Functional description | EN

TF5200 | TwinCAT 3 CNC

Axis position monitoring
Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

It is essential that the documentation and the following notes and explanations are followed when installing and commissioning the components.

It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

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General and safety instructions

Icons used and their meanings
This documentation uses the following icons next to the safety instruction and the associated text. Please read the (safety) instructions carefully and comply with them at all times.

Icons in explanatory text
1. Indicates an action.
   ⇨ Indicates an action statement.

<table>
<thead>
<tr>
<th>ICON</th>
<th>TEXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER</td>
<td>Acute danger to life!</td>
</tr>
</tbody>
</table>
  If you fail to comply with the safety instruction next to this icon, there is immediate danger to human life and health. |
| CAUTION | Personal injury and damage to machines! |
  If you fail to comply with the safety instruction next to this icon, it may result in personal injury or damage to machines. |
| NOTE | Restriction or error |
  This icon describes restrictions or warns of errors. |

Tips and other notes
This icon indicates information to assist in general understanding or to provide additional information.

General example
Example that clarifies the text.

NC programming example
Programming example (complete NC program or program sequence) of the described function or NC command.

Specific version information
Optional or restricted function. The availability of this function depends on the configuration and the scope of the version.
# Table of contents

- Notes on the documentation ........................................................................................................ 3
- General and safety instructions .................................................................................................. 4
- 1 Overview .................................................................................................................................. 8
- 2 Description ............................................................................................................................... 9
- 3 Parameter ................................................................................................................................ 11
  - 3.1 Overview of parameters ....................................................................................................... 11
  - 3.2 Axis parameters .................................................................................................................... 11
- 4 Support and Service .................................................................................................................. 12
- Index .......................................................................................................................................... 13
List of figures

Figure 1  Position monitoring process........................................................................................................ 9
1 Overview

Task
When a target position is approached, the position monitoring function monitors whether the actual position reaches an exact stop window (tolerance range) within a specific time.

If a configurable limit is exceeded, the CNC generates an error message and the axis is stopped.

Characteristics
The position lag monitor checks the correct functioning of the position controller.

For example, this can identify the following problems:

- Mechanical changes to axes, e.g. increased friction due to damaged bearings or guides
- Errors in the axis position measuring systems

Parametrisation

The position monitor is configured for each individual axis in the axis parameter list.

Links to other documents

For the sake of clarity, links to other documents and parameters are abbreviated, e.g. [PROG] for the Programming Manual or P-AXIS-00001 for an axis parameter.

For technical reasons, these links only function in the Online Help (HTML5, CHM) but not in pdf files since pdfs do not support cross-linking.
2 Description

Process

Position monitoring consists of the following steps:

1. When the axis command position reaches the programmed target position, the timeout is started (time \( t_1 \)).
2. Timeout is deactivated when the actual position of the axis is located within the exact stop window (time \( t_2 \)). The exact stop window is configured by P-AXIS-00236.
3. The actual position must be located within the time \( t \) configured in P-AXIS-00532 in \( t_3 \) the exact stop window.

Warnings, errors and reactions

Error message P-ERR-70082. The axis failed within the set time P-AXIS-00532 to reach the exact stop window P-AXIS-00236.

1. Immediately stop the affected axis.
2. Stop all axes that are interpolated with the affected axis in the path compound.
   \( \Rightarrow \) Check the cause of the error message and rectify
   \( \Rightarrow \) Resetting the controller
**Recommended parameterisation**

Position settling time: P-AXIS-00532 = 10000 to 200000µs

Exact stop window: P-AXIS-00236 ≥ 3 · ΔS_{Standstill};

ΔS_{Standstill}: real position lag at standstill

When exact stop (G60) is programmed, an axis reaches the target position when the actual position is located within the same exact stop window.
3 Parameter

3.1 Overview of parameters

<table>
<thead>
<tr>
<th>ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-AXIS-00236</td>
<td>Position window for exact stop</td>
</tr>
<tr>
<td>P-AXIS-00532</td>
<td>Maximum permitted time until the exact stop window is reached</td>
</tr>
</tbody>
</table>

3.2 Axis parameters

**P-AXIS-00236** Position window for exact stop

| Description | For the function 'Accuracy Stop' (or NC command G60 is described in [PROG]), a range is defined in which the axis is assumed to be 'in Position' (|window| ≥ |position lag|). This monitoring is done in position controller if the axis is not interpolated. |
|-------------|--------------------------------------------------------------------------------------------------|
| Parameter   | getriebe[i].window                                                                               |
| Data type   | SGN32                                                                                           |
| Data range  | 0 ≤ window ≤ MAX(SGN32)                                                                          |
| Axis types  | T, R, S                                                                                         |
| Dimension   | T: 0.1µm                                                                                         |
|             | R,S: 0.0001°                                                                                    |
| Default value | 500                                                                                           |
| Drive types | ----                                                                                            |
| Remarks     |                                                                                                 |

**P-AXIS-00532** Maximum permissible position settling time for exact stop window

<table>
<thead>
<tr>
<th>Description</th>
<th>The parameter defines the maximum permissible transient time. If the window for accuracy stop for not interpolated axes has not been reached within this time an error message will be output. If the parameter is 0, the time monitoring is disabled. With a negative value for this parameter the value of P-AXIS-00151 is used for transient time monitoring (backward compatibility).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>getriebe[i].position_settling_time</td>
</tr>
<tr>
<td>Data type</td>
<td>SGN32</td>
</tr>
<tr>
<td>Data range</td>
<td>MIN(SGN32) ≤ position_settling_time ≤ MAX(SGN32)</td>
</tr>
<tr>
<td>Axis types</td>
<td>T, R, S</td>
</tr>
<tr>
<td>Dimension</td>
<td>T: µs</td>
</tr>
<tr>
<td></td>
<td>R,S: µs</td>
</tr>
<tr>
<td>Default value</td>
<td>-1</td>
</tr>
<tr>
<td>Drive types</td>
<td>----</td>
</tr>
<tr>
<td>Remarks</td>
<td>This parameter replaces the parameter P-AXIS-00151.</td>
</tr>
</tbody>
</table>
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# Index

| P-AXIS-00236 | 11 |
| P-AXIS-00532 | 11 |
More information:
www.beckhoff.com/TF5200