

The screenshot shows the WinTrans software interface with the following parameters table:

ID	Description	Value	Unit
C01.087	Adaptive Depth Regulation	Yes	
C01.088	Reference position of 2nd encoder	+0.0000	mm
C01.089	Positive travel range limit of 2nd encoder	+20.0000	mm
C01.090	Negative travel range limit of 2nd encoder	+5.0000	mm
C01.091	Admissible stroke pre-deflection	+5.0000	mm

The diagram below the screenshot illustrates the workpiece setup:

- Workpiece:** A vertical rectangular block on the left.
- Linear encoder:** A horizontal rectangular block on the right, connected to the workpiece.
- Pre-deflection Cxx.091:** A hatched area between the workpiece and the encoder, representing the deflection.
- Travel range limits:** A vertical line above the encoder, labeled "max. Cxx.089".
- Scale:** A horizontal scale at the bottom of the diagram.

MTC200/TRANS200 Adaptive Depth Functional Description

SYSTEM200

Title	MTC200/TRANS200 Adaptive Depth
Type of Documentation	Functional Description
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Description	Release Date	Notes
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1 Overview

1.1 Function and Application

- “Switch to 2nd encoder system” function** The MTC200 and TRANS200 systems support the “Switch to 2nd encoder system” function.
In the MTC200 machine tool control, this function is supported as of software/firmware version 19, in the TRANS200 transfer machine control as of software/firmware version 21.
This universally applicable function can be used for, among other things “adaptive depth”.
- “Adaptive depth” application** One possible application of the “Switch to 2nd encoder system” function is “Adaptive depth”.
This procedure, which is utilized mainly for transfer controllers, is used to compensate for mechanical inaccuracies of the machine / the workpiece clamber in the direction of the processing axis (depth gauge / processing depth).
For this purpose, a reference to a reference surface on the workpiece is made using the second measuring system (i.e. linear sensor).
In subsequent processing, not the absolute position of the first measuring system, but rather the relative position (the processing axis of the tool tip to the workpiece) of the second measuring system is used for position control.
- Advantages of “adaptive depth”** The adaptive depth function allows:
- a significant increase in processing accuracy in the direction of the processing axis (depth gauge) by compensating
 - mechanical inaccuracies in workpiece clamping. labor-intensive workpiece measurement when clamping is no longer required.
 - mechanical inaccuracies of the feed axis.
 - safety during error detection during workpiece clamping.

1.2 Brief Description

- Basic principle** In “adaptive depth”, switching to a 2nd encoder system is used to record position data closer to the contour to be processed using this encoder system.
This permits the compensation of mechanical inaccuracies of the machine / the workpiece clamber.
Axis parameters Cxx.087 -Cxx.091 are used to set the parameters of the function.
The programmed switch to the 2nd encoder system occurs when the 2nd encoder has already been displaced with G code G69. The switch back to the 1st encoder system occurs with the 2nd encoder still displaced using G68.
The switch can be carried out either when the axis is at a standstill or on the fly, i.e. while the axis is moving.

- Supported encoder systems** Various encoder systems can be used:
- surface sensor (e.g. linear encoder)
 - additional rotary encoder (e.g. higher resolution)
 - rotary encoder for rotary axes, etc.
- Parameter value assignment** The “Adaptive depth” function can only be used if it has been released using axis parameter **Cxx.087 Adaptive depth (yes/no)**.
Only then can the parameter values of the function be assigned using axis parameters **Cxx.088** to **Cxx.091**.
In addition, certain drive parameters in the SERCOS menu must be adapted to the application. A description of these parameters can be found in **Chapter 3 Parameters**.

2 NC Commands

2.1 General

The following NC commands in the NC program are used to switch the “Adaptive depth” function on and off:

Syntax **G68** Switch to motor encoder (1st encoder)
 G69 Switch to 2nd encoder

The G codes belong to G code group 21 and work modally.

