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 eminent-ly 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 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 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 Phytron 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.

Phytron
Extreme. Precision. Positioning.
## Specification

### Mechanical

<table>
<thead>
<tr>
<th>Design</th>
<th>SIMATIC ET 200®S plastic housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W x H x D)</td>
<td>30 x 81 x 50 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>80 g</td>
</tr>
<tr>
<td>Mounting position</td>
<td>Optional</td>
</tr>
<tr>
<td>Mounting</td>
<td>Plug-in in SIMATIC ET 200®S terminal modules</td>
</tr>
</tbody>
</table>

### 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 VDC
- **Reverse polarity protection**: Yes
- **Phase current**: 5 A<sub>PEAK</sub> (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, 1/20, 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<sub>DC</sub> at 5 A<sub>PEAK</sub>
- **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

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Diagnostic LEDs

Dimensions in mm

1-STEP-DRIVE 5 A / 48 V
### Features (continued)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware error detection</td>
<td>• Over current, short circuit &gt;10 A spike at the controller</td>
</tr>
<tr>
<td></td>
<td>• Over temperature at the power stage T &gt; 85 °C</td>
</tr>
<tr>
<td>Refresh rate</td>
<td>2 ms</td>
</tr>
</tbody>
</table>

### 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 200S
- Module supply via ET 200S power module

#### Compatible SIEMENS terminal modules for the 1-STEP-DRIVE

<table>
<thead>
<tr>
<th>Terminal module</th>
<th>Order number</th>
<th>Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM-E30546-A1</td>
<td>6ES7193-4CF40-0AA0</td>
<td>screw with AUX</td>
</tr>
<tr>
<td>TM-E30546-A1</td>
<td>6ES7193-4CF50-0AA0</td>
<td>spring with AUX</td>
</tr>
<tr>
<td>TM-E30544-01</td>
<td>6ES7193-4CG20-0AA0</td>
<td>screw without AUX</td>
</tr>
<tr>
<td>TM-E30544-01</td>
<td>6ES7193-4CG30-0AA0</td>
<td>spring without AUX</td>
</tr>
</tbody>
</table>

#### Compatible SIEMENS power modules

- Power module for the ET 200S

<table>
<thead>
<tr>
<th>Power module</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 24V-48V with diagnostic</td>
<td>6ES7138-4CA50-0AB0 SIMATIC DP</td>
</tr>
<tr>
<td>DC 24V-48V, AC 24 - 230 V with diagnostic and protection</td>
<td>6ES7138-4CB11-0AB0 SIMATIC DP</td>
</tr>
</tbody>
</table>

### Communication and Programming

#### Programming

- Via STEP®7 or TIA Portal®

#### Control interface (synchronous)

- **Parameter assignments**
  - Basic frequency \( F_b \)
  - Multiplier \( l \) (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
### Specification

#### Communication and Programming (continued)

<table>
<thead>
<tr>
<th>Data set transfer to the 1-STEP-DRIVE</th>
<th>Parameterising the 1-STEP-DRIVE power stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>(asynchronous while CPU RUN)</td>
<td>• Step resolution (1/1, 1/2 up to 1/512)</td>
</tr>
<tr>
<td></td>
<td>• Preferred direction of rotation</td>
</tr>
<tr>
<td></td>
<td>• Run current (20 mA increments)</td>
</tr>
<tr>
<td></td>
<td>• Stop current (20 mA increments)</td>
</tr>
<tr>
<td></td>
<td>• Boost current (20 mA increments)</td>
</tr>
<tr>
<td></td>
<td>• Current delay time 1 up to 1000 ms</td>
</tr>
<tr>
<td></td>
<td>• Chopper frequency 18 to 25 kHz</td>
</tr>
<tr>
<td></td>
<td>• Switching frequency overdrive 1 to 40 kHz</td>
</tr>
<tr>
<td></td>
<td>• ODIS behaviour</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data set transfer from the 1-STEP-DRIVE</th>
<th>Diagnostics</th>
</tr>
</thead>
<tbody>
<tr>
<td>(asynchronous)</td>
<td>Feedback of the following driver parameters to the main station</td>
</tr>
<tr>
<td></td>
<td>• Reverse reading controller parameter</td>
</tr>
<tr>
<td></td>
<td>• Basic position</td>
</tr>
<tr>
<td></td>
<td>• Error (short circuit, over temperature, parameterizing error)</td>
</tr>
</tbody>
</table>

#### 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 |

#### Ordering Code

**Ordering code**

| 1-STEP-DRIVE | 5 A | 48 V |

Optional Accessories

- Manual as printout (ID No.: 10013573)
- 1-STEP-DRIVE module
- CD-ROM incl. configuration file (HSP), application example and PDF manual
- Function block for TIA Portal® V14

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