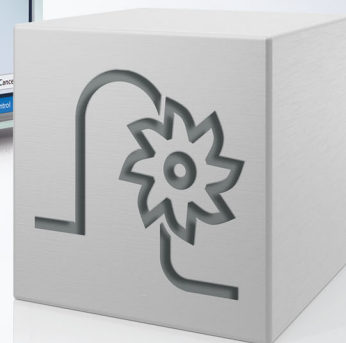
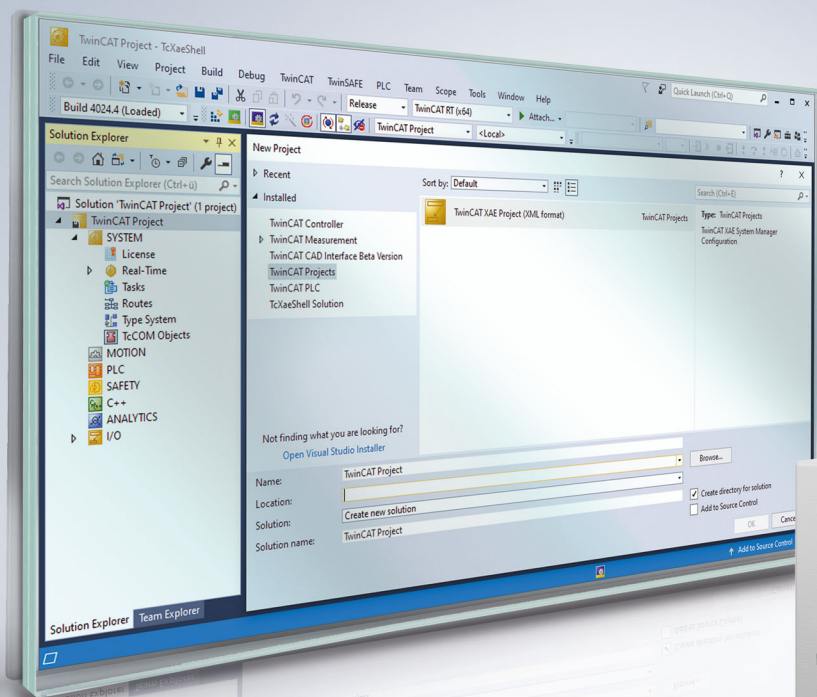


Manual | EN

## TF5200 | TwinCAT 3 CNC

Zero offsets





## 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.

### **DANGER**

#### **Acute danger to life!**

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.

### **NOTICE**

#### **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**
- Overview of zero offsets..... 8**
- 1 General description ..... 9**
  - 1.1 Links to other documents ..... 9
  - 1.2 Structure and classification of zero point data ..... 9
  - 1.3 Syntax and interpretation of ASCII list file ..... 9
  - 1.4 Comments in the ASCII list file..... 10
- 2 Description of elements ..... 11**
  - 2.1 Deselecting zero offsets (P-ZERO-00001)..... 11
  - 2.2 Default setting of zero offsets (P-ZERO-00002) ..... 11
  - 2.3 Zero offset group (np\_grp[i].\*) ..... 12
    - 2.3.1 Axis assignment of data (np\_grp[i].achse[j].\*)..... 12
- 3 Example assignment zero offsets with 3 axes ..... 14**
- 4 Support and Service ..... 16**
- Index..... 17**



# List of figures

## Overview of zero offsets

The overview of zero offsets is sorted into a 4-column table.

- Column 1 contains the unambiguous identifier of the axis parameter called the “ID” which consists of the prefix “P-ZERO” and a unique 5-digit number, e.g. P-ZERO-00003.
- Column 2 represents the data structure which defines the parameters, e.g. np\_grp[i].achse[j].  
The structure is a categorisation aid and is described in the following section. If an entry is missing in ‘structure’, this is not an error. The parameter in column 3 is then only valid on its own.
- Column 3 contains the “parameter” with its exact name, e.g. versch  
The important thing is that “structure”+”parameter” always belong together and must be configured in exactly the same way in the axis parameter list, e.g. np\_grp[i].achse[j].versch
- Column 4 contains the “functionality” in a summarised term/short description, e.g. Zero offset.

ID	Structure	Parameter	Functionality/short description
<a href="#">P-ZERO-00001</a> [▶ 11]		g53_verfuegbar	Deselecting zero offsets
<a href="#">P-ZERO-00002</a> [▶ 11]		default_index	Default setting of zero offsets
<a href="#">P-ZERO-00003</a> [▶ 12]	np_grp[i].achse[j].	versch	Zero offset
<a href="#">P-ZERO-00004</a> [▶ 12]	np_grp[i].achse[j].	inaktiv	Axis-specific activation



# 1 General description

## 1.1 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.

## 1.2 Structure and classification of zero point data

Various zero offset groups can be specified and selected in the NC program by the G commands 'G53' to 'G59' and 'G159'. Specify an offset parameter for each axis in each of these groups. The axis index corresponds to the channel-internal axis index. The initial axis configuration of the NC channel is defined in the channel parameter list [CHAN].