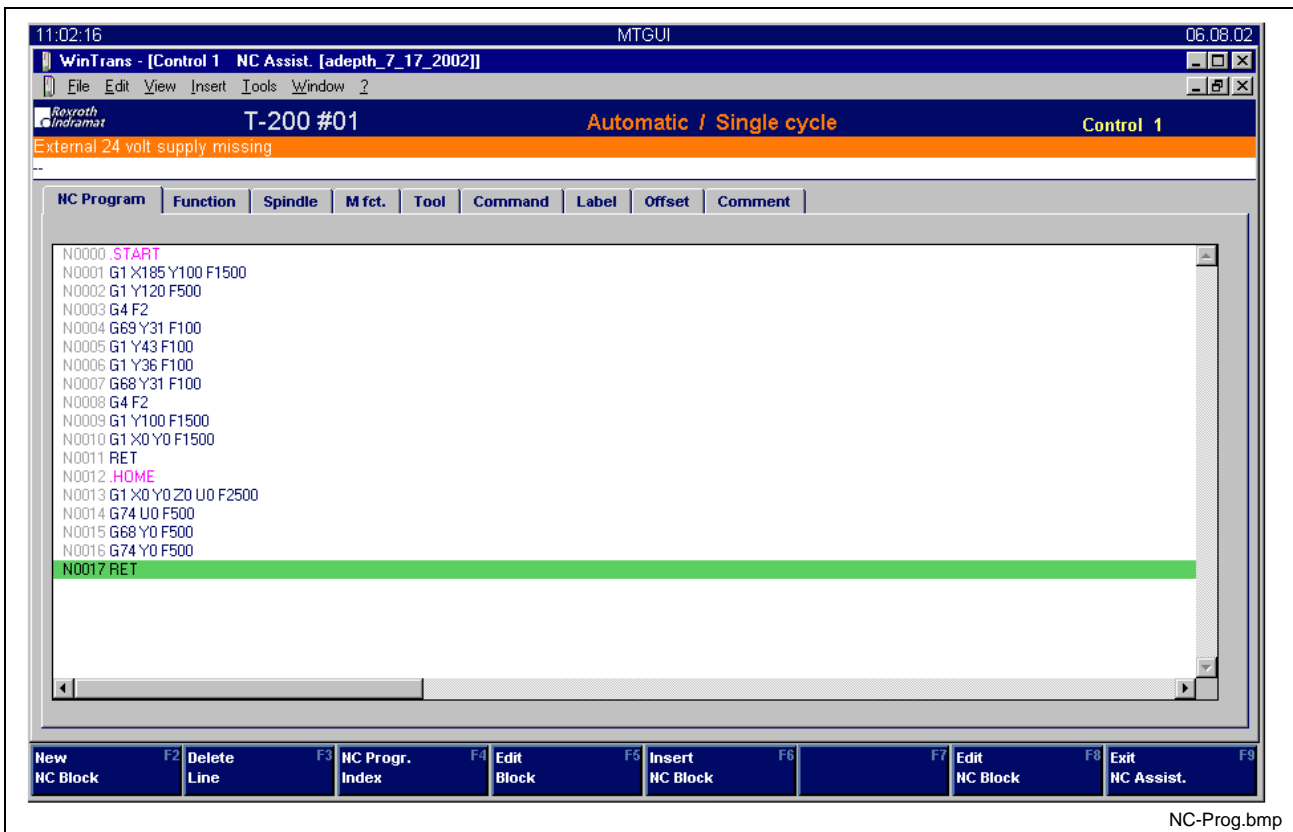


Fig. 2-1: Example of program using G68/G69

2.2 Description

G68 Switch to motor encoder (1st encoder)

Command **G68** is used to switch to the 1st encoder (motor encoder).

Syntax G68 <(axis designation)(position value)(feed)>
 Command G68

- is preselected in the control switch-on state,
- becomes effective automatically when the program is exited with RET,
- becomes effective automatically for program branches with Stop (BST),
- becomes effective automatically for *Control Reset*.

G69 Switch to 2nd encoder

Command **G69** is used to switch to the 2nd encoder (e.g. linear encoder).

Syntax G69 <(axis designation)(position value)(feed)>

Command G69

- is modally effective and is automatically deactivated for Control Reset and when the program is exited (G68),
- is active as soon as the G code in the NC program is executed. The position is controlled depending on the 2nd encoder.
- is automatically reset to G68 when restarting after a power failure.

3 Parameters

3.1 NC Axis Parameters

Activation The “adaptive feed” function is activated with axis parameter **Cxx.087 adaptive feed control (yes/no)**. After parameter C0x.087 has been set to “Yes”, the following additional NC axis parameters for adapting the function to the corresponding application appear.

- Adaptation**
- Cxx.088 Reference value of the 2nd encoder
 - Cxx.089 Positive travel limit of the 2nd encoder
 - Cxx.090 Negative travel limit of the 2nd encoder
 - Cxx.091 Permissible sensor deflection of the 2nd encoder in the 1st encoder system

