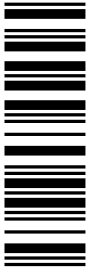


L-force *Runtime Software*



Software Manual

9400



Technology application "positioning sequence control"

Lenze

Overview of the technical documentation for Servo Drives 9400

Project planning, selecting & ordering

- ☐ 9400 Hardware Manual
- ☒ Catalogue / electronic catalogue (DSC - Drive Solution Catalogue)

Mounting & wiring

- ☒ MA 9400 StateLine/HighLine
- ☒ MA for communication module
- ☒ MA for extension module
- ☒ MA for safety module
- ☒ MA for accessories
- ☒ MA for remote maintenance components

Parameter setting

- ☒ BA keypad
- ☐ SW for Lenze »Engineer« software
- ☐ SW for controller (9400 StateLine/HighLine)
- ☐ SW for regenerative power supply module
- ☐ KHB for communication module
- ☐ SW for extension module
- ☐ SW for safety module
- ☐ SW for Lenze technology application
- ☐ SW 9400 function library

← This documentation

Configuring

- ☐ SW for Lenze »Engineer« software
- ☐ SW for controller (9400 HighLine)
- ☐ KHB for communication module
- ☐ SW for extension module
- ☐ SW for safety module
- ☐ SW for Lenze technology application
- ☐ SW 9400 function library

← This documentation

Commissioning of the drive

- ☒ Commissioning guide
- ☐ SW for controller (9400 StateLine/HighLine)
- ☐ Remote Maintenance Manual

Networking

- ☐ KHB for communication medium used

Legend:

- ☒ Printed documentation
- ☐ Online documentation (PDF/Engineer online help)

Abbreviations used:

- BA Operating Instructions
- KHB Communication Manual
- MA Mounting Instructions
- SW Software Manual

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1 About this documentation

This documentation contains information about the technology application "Positioning sequence control" for the Servo Drives 9400 series.



Note!

This documentation supplements the mounting instructions supplied with the controller, the hardware manual and the software manual for the controller.

The Mounting Instructions contain safety information which must be observed!

The information in this documentation applies to:

Technology application	Appl. ID	Required runtime software licence
Positioning sequence control	100602103	Motion Control TopLevel or higher

The technology application can be used with the following controllers:

Product series	Type designation	From hardware version	From software version
9400 Servo Drives	E94AxHExxx	PD	1.35

Target group

This documentation is directed at qualified personnel according to IEC 364.

Document history

Version			Description
1.0	04/2007	TD05	First edition
1.1	10/2008	TD05	New subchapter " Parameterisable function blocks "
1.2	03/2010	TD05	Error corrections & supplements

1.1 Conventions used

This documentation uses the following conventions to distinguish between different types of information:

Type of information	Writing	Examples/notes
Numbers		
Decimal separator	Point	The decimal point is always used. Example: 1234.56
Text		
Program name	» «	The Lenze PC software »Engineer«...
Window pane	<i>Italics</i>	The <i>Message window</i> ... / the <i>Options</i> dialog box...
Control element	Bold	The OK button... / The Copy command... / The Properties tab... / The Name input field...
Sequence of menu commands		If the execution of a function requires several commands, the individual commands are separated by an arrow: Select File→Open to...
Keyboard command	<Bold>	Use <F1> to open the Online Help. If a command requires a combination of keys, a "+" is placed between the key symbols: Use <Shift>+<ESC> to...
Program listings	Courier	<pre>IF var1 < var2 THEN a = a + 1 END IF</pre>
Keyword	Courier bold	
Hyperlink	<u>Underlined</u>	Optically highlighted reference to another topic. It is activated with a mouse click in this online documentation.
Symbols		
Page reference	 7	Optically highlighted reference to another page. It is activated with a mouse click in this online documentation.
Step-by-step instructions		Step-by-step instructions are indicated by a pictograph.

1.2 Definition of notes used

The following signal words and symbols are used in this documentation to indicate dangers and important information:

Safety instructions

Layout of safety instructions:



Danger!

(characterises the type and severity of danger)

Note

(describes the danger and suggests how to avoid the danger)

Pictograph	Signal word	Meaning
	Danger!	Danger of personal injury through dangerous electrical voltage Indicates an impending danger that may lead to death or severe personal injury if the corresponding measures are not taken.
	Danger!	Danger of personal injury through a general source of danger Indicates an impending danger that may lead to death or severe personal injury if the corresponding measures are not taken.
	Stop!	Danger of material damage Indicates a potential danger that may lead to material damage if the corresponding measures are not taken.

Application notes

Pictograph	Signal word	Meaning
	Note!	Important note for trouble-free operation
	Tip!	Useful tip for easy handling
		Reference to another document

2 Brief description

The technology application "Positioning sequence control" enables the drive to execute parameterisable travel profiles. The program sequence is defined by a sequence table.

Functions

- ▶ Sequence control for several successive positioning steps with a break and stop functions and different auxiliary functions (e. g. deriving, counting, waiting).
- ▶ Positioning in different positioning modes
 - Point-to-point positioning
 - Touch probe positioning (residual path positioning)
 - Profile chaining with velocity changeover (overchange)
- ▶ Homing in different homing modes
- ▶ Profile data management
 - Support of S profiles (jerk limitation)
 - Separate setting for acceleration and deceleration
 - "Teach" function
- ▶ Speed/acceleration override
- ▶ Path-dependent switching of outputs
- ▶ Following error monitoring
- ▶ Support of absolute value encoders
- ▶ Support of the basic drive functions "Manual jog" and "Quick stop"
- ▶ Monitoring of travel range limits with the basic drive function "Limiter"
- ▶ Optional control of a holding brake with the basic drive function "Brake control"

Application range

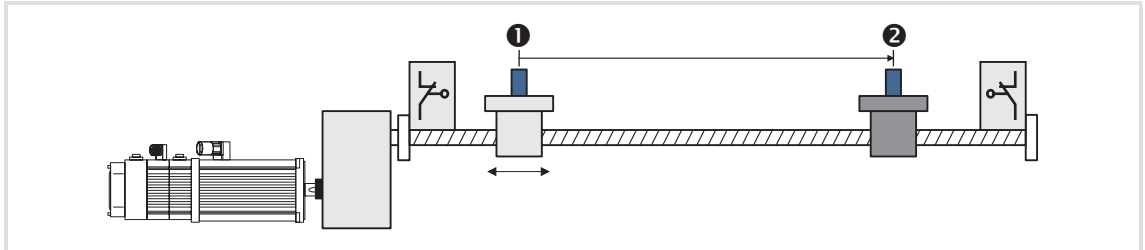
- ▶ Transport units
- ▶ Rotary tables
- ▶ Storage and retrieval units
- ▶ Feed drives
- ▶ Dosing machines
- ▶ Hoists

Required license/delivery

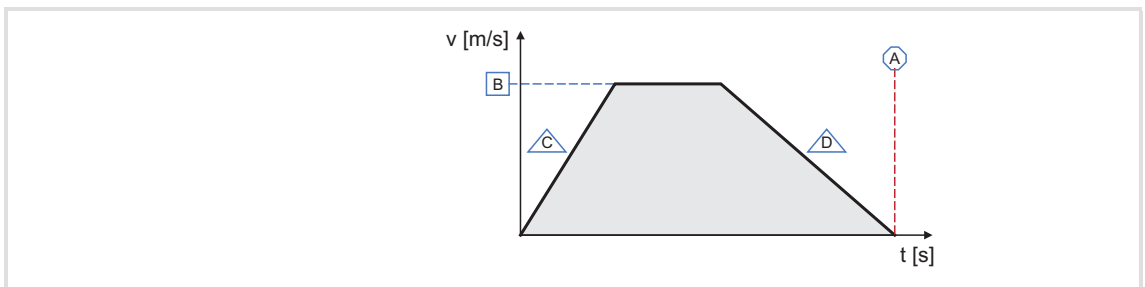
- ▶ License stage Motion Control TopLevel or higher required.
- ▶ The technology application can be selected in the »Engineer« application catalog.

3 Introduction

Positioning means to move a workpiece/tool or a piece of material from a starting position ❶ to a defined target ❷.



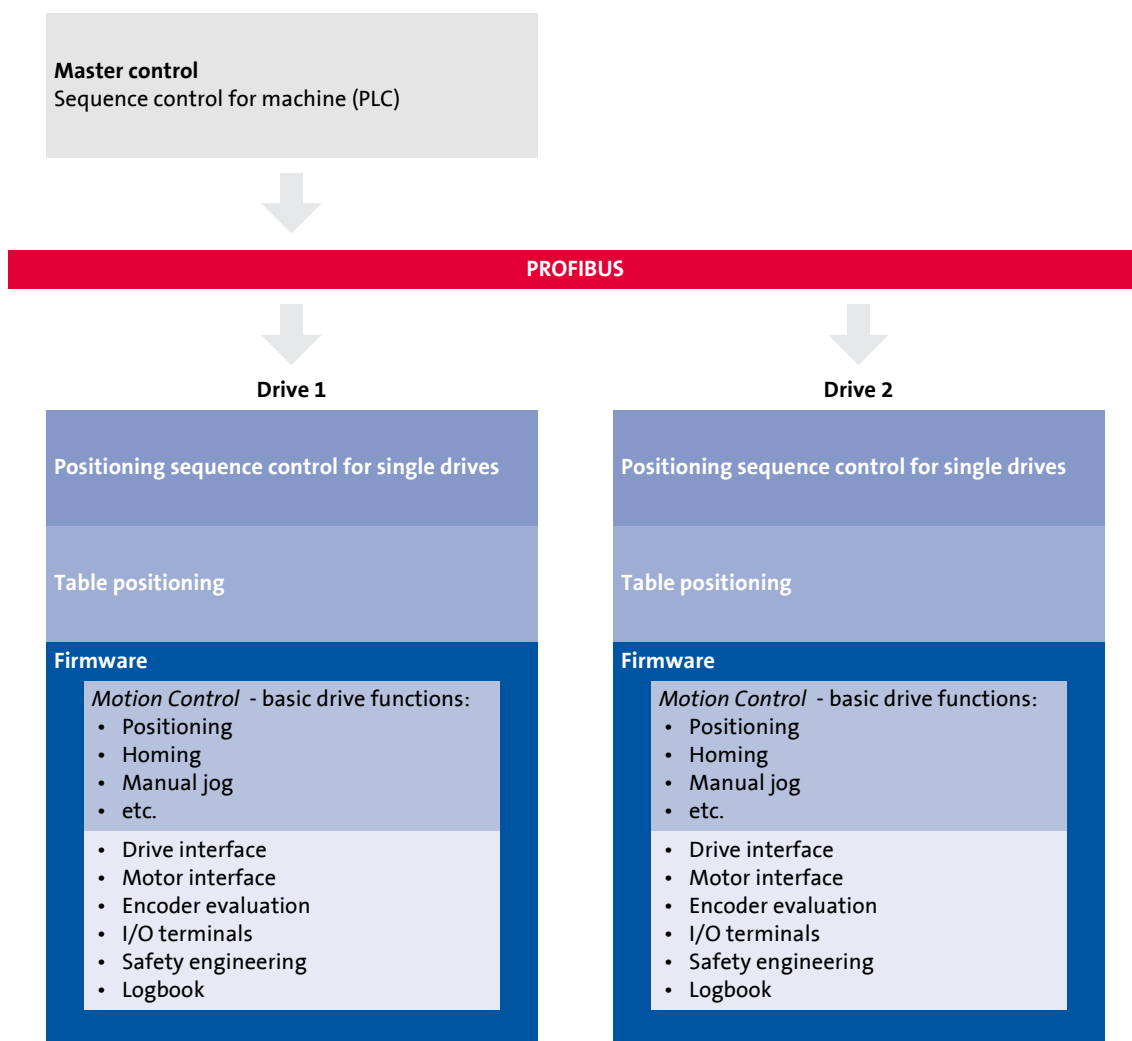
For this purpose a travel profile is to be provided in the controller, for which at least the following profile parameters are required:



Symbol	Profile parameters
❶	Position Target position or path distance to be traversed.
❷	Speed Maximum speed with which the target is to be approached.
❸	Acceleration Selection of the change in speed by which acceleration is to be carried out maximally.
❹	Deceleration Selection of the change in speed by means of which deceleration to standstill is to be maximally effected again.

- A positioning can consist of several profiles which are executed in a specified mode.
- For a detailed explanation of the profile parameters, please see the section "[Profile parameters](#)". (📖 44)

3.1 Example: Positioning sequence control with networking via PROFIBUS



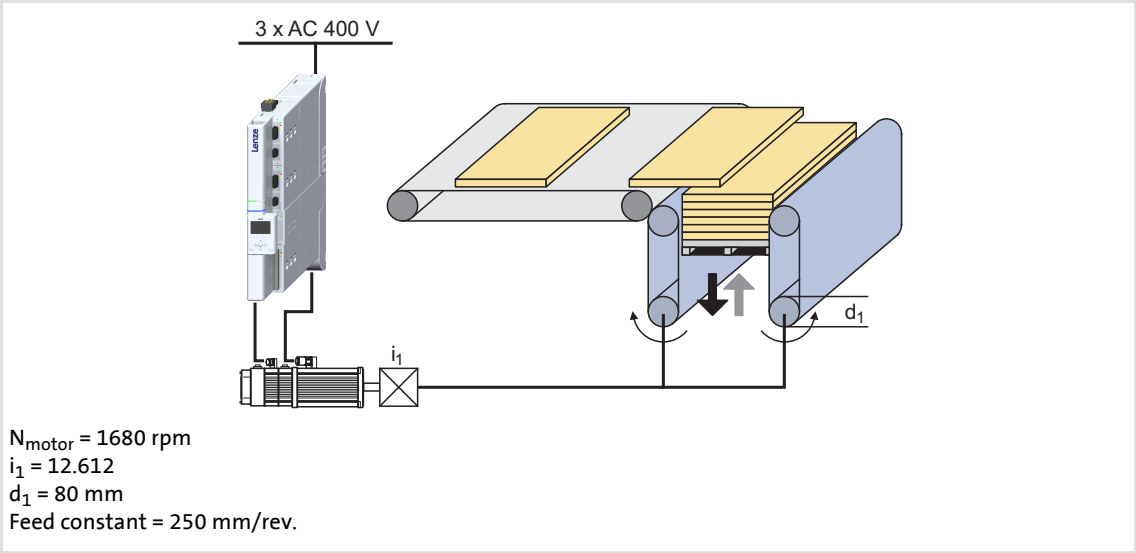
[3-1] Example: Positioning sequence control with networking via PROFIBUS

- ▶ The positioning sequence control utilises the traversing blocks of the table positioning and like this activates the basic function "Positioning" containing the profile generation.
- ▶ Here, the positioning sequence control only control the "own motor".
- ▶ The sequence of the motor/tool/material control are defined in the positioning sequence control.

