MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

PHYTRON

1-STEP-DRIVE-5A-48V

INTEGRATED STEPPER MOTOR CONTROLLER

Used with the applicable Phytron 1-STEP-DRIVE configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Phytron 1-STEP-DRIVE-5A-48V technical data and applicable product instructions



ENG www.phytron.eu/1-step-drive

INDUSTRIAL

1–STEP–DRIVE–5A–48V

Stepper motor module for the SIMATIC ET 200®S

In coordination with SIEMENS

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

This 1-STEP-DRIVE module is configured via mouse click with the STEP®7 or TIA Portal® by using the provided configuration files and then parameterised. 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 are assembly and transfer lines, building automation, x-y-tables, paper mills, printing and textile machines.

Highlights

Online parameterisation

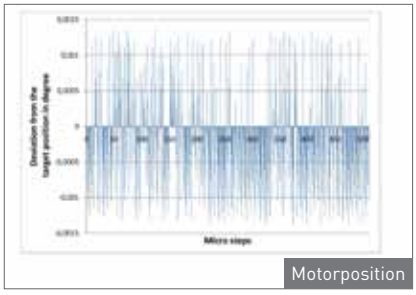
These Phytron power stages are eminently suitable not only for setting the basic parameters via interface bus, but also for the technological parameters found in the application.

The power stage can be optimised 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 brings out the best in your system.

Fine positioning to 1/512 step

Almost all commercially available stepper motor power stages can be operated in microstep mode. When driving the motor with encoder feedback, it is apparent that certain microstep 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 Phytron 200 step motor with encoder is able to reach each 1/512 microstep position with an absolute and non-cumulative error of about 0.0015°, typically much less than this.



Motorposition

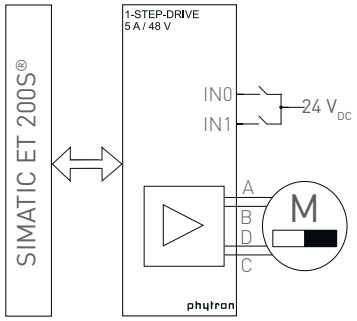
In Focus

Integrated Driver

I/O Digital

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

- 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 parameterisation and diagnostics
- Programming via STEP®7 or TIA Portal®, functional block for TIA Portal® V14 included



Overview

Industrial

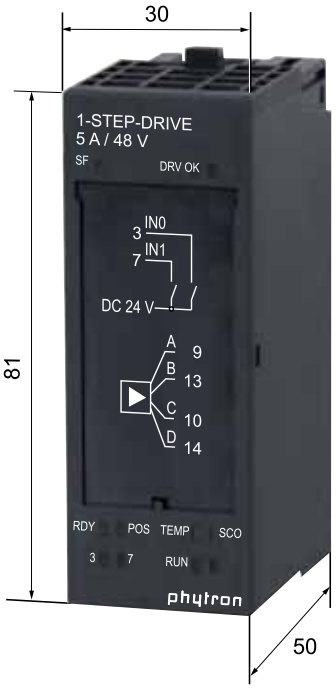
Specification

Mechanical

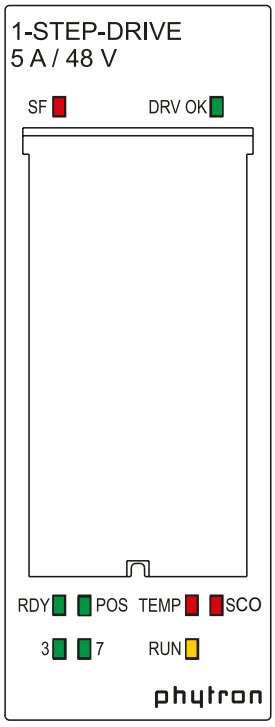
Design	SIMATIC ET 200®S plastic housing
Dimensions (W x H x D)	30 x 81 x 50 mm
Weight	80 g
Mounting position	Optional
Mounting	Plug-in in SIMATIC ET 200®S terminal modules