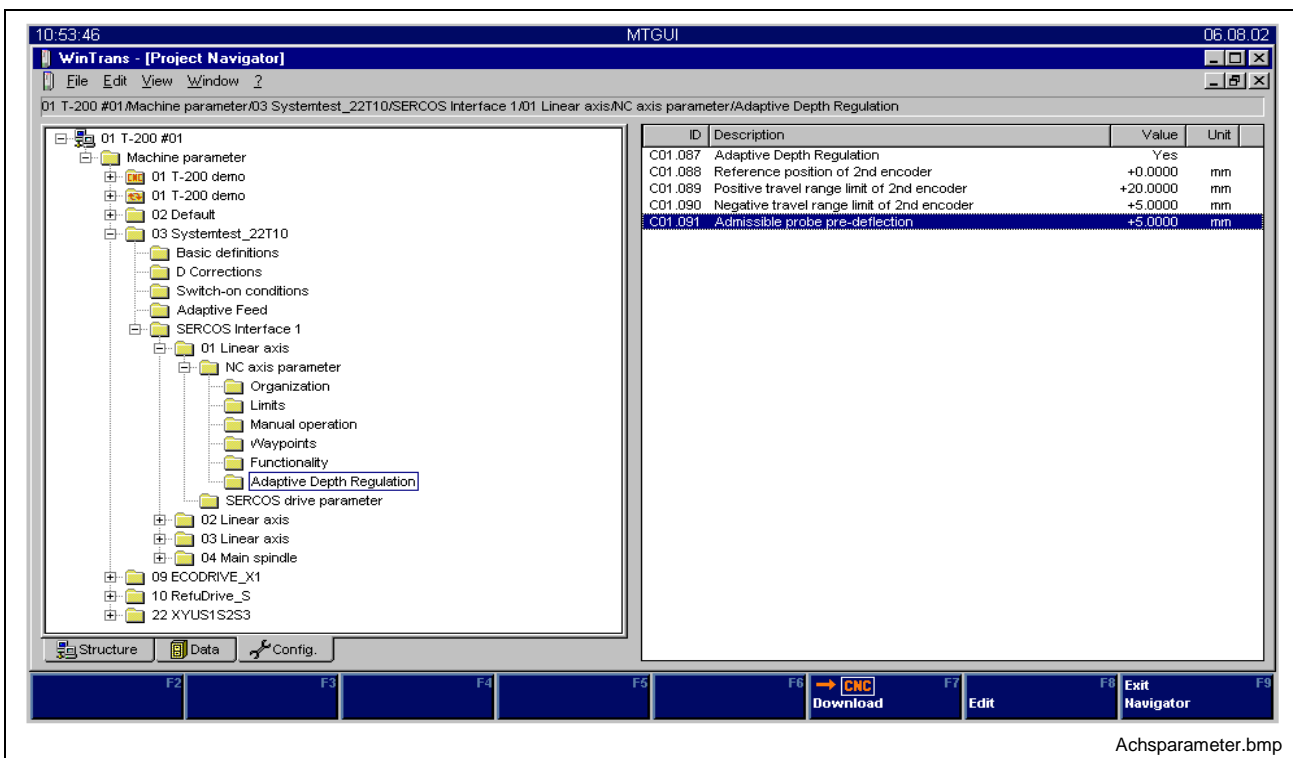


Fig. 3-1: Parameter menu

Parameters Cxx.088 to Cxx.091 appear in the parameter menu of the corresponding axis only if parameter Cxx.087 Adaptive depth has been set to “Yes”.

3.2 Description of Axis Parameters

Adaptive Depth

Designation	Adaptive depth (2 nd encoder)
Number	Cxx.087
Value range	Yes/No
Preset value	No
Unit	-
From version	MTC200: V19, TRANS200: V21
Dependency	If axis parameter Cxx.087 (Adaptive depth) is set to "Yes", the additional axis parameters Cxx.088 - Cxx.091 appear.
Purpose	If processing is to be carried out with the second encoder system, the corresponding axis parameter Cxx.087 must be set to "Yes".
Explanation	Adaptive depth permits processing to be carried out depending on the 2 nd encoder (e.g. linear encoder).

Note: Adaptive depth can be activated only if axis parameter **Cxx.087 Adaptive depth** has been set to "Yes".

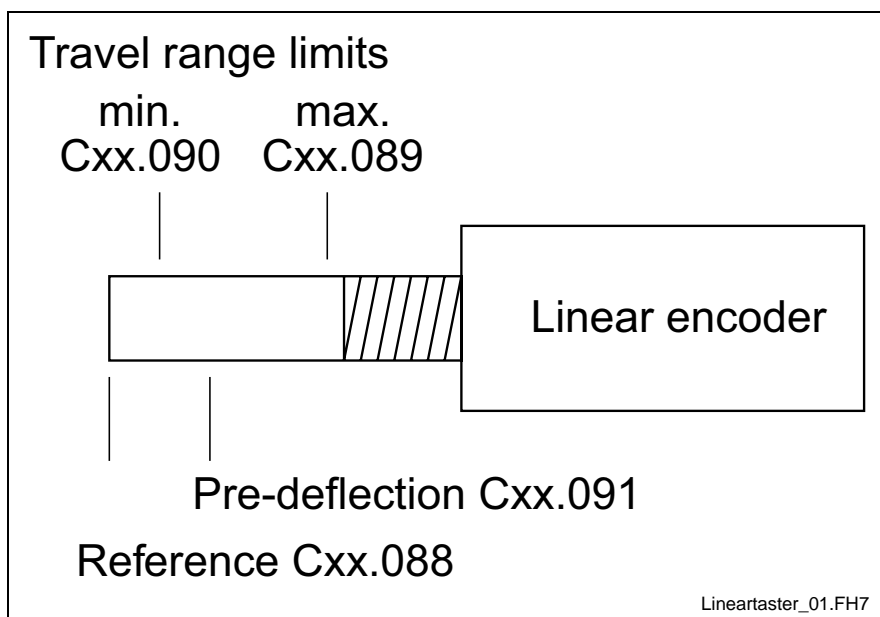


Fig. 3-2: Description of axis parameters

Reference Value of the 2nd Encoder

Designation	Reference value of the 2 nd encoder
Number	Cxx.088
Value range	-9999.9999 to +9999.9999
Preset value	0
Unit	mm/inch
From version	MTC200: V19, TRANS200: V21
Dependency	Writing to axis parameter Cxx.088 (Reference value of the 2 nd encoder) is possible only if Cxx.087 is set to "Yes".

Purpose	The user specifies the reference point of the 2 nd encoder system with axis parameter Cxx.088 (Reference value of the 2nd encoder) . The value is incorporated into the position register of the 2 nd encoder during referencing with the motor encoder (G74).
Explanation	In the case of a linear encoder, it is assumed at the reference position of the motor encoder that the sensor is not displaced, but is rather fully extended. See the figure above.

Positive Travel Limit of the 2nd Encoder

Designation	Positive travel limit of the 2 nd encoder
Number	Cxx.089
Value range	-9999.9999 to +9999.9999
Preset value	0
Unit	mm/inch
From version	MTC200: V19, TRANS200: V21
Dependency	Writing to axis parameter Cxx.089 (Positive travel limit of the 2 nd encoder) is possible only if Cxx.087 is set to "Yes".
Purpose	The user specifies the positive travel limit of the 2 nd encoder system with axis parameter Cxx.089 (Positive travel limit of the 2nd encoder) .
Explanation	See the figure above.