4 Short setup

4.1 Application example

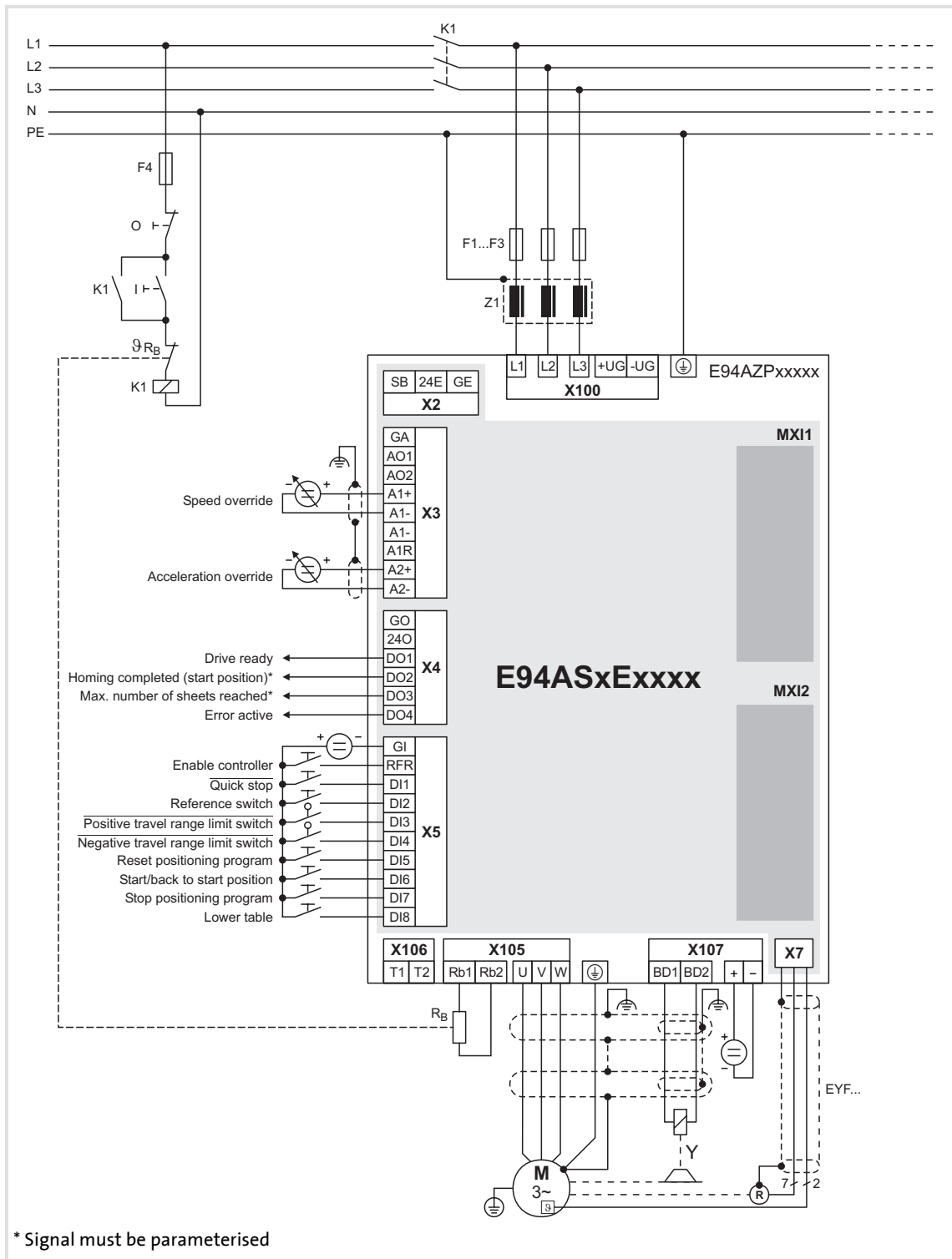
A sheet stacker is used as an application example for short setup:



[4-1] Schematic diagram

Component	Technical data	
Controller	9400 SingleDrive HighLine with brake module	
Motor	MDFKA-090-22, 60	
	Type:	Asynchronous servo motor
	Connection:	Y
	Power factor:	0.8
	Rated current:	8.5 A
	Rated frequency:	60 Hz
	Rated power:	3.8 kW
	Rated speed:	1680 rpm
	Rated voltage:	390 V
Brake	24 V DC	
Gearbox	GKS06	
	Gearbox factor:	12.612

4.2 Connection diagram



[4-2] Connection diagram

9400 Technology applications | Positioning sequence control

Short setup

Connection diagram

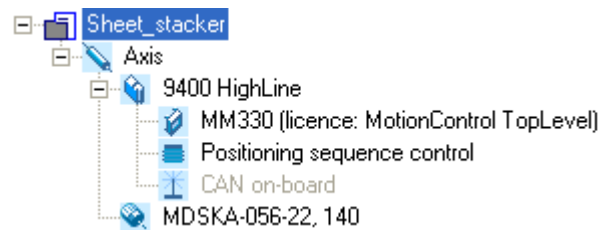
Designation	Component
E94ASxxxx	9400 Single Drive servo axis module
E94AZPxxxx	Mounting backplane
k1	Mains contactor
F1 ... F4	Fuses
Z1	Mains filter/RFI filter (option)
	HF-shield termination through large-surface connection to functional earth
EYF...	System cable for resolver feedback
R	Resolver
R_B	Brake resistor
Y	Motor holding brake (at optional motor brake control)

4.3 Sequence

1. After power-on, the drive indicates the status "Drive ready" by setting digital output DO1 to HIGH level.
2. After controller enable, the positioning program is started by setting digital input DI6 to HIGH level.
3. The table traverses upwards until reaching the home switch.
 - The home switch is 10 mm above the start position and connected to digital input DI2.
4. After the homing mark has been detected, the table traverses downwards until reaching the start position (first pick-up position).
5. The drive indicates the status "Homing completed/table in start position" by setting digital output DO2 to HIGH level.
6. The internal sheet counter is reset to zero and stacking can start.
7. When a sheet has been added, digital input DI8 changes to HIGH level.
 - After this, the table is lowered by one sheet thickness each.
8. 10 sheets can be piled up before the drive indicates the status "Maximum number of sheets reached" by setting digital output DO3 to HIGH level.
 - Then, the stack must be removed.
9. After the stack has been removed and digital input DI6 has been set to HIGH level, the table traverses back to the start position (first pick-up position).
 - A new stacking process can be started.

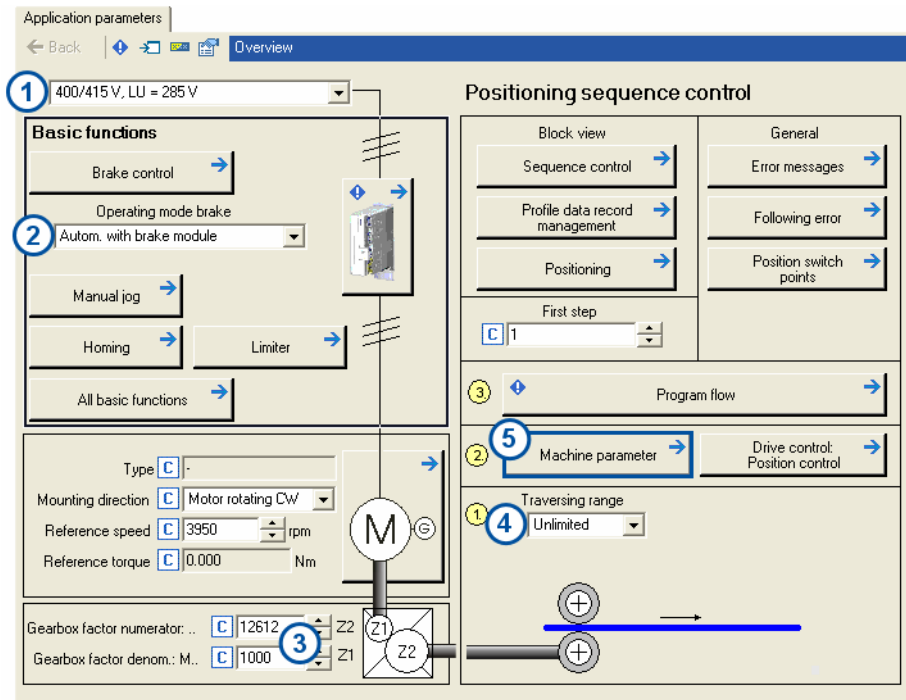
4.4 Step 1: Creating a project

1. Start »Engineer«.
2. Go to *Start-up wizard* and select the option "New project (empty)" and enter a name for the project in a next step.
3.  Insert the axis for the sheet stacker.
 - Add the corresponding components (controller, motor, extension module) to the axis.
 - Select the application "Positioning sequence control" for the controller.
 - Example *project view* in the »Engineer«:



4.5 Step 2: Parameterising the application

For parameterising the application in the »Engineer«, use the **Application parameters** tab which will be displayed by default when selecting the controller in the *project view*:



1. Select the mains voltage (C00173).
2. Activate automatic brake control via brake module (C02580 = "Autom. with brake module").
3. Enter gearbox ratio as a quotient (numerator and denominator): $i_1 = 12.612 = 12612 / 1000$
 - Numerator (C02520) = 12612
 - Denominator (C02521) = 1000
4. Select "Unlimited" as traversing range (C02528).
5. Click **Machine parameter** to change to the dialog level *Overview* → *Machine parameter* for further parameter setting.

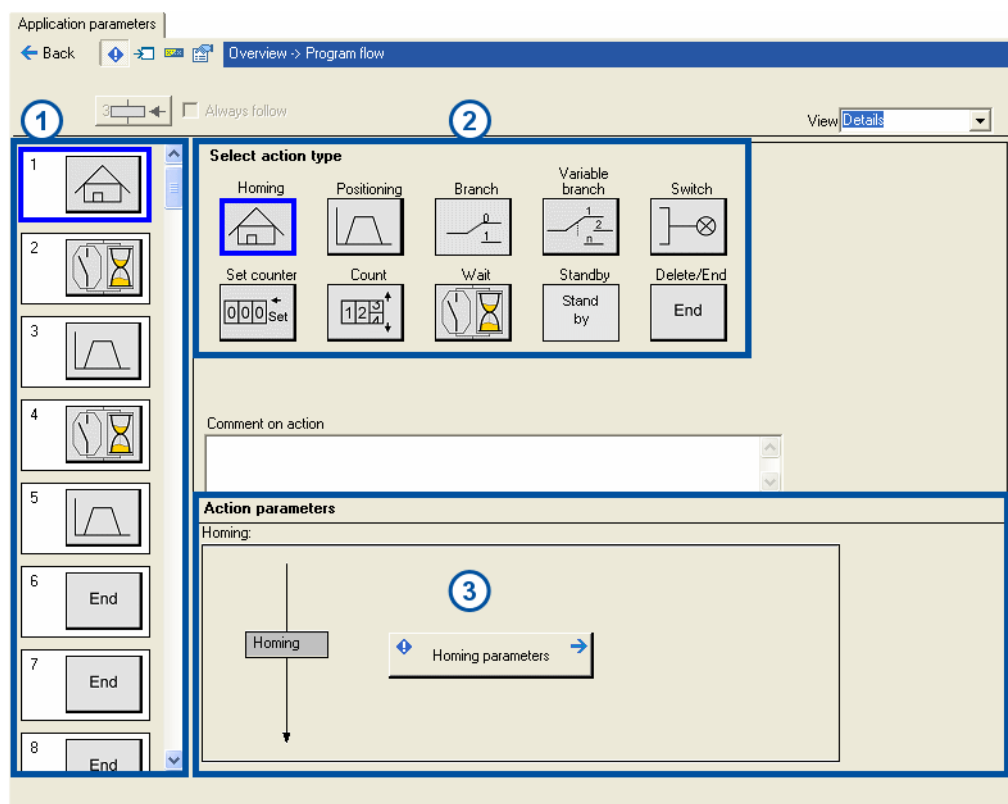
Setting the machine parameters

Go to dialog: [Overview](#)
[Machine parameter](#)

1. Set the selection "mm" as unit (C02525).
 - This parameter is used to define the real unit of the machine for the selection of physical values (e. g. speeds, accelerations and decelerations).
2. Set feed constant (C02524).
 - The feed constant corresponds to the motion of the machine at one revolution of the gearbox output shaft.
 - For the sheet stacker: Feed constant = 250 mm/rev.
3. Click **Back** to go back to the *Overview* dialog level.
4. In the *Overview* dialog level, click **Program flow** to change to the dialog level *Overview* → *Program flow* and select the positioning program.

4.6 Step 3: Parameterising the program flow

The program flow of the positioning sequence control is parameterised in the dialog level
Overview → Program flow:



Basic procedure

In the default setting the sequence table contains a small "Positioning program", which first rotates the axis 360° clockwise and afterwards 360° counter-clockwise.

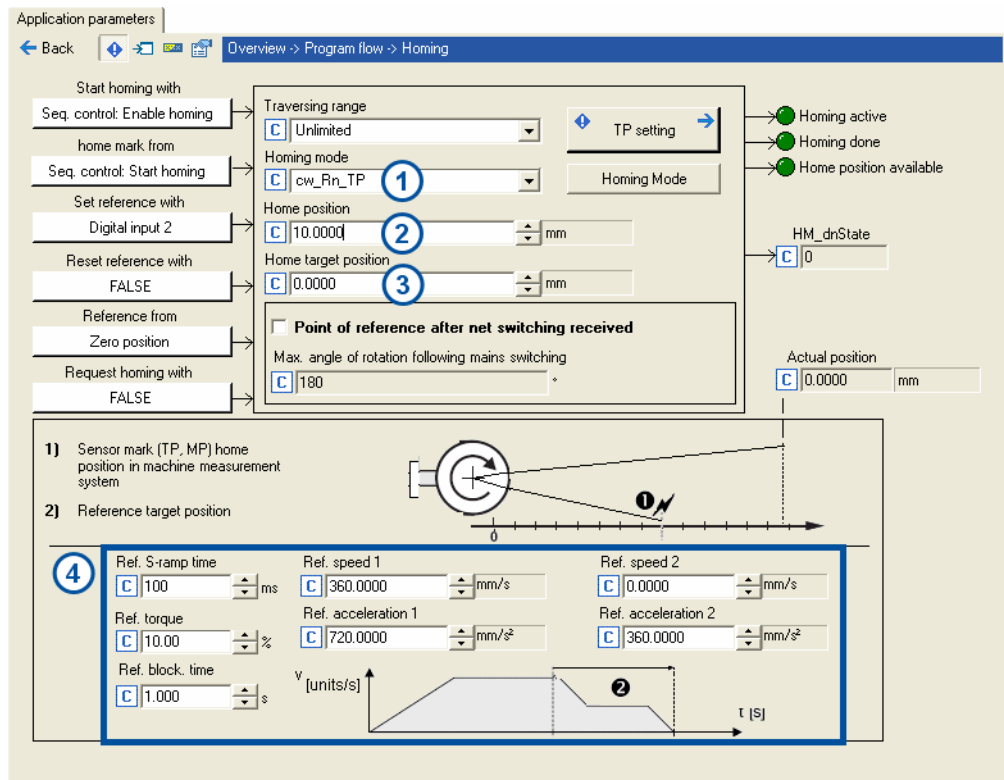
Proceed as follows to define the desired program flow:

1. Select the program step (1 100) to be edited on the left in the sequence table.
2. Select the action type for the selected program step by clicking it.
 - If the selected action type provides more than one action, the next free action will be automatically suggested in the **Selection Action Number** list field.
 - Enter a comment on the action (option).
3. Set parameters of the action.
 - If required, call the corresponding subsequent dialogs.
4. Repeat steps 1 ... 3 until all actions required for the program flow have been parameterised (see the following sections).
5. Click **Back** to go back to the *Overview* dialog level.

4.6.1 Program step 1: Homing

Action	Comment
	Homing with homing mark (home switch at digital input DI2), after homing, approach start position (0 mm).