Features

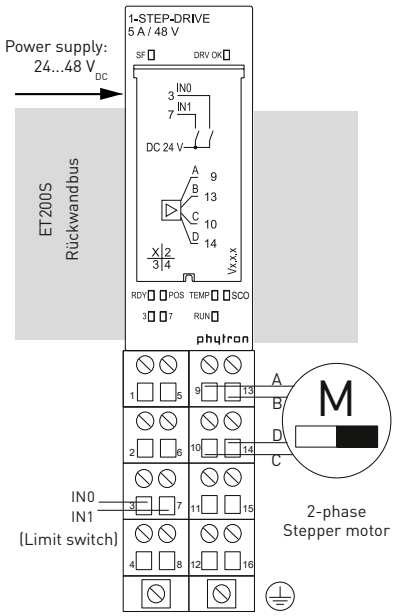
Stepper motors	Suitable for bipolar control of 2-phase stepper motors with 4, (6) or 8 lead wiring
Superior main station	SIMATIC ET 200®S
Power supply	24 to 48 V_{DC}
Reverse polarity protection	Yes
Phase current	5 A_{PEAK} (short circuit-proof, overload protected)
Motor current adjustment	20 mA increments
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) 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 200 W range
Cable length - motor	Shielded: 50 m max.
Cable length - digital inputs	Shielded: 100 m max.
Diagnostic LEDs	• 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	• 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 parameterising PLC in CPU RUN mode: data set transfer



Dimensions in mm



Diagnostic LEDs



Connection diagram



Parameterisation

Specification

Features (continued)

Support of linear and modulo axes (rotary axes)	Yes
Hardware error detection	• Over current, short circuit >10 A spike at the controller • Over temperature at the power stage T > 85 °C
Refresh rate	2 ms

Interfaces

Analogue outputs	A, B, C, D - For a 2-phase stepper motor
Digital inputs	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 **IN0:** • External release of momentum • External stop • Limit switch towards forward / reverse **IN1:** • Reference switch and also limit switch towards forward / 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

Compatible SIEMENS terminal modules for the 1-STEP-DRIVE

Terminal module	Order number	Terminals
TM-E30S46-A1	6ES7193-4CF40-0AA0	screw with AUX
TM-E30C46-A1	6ES7193-4CF50-0AA0	spring with AUX
TM-E30S44-01	6ES7193-4CG20-0AA0	screw without AUX
TM-E30C44-01	6ES7193-4CG30-0AA0	spring without AUX

Compatible SIEMENS power modules

Power module for the ET 200®S	Order number
DC 24V-48V with diagnostic	6ES7138-4CA50-0AB0 SIMATC DP
DC 24V-48V, AC 24 - 230 V with diagnostic and protection	6ES7138-4CB11-0AB0 SIMATC DP

Communication and Programming

Programming	Via STEP®7 or TIA Portal®
Control interface (synchronous)	**Parameter assignments** • Basic frequency F_b • Multiplier i (ramp) • Multiplier n (start-stop) **Positioning** • 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)	**Configurable** • Residual path • Absolute positioning • Velocity **Also included in the feedback** • Position reached • Parameterization error • Power stage error • Limit switch causes a stop • and other states

Industrial

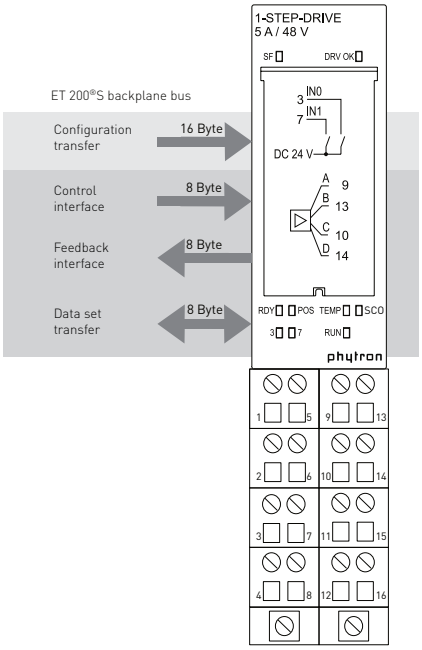
Specification

Communication and Programming (continued)

Data set transfer to the 1-STEP-DRIVE (asynchronous while CPU RUN)	**Parameterising 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 • Reading back controller parameters • Basic position • Error (short circuit, over temperature, parameterizing error)

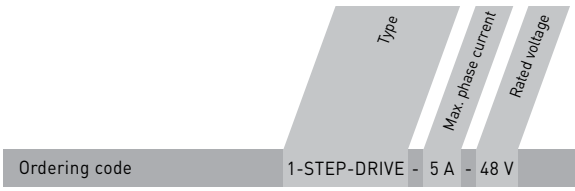
Operating Conditions

Operating temperature	0 to +60 °C
Storage and transport temperatures	-40 to +70 °C
Relative humidity	95 % max. non-condensing
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



SIMATIC®, ET 200®S , STEP®7 and TIA Portal® are trademarks of SIEMENS AG.

Extent of Supply

- 1-STEP-DRIVE module
- Download of the configuration file (HSP), Function block for TIA Portal® V14, application example and PDF manual from the Phytron or Siemens website

Optional Accessories

Manual as printout (ID No.: 10013573)

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