Negative Travel Limit of the 2nd Encoder

Designation	Negative travel limit of the 2 nd encoder
Number	Cxx.090
Value range	-9999.9999 to +9999.9999
Preset value	0
Unit	mm/inch
From version	MTC200: V19, TRANS200: V21
Dependency	Writing to axis parameter Cxx.090 (Negative travel limit of the 2 nd encoder) is possible only if Cxx.087 is set to "Yes".
Purpose	The user specifies the negative travel limit of the 2 nd encoder system with axis parameter Cxx.090 (Negative travel limit of the 2nd encoder) .
Explanation	See the figure above.

Permissible Sensor Deflection of 2nd Encoder in 1st Encoder System

Designation	Permitted sensor deflection
Number	Cxx.091
Value range	0 to 9999.9999
Preset value	0
Unit	mm/inch
From version	MTC200: V19, TRANS200: V21
Dependency	Writing to axis parameter Cxx.091 (Permissible sensor deflection of the 2 nd encoder in the 1 st encoder system) is possible only if Cxx.087 is set to "Yes".
Purpose	The user specifies the range within which the 2 nd encoder in the first encoder system may be deflected with axis parameter Cxx.091 Permitted sensor deflection . This parameter is used only with a linear sensor.

Explanation See the figure above.

3.3 SERCOS Drive Parameters

- Activation** As of version 21 (MTC200, TRANS200), SERCOS drive parameters can be adapted to the corresponding application requirements with the “DriveTop” commissioning tool.
- Adaptation** The “adaptive depth” function requires that the parameter values of the external (2nd) encoder system be correctly set. If the drive parameters are not adapted, the drive is not attuned to the required hardware (2nd encoder with encoder interface). The following drive parameters are used to set the parameters / evaluate the external encoder.
- P-0-0075 External encoder interface
 - P-0-0185 Function of the external encoder
 - S-0-0053 Actual position value 2 (external encoder)
 - S-0-0115 Position encoder type parameter 2
 - S-0-0117 Resolution of the external encoder
 - S-0-0391 Monitoring window of the external encoder
- Validity** The description of the following parameters is valid solely for the DIAX04 drive family with SSE-03VRS firmware. For other drive families, the valid parameter descriptions must be found in the documentation.

3.4 Description of Drive Parameters

P-0-0075, Encoder Type 2

This parameter is used to specify the encoder interface to which the external encoder is connected. The number of the corresponding interface module is to be entered in this parameter.

Module	P-0-0075	Measurement system
--	0	Does not exist
Standard	1	Digital servo feedback (resolver)
DLF01.1M	2	Incremental encoder with sinusoidal signals (Heidenhain-compatible signal specification, 1Vss or 7-15uAss signals)
DZF02.1M	3	Indramat gear encoder
DFF01.1M	4	Digital servo feedback if standard encoder interface is used by motor encoder
DEF01.1M	5	Incremental encoder with square-wave signals (Heidenhain-compatible signal specification)
DEF02.1M	6	Incremental encoder with square-wave signals (Heidenhain-compatible signal specification) if DEF01.1 is used by motor encoder
DAG01.2M	7	Encoder with SSI interface
DAG01.2M	8	Encoder with EnDat interface
DZF03.1M	9	Gear encoder with 1Vss signals

Fig. 3-3: P-0-0075, encoder type 2

Restriction:

Modules DLF, DZF, DRF and DEF 1 must not be operated simultaneously within a controller. Bit 6 is formed by the drive.

=> Danger of damage!

The combination of DLF and DZF is not possible. To operate an incremental encoder together with DLF or DZF, the DEF 2 module can be used in DDS devices.

Also see the description of functions: "Specifying the Encoder Interface of the Optional Encoder"

P-0-0185, Function of the 2nd Encoder

Using parameter P-0-0185, it is possible to assign certain functions to the external encoder. The following function assignments are defined:

P-0-0185	Function of encoder 2
0	Optional control encoder
2	Load-side motor encoder

Fig. 3-4: Functions of encoder 2

Explanation:

Re 0: If the optional encoder is used as a **control encoder**, it can be used to close the control circuit. All operating modes with optional encoders are possible. The position value is stored in parameter **S-0-0053 Actual position value 2**.

Re 2: If the optional encoder is used as a **load-side motor encoder**, the control circuit and the commutation are created using this encoder. Only S-0-0053 Actual position value 2 is supported.

Also see the description of functions: Optional Encoder.

P-0-0185 - Attribute

Para. name:	DE Funktion des ext. Gebers		
	EN Function of ext. encoder		
Function:	Parameter	Modifiability:	P23
Data length:	2 bytes	Storage:	Param. EE
Format:	DEC_OV	Validity check:	Phase 3
German unit:	--	Extr. val. check:	no
Pos. after dec. point:	0	Combin. check.:	yes
Min./max. entry:	--- / ---		
Default value:	0	Cycl. transferable:	no

S-0-0053, Actual Position Value of Encoder 2

Actual position value of encoder 2 represents the current position of the optional/external encoder. The actual position values are initialized during the execution of **S-0-0128, C200 Preparation for switching to comm. phase 4**, i.e. the actual position values are initialized only after the command has been successfully executed. If an absolute optional encoder is present, the value in **S-0-0053, Actual position value encoder 2** then displays the absolute reference compared to the machine zero point as long as command **P-0-0012, C300 Set absolute dimension command** was executed once during commissioning. In the other case, the initialization value depends whether parameter **P-0-0019, Starting position value** was written to while the phase was being started or whether a possibly existing optional encoder is an absolute value encoder.

Also see the description of functions: "Setting the Measurement Systems"

S-0-0115, Position Encoder Type 2

This parameter is used to specify important characteristics of the optional/external encoder.