The "Homing" action does not have its own parameters. The settings for homing are made via the parameters of the basic function "Homing":



The screenshot shows the 'Application parameters' window for the 'Homing' function. The window is divided into several sections:

- Start homing with:** Includes 'Seq. control: Enable homing' (set to 'home mark from'), 'Seq. control: Start homing' (set to 'Digital input 2'), 'Set reference with' (set to 'FALSE'), 'Reset reference with' (set to 'FALSE'), 'Reference from' (set to 'Zero position'), and 'Request homing with' (set to 'FALSE').
- Traversing range:** Set to 'Unlimited'.
- Homing mode:** Set to 'cw_Rn_TP' (labeled 1).
- Home position:** Set to '10.000' mm (labeled 2).
- Home target position:** Set to '0.000' mm (labeled 3).
- Point of reference after net switching received:** A checkbox that is currently unchecked.
- Max. angle of rotation following mains switching:** Set to '180'.
- TP setting:** A button labeled 'TP setting'.
- Homing Mode:** A button labeled 'Homing Mode'.
- Status indicators:** Three green circles indicating 'Homing active', 'Homing done', and 'Home position available'.
- HM_dhState:** A dropdown menu set to '0'.
- Actual position:** A dropdown menu set to '0.0000' mm.
- Reference parameters:** A section labeled 4 containing:
 - Ref. S-ramp time: 100 ms
 - Ref. torque: 10.00 %
 - Ref. block time: 1.000 s
 - Ref. speed 1: 360.0000 mm/s
 - Ref. acceleration 1: 720.0000 mm/s²
 - Ref. speed 2: 0.0000 mm/s
 - Ref. acceleration 2: 360.0000 mm/s²
- Diagram:** A diagram at the bottom shows a motor and a position axis with a homing mark. The axis is labeled 'v [units/s]' and 't [s]'. A graph shows a trapezoidal profile with a peak at '2'.

1. Select "cw_Rn_TP" as homing mode (C02640).
2. Select the position of the home switch (10 mm) as home position (C02642).
3. Select the position of the first sheet (0 mm) as home target position (C02643).
4. If necessary, adapt the profile parameters for homing to your application.

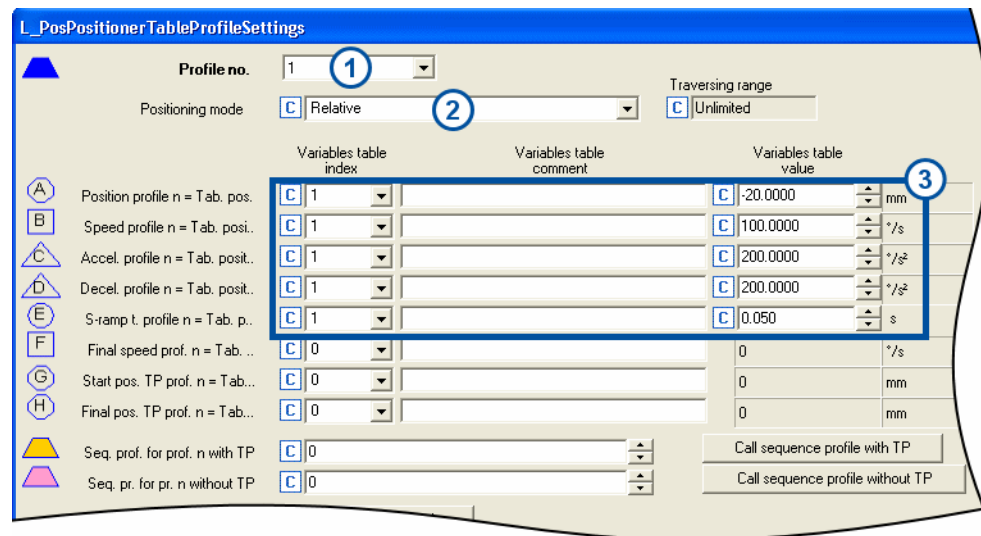
4.6.2 Program step 2: Setting counter 1 to "0"

Action	Comment	Parameter	Setting
	Step 2: Set counter 1 to "0".	Selection Action Number:	1
		Counter no.:	1
		Start value:	0

4.6.3 Program step 3: Positioning action 1

Action	Comment	Parameter	Setting
	When input 8 of sequence control is set to "1", lower table relatively by 20 mm. In the Lenze setting, sequence control input 8 is connected to digital input DI8.	Selection Action Number:	1
		Start with:	Input 8
		Profile no.:	1
		Jump destination:	0

Click **Profile settings** to open the following dialog box:



1. Select Profile no. 1.
2. Select "Relative" as positioning mode.
3. Select the profile parameters as described above.
4. Click **Back** to close the dialog box again.

4.6.4 Program step 4: Counting the sheets

Action	Comment	Parameter	Setting
	Count the sheets and go back to program step 3, unless 10 sheets are reached.	Selection Action Number:	1
		Counter no.:	1
		Comparison function:	Count < comparison value
		Step value:	1
		Comparison value:	10
		Sequence step:	3

4.6.5 Program step 5: Setting the status output

Action	Comment	Parameter	Setting
	Set sequence control output 1 to "1", when maximum number of sheets (10) is reached.	Selection Action Number:	1
		Output for A switching:	Output 1
		Signal state for A switching:	
		Output for B switching:	Deactivated
		Signal state for B switching:	



Tip!

In a later step, sequence control output 1 will be connected with digital output DO3.

4.6.6 Program step 6: Positioning action 2

Action	Comment	Parameter	Setting
	When sequence control input 6 is set to "1", go back to start position.	Selection Action Number:	2
		Start with:	Input 6
		Profile no.:	2
		Jump destination:	0



Tip!

In a later step, sequence control input 6 will be connected with digital input DO6.

Click **Profile settings** to open the following dialog box:

1. Select Profile no. 2.
2. Select "Absolute" as positioning mode.
3. Select the profile parameters as described above.
4. Click **Back** to close the dialog box again.

4.6.7 Program step 7: Resetting the status output

Action	Comment	Parameter	Setting
	Reset sequence control output 1 to "0", when start position is reached.	Selection Action Number:	2
		Output for A switching:	Output 1
		Signal state for A switching:	
		Output for B switching:	Deactivated
		Signal state for B switching:	

4.6.8 Program step 8: Going back to program step 2

Action	Comment	Parameter	Setting
	Go back to program step 2.	Selection Action Number:	1
		Jump input:	Continue with next step
		Jump destination:	2

4.7 Step 4: Parameterising the multiplexer for the digital outputs

1. Go to the **All parameters** tab.
2. Set the following multiplexer parameters:

Parameter		Setting
C03100/2	X digital output 2 of	Homing completed
C03100/3	X digital output 3 of	Sequence control output 1

4.8 Step 5: Transferring the application to the controller



Note!

The transferred application is always stored in the first application memory location in the memory module of the controller.

The preinstalled technology applications on the following memory locations are still available.

1.  Update devices.
 - Set the checkmark in the control field **Recreate all**.
 - Click **Create** to start the compiling process.
2.  Go online and transfer the application to the controller.
 - With an online connection, the »Engineer« displays the current controller parameter settings with a yellow background colour.

4.9 Step 6: Controlling the application via terminals

Terminal assignment

Terminal	Signal (Lenze setting)
X3	AI1- AI1+ Selection for speed override ‣ Speed/acceleration override (📖 53)
	AI2- AI2+ Selection for acceleration override ‣ Speed/acceleration override (📖 53)
X5	DI1 Quick stop • If DI1 is set to LOW level, the positioning program is interrupted and drive is decelerated to standstill within the deceleration time set for the quick stop function independent of the setpoint selection. • After the quick stop function is deactivated, a new LOW/HIGH edge is required at DI6 in order that the positioning program is continued with the next step. ‣ Quick stop (📖 56)
	DI2 Connection of reference switch/touch probe sensor ‣ Action type "Homing" (📖 36)
	DI3 Connection of travel range limit switch for basic function " Limiter ". (📖 57)
	DI4 • DI3 = positive travel range limit switch, DI4 = negative travel range limit switch. • The inputs respond to the FALSE state (fail-safe).
	DI5 Reset error and positioning program • By means of a LOW-HIGH edge an existing error status can be reset if the cause of the fault is removed. At the same time the positioning program is reset.
	DI6 Start positioning program/back to start position ‣ Control of the sequence table (📖 43)
	DI7 Stop positioning program (break) ‣ Control of the sequence table (📖 43)
DI8	Lower table

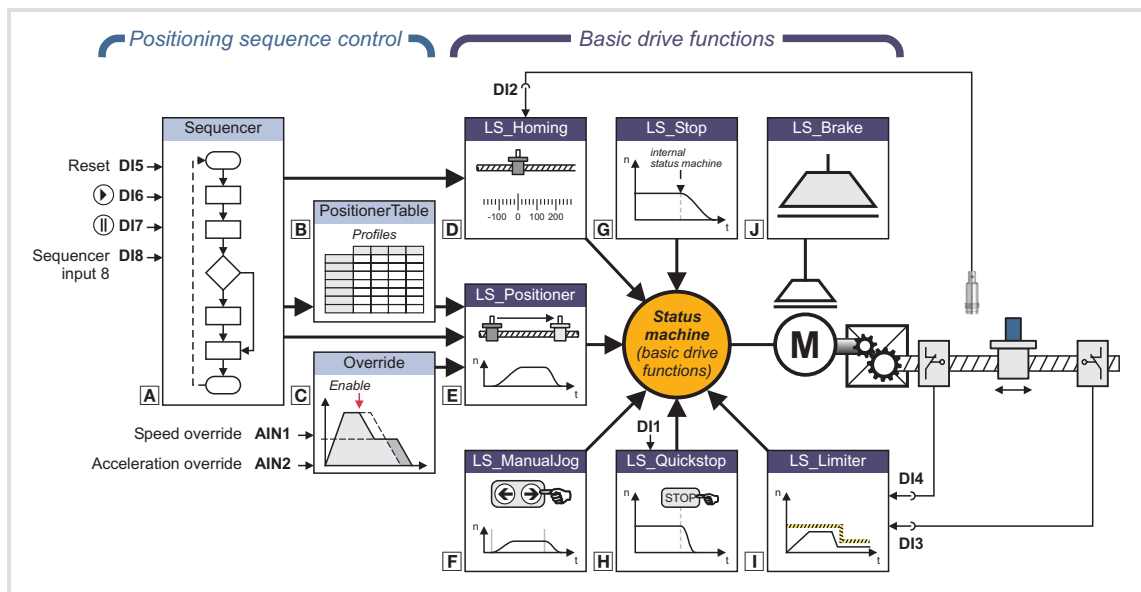
Procedure

1. Enable controller: Set digital input RFR to HIGH level.
2. Deactivate quick stop: Set digital input DI1 to HIGH level.
3. Start sequence control: Set digital input DI6 to HIGH level.

5 Parameter setting & configuration

5.1 Basic signal flow

The functional core of the positioning sequence control is formed by the sequence table and the profile data management, which transmit the required control signals and profile data to the basic drive function "Positioning".



[5-1] Signal flow of the TA "Positioning sequence control" (schematic diagram)

Positioning sequence control

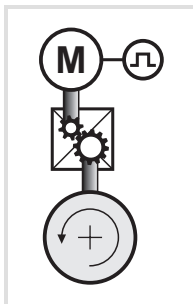
- A** Sequence table
- B** Profile data management
- C** Speed/acceleration override

Basic drive functions

- D** Homing
- E** Positioning
- F** Manual jog
- G** Stop
- H** Quick stop
- I** Limiter
- J** Brake control (optional)

5.2 Basic settings

5.2.1 Machine parameters



The machine parameters describe e.g. the motor end of the mechanics used.

The setting of the machine parameters in the »Engineer« is carried out on the **Application parameters** tab in the dialog level *Overview* → *Machine parameters*.



Tip!

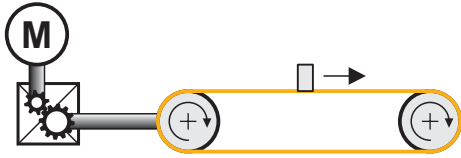
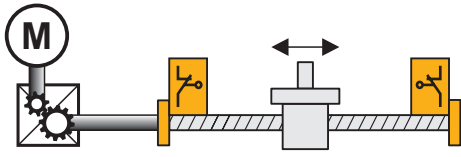
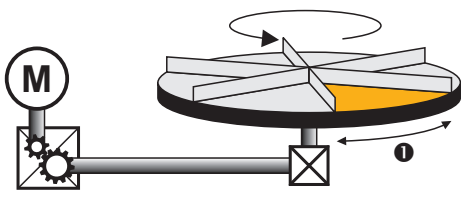
In the »Engineer« the most important machine parameters can be directly adapted to the machine on the **Application parameters** tab in the topmost *Overview* dialog level.

Short overview of machine parameters

Parameter		Lenze setting	
		Value	Unit
C00173	Mains voltage	400/415	V
C00174	Undervoltage (LU) threshold	285	V
C00600	Resp. to DC bus overvoltage	Trouble	
C02520	Gearbox factor numerator: Motor	1	
C02521	Gearbox factor denom: Motor	1	
C02527	Motor mounting direction	Motor rotating CW	
C02570	Position control structure	Phase control	
C02522	Gearbox factor num.: Pos. enc.	1	
C02523	Gearbox factor denom.: Pos. enc.	1	
C02529	Mounting direction of position encoder	Encoder rotating CW	
Description of the mechanics (load, tool)			
C02528	Traversing range	Limited	
C02524	Feed constant	360.0000	unit
C02525	Unit	°	
C02526	User-defined unit	°	
C02533	Time unit	s	
C00273/1	Motor moment of inertia	Motor-dependent	kg cm ²
C00273/2	Load moment of inertia	0.00	kg cm ²

5.2.2 Traversing range

By setting the traversing range the machine type/measuring system is set:

Traversing range	
Unlimited 	The drive can traverse optionally in both directions without reaching limitations. - Positioning here generally is effected in the positioning modes "Relative with/without TP" or "Speed with/without TP". - The positioning measuring system is reset to zero with every new positioning process. - By homing, the positioning measuring system receives a fixed reference point (zero point), so that also the positioning modes "Absolute with/without TP" can be used. Then also the software limit positions for limiting the traversing range are provided.
Limited 	After reaching the position limits, the drive must travel in the opposite direction again. - For positioning, the home position has to be known. By homing, the positioning measuring system receives a fixed reference point (zero point). - Basically, monitoring to the internally maximum usable value range ($\pm 2^{31}$ increments) takes place (software limit position monitoring of the internal value range). An overflow of the value range results in the loss of the home position. - Additionally parameterisable software limit positions can be activated on the user side for limiting the travel range.
Modulo 	The measuring system is repeated. - If the cycles ① set are exceeded a defined overflow occurs. The cycle typically corresponds to a rotation or tool distance in a rotative system. - For positioning, the home position has to be known. - Software limit positions are not effective. - Absolute targets can be approached by exceeding the measuring system limit, e.g. from 10° via 0° to 350°.

