



# DOCUMENTATION ISG-kernel

## Functional description Skipping of NC blocks

Short Description:  
FCT-M6

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# Preface

## Legal information

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This documentation was produced with utmost care. The products and scope of functions described are under continuous development. We reserve the right to revise and amend the documentation at any time and without prior notice.

No claims may be made for products which have already been delivered if such claims are based on the specifications, figures and descriptions contained in this documentation.

## Personnel qualifications

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This description is solely intended for skilled technicians who were trained in control, automation and drive systems and who are familiar with the applicable standards, the relevant documentation and the machining application.

It is absolutely vital to refer to this documentation, the instructions below and the explanations to carry out installation and commissioning work. Skilled technicians are under the obligation to use the documentation duly published for every installation and commissioning operation.

Skilled technicians must ensure that the application or use of the products described fulfil all safety requirements including all applicable laws, regulations, provisions and standards.

## Further information

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Links below (DE)

<https://www.isg-stuttgart.de/produkte/softwareprodukte/isg-kernel/dokumente-und-downloads>

or (EN)

<https://www.isg-stuttgart.de/en/products/softwareproducts/isg-kernel/documents-and-downloads>

contains further information on messages generated in the NC kernel, online help, PLC libraries, tools, etc. in addition to the current documentation.

## Disclaimer

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It is forbidden to make any changes to the software configuration which are not contained in the options described 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

➤ 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.



### **Attention**

#### **Restriction or error**

This icon describes restrictions or warns of errors.



### **Notice**

#### **Tips and other notes**

This icon indicates information to assist in general understanding or to provide additional information.



### **Example**

#### **General example**

Example that clarifies the text.



### **Programing Example**

#### **NC programming example**

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



### **Release Note**

#### **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

<b>Preface</b> .....	<b>2</b>
<b>General and safety instructions</b> .....	<b>3</b>
<b>1 Overview</b> .....	<b>5</b>
<b>2 Skip NC blocks</b> .....	<b>6</b>
2.1 Skip block / ignore block .....	6
2.2 Multiple skip levels .....	7
2.3 Enable/disable.....	10
2.3.1 Enabling/disabling via HMI.....	10
2.3.2 Enabling/disabling via PLC .....	12
<b>3 Parameter</b> .....	<b>13</b>
3.1 CNC objects .....	13
3.2 PLC parameters .....	14
3.2.1 PLC parameters up to Build V2.11.20xx.....	15
<b>4 Appendix</b> .....	<b>16</b>
4.1 Suggestions, corrections and the latest documentation.....	16

# 1 Overview

## Task

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Specific blocks can be skipped in the NC program. The “Skip block” function defines optional processing steps such as measuring loops, test blocks, dummy steps etc. within an NC program.

## Characteristics

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Skips are taken into account when a NC program is processed.

- If the “Skip block” function was activated on the operating console (HMI).
- When the PLC was activated by a BOOL command before the main program start.

## Programming

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The function is activated by a preceding “/” character.

## Parameterisation

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The following HMI objects are required to select and control the function.

- HMI mc\_command\_block\_ignore\_w
- HMI mc\_command\_block\_ignore\_r
- HMI mc\_active\_block\_ignore\_r

## ***Mandatory note on references to other documents***

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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 Skip NC blocks

### 2.1 Skip block / ignore block

Specific NC blocks can be skipped by prefixing them with a "/" character. The controller ignores NC blocks if the function "Skip block" is activated before main program start by a BOOL command on the operating console (HMI) or by the SPS.

```
/ N3412 X100 ...
```

The function defines optional processing steps in an NC program such as measuring loops, test blocks, etc.

