



ENG

www.phytron.eu/1-step-drive

1-STEP-DRIVE-5A-48V

Stepper motor module for the SIMATIC ET 200®S

In coordination with SIEMENS

The 1-STEP-DRIVE-5V-48A is a stepper motor controller with integrated power stage. It is specially developed for application in the decentralized SIMATIC ET 200®S peripheral system.

This 1-STEP-DRIVE module is configured via mouse click with the STEP®7 by using the provided configuration files and then parameterized. The module is ready for use in a very short time and supplements the

SIMATIC ET 200®S with a fully integrated, powerful and high-precision positioning controller for 2 phase stepper motors.

Application

Application examples for the 1-STEP-DRIVE module assembly and transfer lines, building automation, x-y-tables, paper mills, printing and textile machines.

In Focus



Integrated Driver



Digital

The 1-STEP-DRIVE-5A-48V module successfully completed the system compliance test performed by SIEMENS.

Highlights

Online parameterization

These Phytрон power stages are eminently suitable for not only setting the basic parameters via interface bus, but also the technological parameters found in the application.

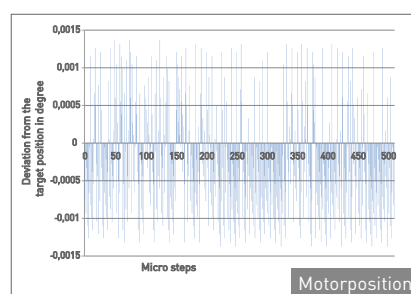
The power stage can be optimized for the requirements of the drive system during commissioning. Furthermore it is possible to adjust the power stage during 'CPU RUN', particularly for the next program sequence.

For example, raise the stop current when the motor is holding a load and then reduce it as soon as the system comes to a standstill without the load to minimize the power requirement and motor heating. Using these functions combined with additional parameters bring out the best in your system.

Fine positioning to 1/512 step

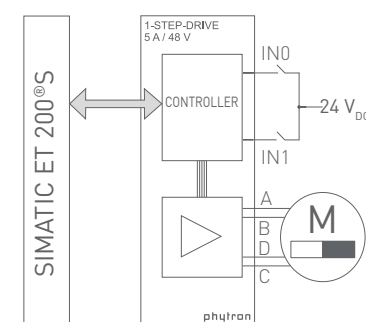
Almost all commercially available stepper motor power stages can be operated in micro step mode. When driving the motor with encoder feedback, it is apparent that

certain micro step positions cannot often be reached because of a lack of fine current settings and the motor may not reach the desired position. The 1-STEP-DRIVE technology guarantees a high-precision current



adjustment and enables fine positioning up to 1/512 step. The diagram above shows that a Phytрон 200 step motor with encoder is able to be at each 1/512 micro step position with an absolute and non-cumulative error of about 0.0015°, typically much less than this.

- Stepper motor controller with an integrated power stage for SIMATIC ET 200®S
- For 2 phase stepper motors
- 5 A_{PEAK} at 24 to 48 V_{DC}
- Up to 1/512 microsteps
- Online controller parameterization and diagnostics
- STEP®7 programming