► Parameter setting: Tab **Application parameters** → dialog level *Overview*

Parameter		Lenze setting	
		Value	Unit
C02528	Traversing range	Limited	
C02536	Cycle (only relevant for traversing range "Modulo")	360.0000	unit

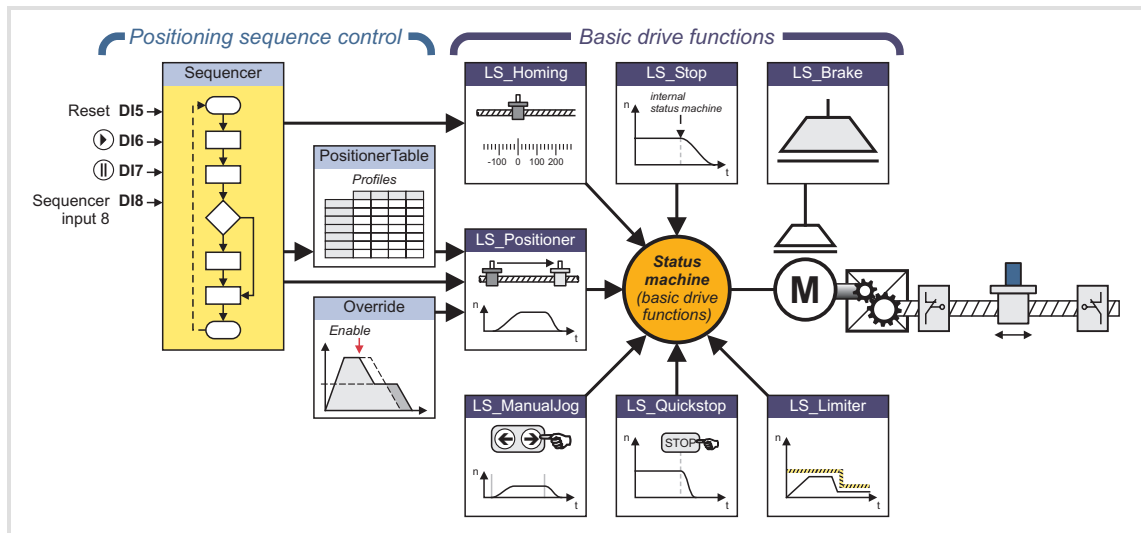
5.2.3 Position control

In the dialog level *Overview* → *LS_Positioner* and the subordinate dialog levels, you can adapt the parameters for the position control, if necessary.

Parameter		Lenze setting	
		Value	Unit
C00254	Phase controller gain	20.00	1/s
C02553	Position controller gain	20.00	1/s
C02556	Position controller limitation	214748.3647	unit/s

5.3 Program flow

The program flow of the positioning sequence control is selected according to a sequence table which can contain up to 100 references to "actions".



[5-2] Sequence table (schematic diagram)

What is an action?

- ▶ An action comprises a clear functionality which is described with a few parameters.
- ▶ Different action types are available which serve to implement, for instance, program branching, switching operations, waiting times and counters.



- ▶ Before every action type a defined number of actions is available which can be individually parameterised. The parameters of the actions of the same type only differ in the subcode.
- ▶ An action can be used in several steps if always exactly the same task is to be carried out.
- ▶ After an action has been processed, the action in the next step of the sequence table is automatically processed unless it is jumped to another step in the sequence table due to a branch.
- ▶ One action can be maximally processed per computing cycle.

5.3.1 Overview of action types

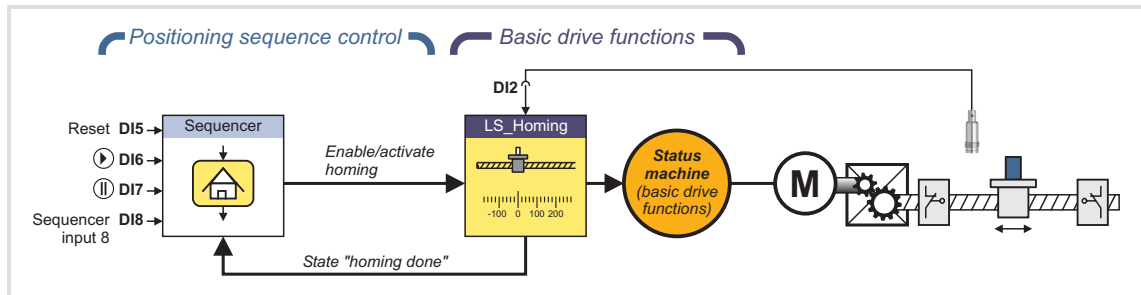
Action type	Function/parameter		
Homing			
	In order to execute a homing process, the action type "Homing" is available which activates the basic function "Homing". Note: The "Homing" action does not have its own parameters. The settings for homing are made via the parameters of the basic function "Homing".		
Positioning			
	To execute a profile, 50 actions of the "Positioning" type are available. The execution of the adjusted profile is only started with activated waiting function if the sequencer input selected for the waiting function accepts the selected signal state. ▶ Sequencer inputs (📖 40)		
	Parameter		Information
	C04513/1...50	Profile number	Specification of the profile to be executed. - Press the "Set up profile" button to open a dialog box to enter the corresponding profile parameters. - In this dialog a sequence profile can also be set.
	C04511/1...50	Input for waiting function	Sequencer input 1 ... 32 to be evaluated. With the default setting "0" the waiting function is skipped and the profile execution is started immediately.
	C04512/1...50	Signal state for waiting function	Profile processing is only started when the sequencer input to be evaluated is in this state.
	C04514/1...50	Sequence step	Step inside the sequence table which will be processed after the profile has been executed.
	C04515/1...50	Watchdog time	Monitoring time within which positioning must be completed. Otherwise, a branch to the watchdog sequence step defined in C04516 is executed.
	C04516/1...50	Watchdog sequence step	Executed when the watchdog time has expired.
Branching			
	25 actions of type "Branching" are available for conditional and unconditional branches (jumps). A branch to the indicated step is executed when the selected sequencer input has the selected signal state at the time of processing. If not, the sequence step is processed in the sequence table. ▶ Sequencer inputs (📖 40)		
	Parameter		Information
	C04530/1...25	Input for comparison	Sequencer input 1 ... 32 to be evaluated. With the default setting "0" a branch to the adjusted sequence step is executed.
	C04531/1...25	Comparison value	State in which the sequencer input to be evaluated is compared.
	C04532/1...25	Sequence step in case of equality	If the sequencer input to be evaluated equals the comparison value, a branch to the step set here is executed. In case of inequality or "0" setting, the next step in the sequence table is processed.

Action type	Function/parameter																	
Variable branching																		
	For variable branches (jumps) 5 actions of type "Variable branching" are available.																	
	- The branch to one of 20 possible steps is executed depending on the value in C03001 ... C03005 at the time or processing. - The parameters C03001 ... C03005 are firmly assigned to the five available actions: –C03001 determines the branch for action 1. –C03002 determines the branch for action 2, etc.																	
	Example: If C03002 is assigned to the value "15" at the time of processing the action no. 2, it is branched to the step which is entered in the parameter "Sequence step at branch value 15" for action no. 2 (C04554/2).																	
	<table><tr><th colspan="2">Parameter</th><th>Information</th></tr><tr><td>C04540/1...5</td><td>Sequence step at branch value 1</td><td>Step which is executed next when C03001 ... C03005 = "1". - With the default setting "0" the branching is deactivated (sequence step is processed). </td></tr><tr><td>C04541/1...5</td><td>Sequence step at branch value 2</td><td>Step which is executed next when C03001 ... C03005 = "2". - In the default setting "0", branching is deactivated and the next step in the sequence table is processed. </td></tr><tr><td>...</td><td>...</td><td>...</td></tr><tr><td>C04559/1...5</td><td>Sequence step at branch value 20</td><td>Step which is executed next when C03001 ... C03005 = "20". - In the default setting "0", branching is deactivated and the next step in the sequence table is processed. </td></tr></table>			Parameter		Information	C04540/1...5	Sequence step at branch value 1	Step which is executed next when C03001 ... C03005 = "1". With the default setting "0" the branching is deactivated (sequence step is processed).	C04541/1...5	Sequence step at branch value 2	Step which is executed next when C03001 ... C03005 = "2". In the default setting "0", branching is deactivated and the next step in the sequence table is processed.	...	...	...	C04559/1...5	Sequence step at branch value 20	Step which is executed next when C03001 ... C03005 = "20". In the default setting "0", branching is deactivated and the next step in the sequence table is processed.
	Parameter		Information															
C04540/1...5	Sequence step at branch value 1	Step which is executed next when C03001 ... C03005 = "1". With the default setting "0" the branching is deactivated (sequence step is processed).																
C04541/1...5	Sequence step at branch value 2	Step which is executed next when C03001 ... C03005 = "2". In the default setting "0", branching is deactivated and the next step in the sequence table is processed.																
...	...	...																
C04559/1...5	Sequence step at branch value 20	Step which is executed next when C03001 ... C03005 = "20". In the default setting "0", branching is deactivated and the next step in the sequence table is processed.																
Switching																		
	In order to switch digital output signals 25 actions of type "Switching" are available.																	
	Each action can set two selectable sequencer outputs independently of each other to FALSE or TRUE. ▶ Sequencer outputs (41)																	
	<table><tr><th colspan="2">Parameter</th><th>Information</th></tr><tr><td>C04520/1...25</td><td>Output for A switching</td><td>Sequencer output 1 ... 32 to be switched. - With the setting "0" switching is deactivated. </td></tr><tr><td>C04521/1...25</td><td>Signal state for A switching</td><td>State to which the sequencer output is to be set.</td></tr><tr><td>C04522/1...25</td><td>Output for B switching</td><td>Sequencer output 1 ... 32 to be switched. - With the setting "0" switching is deactivated. </td></tr><tr><td>C04523/1...25</td><td>Signal state for B switching</td><td>State to which the sequencer output is to be set.</td></tr></table>			Parameter		Information	C04520/1...25	Output for A switching	Sequencer output 1 ... 32 to be switched. With the setting "0" switching is deactivated.	C04521/1...25	Signal state for A switching	State to which the sequencer output is to be set.	C04522/1...25	Output for B switching	Sequencer output 1 ... 32 to be switched. With the setting "0" switching is deactivated.	C04523/1...25	Signal state for B switching	State to which the sequencer output is to be set.
	Parameter		Information															
	C04520/1...25	Output for A switching	Sequencer output 1 ... 32 to be switched. With the setting "0" switching is deactivated.															
C04521/1...25	Signal state for A switching	State to which the sequencer output is to be set.																
C04522/1...25	Output for B switching	Sequencer output 1 ... 32 to be switched. With the setting "0" switching is deactivated.																
C04523/1...25	Signal state for B switching	State to which the sequencer output is to be set.																
Set counter																		
	10 actions of type "Set counter" are available for setting one of the 10 available counters to a certain starting value.																	
	- The 10 actions of type "Set counter" are not firmly assigned to the 10 actions of the "Counting" type. - You can use, for instance, an action of type "Set counter" to set a counter to a value and later you can set the same counter with another action of type "Set counter" to another value.																	
	<table><tr><th colspan="2">Parameter</th><th>Information</th></tr><tr><td>C04580/1...10</td><td>Counter selection</td><td>With the setting "0" the setting of the counter is deactivated.</td></tr><tr><td>C04581/1...10</td><td>New counter content</td><td>-2147483648 ... 2147483648</td></tr><tr><td>C04582/1...10</td><td>Current counter content</td><td>Read only</td></tr></table>			Parameter		Information	C04580/1...10	Counter selection	With the setting "0" the setting of the counter is deactivated.	C04581/1...10	New counter content	-2147483648 ... 2147483648	C04582/1...10	Current counter content	Read only			
	Parameter		Information															
	C04580/1...10	Counter selection	With the setting "0" the setting of the counter is deactivated.															
C04581/1...10	New counter content	-2147483648 ... 2147483648																
C04582/1...10	Current counter content	Read only																

Action type	Function/parameter												
Count													
	25 actions of type "Count" are available for counting processes. - With each action processing the counter content of the counter selected is increased or reduced by the specified step value depending on the setting (count upwards or downwards). - When the comparison condition for comparing the counter content with an adjustable comparison value is fulfilled, a branch to any step is possible. 10 actions of type "Set counter" are available for setting a counter to a starting value.												
	<table><tr><th>Parameter</th><th>Information</th></tr><tr><td>C04590/1...25</td><td>Counter selection With the setting "0" the setting of the counter is deactivated.</td></tr><tr><td>C04591/1...25</td><td>Step value Value by which the counter is increased or reduced. - Range: -2147483648 ... 2147483648 </td></tr><tr><td>C04592/1...25</td><td>Comparison value Value with which the counter is compared. - Range: -2147483648 ... 2147483648 </td></tr><tr><td>C04593/1...25</td><td>Sequence step When the set comparison condition is met, a branch to the step set here is executed. If the condition is not met, the next step in the sequence table is processed instead.</td></tr><tr><td>C04594/1...25</td><td>Comparison condition Selection of the condition for the comparison of the counter content with the comparison value.</td></tr></table>	Parameter	Information	C04590/1...25	Counter selection With the setting "0" the setting of the counter is deactivated.	C04591/1...25	Step value Value by which the counter is increased or reduced. Range: -2147483648 ... 2147483648	C04592/1...25	Comparison value Value with which the counter is compared. Range: -2147483648 ... 2147483648	C04593/1...25	Sequence step When the set comparison condition is met, a branch to the step set here is executed. If the condition is not met, the next step in the sequence table is processed instead.	C04594/1...25	Comparison condition Selection of the condition for the comparison of the counter content with the comparison value.
	Parameter	Information											
	C04590/1...25	Counter selection With the setting "0" the setting of the counter is deactivated.											
	C04591/1...25	Step value Value by which the counter is increased or reduced. Range: -2147483648 ... 2147483648											
	C04592/1...25	Comparison value Value with which the counter is compared. Range: -2147483648 ... 2147483648											
	C04593/1...25	Sequence step When the set comparison condition is met, a branch to the step set here is executed. If the condition is not met, the next step in the sequence table is processed instead.											
C04594/1...25	Comparison condition Selection of the condition for the comparison of the counter content with the comparison value.												
Wait													
	25 actions of type "Wait" are available for the insertion of wait times into the program flow. The sequence step is only processed after the waiting time has elapsed or when the selected sequencer input has the selected signal state at the time of processing. ▶ Sequencer inputs (40)												
	<table><tr><th>Parameter</th><th>Information</th></tr><tr><td>C04571/1...25</td><td>Waiting time With setting "0", the waiting time is deactivated.</td></tr><tr><td>C04572/1...25</td><td>Input for waiting function Sequencer input 1 ... 32 to be evaluated. The sequence step will be processed when this input has the set state, but no later than after the set waiting time has elapsed. </td></tr><tr><td>C04573/1...25</td><td>Signal state for waiting function Required state for completing the waiting function.</td></tr></table>	Parameter	Information	C04571/1...25	Waiting time With setting "0", the waiting time is deactivated.	C04572/1...25	Input for waiting function Sequencer input 1 ... 32 to be evaluated. The sequence step will be processed when this input has the set state, but no later than after the set waiting time has elapsed.	C04573/1...25	Signal state for waiting function Required state for completing the waiting function.				
	Parameter	Information											
	C04571/1...25	Waiting time With setting "0", the waiting time is deactivated.											
C04572/1...25	Input for waiting function Sequencer input 1 ... 32 to be evaluated. The sequence step will be processed when this input has the set state, but no later than after the set waiting time has elapsed.												
C04573/1...25	Signal state for waiting function Required state for completing the waiting function.												
Stand-by													
	5 actions of type "Stand-by" are available for the temporary activation of a setpoint follower. - For a sensible use of the "Standby" action, appropriate signal combinations are required in the (enabled) function block editor. - The setpoint follower is enabled until the condition for exiting the stand-by is met.												
	<table><tr><th>Parameter</th><th>Information</th></tr><tr><td>C04601/1...5</td><td>Input for "Stand-by" end Sequencer input 1 ... 32 to be evaluated.</td></tr><tr><td>C04602/1...5</td><td>Signal state for "Stand-by" end Only if the sequencer input to be evaluated has this state, the standby step is exited, and the next step in the sequence table is processed.</td></tr></table>	Parameter	Information	C04601/1...5	Input for "Stand-by" end Sequencer input 1 ... 32 to be evaluated.	C04602/1...5	Signal state for "Stand-by" end Only if the sequencer input to be evaluated has this state, the standby step is exited, and the next step in the sequence table is processed.						
	Parameter	Information											
C04601/1...5	Input for "Stand-by" end Sequencer input 1 ... 32 to be evaluated.												
C04602/1...5	Signal state for "Stand-by" end Only if the sequencer input to be evaluated has this state, the standby step is exited, and the next step in the sequence table is processed.												
Program end													
	To define the program end in the sequence table or delete a program step, the action of type "Program end" is available.												