As required, value ranges of parameters are also defined by specifying a limit that results from the data format, e.g. MAX(UNS32), etc.

## 1.3 Syntax and interpretation of ASCII list file

An interpreter copies the entries in the ASCII list file into identical internal structures which are then checked for plausibility. To ensure reliable controller start-up every time, defective entries found by the plausibility check are replaced by default values.

Unknown entries are not taken over. These irregularities are displayed by warning messages. We advise you to investigate the cause for these warning messages and remove defective entries from the ASCII list file.



The following agreement applies to BOOLEAN data:

Value	Meaning
0	Definition of FALSE
1	Definition of TRUE

## 1.4 Comments in the ASCII list file

Comments can be in an entire line or can be added at the end of a line.

With a comment spanning an entire line, the comment character "#" must be placed at the start of the line and followed by a blank.

If a comment is to be inserted at the end of a line, only a blank is required before the comment. However, if a string was defined in the line, the comment must be preceded by the comment character "(".

Blank lines are also possible.

### Comments in the ASCII list file

```
# *****
# Data
# *****
#
# Listing

dummy[1] 1 Comment
dummy[2] 1 # Comment
dummy[3] 1 ( Comment
dummy[4] 1 /* Comment
...
...
beispiel[0].bezeichnung STRING_2 (Comment: comment brackets required!)
```

## 2 Description of elements

### 2.1 Deselecting zero offsets (P-ZERO-00001)

P-ZERO-00001	Deselecting zero offsets
Description	This parameter allows the use of the G53 data record to define an additional offset data record.
Parameter	g53_verfuegbar
Data type	BOOLEAN
Data range	0/1
Dimension	----
Default value	0
Remarks	<p>This datum controls the significance of zero offsets with the zero offset group index '0' which are selected by 'G53' or 'G159 = 0' in the NC program. If <i>g53_verfuegbar</i> is <u>not</u> assigned or is assigned with <u>zero</u>, all zero offsets are removed from the calculation (deselection) of the motion paths when 'G53' or 'G159 = 0' is programmed in the NC program.**</p> <p>On the other hand, when <i>g53_verfuegbar</i> = TRUE, the zero data record can also be used as a full zero offset with offset values not equal to zero. See also [PROG].</p> <p>** G53 is only active automatically in the basic state when P-ZERO-00002 [► 11] is <u>not</u> assigned or is assigned with <u>zero</u>.</p>

### 2.2 Default setting of zero offsets (P-ZERO-00002)

P-ZERO-00002	Default setting of zero offsets
Description	This parameter defines what zero offsets (index) should be automatically active after program start-up.
Parameter	default_index
Data type	UNS16
Data range	0 ... 96 (number of zero offset groups: 97, application-specific)
Dimension	----
Default value	0
Remarks	

## 2.3 Zero offset group (np\_grp[i].\*)

A zero offset group compiles zero offsets which are selected when one of the G functions 'G53' - 'G59' or 'G159' is programmed.

Structure name	Index
np_grp[i]	i = 0 ... 96 (number of zero offset groups: 97, application-specific)



The following relationship exists between the G function and zero offset group index 'i':

G function	Select using G159	Zero offset group index 'i'
G53 or	G159 = 0	0
G54 or	G159 = 1	1
G55 or	G159 = 2	2
G56 or	G159 = 3	3
G57 or	G159 = 4	4
G58 or	G159 = 5	5
G59 or	G159 = 6	6
	G159 = 7	7
	G159 = 8	8
	G159 = 9	9
	G159 = 10	10
	:	:

### 2.3.1 Axis assignment of data (np\_grp[i].achse[j].\*)

Zero offsets are assigned to path axes by channel-internal axis indexing.

Structure name	Index
achse[j]	j = 0 ... 31 (Maximum number of axes per channel: 32, application-specific)

#### 2.3.1.1 Zero offset (P-ZERO-00003)

P-ZERO-00003	Zero offset
Description	An offset parameter is reserved for every axis in every zero offset group.
Parameter	np_grp[i].achse[j].versch
Data type	SGN32
Data range	MIN(SGN32) < versch < MAX(SGN32)
Dimension	0.1µm or 0.0001°
Default value	0
Remarks	Zero offsets are expected in the unit [0.1µm] for translatory axes and [0.0001°] for rotary axes.

