

SIEMENS

Tool to calculate the acceleration time

SIMOTICS

M-1FE1 built-in motors

For SINAMICS S120

Edition

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Calculating the
acceleration time for
SIMOTICS M-1FE1

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

| |
|--|
| ⚠ DANGER |
| indicates that death or severe personal injury will result if proper precautions are not taken. |
| ⚠ WARNING |
| indicates that death or severe personal injury may result if proper precautions are not taken. |
| ⚠ CAUTION |
| indicates that minor personal injury can result if proper precautions are not taken. |
| NOTICE |
| indicates that property damage can result if proper precautions are not taken. |

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

| |
|--|
| ⚠ WARNING |
| Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed. |

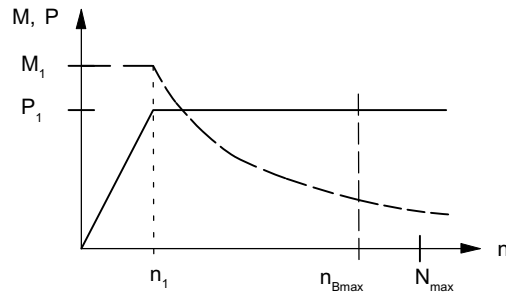
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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Calculating the acceleration time based on the torque/power characteristic for SIMOTICS-M 1FE1 built-in motors



$$t_h = \frac{\pi}{60} \frac{J_{tot}}{M_1} \left[n_1 + \frac{n_{Bmax}^2}{n_1} \right]$$

or

$$t_h = \frac{\pi^2}{1800} \frac{J_{tot}}{P_1} \left[n_1^2 + n_{Bmax}^2 \right]$$

| | |
|------------|---|
| t_h | Acceleration time up to maximum speed in s |
| J_{tot} | Total spindle moment of inertia in kgm ² |
| n_1 | Speed in rpm, e.g. for S6 - 25 % |
| n_{Bmax} | Maximum operating speed in rpm |
| N_{max} | Maximum speed in rpm |
| M_1 | Acceleration torque in Nm, e.g. for S6 - 25 % |
| P_1 | Acceleration power in W, e.g. for S6 - 25 % |

Diagram - calculating the acceleration time

General conditions:

- Performance data are applicable when operated with a SINAMICS S120 400 V ALM
- Constant power up to n_{Bmax} (characteristic, see above)
- Performance data for S6-25 % operation (some types require a larger Motor Module than for S1 operation)
- With a 200 A Motor Module, the following motors reach as maximum, duty type S6-40 %:
1FE1106-4WN11, 1FE1125-4WN11, 1FE1126-4WN11, 1FE1126-4WP11, 1FE1145-8WN11, 1FE1145-8WQ11,
1FE1147-8WN11, 1FE1147-8WQ11;
As a consequence, the acceleration time increases slightly.
- Motor Module recommendations are applicable without derating.
For converter output frequencies > 800 Hz, you must also take into account derating. Take into consideration the configuring information, and/or use the SIZER engineering tool.
- The rotor moment of inertia is applicable for versions without sleeve 1FE1...-.....-A.
When using a rotor sleeve, the additional moment of inertia is added to the external moment of inertia (field 2).
The rotor sleeve moment of inertia is listed in the Configuration Manual.

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Für weitere
Informationen zu
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