5.3.2 Action type "Homing"

In order to execute a homing process, the action type "Homing" is available for the sequence table which activates the basic function "Homing".



[5-3] "Homing" (schematic diagram for limited traversing range)



Note!

The "Homing" action for the sequence table does not have its own parameters. The settings for homing are made via the parameters of the basic function "Homing".

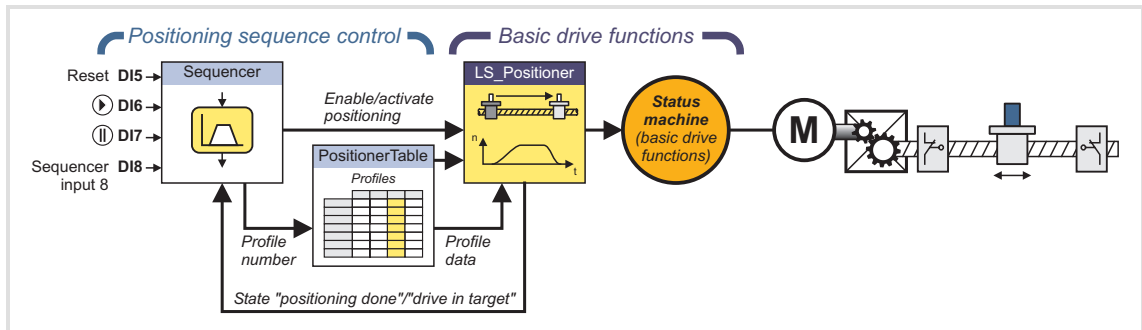
► Parameter setting: Tab **Application parameters** → dialog level *Overview* → *Homing*

Parameter		Lenze setting	
		Value	Unit
C02528	Traversing range	Limited	
C02640	Homing mode	Set home pos. directly	
C02642	Home position	0.0000	unit
C02643	Homing: Target position	0.0000	unit
C02644	Homing: Speed 1	360.0000	unit/s
C02645	Homing: Acceleration 1	720.0000	unit/s ²
C02646	Homing: Speed 2	180.0000	unit/s
C02647	Homing: Acceleration 2	360.0000	unit/s ²
C02648	Homing: S-ramp time	100	ms
C02649	Homing: Torque limit	10.00	%
C02650	Homing: Blocking time	1.000	s
C02652	Ref. pos. after mains switching	Delete	
C02653	Max. rot. ang. aft. mns. swtch.	180	°

Control inputs of the function		Signal configuration (Multiplexer parameters)
Lenze setting	Control input	
Sequencer Enable Homing	→ Request homing	C03160/1
Sequencer Activate Homing	→ Start homing	C03160/2
DIGIN 2	→ Home mark	C03160/3
FALSE	→ Set home position	C03160/4
FALSE	→ Reset home position	C03160/5
Zero position	→ Home position	C03163
+100 %	→ Homing override	C03186/4

5.3.3 Action type "Positioning"

In order to execute a positioning process, 50 actions of "Positioning" type are available for the sequence table which activates the basic function "Positioning":

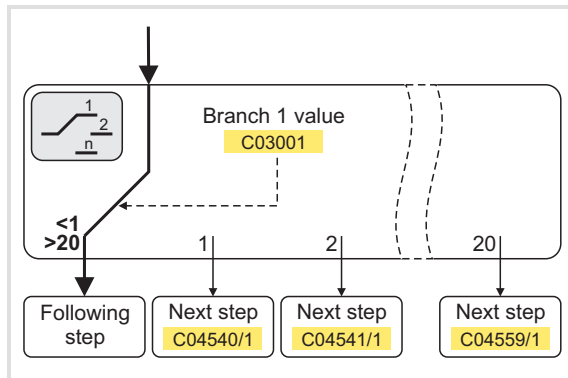


[5-4] "Positioning" (schematic diagram for limited traversing range)

- Use the parameter **Profile number** of the action to select the number or the table position of the profile to be executed. The final profile data are then given to the basic function by the [Profile data management](#). (📖 44)
- The execution of the adjusted profile is only started with activated waiting function if the sequencer input selected for the waiting function accepts the selected signal state. ► [Sequencer inputs](#) (📖 40)

5.3.4 Action type "Variable branching"

For variable branches (jumps) 5 actions of type "Variable branching" are available for the sequence table.



[5.1] Principle of the variable branch (here for action no. 1)

- The branch to one of 20 possible steps is executed in the Lenze setting depending on the value in C03001 ... C03005 at the time or processing.
- The parameters C03001 ... C03005 are firmly assigned to the five available actions, i.e. C03001 determines the branch for action 1, C03002 for action 2, etc.



Tip!

Instead of the parameters C03001 ... C03005 you can also assign other signal sources of the application to the "branch" inputs via multiplexer parameters.

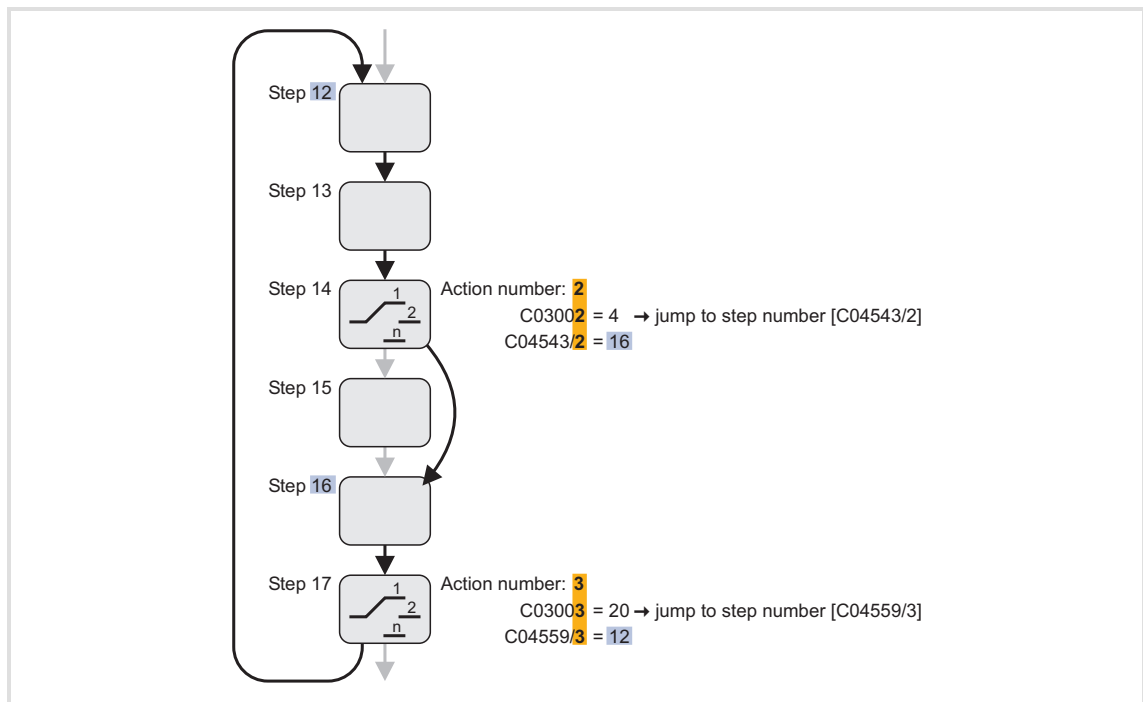
- Parameter setting: Tab **Application parameters** → dialog level *Overview* → *Sequence control*

Parameter		Lenze setting	
		Value	Unit
C03001	Branch value 1	1	
C03002	Branch value 2	1	
C03003	Branch value 3	1	
C03004	Branch value 4	1	
C03005	Branch value 5	1	

Control inputs of the function		Signal configuration
Lenze setting	Control input	(Multiplexer parameters)
C03001	→ Sequencer branch 1	C03079/1
C03002	→ Sequencer branch 2	C03079/2
C03003	→ Sequencer branch 3	C03079/3
C03004	→ Sequencer branch 4	C03079/4
C03005	→ Sequencer branch 5	C03079/5

Example

The following example illustrates the function of the variable branch based on a program flow which contains, among other things, two actions of the "Variable branching" type.



[5.2] Example "Variable branch"

5.3.5 Sequencer inputs

In order to control conditional branches and the optional waiting function of some action types during the program flow, 32 sequencer inputs of "BOOL" type.

- ▶ The sequencer inputs 1 ... 16 can be linked with the signal sources of the application or device interfaces in the dialog level *Overview* → *L_Sequencer* → *Program inputs* via multiplexer parameters.
- ▶ For the action types "positioning", "branching", "waiting" and "stand-by", you can individually define for each action which of the sequencer inputs is to be called for the corresponding function when the program is executed.



Note!

The sequencer input 8 in the Lenze setting is linked with the digital input DI8.

5.3.6 Sequencer outputs

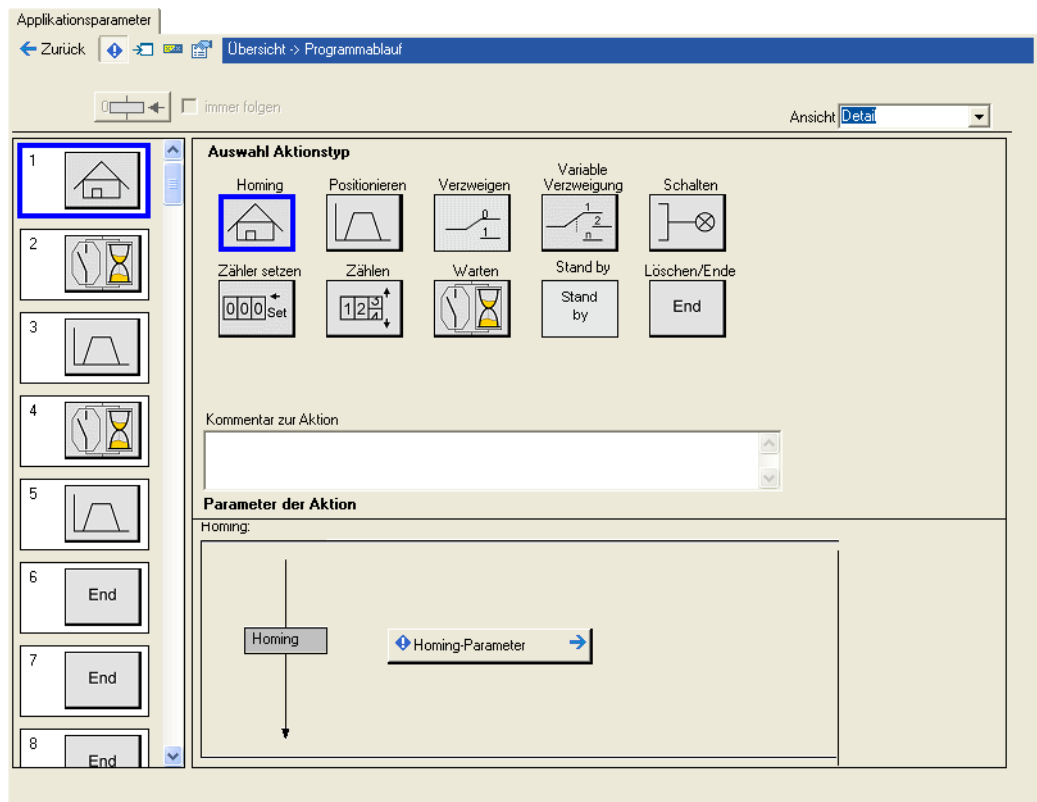
Via a DWORD-to-BIT-converter, 32 sequencer outputs of type "BOOL" are available for "switching" which can be set to FALSE or TRUE with the action type "switching".

- ▶ These sequencer outputs can be connected with the inputs of the application or device interfaces via multiplexer parameters.
- ▶ The following table lists the corresponding module outputs of the FB interconnection and the corresponding selection numbers for the multiplexer parameters:

Module output	Signal type	Selection no.	Selection text
SequencerOutput.bBit0	□	551	Sequencer output 1
SequencerOutput.bBit1		552	Sequencer output 2
SequencerOutput.bBit2		553	Sequencer output 3
...		...	...
SequencerOutput.bBit31		582	Sequencer output 32

5.3.7 Parameter setting of the program flow in the Engineer

Go to the »Engineer« to the **Application parameter** tab and click **Program flow** in the topmost dialog level to change to the dialog for the sequence table:



Basic procedure

In the default setting the sequence table contains a small "Positioning program", which first rotates the axis 360° clockwise and afterwards 360° counter-clockwise.

Proceed as follows to define the desired program flow:

1. Select the program step (1 100) to be edited on the left in the sequence table.
2. Select the action type for the selected program step by clicking it.
3. If the selected action type provides more than one action, select the action to be parameterised from the list field **Selection of action number**.
 - The next free action is suggested automatically.
4. Enter a comment about the action (optional).
5. Set parameters of the action.
 - If required, call the corresponding subsequent dialogs.
6. Repeat step 1 ... 5 until all actions required for the program flow are parameterised.

5.3.8 Control of the sequence table

A LOW/HIGH edge at the digital input DI6 starts the parameterised program flow if the controller is enabled and no error is pending.

- ▶ The first step set in C03000 of the sequence table is executed.
- ▶ By setting the digital input DI7 to HIGH level, the program flow can be stopped, if required (break).

**Note!**

In the following cases the program flow is interrupted:

- The controller inhibit is activated.
- Quick stop is activated.
- The drive interface changes to an error status.

If the controller is not inhibited, a shutdown of the drive via the basic function "Quick stop" is effected.

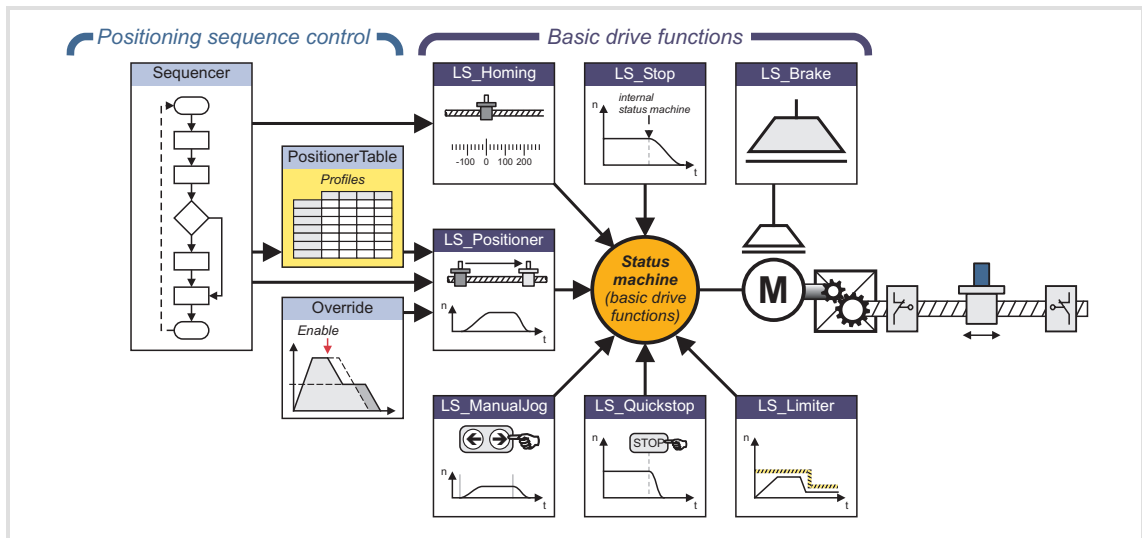
After the interruption is deactivated again (e.g. because an activated quick stop has been deactivated again), a renewed LOW/HIGH edge is required at the digital input DI6 in order that the positioning program can be continued with the sequence step.