#### 2.3.1.2 Axis-specific activation (P-ZERO-00004)

P-ZERO-00004	Axis-specific activation
--------------	--------------------------

Description	In every zero point data block, setting the <i>inactive</i> code defines the axes in which the offset is to be included in the calculation or not. As a result, individual axis offsets can be hidden in specific zero offsets.  If the inactive code is <u>not</u> assigned or is assigned with <u>zero</u> , the axis offset continues to remain valid. If they are set to TRUE, they are inactive, see also [PROG// Zero offsets].
Parameter	np_grp[i].achse[j].inaktiv
Data type	BOOLEAN
Data range	0/1
Dimension	----
Default value	0
Remarks	

### 3 Example assignment zero offsets with 3 axes

```

# *****
# Zero point data
# *****
# Important note : Behind the comment character `#`
# a blank (space) must be added.
# CAUTION: Zero offsets are expected in the unit
# 0.1 µm for linear axes and 0.0001° for rotary axes.
# *****
#
g53_verfuegbar 1 ( offsets unequal to 0 are evaluated )
default_index 2 ( G55 is automatically active after startup)
#
# =====
# Zero point data which are effective with 'G53' or 'G159 = 0'
# =====
np_grp[0].achse[0].inaktiv 80000 # Zero offset 8 mm
np_grp[0].achse[0].inaktiv 0 # Offset not valid
np_grp[0].achse[1].versatz 81000 # Zero offset 8.1 mm
np_grp[0].achse[1].inaktiv 0 # Offset not valid
np_grp[0].achse[2].versatz 82000 # Zero offset 8.2 mm
np_grp[0].achse[2].inaktiv 0 # Offset not valid
# =====
# Zero point data which are effective with 'G54' or 'G159 = 1'
# =====
np_grp[1].achse[0].versch 100000 # Zero offset by 10 mm
np_grp[1].achse[0].inaktiv 0 # Offset not valid
np_grp[1].achse[1].versch 200000 # Zero offset by 20 mm
np_grp[1].achse[1].inaktiv 1 # Offset not valid
np_grp[1].achse[2].versch 300000 # Zero offset by 30 mm
np_grp[1].achse[2].inaktiv 1 # Offset not valid
# =====
# Zero point data which are effective with 'G55' or 'G159 = 2'
# =====
np_grp[2].achse[0].versch -110000
np_grp[2].achse[0].inaktiv 0 # Offset not valid
np_grp[2].achse[1].versch 210000
np_grp[2].achse[1].inaktiv 0 # Offset not valid
np_grp[2].achse[2].versch 310000
np_grp[2].achse[2].inaktiv 0 # Offset not valid
# =====
# Zero point data which are effective with 'G56' or 'G159 = 3'
# =====
np_grp[3].achse[0].versch 120000
np_grp[3].achse[0].inaktiv 0 # Offset not valid
np_grp[3].achse[1].versch -220000
np_grp[3].achse[1].inaktiv 0 # Offset not valid
np_grp[3].achse[2].versch 320000
np_grp[3].achse[2].inaktiv 0 # Offset not valid
# =====
# Zero point data which are effective with 'G57' or 'G159 = 4'
# =====
np_grp[4].achse[0].versch 120000
np_grp[4].achse[0].inaktiv 0 # Offset not valid
np_grp[4].achse[1].versch 220000
np_grp[4].achse[1].inaktiv 1 # Offset not valid
np_grp[4].achse[2].versch 320000
np_grp[4].achse[2].inaktiv 0 # Offset not valid
# =====
# Zero point data which are effective with 'G58' or 'G159 = 5'
# =====
np_grp[5].achse[0].versch 130000
np_grp[5].achse[0].inaktiv 0 # Offset not valid
np_grp[5].achse[1].versch 230000
np_grp[5].achse[1].inaktiv 0 # Offset not valid
np_grp[5].achse[2].versch -330000
np_grp[5].achse[2].inaktiv 0 # Offset not valid
# =====
# Zero point data which are effective with 'G59' or 'G159 = 6'
# =====
np_grp[6].achse[0].versch 400000
np_grp[6].achse[0].inaktiv 0 # Offset not valid
np_grp[6].achse[1].versch 500000
np_grp[6].achse[1].inaktiv 0 # Offset not valid
np_grp[6].achse[2].versch -600000
np_grp[6].achse[2].inaktiv 0 # Offset not valid
# =====

```

```
# Zero point data which are effective with 'G159 = 7'
# =====
np_grp[7].achse[0].versch -450000
np_grp[7].achse[0].inaktiv 0 # Offset not valid
np_grp[7].achse[1].versch 340000
np_grp[7].achse[1].inaktiv 1 # Offset not valid
np_grp[7].achse[2].versch 670000
np_grp[7].achse[2].inaktiv 1 # Offset not valid
# =====
# Zero point data which are effective with 'G159 = 8'
# =====
np_grp[8].achse[0].versch -110000
np_grp[8].achse[0].inaktiv 0 # Offset not valid
np_grp[8].achse[1].versch 220000
np_grp[8].achse[1].inaktiv 0 # Offset not valid
np_grp[8].achse[2].versch 344500
np_grp[8].achse[2].inaktiv 0 # Offset not valid
```

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# Index

## **P**

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P-ZERO-00001	11
P-ZERO-00002	11
P-ZERO-00003	12
P-ZERO-00004	12



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