Structure of the parameter:

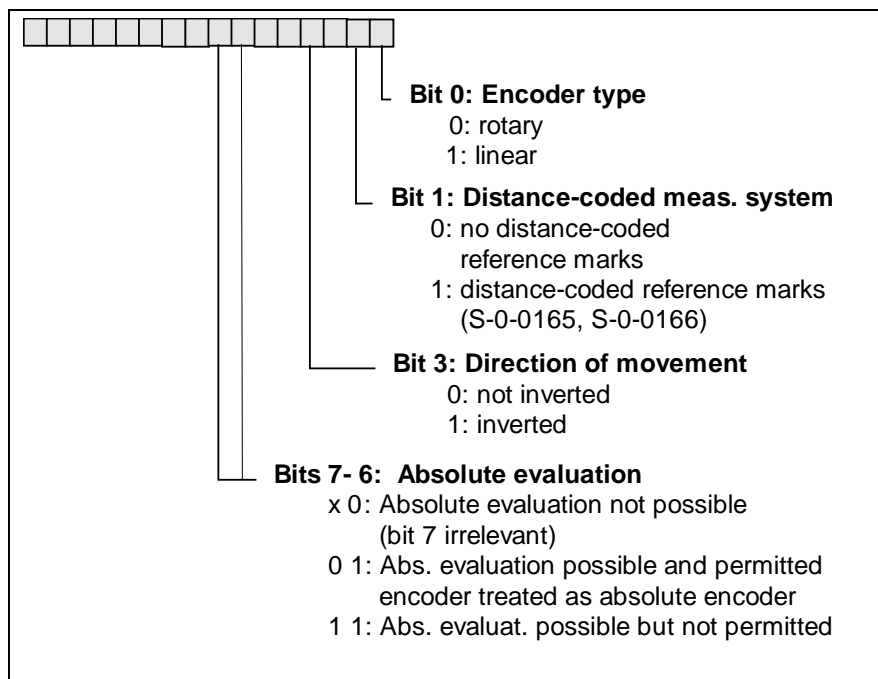


Fig. 3-5: S-0-0115, Position encoder type 2

Note: Bit 6 is formed by the drive.

Note: With bit 0, the unit and number of decimal places of parameter **S-0-0117, Encoder 2 resolution** are switched.

Bit 0 = 1: unit = mm with 5 pos. after the decimal point.

Bit 0 = 0: unit = graduation periods per revolution with no positions after the decimal point.

Also see the description of functions: "Other Characteristics of the Optional Encoder"

S-0-0117, Encoder 2 Resolution

The resolution of encoder 2 (optional/external encoder) contains the cycles per optional encoder rotation for rotary encoders. In the case of translatory optional encoders, the line graduation is given in mm.

Also see the description of functions: "Resolution of the Optional Encoder"

S-0-0391, Monitoring Window Encoder 2

This parameter is used to define the maximum permitted variance of **S-0-0051, Actual position value of encoder 1** and **S-0-0053, Actual position value of encoder 2**.

If this value is exceeded for 20 ms, the error **F236 Excessive actual position value difference**. Monitoring can be switched off by writing this parameter with 0.

Also see the description of functions: "Actual Position Value Monitoring"

4 Commissioning

4.1 Procedure

Application

Switching from the motor encoder to the 2nd encoder (e.g. linear sensor) can be carried out in two different ways using G codes **G68** and **G69** in the NC program:

Switching at a standstill	Switching is performed at a standstill under power and with controller enablement.
Switching on the fly	Switching is performed during axis movement.

Switching at a Standstill

A switch to the 2nd encoder is performed at a standstill if G code **G69** is sent when **G09 (Speed-limited NC block transition)** is preselected.

Example	G69 G09 X0	Switch to the 2 nd encoder system at a standstill
	G01 X10	Move the axis in the 2 nd encoder system
	G68 G09 X0	Switch to the 2 nd encoder system at a standstill; X0 describes a position in the 2 nd encoder system.
	G01 X120	Move the axis in the 1 st encoder system

Switching on the Fly

When switching on the fly, note that the switching procedure is separated into 2 NC blocks. G code G08 must be sent to an NC block before G69 can be used to switch to the 2nd encoder system.

Switching is performed during axis movement.

Example	G01 G08 G90 X100 F2000	Move the axis in the 1 st encoder system
	G69 X10 F2000	Switch to 2 nd encoder system
	G01 G08 X20 F2000	Move the axis in the 2 nd encoder system
	G68 X50 F2000	Switch to the 1 st encoder system; X50 describes a position in the 2 nd encoder system (pay attention to the traverse range limits!)

Note: When switching to the 2nd encoder system on the fly, pay attention to the following limitations.

- Only one axis can be programmed in the NC block with the encoder switch and in the previous NC block.
 - The axis speed (feed value F) must be the same in these two NC blocks.
 - The direction of movement must be the same in these two NC blocks.
- No M functions can be programmed in the NC block before the switch.