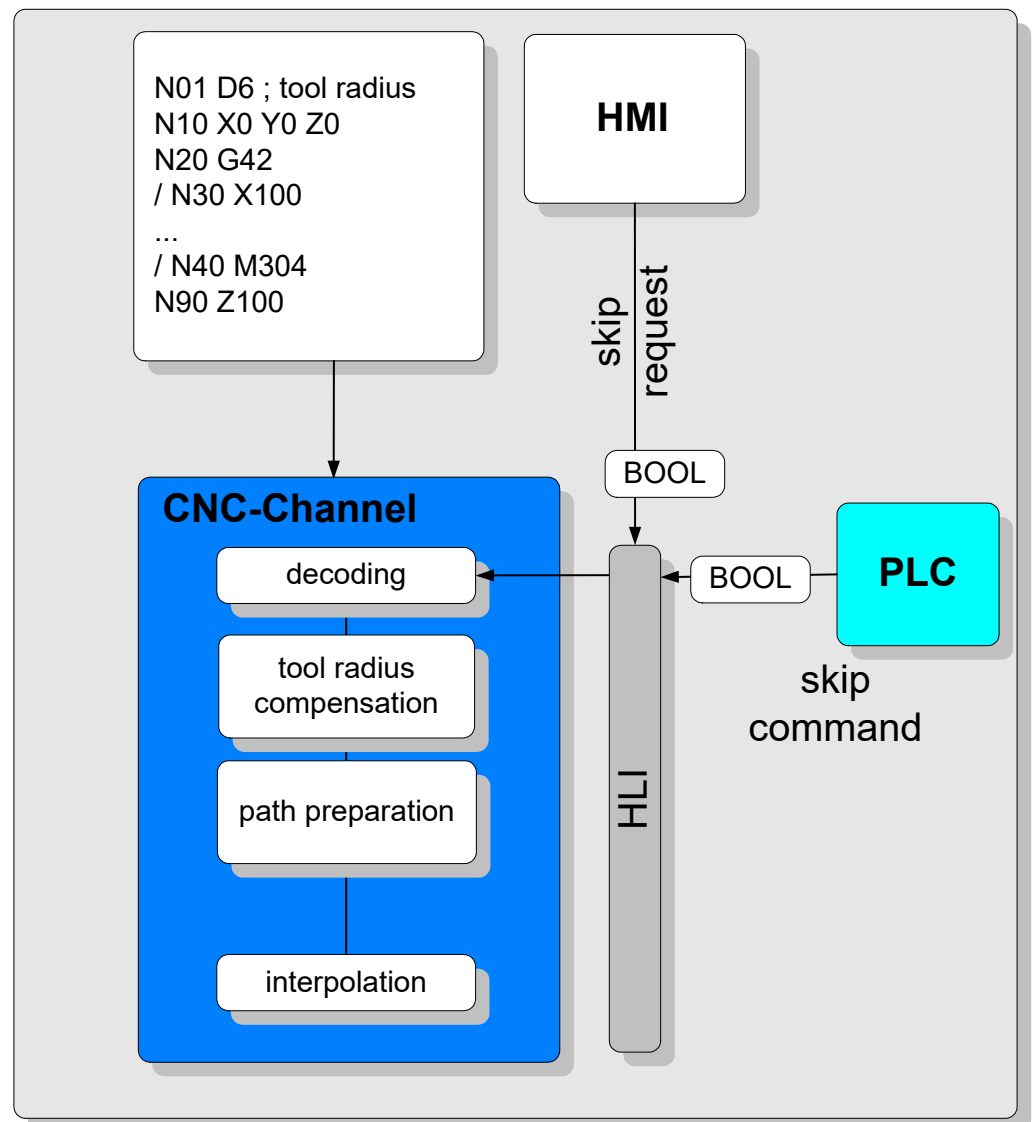


Fig. 1: Enabling/disabling Skip block via HMI or PLC



#### Notice

The enable/disable status of the Skip block function is taken over at program start and remains effective until program end.

In Builds up to V3.01.3021.01, any change in skip settings while an NC program is active only becomes effective at the next main program start. The extended skipping [► 7] function is then available in higher Builds.

## 2.2 Multiple skip levels



### Release Note

This function is available as from CNC Build V3.01.3021.1 and higher.



### Attention

#### Changing the interface to HMI and PLC

The BOOL data type was changed to 32 bits for the skip levels.

You can now use up to 10 skip levels in the NC program using this extension. The different skip levels can be set either on the operating console (HMI) or in the PLC before the main program starts.

In the Extended Skipping function, changes in skipping settings take effect immediately while the NC program is active. Defined break points can be implemented, e.g. by M functions followed by #FLUSH WAIT, to ensure that these skipping setting changes are safely accepted and become effective in the NC program.

The syntax programming is a slash "/" followed by a number to define the skip level:

```

/1  Skip level one
/2  Skip level two
...
/10 Skip level ten
  