- ▶ Parameter setting: Tab **Application parameters** → dialog level *Overview* → *L_Sequencer*

Parameter		Lenze setting	
		Value	Unit
C03000	First step	1	
C04504	Jump destination	0	

Control inputs of the function		Signal configuration
Lenze setting	Control input	(Multiplexer parameters)
C03000	→ First step	C03079/6
DIGIN 6	→ Sequencer start	C03070/1
DIGIN 7	→ Sequencer break	C03070/2
FALSE	→ Sequencer jump	C03070/3
FALSE	→ Sequencer abort	C03070/4
FALSE	→ Sequencer interruption	C03070/5
Controller inhibit or Quick stop active or Error active	→ Reset program status	C03070/6
DIGIN 5	→ Reset program/error status	C03070/8

5.4 Profile data management



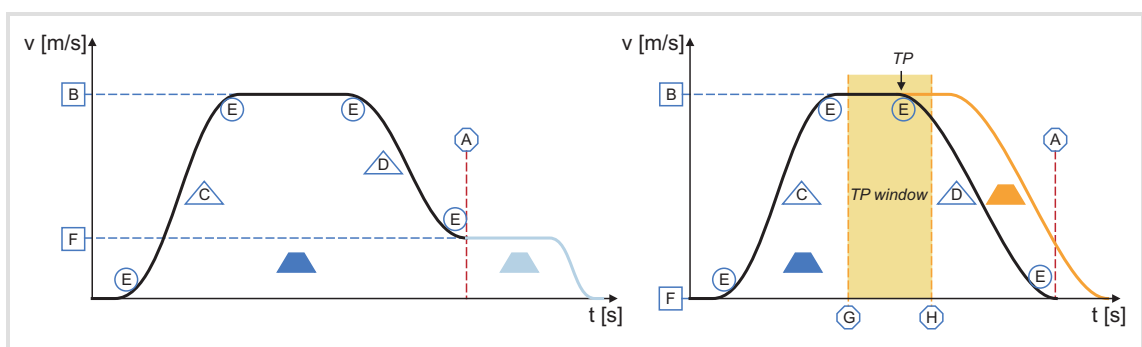
[5-5] Profile data management (schematic diagram)

The profile data management serves to file and manage up to 75 (travel) profiles.

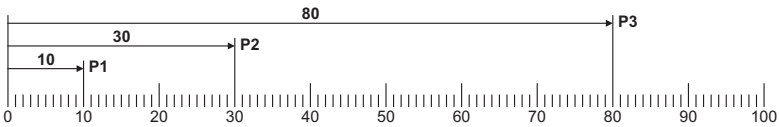
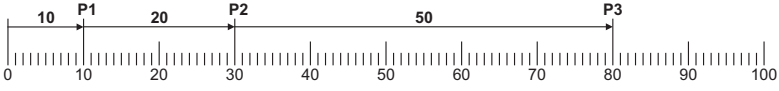
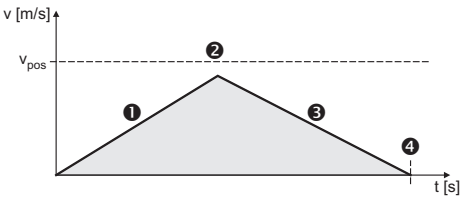
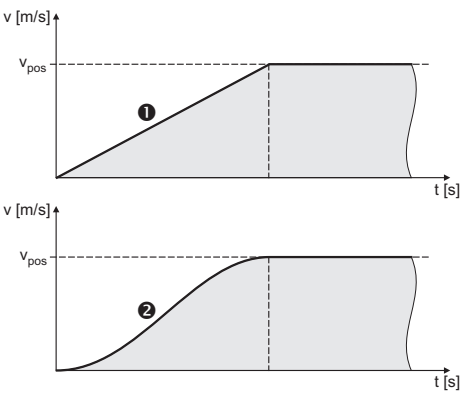
- ▶ A profile describes a motion request which can be converted by the basic drive function "Positioning" into a rotary motion.
- ▶ To execute a profile, 50 actions of type "Positioning" are available for the sequence table.
- ▶ The profile data management also enables the "teaching" of speed, acceleration/ deceleration and S-ramp times. ▶ ["Teach" function](#) (52)

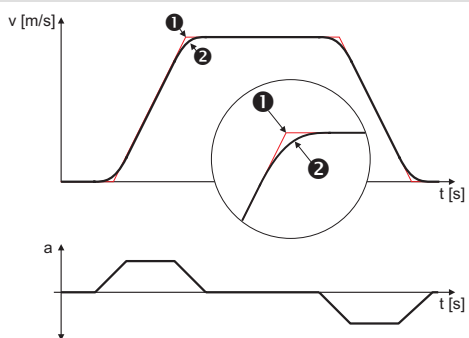
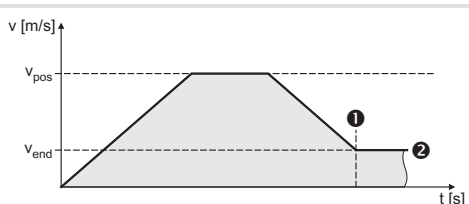
5.4.1 Profile parameters

A profile is described by the following profile parameters:



[5-6] Profile parameters

Symbol	Profile parameters
	(Standard) profile Profile data set (profile no. 1 ... 75) in which the profile data are stored.
	Mode Selection of the positioning mode. ▶ Positioning modes (48)
	Position Target position or path distance to be traversed. The position is either indicated as absolute or relative position. - An absolute position always specifies the distance to the zero position defined: $\text{absolute position} = \text{target position}$  - A relative position indicates the distance to the starting position (current position): $\text{Relative position} = \text{target position} - \text{starting position}$ 
	Speed Maximum speed with which the target is to be approached. - Depending on the profile parameter position, acceleration and deceleration, it is possible that the drive may not reach the maximum speed. In this case, the graph would display a triangle instead of a trapezium.  1 Acceleration 2 Travelling speed (is not reached here) 3 Deceleration 4 Target position (or feed distance)
	Acceleration Selection of the change in speed by which acceleration is to be carried out maximally. - The following two acceleration types are distinguished: - Constant acceleration: the speed increases linearly. - Linearly increasing acceleration: The speed increases in S-shapes.  1 Constant acceleration 2 Linearly increasing acceleration
	Deceleration Selection of the change in speed by means of which deceleration to standstill is to be maximally effected again.

Symbol	Profile parameters
E	S-ramp time When the S-ramp time is selected for a profile, it is executed with S-shaped ramps, e.g. acceleration and deceleration processes are started smoothly to reduce the jerk and thus prevent the drive components from damage. - The acceleration/deceleration specified in the profile are only reached after the defined S-ramp time has elapsed. - This type of acceleration/deceleration is required for e.g. sensitive machine parts with clearance. - The slower acceleration increase with the S profile prolongs the positioning time compared to the time optimal L profile.  1 without jerk limitation (L profile) 2 with jerk limitation (S profile)
F	Final speed Selection of the speed by which the drive is to start the next profile after reaching the target position. "Velocity changeover" or "Overchange" can be implemented with a final speed that is non-zero, i.e. when the target position is reached, a second positioning process is started immediately without the drive being decelerated to standstill at the first target position:  1 Target position 2 Final speed (here unequal "0")
G H	Start of TP window / End of TP window These profile parameters serve to restrict the range for a touch probe positioning (residual path positioning) in which touch probes are to be detected.
	Sequence profile with TP Profile data set (profile no. 1 ... 75) in which the profile data of the profile are stored which is to be executed after a touch probe has been detected. For the setting "0" no further profile connection by touch probe is effected.
	Sequence profile without TP Profile data set (profile no. 1 ... 75) in which the profile data of the profile is stored which is to be executed after the standard profile has been executed (profile chaining). - With the setting "0" no profile chaining is carried out. - The sequence profile defined in this profile parameter is executed even if no touch probe has been detected within the defined TP window.

5.4.2 Variable tables

To simplify parameter handling, the four most important physical sizes for profile parameters are stored in separate "variable tables".

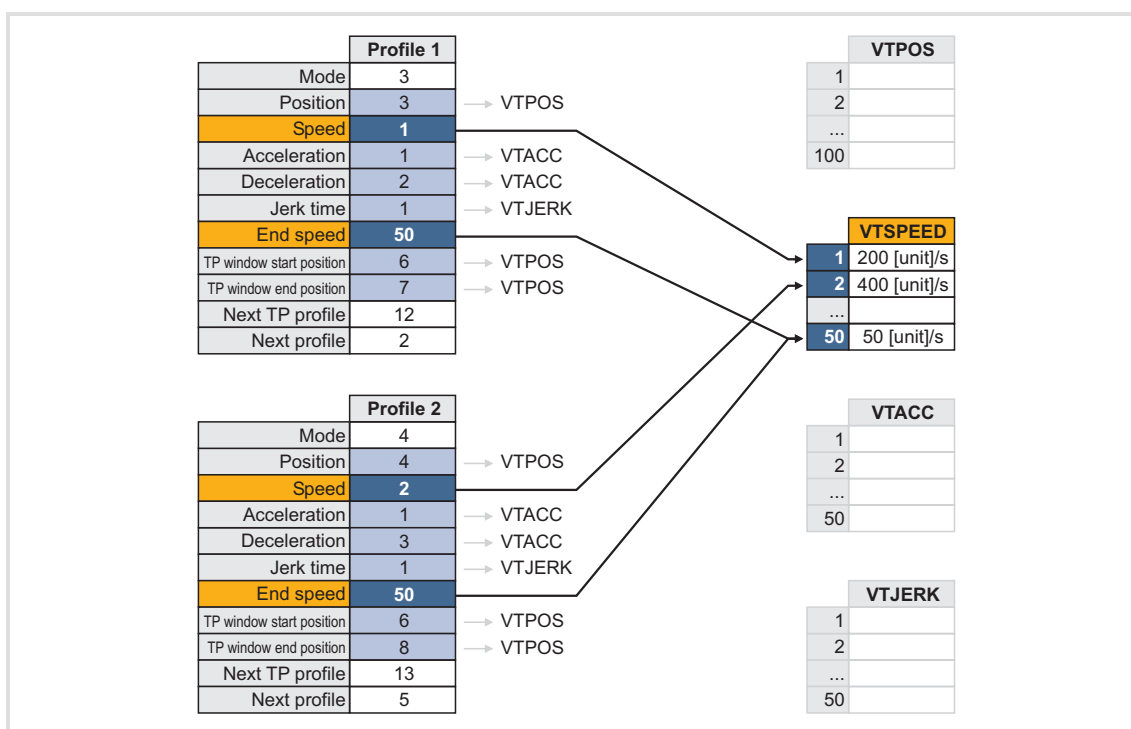
	VTPOS Positions	VTSPED Speeds	VTACC Acceleration/ deceleration	VTJERK S-ramp times
Unit	unit	unit/s	unit/s ²	s
Data format	DINT with four decimal positions			
Memory locations	75	50	50	50
Code	C04711/1...75	C04712/1...50	C04713/1...50	C04714/1...50
For profile parameters	Target position TP window starting position TP window end position	Speed Final speed	Acceleration Deceleration	S-ramp time



Note!

A value is assigned to a profile parameter by referring to a table position of the assigned variable table.

- Hence, not the value itself is entered into the profile parameter but the index of the table position which contains the value to be used.
- See the example in the illustration [\[5-7\]](#). (47)



[5-7] Principle: References to variable tables (here: References to VTSPED)

- In case of several references to the same table position, a change of the value in this table position affects several profiles at the same time. Thus, recurring profile parameters only need to be changed on one position.

- ▶ If e.g. in case of a profile linkage, several profiles are to be executed with the same speed, the corresponding profile parameters "speed" can all refer to the same table position.
- ▶ For an easier assignment and identification of the entered values, each table position can be optionally provided with a comment in the »Engineer«.

5.4.3 Positioning modes

Depending on the traversing range/application, you can select between different positioning modes which are described in the below table.



Note!

For absolute positioning, the home position must be known!

- If an absolute positioning process (positioning modes 1 ... 2 and 11 ... 16) is started although the home position is not known, an error message is indicated.
 - In this case a programming error has occurred and the program flow must be reset.
 - If the error only occurs in a sequence profile, the last valid deceleration is used to decelerate the drive to standstill.

The modulo positioning modes may involve reversing processes!

- If a modulo positioning process (positioning modes 11 ... 16) is started at an initial speed other than zero, the target position may be overtravelled and a reversing process may follow, depending on the selected deceleration / S-ramp time parameters. This would also cause e.g. counter-clockwise rotation in the "Absolute CW (modulo)" positioning mode.

Positioning mode

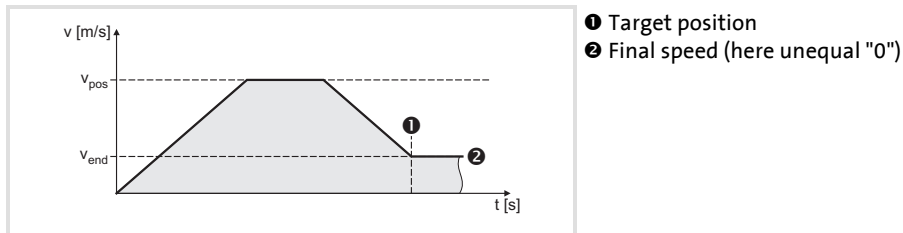
1	Absolute The axis travels to an absolute position. • Reference for the absolute position is zero position. • The home position must be known. • The traversing range is limited: – to 214748.3647 [unit] – by the internal display area ($\pm 2^{31}$ increments) • Not possible with "modulo" traversing range.
2	Absolute TP Like mode 1, but with profile change when a touch probe is detected. ▶ Touch probe positioning. (📖 51)
5	Relative The axis is traversed by a distance. • Reference for the distance is the target position of the profile executed before. • The feed per positioning is limited: – to 214748.3647 [unit] – by the internal display area ($\pm 2^{31}$ increments)
6	Relative TP Like mode 5, but with profile change on touch probe detection. ▶ Touch probe positioning. (📖 51)

Positioning mode

7	Speed Continuous constant travel. • Only possible with "unlimited" and "limited" traversing range • This mode does not approach a defined position, but follows the profile. • Acceleration and deceleration are based on profile values. • The traversing direction is defined by the sign of the traversing speed. • Stopped through break signal.
8	Speed TP Like mode 7, but with profile change on touch probe detection. ▶ Touch probe positioning. (51)
11	Absolute CW The axis travels in CW direction to an absolute position. • Only possible with "Modulo" traversing range. • Reference for the absolute position is zero position. • In this direction the zero position of the axis can be overtravelled.
12	Absolute CW TP Like mode 11, but with profile change on touch probe detection. ▶ Touch probe positioning. (51)
13	Absolute CCW The axis travels in CCW direction to an absolute position. • Only possible with "Modulo" traversing range. • Reference for the absolute position is zero position. • In this direction the zero position of the axis can be overtravelled.
14	Absolute CCW TP Like mode 13, but with profile change when a touch probe is detected. ▶ Touch probe positioning. (51)
15	Absolute ShortestWay The axis travels to an absolute position in best time. • Only possible with "Modulo" traversing range. • Reference for the absolute position is zero position. • The rotary table positioning is basically an absolute positioning with target positions between 0 and 360 angular degree [°]. In this mode the zero point can also be overtravelled if this is the shortest way to the target position: The diagram shows a circular rotary table divided into six sectors by radial lines. The sectors are labeled with angles: 0° (top), 60° (top-right), 120° (right), 180° (bottom), 240° (bottom-left), and 300° (left). A blue arrow starts at the 0° position and points counter-clockwise towards the 300° position, illustrating the 'ShortestWay' principle where the path is the shortest arc between the two points.
16	Absolute ShortestWay TP Like mode 15, but with profile change on touch probe detection. ▶ Touch probe positioning. (51)

5.4.4 Positioning with final speed

If a positioning process with a final speed other than zero is carried out, a velocity changeover / overchange can be realised, i.e. a second positioning process is started immediately once the target position is reached, and the drive does not come to a standstill at the first target position.