4.2 Boundary Conditions

The following boundary conditions must be heeded:

- Before switching to the second encoder, the encoder is to be referenced with G74. If a G74 is activated while the G69 is active, the CNC issues an error.
- Switching to the 2nd encoder is possible only if the current sensor deflection has not yet exceeded the **Permissible sensor deflection Cxx.091** and if the position of the 2nd encoder lies in the traverse range limits (see Cxx.089 and Cxx.090) of the 2nd encoder. If these boundary conditions are not fulfilled, an error occurs.
- The traverse range limits of the 1st encoder (motor encoder) are monitored during the movement with the 2nd encoder, i.e. the limit values entered in NC parameters **Cxx.011 Positive travel limit** and **Cxx.012 Negative travel limit** are effective for the motor encoder.
- The drive-side traverse range limits **S-0-0049 Position limit value positive** and **S-0-0050 Position limit value negative** are monitored for the motor encoder as long as monitoring was activated with parameter **S-0-0055 Position polarities parameter bit 4 position limit values**.
- During the switching procedure from encoder 1 to encoder 2 (**G69 Switch to encoder 2**) or back (**G68 Switch to encoder 1**), the coordinate system that is being switched into must be observed in the NC block. The programmed positions are to be programmed in the coordinate system for encoder 2 (G69) or encoder 1 (G68). The value of the position display also switches.
- The following G codes are not permitted in a block with G69:
 - G04 Dwell time
 - G74 Home axes
 - G75 Feed to positive stop
 - G76 Cancel all feeds to positive stop
- If a surface sensor is used as the 2nd encoder system, note that the surface sensor contacts the surface of the workpiece when switching to the 2nd encoder system. The deflection of the measuring sensor must lie within the range that was set in Cxx.091 Permissible sensor deflection during switching.
- The axis must not belong to a group (gantry or follower group) during processing in the 2nd encoder system.

5 Error Messages

5.1 NC Axis Errors

Error 268: Travel Range Limit @ Axis +

- Cause** The positive travel range limit of the @ axis is exceeded
- by the current NC block or
 - by incremental jogging
- Remedy**
- Delete the error with the “CLEAR ERROR” key
 - If necessary, correct the NC program and retransmit

Error 269: Travel Range Limit @ Axis -

- Cause** The negative travel range limit of the @ axis is exceeded
- by the current NC block or
 - by incremental jogging
- Remedy**
- Delete the error with the “CLEAR ERROR” key
 - If necessary, correct the NC program and retransmit

Error 372: Encoder Switch Progr. with Blockwise Effective G Code

- Cause**
- A blockwise effective G code (G04/G74/G75/G76) was programmed in the switching block
- Remedy**
- Delete the error with the “CLEAR ERROR” key
 - Check the NC block with the encoder switch for a blockwise effective G code. If necessary, correct the NC program and retransmit

Error 373: Encoder Switch Programmed with Incremental Dimensions

- Cause**
- The switch block was programmed with an incremental dimension (G91).
- Remedy**
- Delete the error with the “CLEAR ERROR” key
 - Check the NC block with the encoder switch for an incremental dimension (G91). If necessary, correct the NC program with G90 and retransmit

Error 406: Traverse Range Limit of @ Axis Exceeded

- Cause** The @ axis has exceeded the positive or negative traverse range limit specified in the axis parameters
- Remedy**
- Delete the error with the “CLEAR ERROR” key
 - Then recover the tools of the affected axis in jog mode (in the opposite direction)

Error 412: Error Message from Drive of @ Axis

This error message is a general message since, in this case, it is a SERCOS error message. For detailed error messages and remedies, See section 5.2 SERCOS Drive Errors or the corresponding documentation "Notes Regarding Fault Clearance" of the drive families.

Cause SERCOS error diagnosis: @ axis

Remedy

- Eliminate the displayed error and delete the error by pressing the "CLEAR ERROR" key.

Error 461: Error in Encoder Switch of @ Axis

Cause When switching on the fly (G08 preselected) to another encoder system (G68 or G69), the end point can not be reached without changing direction.

Remedy

- Program a new end point that can be reached without changing direction in the switch block.

Error 462: Dynamic Traverse Range Limit of @ Axis Exceeded

Cause The axis has exceeded the traverse range limit or has approached the traverse range limit with a speed that just barely permits braking before the traverse range limit

Remedy

- Delete the error and jog the axis back into the travel range; if necessary, program a lower feed speed.

Error 463: Permissible Sensor Deflection of @ Axis Exceeded

Cause With the first encoder system active, the linear sensor was deflected further than specified in axis parameter Cxx.091 "Permissible sensor deflection".

Remedy

- Delete the error and check the NC program

Error 464: Second Encoder System @ Axis Without Ref.

Cause A switch to the second encoder system was made

- without first creating a reference for this encoder system, or
- the reference for this encoder system is no longer present.

Remedy

- Delete the error using CLEAR ERROR,
- then reset the control with CONTROL RESET, and
- create a reference for the second encoder system

5.2 SERCOS Drive Errors

The drive errors of the SERCOS participants are displayed directly on the drive. The error code is represented as a symbol in display H1 (HDS) and H1 / H2 (HDD). Depending on the operating modes and parameter settings, a variety of monitoring systems are executed. If a state is detected that no longer permits proper operation, an error message is generated.

Error class Errors can be classified in 4 different error classes. The error class can be seen in the diagnostics. It determines the reaction to the drive error.

Error class:	Diagnostic:	Drive reaction:
Fatal	F8xx	Torque safety isolation
Traverse range	F6xx	Setpoint speed value switched to zero
Interface	F4xx	According to set best-possible shutdown
Nonfatal	F2xx	According to set best-possible shutdown

Fig. 5-1: Error classes and drive reaction

Drive error reaction If an erroneous state is detected in the drive, the execution of a drive error reaction is automatically started as long as the drive is being controlled. The H1 display flashes with Fx / xx.

The drive reaction in the case of interface and nonfatal errors can be set with **P-0-0119, Best-possible shutdown**. The drive releases itself from torque at the end of each error reaction.

Deleting errors Errors are not cleared automatically; they can be deleted

- from the control by triggering command S-0-0099, Reset status class 1 or
- externally.

If the erroneous state is still present, the error is immediately detected again.