```

#### Example:

```
/5 N100 G00 X150 (block is ignored if level 5 is enabled)
```



### Notice

**The maximum number of skip levels is 10. This number is not parameterisable.**

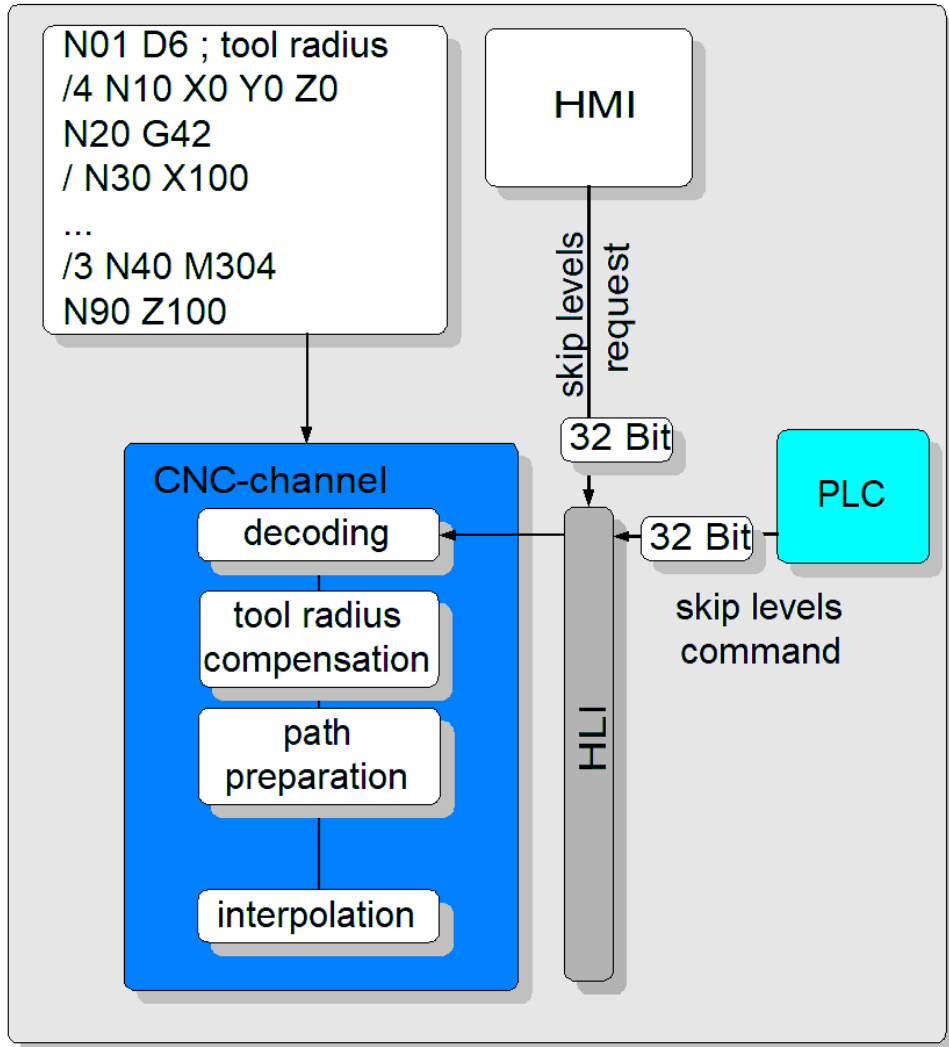


Fig. 2: Enabling/disabling skip levels via HMI or PLC





## Programing Example

### Using skip levels

```

%skip_levels
N0 G0 X0 Y0 Z0
/1 N10 X1          ;Alternative: / N10 X1
/2 N20 Y2
/2 N25 Y2.5
/3 N30 Z3
/4 N40 X-1
/4 N45 X-1.5
/ N47 X-1.8       ;Skip with no level definition
                  ;Corresponds to level 1

/10 N50 Y-2
/100 N60 Z-30    ;Error 21655
/N99 X9
N999 M30
  
```

The valid range of skip level values is from 1 to 10. If a value is programmed outside this range, then **“error 21655”** is output.



### Notice

For compatibility reasons the skip levels **"/** and **“/1”** have the same meaning. They are each addressed by the first bit in the control bit string of HMI/PLC.

## 2.3 Enable/disable

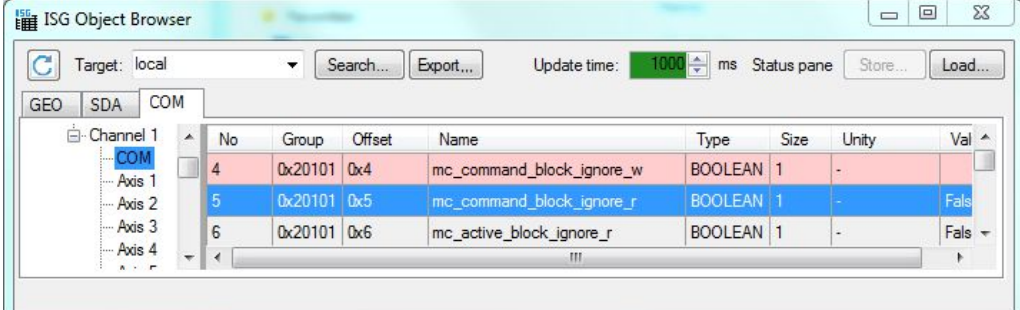
### 2.3.1 Enabling/disabling via HMI

The "Skip block" function can be enabled and disabled with the CNC object object `mc_command_block_ignore_w` [▶ 13].