[5-8] The principle of velocity changeover / overchange

- ▶ Normally, the drive has reached the final speed when the target position is reached.
- ▶ The profile is run through which is defined via "Profile data sequence profile without TP".
- ▶ The final speed must not exceed the maximum profile speed.
 - The speed is internally limited to the profile speed.
 - This is the maximum value for the final speed if the profile speed is reduced via override. (This behaviour may add to the cases described in the note below.)
 - The speed limitation is not affected by subsequent increases in the override value.



Note!

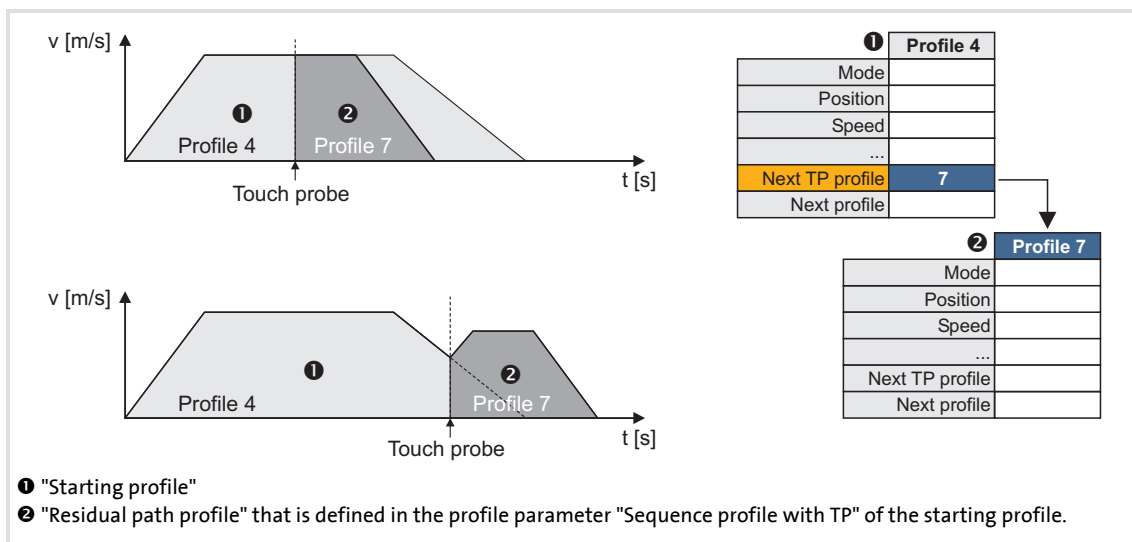
Positioning processes with final speeds other than zero do not permit reversing. In this case, the positioning process is aborted and an error is issued.

In the case of positioning processes with final speeds and if S-shaped ramps are used, a plausibility check as to whether the final speed can be reached is carried out when the profile is started. If the final speed cannot be reached, the positioning process is aborted and an error is issued. This is often the case if the positioning process has been paused and is then to be continued.

5.4.5 Touch probe positioning

In the touch probe positioning mode, the profile is first executed according to the [Profile parameters](#) set. If a touch probe is detected during the process, it is automatically changed to the profile specified in the profile parameter "Sequence profile with TP".

- ▶ Here the current actual position is stored at the time of the touch probe activation (by a touch probe sensor).
- ▶ In the following relative positioning process, the "residual path" to this stored position is travelled according to the increments.



[5-9] Examples for a "residual path positioning" after a touch probe is detected

- ▶ The profile parameters "TP window start" and "TP window end" the range in which touch probes are to be detected can be restricted.
 - If both profile parameters are "0", touch probe detection will be active over the whole profile/the whole traversing range.
- ▶ If no touch probe is detected and after the profile is executed, the positioning is continued with the profile defined in the profile parameter "Sequence profile without TP" (profile chaining).



Note!

If a profile is travelled with high speed and a touch probe positioning is started the residual path of which is shorter than the result from current speed and set deceleration ramp, the target position is "overtravelled".

- Normally a reversing movement occurs, i.e. the drive returns.
- If, for instance, a CCW rotation of the drive is forbidden by the safety module, the target cannot be approached since in this case the reversing movement is not permissible.

Further constellations are possible in connection with profile chaining in which an approach of the target position is impossible.

5.4.6 "Teach" function

The "Teach" function of the profile data management enables the teaching of positions, speeds, accelerations and S-ramp times.

The basic function "Manual jog" serves, for instance to approach the desired position manually and transmits it via "Teaching" to the variable table for positions.

- Parameter setting: Tab **Application parameters** → dialog level *Overview* → *L_PositionerTable*

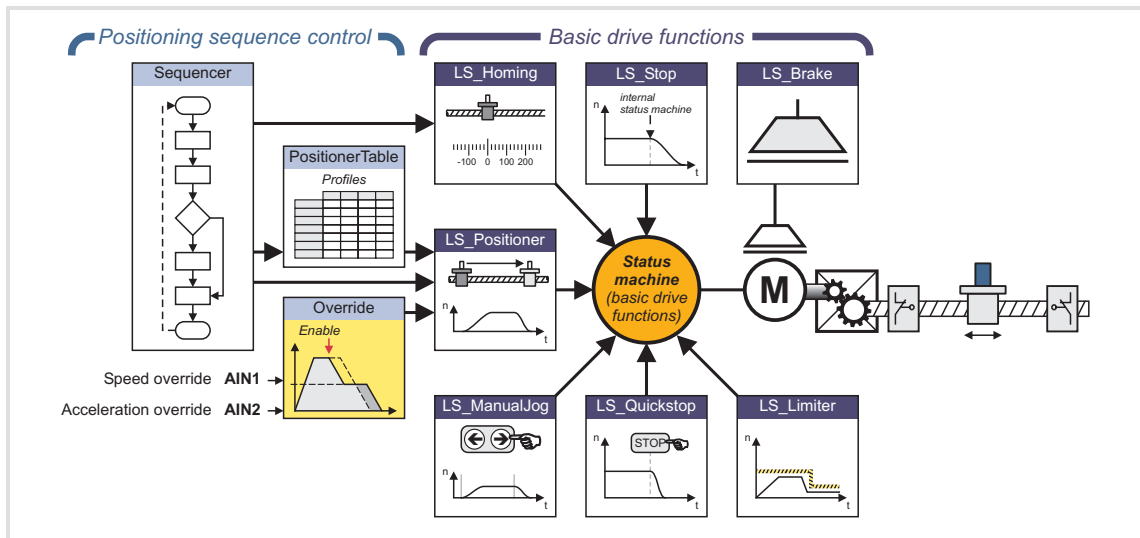
Control/setpoint inputs of the function		Signal configuration (Multiplexer parameters)
Lenze setting	Control/setpoint input	
FALSE	→ Teach position	C03020/1
C03016	→ Selection of table position for position	C03029/1
Zero position	→ Teach position	C03125/1
FALSE	→ Teach speed	C03020/2
C03017	→ Selection of table position for speed	C03029/2
Speed setpoint	→ Teach speed	C03024/1
FALSE	→ Teach acceleration	C03020/3
C03018	→ Selection of table position for acceleration	C03029/3
0	→ Teach acceleration	C03027
FALSE	→ Teach S-ramp time	C03020/4
C03019	→ Selection of table position for S-ramp time	C03029/4
0	→ Teach S-ramp time	C03028



Note!

After the function block editor is enabled the "Teach" function must be configured directly in the FB interconnection instead of via the parameters mentioned before!

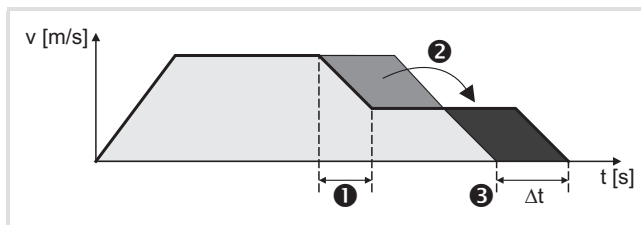
5.5 Speed/acceleration override



[5-10] Speed/acceleration override (schematic diagram)

"Override" is the change of profile parameters and their acceptance during the positioning process.

In this case, the travel profile is adapted accordingly to ensure that the defined target position is still exactly approached if, for example, the speed is changed during the positioning process ("speed override"):



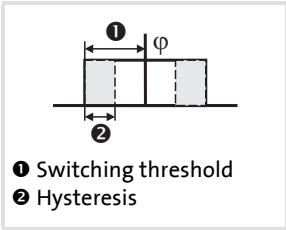
- ❶ The speed is reduced during the positioning process.
- ❷ To reach the defined position, the missing surface must be "attached" to the profile.
- ❸ When the speed is reduced the positioning process takes a longer time (Δt).

[5-11] Override (here: Speed override)

► Parameter setting: Tab **Application parameters** → dialog level *Overview* → *LS_Positioner*

Control/setpoint inputs of the function		Signal configuration
Lenze setting	Control/setpoint input	(Multiplexer parameters)
C03013	→ Activate override	C03185/5
AIN 1	→ Speed override	C03186/1
AIN 2	→ Acceleration override	C03186/2
+100 %	→ Deceleration override	C03186/3

5.6 Following error monitoring



In the Lenze setting a two-stage following error monitoring is active.

If the parameterisable switching threshold 1 is exceeded, a warning appears. If the higher-set switching threshold 2 is exceeded, a "warning locked" appears.

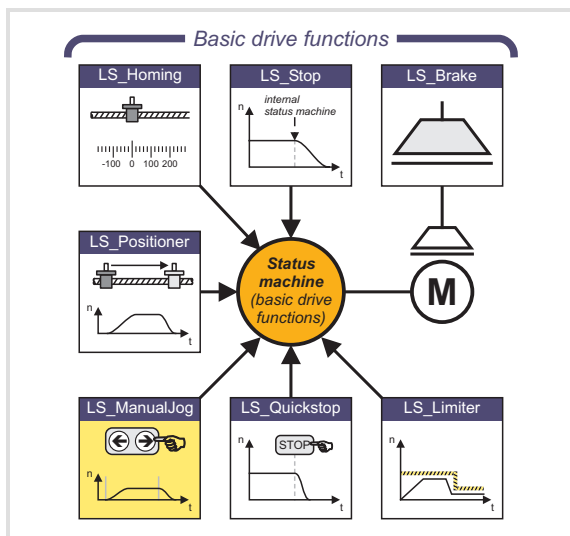
[5-12] Following error monitoring

► Parameter setting: Tab **Application parameters** → dialog level *Overview* → *Following error*

Parameter		Lenze setting	
		Value	Unit
C03911	Switching threshold 1	100.0000	unit
C03914	Switching threshold 2	200.0000	unit
C03917	Hysteresis 1	0.0000	unit
C03920	Hysteresis 2	0.0000	unit
C05902/1	Error response - following error 1	Warning	
C05902/2	Error response - following error 2	Warning locked	

Control inputs of the function		Signal configuration
Lenze setting	Control input	(Multiplexer parameters)
TRUE	→ Activate following error limit 1	C03058/1
TRUE	→ Activate following error limit 2	C03058/2

5.7 Manual jog



[5-13] Basic function "Manual jog" (schematic diagram)

For the setting-up operation and "Teaching" of positions the basic function "Manual jog" is available.

Manual jog is controlled via parameters (e. g. via HMI).

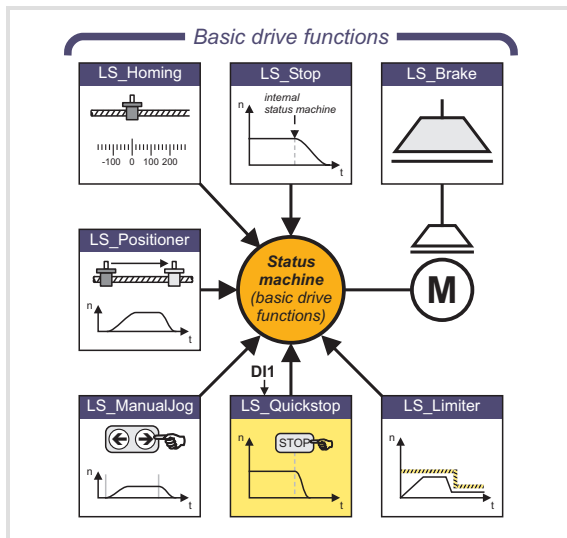
Manual jog can always be carried out if the sequence control is not active and no other basic function and no error status are active. The request of manual jog then is effected automatically with the travel commands.

► Parameter setting: Tab **Application parameters** → dialog level *Overview* → *Manual jog*

Parameter		Lenze setting	
		Value	Unit
C02620	Manual jog: Speed 1	360.0000	unit/s
C02621	Manual jog: Speed 2	720.0000	unit/s
C02622	Manual jog: Acceleration	360.0000	unit/s ²
C02623	Manual jog: Deceleration	1440.0000	unit/s ²
C02624	Manual jog: S-ramp time	0.100	s
C03007	Activate positive manual jog	FALSE	
C03008	Activate negative manual jog	FALSE	
C03009	Activate "Retract limit switch"	FALSE	

Control inputs of the function		Signal configuration (Multiplexer parameters)
Lenze setting	Control input	
Automatic activation	→ Request manual jog	C03155/1
C03007	→ Activate positive manual jog	C03155/2
C03008	→ Activate negative manual jog	C03155/3
FALSE	→ Activate 2. speed	C03155/4
C03009	→ Activate "Retract limit switch"	C03155/5
+100 %	→ Manual jog override	C03186/5

5.8 Quick stop



[5-14] Basic function "Quick stop" (schematic diagram)

The basic function "Quick stop" brakes the drive to standstill within the deceleration time set for the quick stop function after a corresponding request independent of the setpoint selection. The sequence control is interrupted.

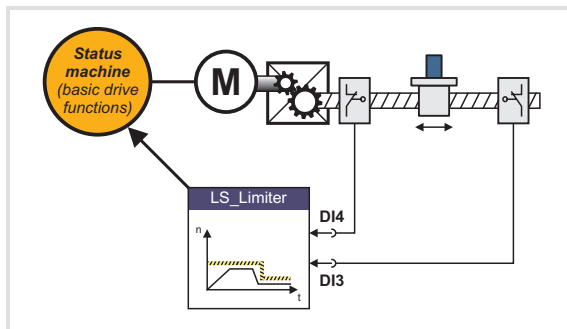
If the quick stop is deactivated, the drive remains in standstill until the sequence control is started again and takes over the drive control.

- The quick stop function can be activated as follows in the Lenze setting:
 - By setting the digital input DI1 to LOW level.
 - By a master control via the port *LPortControl*:
By setting bit 2 of the bit-coded control word 1.
- Parameter setting: Tab **Application parameters** → dialog level *Overview* → *All basic functions* → *Quick stop*

Parameter		Lenze setting	
		Value	Unit
C00105	Deceleration time "quick stop"	0.000	s
C00106	S-ramp time "quick stop"	0.00	%
C00107	Reference for quick stop deceleration time	Motor reference speed (C00011)	

Control inputs of the function		Signal configuration (Multiplexer parameters)
Lenze setting	Control input	
DIGIN 1	→ Activate quick stop 1	C03135/1
Control word 1 bit 02	→ Activate quick stop 2	C03135/2
FALSE	→ Activate quick stop 3	C03135/3

5.9 Limiter



[5-15] Basic function "Limiter" (schematic diagram)

The basic function "Limiter" monitors the travel range limits via limit switches and parameterisable software limit positions and after an according request from the safety module can lead the drive into defined limit ranges. Furthermore higher-level limit values for travel profiles can be entered and activated.

