 and 2x12 pins	2 mm grid; 0.5 mm pin Pins: 2x10 and 2x12
Pushbutton	Reset of the Arduino

Ordering Code

Ordering Code	*Type* APS Shield (incl. APS)

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