The state can be checked using the CNC objects

- `mc_command_block_ignore_r` [▶ 13]
- `mc_active_block_ignore_r` [▶ 13]

#### CNC Builds < V3.01.3021.1

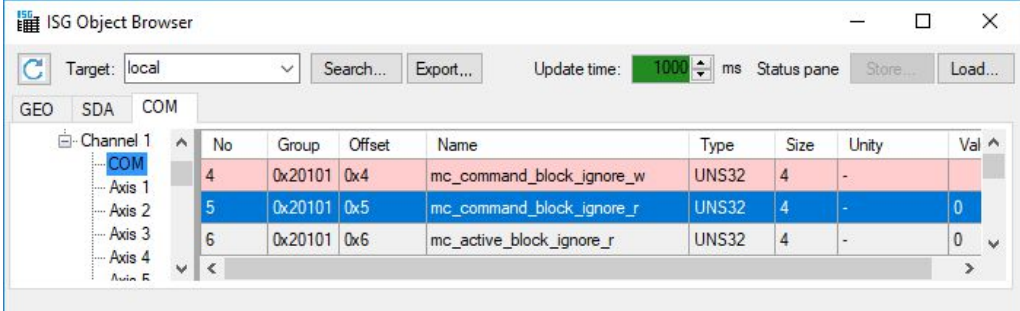


No	Group	Offset	Name	Type	Size	Unity	Val
4	0x20101	0x4	mc_command_block_ignore_w	BOOLEAN	1	-	
5	0x20101	0x5	mc_command_block_ignore_r	BOOLEAN	1	-	Fals
6	0x20101	0x6	mc_active_block_ignore_r	BOOLEAN	1	-	Fals

Fig. 3: Enabling a single skip in the ISG object browser

Value range of `mc_command_block_ignore_w`: TRUE/FALSE

#### CNC Builds >= V3.01.3021.1



No	Group	Offset	Name	Type	Size	Unity	Val
4	0x20101	0x4	mc_command_block_ignore_w	UNS32	4	-	0
5	0x20101	0x5	mc_command_block_ignore_r	UNS32	4	-	0
6	0x20101	0x6	mc_active_block_ignore_r	UNS32	4	-	0

Fig. 4: Enabling skip level in ISG object browser

`mc_command_block_ignore_w` is a bit string in which the 10 lower bits are used to enable or disable skip levels.

If the remaining bits are assigned, there is no reaction. They are ignored.



## Programing Example

### Setting mc\_command\_block\_ignore\_w in the ISG object browser

In the following example, lines N050, N060 and N080 are to be skipped. In this example, since skip levels /2, /3 and /5 were assigned for these lines, the data item mc\_command\_block\_ignore\_w must be assigned 0x16 in the ISG Object Browser.

```
%skippingtest3.nc
N010 G00 X0 Y0 F500
N020 G1 X50
/ N030 G1 X60
/1 N040 G1 X80 Y10
/2 N050 G1 X100 Y20 ;is skipped
/3 N060 G1 X120 Y30 ;is skipped
/4 N070 G1 X140 Y40
/5 N080 G1 X160 Y50 ;is skipped
/6 N090 G1 X180 Y60
/7 N100 G1 X160 Y70
/8 N110 G1 X140 Y80
/9 N120 G1 X100 Y90
/10 N130 G1 X40 Y100
N140 G1 X0 F2000
N150 G1 Y0
N160 M30
```

## 2.3.2 Enabling/disabling via PLC

A control unit [▶ 14] in the PLC can be assigned to enable or disable the skip block `program_block_ignore`.



### Release Note

The expanded function for several skip levels is available as of Build V3.01.3021.1. The `program_block_ignore` control block is of type `MC_CONTROL_UN32_UNIT`.

Enabling uses the following data item:

```
gpCh[nChanIdx]^ .decoder_mc_control.program_block_ignore.com-  
mand_w
```

The data item is a bit string in which the 10 lower bits are used to enable or disable skip levels.