In order for the drive to be switched back on again, a positive flank on the control release signal is required.

Documentation In order to be able to clearly look up and interpret the error diagnostics of the drive, consult the following documents of the corresponding drives:

- DIAX04 – Notes Regarding Fault Clearance: SSE 03VRS
- DIAX04 – Notes Regarding Fault Clearance: SHS 03VRS
- ECODRIVE03 – Notes Regarding Fault Clearance: SMT 02VRS

6 Application Example

6.1 Settings

The application example is based on the application with a compound table and a surface sensor. The NC axis parameters and SERCOS drive parameters are to be set as follows.

Parameter	Description	Value
P-0-0075	Type of 2 nd encoder interface	2
P-0-0185	Function of 2 nd encoder	0
S-0-0053	Actual position value, encoder 2	0
S-0-0115	Position encoder type for encoder 2	x0x01001
S-0-0117	Resolution of external sensor	0.01 mm
S-0-0391	Monitoring window for 2 nd encoder	0
Cxx.088	Reference position for 2 nd encoder	0
Cxx.089	Pos. traverse range limit for encoder 2	+30 mm
Cxx.090	Neg. traverse range limit for encoder 2	0 mm
Cxx.91	Permitted sensor deflection	+5 mm

Fig. 6-1: Parameter settings for adaptive depth on compound table

The following illustration elucidates the application with a linear sensor. The required parameters or information can be found in the table above.

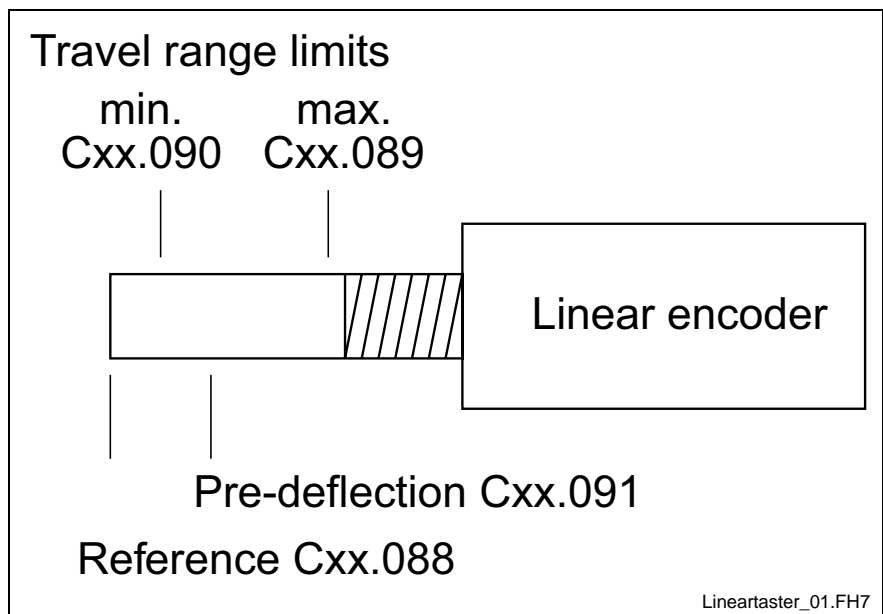


Fig. 6-2: Linear sensor

6.2 Application

The following program shows an application of adaptive depth. Here, switching occurs with the axes at a standstill. The performance and control enablement remain set after switching. The presets for this application are shown in Section 6.1 Settings. The figure below shows the arrangement at the beginning of movement. In this example, the reference mark is set to 0 mm. The counting direction of the 2nd encoder can be checked with **SERCOS parameter S-0-0053** (Actual position value of 2nd encoder).