Overview

Control

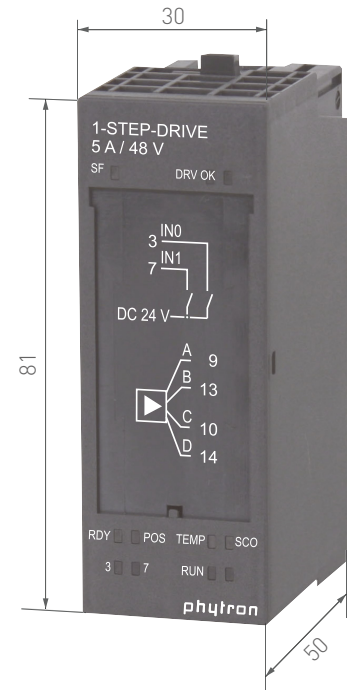
Specification

Mechanical

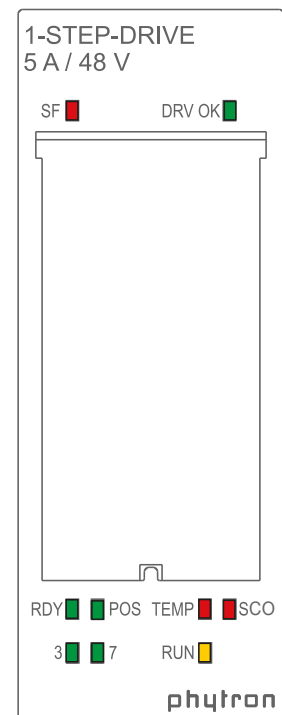
Design	SIMATIC ET 200®S plastic housing
Dimensions (W x H x D)	30 x 81 x 50 mm
Weight	80 g
Mounting position	Optional
Mounting	Pluggable in SIMATIC ET 200®S terminal modules

Features

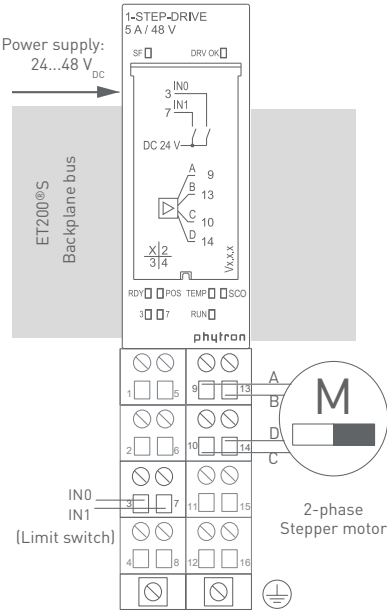
Stepper motors	Suitable for bipolar control of 2 phase stepper motors with 4-, (6-) or 8 lead wiring
Superior main station	SIMATIC ET 200®S
Power supply	24 to 48 V _{DC}
Reverse polarity protection	Yes
Phase current	5 A _{PEAK} (short-circuit-proof, overload-protected)
Motor current adjustment	20 mA increments
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	510,000 steps/s
Physical resolution	Approx. 102,400 positions per revolution (0.0035°/step). An encoder with a counter should be considered for very fine positioning.
Chopper frequency	18, 20, 22 or 25 kHz selectable Patented Phyttron 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 200 W range
Cable length - motor	Shielded: 50 m max.
Cable length - digital inputs	Shielded: 100 m max.
Diagnostic LEDs	<ul style="list-style-type: none"> • SF (group error) • DRV OK (power stage ready) • RDY (module ready) • POS (driving instruction is running) • 3 (digital input IN0 active) • 7 (digital input IN1 active) • TEMP (over temperature > 85 °C) • SCO (over current > 10 A) • RUN (motor is running)
Controller modes	<ul style="list-style-type: none"> • Relative positioning • Move to a reference point • Absolute positioning • Revolution mode • Reference setting
Security modes	Security modes, such as e. g. Safe Torque Off (STO) from IEC 61508-2 are not directly compatible
Mechanism of the communication via backplane bus	Synchronous: Control interface, feedback interface Asynchronous: PLC in CPU STOP mode: basic parameterizing PLC in CPU RUN mode: data set transfer



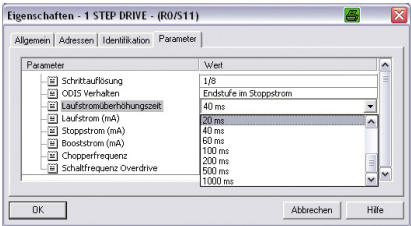
Dimensions in mm



Diagnostic LEDs



Connection diagram



Parameterization

Specification

Features (continued)

Support of linear and modulo axes (rotary axes)	Yes
Hardware error detection	<ul style="list-style-type: none">• Over current, short circuit >10 A spike at the controller• Over temperature at the power stage T > 85 °C
Refresh rate	2 ms