**Enabling uses the following single data:**

for CNC Builds > V2.11.2800

```
pMC[channel_idx]^ .addr^.MCControlDecoder_Data.MCControl-  
BoolUnit_ProgramBlockIgnore
```

for CNC Builds > V2.11.2800

```
gpCh[nChanIdx]^ .decoder_mc_control.program_block_ignore.com-  
mand_w
```

This is a control unit of type `MC_CONTROL_BOOL_UNIT`.

## 3 Parameter

### 3.1 CNC objects

<b>Name</b>	mc_active_block_ignore_r		
<b>Description</b>	This object reads whether skip mode is active. As of Build V3.01.3021.1 a UNS32 data element is read.		
<b>Task</b>			
<b>Index group</b>	0x120101	<b>Index offset</b>	0x6
<b>Data type</b>	UNS32	<b>Length/byte</b>	4
<b>Attributes</b>		<b>Unit</b>	-
<b>Remarks</b>	Up to Build V3.01.3021.1 this object reads whether skip mode is active. It is a BOOL data element.		

<b>Name</b>	mc_command_block_ignore_r		
<b>Description</b>	This object reads the bitmask for the skip level.		
<b>Task</b>			
<b>Index group</b>	0x120101	<b>Index offset</b>	0x5
<b>Data type</b>	UNS32	<b>Length/byte</b>	4
<b>Attributes</b>		<b>Unit</b>	-
<b>Remarks</b>			

<b>Name</b>	mc_command_block_ignore_w		
<b>Description</b>	This object defines the bitmask for the skip level.		
<b>Task</b>			
<b>Index group</b>	0x120101	<b>Index offset</b>	0x4
<b>Data type</b>	UNS32	<b>Length/byte</b>	4
<b>Attributes</b>		<b>Unit</b>	-
<b>Remarks</b>			

## 3.2 PLC parameters

<b>Skip mode, NC block</b>	
Description	Activates/deactivates skip mode at interpreter level for the NC program. The status of skip mode is only evaluated at the start of the NC program. Switchover during execution of an NC program has no effect.
Data type	MC_CONTROL_BOOL_UNIT, see description Control unit Available as of CNC Build V3.01.3021.1 MC_CONTROL_UN32_UNIT
Access	PLC reads request_r + state_r and writes command_w + enable_w
ST Path	gpCh[channel_idx]^*.decoder_mc_control. <b>program_block_ignore</b>
Commanded, requested and return values	
ST Element	<b>.command_w</b> <b>.request_r</b> <b>.state_r</b>
Data type	BOOL or UNS32
Value range	[TRUE = Skip mode NC block ON, FALSE = Skip mode NC block OFF, default: FALSE]  Available as of CNC Build V3.01.3021.1 for UNS32: 0x0 - Skip mode NC block OFF 0x1 – Skip level 1 0x2 - Skip level 2 0x4 - Skip level 3 0x8 - Skip level 4 0x10 – Skip level 5 0x20 - Skip level 6 0x40 - Skip level 7 0x80 - Skip level 8 0x100 – Skip level 9 0x200 - Skip level 10 Skip levels active simultaneously are enabled by bitwise ORing. Example: Enable all skip levels by setting 0x3FF.
Redirection	
ST Element	<b>.enable_w</b>

### 3.2.1 PLC parameters up to Build V2.11.20xx

Skip mode, NC block	
Description	Activates/deactivates skip mode at interpreter level for the NC program. The status of skip mode is only evaluated at the start of the NC program. Switchover during execution of an NC program has no effect.
Data type	MCCControlDistCtrlUnit, see description of Control Unit
Access	PLC reads Request + State and writes Command + Enable
ST path	pMC[channel_idx]^^.addr^.MCCControlDecoder_Data.MCCControlBoolUnit_ProgramBlockIgnore
Commanded, requested and return value	
ST element	.X_Command .X_Request .X_State
Data type	BOOL
Value range	[TRUE = Skip mode NC block ON, FALSE = Skip mode NC block OFF, FALSE]
Redirection	
ST element	.X_Enable

## 4 Appendix

### 4.1 Suggestions, corrections and the latest documentation

Did you find any errors? Do you have any suggestions or constructive criticism? Then please contact us at [documentation@isg-stuttgart.de](mailto:documentation@isg-stuttgart.de). The latest documentation is posted in our Online Help (DE/EN):



QR code link: <https://www.isg-stuttgart.de/documentation-kernel/>

The link above forwards you to:

<https://www.isg-stuttgart.de/fileadmin/kernel/kernel-html/index.html>



#### Notice

##### Change options for favourite links in your browser;

Technical changes to the website layout concerning folder paths or a change in the HTML framework and therefore the link structure cannot be excluded.

We recommend you to save the above "QR code link" as your primary favourite link.

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