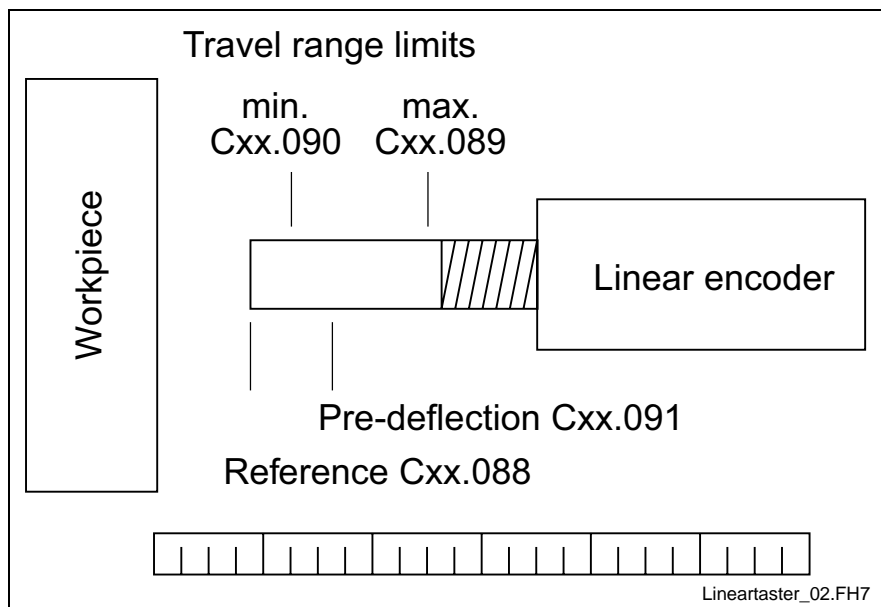


Fig. 6-3: Positions during the home position

```
[Data]
N0000 .START
N0001 G1 X185 Y100 F1500
N0002 G1 Y120 F500
N0003 G4 F2 (Dwell time before G69)
N0004 G69 Y1 F100 (Switch to 2nd encoder)
N0005 G1 Y23 F100 (Linear interpol 2nd encoder)
N0006 G1 Y16 F100 (Linear interpol 2nd encoder)
N0007 G68 Y1 F100 (Switch to 1st encoder)
N0008 G4 F2 (Dwell time after G68)
N0009 G1 Y100 F1500 (Linear interpol.)
N0010 G1 X0 Y0 F1500 (Linear interpol.)
N0011 RET (Program end with ret. jump)
N0012 .HOME
N0013 G1 X0 Y0 Z0 U0 F2500 (Zero driving of axes)
N0014 G74 U0 F500 (Referencing of axis U)
N0015 G68 Y0 F500 (Switch to 1st encoder)
N0016 G74 Y0 F500 (Ref of axis Y with 2nd enc.)
N0017 RET
```

Fig. 6-4 shows the arrangement in NC block N0003 before the encoder systems are switched. The following points must be heeded:

- The sensor deflection must not exceed the value programmed in **Cxx.091**.
- The traverse range limits must be observed; those of the 1st encoder system are checked even when movement is in the 2nd encoder system.

The switching procedure from encoder system 2 to encoder system 1 is similar to the reverse case; the following figure applies in this case also.

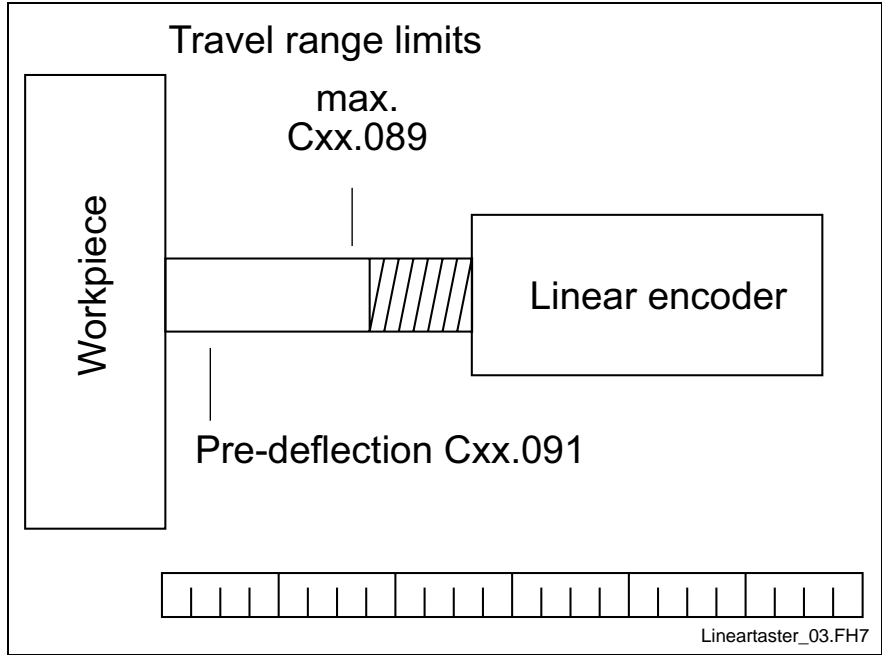


Fig. 6-4: Positions before switching to 2nd encoder system

The figure below shows the arrangement during movement in the 2nd encoder system. During movement, not only the traverse range limits of the 2nd encoder system (Cxx.089 and Cxx.090) are checked, but also those in the 1st encoder system (Cxx.011 and Cxx.012).

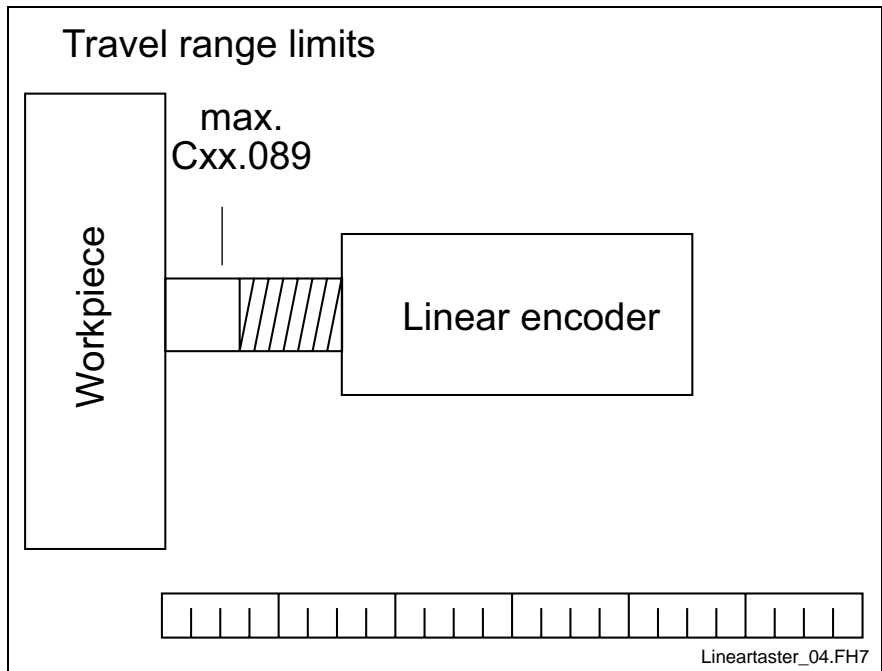


Fig. 6-5: Positions during movement in 2nd encoder system

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