Interfaces

Analog outputs	A, B, C, D For a 2 phase stepper motor
Digitale inputs	<p>2 configurable digital inputs IN0 and IN1: 0 signal: -30 to 5 V with 2 mA max. (quiescent current) 1 signal: 11 to 30 V with 9 mA typical Input delay: 4 ms</p> <p>IN0:</p> <ul style="list-style-type: none">• External release of momentum• External stop• Limit switch towards forward / reverse <p>IN1:</p> <ul style="list-style-type: none">• Reference switch and also limit switch towards forwards / reverse• Limit switch configurable to open / close
Backplane bus and module supply	Backplane bus of the ET 200®S Module supply via ET 200®S power module

Communication and Programming

Programming	Via STEP®7
Control interface (synchronous)	<p>Parameter assignments</p> <ul style="list-style-type: none">• Basic frequency F_B• Multiplier i (ramp)• Multiplier n (start-stop) <p>Positioning</p> <ul style="list-style-type: none">• Move to a reference point• Set home position• Relative incremental mode (relative positioning)• Absolute incremental mode (absolute positioning)• Revolution mode• Reference setting
Feedback interface (synchronous)	<p>Configurable</p> <ul style="list-style-type: none">• Residual path• Absolute positioning• Velocity <p>Also included in the feedback</p> <ul style="list-style-type: none">• Position reached• Parameterization error• Power stage error• Limit switch causes a stop• and other states

Control

Specification

Communication and Programming (continued)

Data set transfer to the 1-STEP-DRIVE (asynchronous while CPU RUN)

Parameterizing the 1-STEP-DRIVE power stage

- Step resolution (1/1, 1/2 up to 1/512)
- Preferred direction of rotation
- Run current (20 mA increments)
- Stop current (20 mA increments)
- Boost current (20 mA increments)
- Current delay time 1 up to 1000 ms
- Chopper frequency 18 to 25 kHz
- Switching frequency overdrive 1 to 40 kHz
- ODIS behaviour

Data set transfer from the 1-STEP-DRIVE (asynchronous)

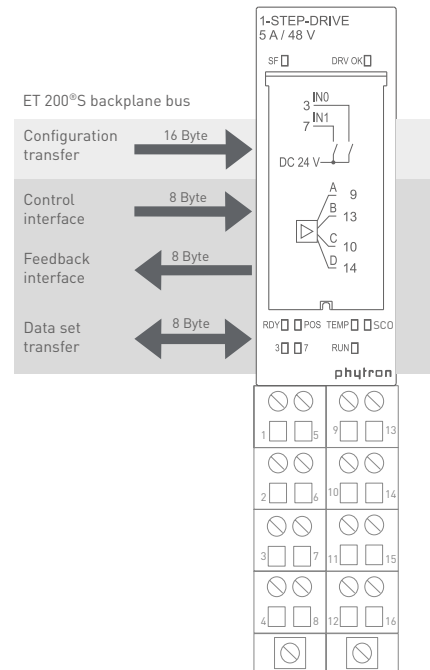
Diagnostics

Feedback of the following driver parameters to the main station

- Reverse reading controller parameter
- Basic position
- Error (short circuit, over temperature, parameterizing error)

Operating conditions

Operating temperature	0 to + 60 °C
Storage and transport temperatures	- 40 to +70 °C
Relative humidity	95 % max. no dew
Degree of pollution	Level 2
Protection class	IP 20
Vibration / Shock protection	According to EN 60068-2-6 According to EN 60068-2-27/29
EMC immunity / EMC emission	According to EN 61000-6-2 According to EN 61000-6-4
Approval	CE



Communication mechanism

Ordering Code

Ordering code	Type	Max. phase current	Rated voltage
1-STEP-DRIVE	-	5 A	- 48 V

SIMATIC®, ET 200® und STEP®7 are trademarks of the SIEMENS AG.

Extent of supply

- 1-STEP-DRIVE module
- CD-ROM incl. configuration file (HSP), application example and PDF manual

Accessories

Manual as printout (ID No.: 10013573)

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