- The software limit positions which can be set via parameters serve to limit the travel range by means of software and prevent that travel commands are executed which would cause an exit of the permissible travel range.
- Moreover, the travel range limits are monitored via limit switches via the digital inputs DI3 and DI4.

**Note!**

The digital inputs DI3 and DI4 are configured fail-safe in C00114/3 and C00114/4, i.e. a HIGH level is expected at both inputs in idle state.

- If the travel range limits should not be monitored (e.g. in case of a rotary axis), set the limit switch inputs of the basic function "Limiter" permanently to FALSE.

The parameterised limit values for travel profiles are not effective for the basic functions "speed follower", "torque follower", and "position follower"!

- For the exceeding of the limit values an error response can be set.

- Parameter setting: Tab **Application parameters** → dialog level *Overview* → *Limiter*

Parameter		Lenze setting	
		Value	Unit
Limit values			
C02707	Permissible direction of rotation	Positive and negative	
C02700	Software limit positions are active	Deactivated	
C02701/1	Positive software limit position	0.0000	unit
C02701/2	Negative software limit position	0.0000	unit
Only for homing, positioning and manual jog			
C02702	Limitations are active	Deactivated	
C02703	Max. speed	3600.0000	unit/s
C02705	Max. acceleration	3600.0000	unit/s ²
C02706	Min. S-ramp time	100	ms

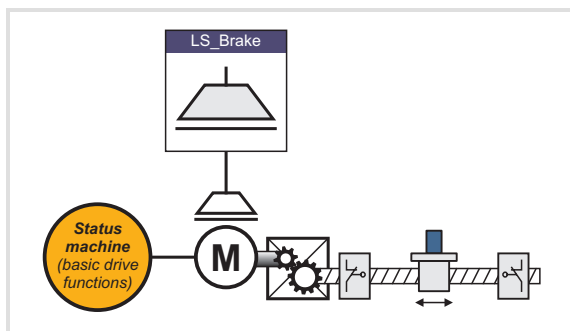
9400 Technology applications | Positioning sequence control

Parameter setting & configuration

Limiter

Parameter		Lenze setting	
		Value	Unit
For manual jog only			
C02713	Max. manual jog distance	360.0000	unit
Limited speed 1 ... 4 (only for homing, positioning, and manual jog)			
C02708/1	Limited speed 1	3600.0000	unit/s
C02710/1	Delay lim. speed 1	0.0100	unit/s ²
C02711/1	S-ramp time lim. speed 1	100	ms
C02708/2	Limited speed 2	7200.0000	unit/s
C02710/2	Delay lim. speed 2	0.0100	unit/s ²
C02711/2	S-ramp time lim. speed 2	100	ms
C02708/3	Limited speed 3	14400.0000	unit/s
C02710/3	Delay lim. speed 3	0.0100	unit/s ²
C02711/3	S-ramp time lim. speed 3	100	ms
C02708/4	Limited speed 4	28800.0000	unit/s
C02710/4	Delay lim. speed 4	0.0100	unit/s ²
C02711/4	S-ramp time lim. speed 4	100	ms
Control inputs of the function		Signal configuration	
Lenze setting	Control input	(Multiplexer parameters)	
DIGIN 3	→ Positive limit switch	C03150/1	
DIGIN 4	→ Negative limit switch	C03150/2	

5.10 Brake control



[5-16] Basic function "Brake control" (schematic diagram)

The basic function "Brake control" serves to the wear free control and monitoring of a holding brake.

In the simplest case, an optionally available brake module is used.

Alternatively the holding brake can also be controlled and monitored via the digital inputs/outputs.

**Note!**

In the Lenze setting the brake control is switched off to reach a safe state after mains connection.

If the automatic operation (operating mode 2 or 12) is selected in C02580, the brake is controlled automatically, i.e. if the multi-purpose positioning or another basic function is activated which causes the drive to traverse, the brake is opened automatically and the operation is enabled.

► Parameter setting: Tab **Application parameters** → dialog level *Overview* → *Brake control*

Parameter		Lenze setting	
		Value	Unit
C02580	Operating mode of brake	Brake control off	
C02581	Threshold for brake activation	50	rpm
C02582	Brake resp. to pulse inhibit	Activate brake immediately	
C02583	Status input monitoring	Not active	
C02585	Brake control polarity	Not inverted	
C02586	Starting torque 1	0.00	Nm
C02587	Starting torque 2	0.00	Nm
C02588	Starting torque source	Starting torque 1/2	
C02589	Brake closing time	100	ms
C02590	Brake opening time	100	ms
C02591	Waiting time - status monitoring	100	ms
C02593	Waiting time - brake activation	0.000	s
C02594	Test torque	0.00	Nm
C02595	Permissible angle of rotation	5	°
C02596	Grinding speed	100	rpm
C02597	Accel./decel. time - grinding	1.000	s
C02598	Grinding ON time	0.5	s
C02599	Grinding OFF time	0.5	s

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Parameter setting & configuration

Brake control

Control/setpoint inputs of the function		Signal configuration
Lenze setting	Control/setpoint input	(Multiplexer parameters)
FALSE	→ Open brake (release)	C03165/1
FALSE	→ Activate starting torque 2	C03165/2
FALSE	→ Keep open brake at standstill	C03165/3
FALSE	→ Brake status signal	C03165/4
FALSE	→ Activate brake test	C03165/5
FALSE	→ Grind brake	C03165/6
0 %	→ Additional torque	C03166

5.11 Signal configuration**5.11.1 Drive and motor interface**

If required, the preset signal configuration of the control and setpoint inputs of the drive and motor interface can be easily reconfigured by parameterising the assigned multiplexer parameters.

Drive interface

Signal (Lenze setting)	Control input	Signal configuration
FALSE	→ Set controller inhibit	C03130/1
DIGIN 5	→ Reset error 1	C03130/2
FALSE	→ Reset error 2	C03130/3
FALSE	→ Reset error 3	C03130/4
FALSE	→ Set error	C03130/5
FALSE	→ Switch on drive	C03130/6

Motor interface

Signal (Lenze setting)	Setpoint input	Signal configuration
100 %	→ Position controller adaptation	C03141/1
100 %	→ Phase controller adaptation	C03141/2
100 %	→ Speed controller adaptation	C03141/3
100 %	→ Upper torque limit value	C03141/4
-100 %	→ Lower torque limit value	C03141/5
100 %	→ Flux setpoint	C03141/6
100 %	→ Adaptation of mass inertia	C03141/7

5.11.2 Output ports

If required, the preset signal configuration of the output ports can be easily reconfigured by parameterising the assigned multiplexer parameters.

Output port "LPortAxisOut1"

The output port **LPortAxisOut1** is intended for the connection with a following axis.

Signal (Lenze setting)	Output port	Signal configuration
Axis status word		
- The bit assignment is identical to that of status word 1/2. - Application-specific signals can be supplemented.		
Drive ready	→ Axis status word bit 00	C03120/1
FALSE	→ Axis status word bit 01	C03120/2
Operation enabled	→ Axis status word bit 02	C03120/3
Error active	→ Axis status word bit 03	C03120/4
FALSE	→ Axis status word bit 04	C03120/5
Quick stop active	→ Axis status word bit 05	C03120/6
Drive is ready to start	→ Axis status word bit 06	C03120/7
Warning active	→ Axis status word bit 07	C03120/8
FALSE	→ Axis status word bit 08	C03120/9
FALSE	→ Axis status word bit 09	C03120/10
FALSE	→ Axis status word bit 10	C03120/11
Motor control in limitation	→ Axis status word bit 11	C03120/12
Sequence control ready to start	→ Axis status word bit 12	C03120/13
Sequence control started	→ Axis status word bit 13	C03120/14
Sequence control reset	→ Axis status word bit 14	C03120/15
Sequence control processed	→ Axis status word bit 15	C03120/16
Setpoints for horizontal communication		
Filtered torque setpoint	→ Axis-Port Out 1	C03124/1
	Scaling: $16384 \equiv 2^{14} \equiv 100\% \text{ motor reference torque (C00057/2)}$	
Motor speed	→ Axis port out 2	C03124/2
	Scaling: $1073741824 \equiv 2^{30} \equiv 100\% \text{ motor reference speed (C00011)}$	

Output port "LPortStatus1"

The output port **LPortStatus1** is intended for the connection with a higher-level control.

Signal (Lenze setting)	Output port	Signal configuration
Status word 1		
Drive ready	→ Status word 1 bit 00	C03121/1
FALSE	→ Status word 1 bit 01	C03121/2
Operation enabled	→ Status word 1 bit 02	C03121/3
Error active	→ Status word 1 bit 03	C03121/4
FALSE	→ Status word 1 bit 04	C03121/5
Quick stop active	→ Status word 1 bit 05	C03121/6
Drive is ready to start	→ Status word 1 bit 06	C03121/7
Warning active	→ Status word 1 bit 07	C03121/8
FALSE	→ Status word 1 bit 08	C03121/9
FALSE	→ Status word 1 bit 09	C03121/10
FALSE	→ Status word 1 bit 10	C03121/11
Motor control in limitation	→ Status word 1 bit 11	C03121/12
Sequence control ready to start	→ Status word 1 bit 12	C03121/13
Sequence control started	→ Status word bit 13	C03121/14
Sequence control reset	→ Status word 1 bit 14	C03121/15
Sequence control processed	→ Status word 1 bit 15	C03121/16

Output port "LPortStatus2"

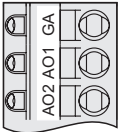
Signal (Lenze setting)	Output port	Signal configuration
Status word 2		
FALSE	→ Status word 2 bit 00	C03122/1
FALSE	→ Status word 2 bit 01	C03122/2
FALSE	→ Status word 2 bit 02	C03122/3
FALSE	→ Status word 2 bit 03	C03122/4
FALSE	→ Status word 2 bit 04	C03122/5
FALSE	→ Status word 2 bit 05	C03122/6
FALSE	→ Status word 2 bit 06	C03122/7
FALSE	→ Status word 2 bit 07	C03122/8
FALSE	→ Status word 2 bit 08	C03122/9
FALSE	→ Status word 2 bit 09	C03122/10
FALSE	→ Status word 2 bit 10	C03122/11
FALSE	→ Status word 2 bit 11	C03122/12
FALSE	→ Status word 2 bit 12	C03122/13
FALSE	→ Status word 2 bit 13	C03122/14
FALSE	→ Status word 2 bit 14	C03122/15
FALSE	→ Status word 2 bit 15	C03122/16

5.12 Actual value and status signals

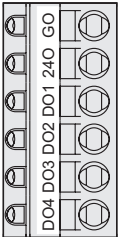
The following tables contain the Lenze assignment of the analog and digital outputs for the "Positioning sequence control" technology application.

- The default signal configuration if required can be easily changed by parameterising the multiplexer parameters assigned.

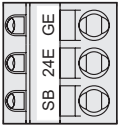
Analog outputs

Terminal X3	Signal (Lenze setting)	Signal configuration
	AO1 Motor speed • Scaling: $\pm 10 \text{ V} \equiv$ motor reference speed (C00011)	C03110/1
	AO2 Motor torque (setpoint) • Scaling: $10 \text{ V} \equiv$ Motor reference torque (C00057/2)	C03110/2

Digital outputs

Terminal X4	Signal (Lenze setting)	Signal configuration
	DO1 Status "Drive ready" • DC-bus voltage is available and no error has occurred.	C03100/1
	DO2 Status "Positioner active"	C03100/2
	DO3 Status "Limitation active" • At the moment a setpoint is limited or a software or hardware limit switch has been reached.	C03100/3
	DO4 Status "Error active acknowledgement is required" • A monitoring function with the error response "Error" or "Quick stop by trouble" has been activated and the controller is in the status "Error active" or "Quick stop by trouble active".	C03100/4

Statebus

Terminal X2	Signal (Lenze setting)	Signal configuration
	SB Status "Error active acknowledgement is required" • A monitoring function with the error response "Error" or "Quick stop by trouble" has been activated and the controller is in the status "Error active" or "Quick stop by trouble active". • The state bus is put in the "error" status.	C03100/5

Display elements

User LED	Signal (Lenze setting)	Signal configuration
	"Positioning sequence control active" status	C03100/6

5.13 Application error messages

For the output of application-specific error messages, the FB instances *ApplicationError1* and *ApplicationError2* of the function block **L_DevApplErr** are available in the network.

- Via the boolean inputs up to 16 different application error messages with parameterisable module ID, error ID and error response can be released by the application.

Error message		Error ID	Error response
FB instance "ApplicationError1"			
1	Following error limit 1	8001	Warning
2	Following error limit 2	8002	Warning locked
3	Positioner: Home position is not known	8003	Warning
4	Positioner: Cycle is not known	8004	Warning
5	Positioner: Wrong positioning mode	8005	Warning
6	Positioner: Invalid change of the positioning mode	8006	Warning
7	Positioner: Profile data is not plausible or faulty	8007	Warning
8	Positioner: Error in profile generation	8008	Warning
FB instance "ApplicationError2"			
1	Free error message 1	8011	Information
2	Free fault message 2	8012	Information
3	PositionerTable: Invalid axis data structure	8013	Warning
4	PositionerTable: Invalid profile no.	8014	Information
5	PositionerTable: Invalid table no.	8015	Warning
6	Watch-Dog	8016	Quick stop by trouble
7	Sequencer: Error due to variable branch	8017	Warning
8	Sequencer: Pause	8018	Information

- Parameter setting: Tab **All parameters**

Parameter		Lenze setting
FB instance "ApplicationError1"		
C05900	Function block ID	999
C05901/1...8	Error ID 1 ... 8	See table above
C05902/1...8	Error response 1 ... 8	See table above
FB instance "ApplicationError2"		
C05903	Function block ID	998
C05904/1...8	Error ID 1 ... 8	See table above
C05905/1...8	Error response 1 ... 8	See table above

Reset of error message

In the Lenze setting the digital input DI5 for resetting (acknowledging) an error message is connected to the input *DI_bResetError1* of the drive interface.

5.14 Parameterisable function blocks

This subchapter lists all relevant parameterisable function blocks of the technology application and the corresponding parameters in alphabetical order.

5.14.1 ActualSpeedScaling

Is an instance of	Function
L_TbNormalize	Scaling of actual speed to a parameterisable reference variable

Parameter	Possible settings	Information
C04036	-2147483647 2147483647	Reference variable - Setting "0" is not possible. - Initialisation: 44739243

5.14.2 ApplicationError1

Is an instance of	Function
L_DevApplErr	Error handling ▶ Application error messages (65)

Parameter	Possible settings			Information
C05900	980		999	Module ID Initialisation: 999
C05901/1...8	0		65535	Error ID Initialisation: 8001 ... 8008
C05902/1...8				Error response
	0	None		
	1	Fault		
	2	Trouble		
	3	Quick stop by trouble		
	4	Warning locked		
	5	Warning		
	6	Information		

5.14.3 ApplicationError2

Is an instance of	Function			
L_DevApplErr	Error handling ▶ Application error messages (📖 65)			

Parameter	Possible settings			Information
C05903	980		999	Module ID • Initialisation: 998
C05904/1...8	0		65535	Error ID • Initialisation: 8011 ... 8018
C05905/1...8				Error response
	0	None		
	1	Fault		
	2	Trouble		
	3	Quick stop by trouble		
	4	Warning locked		
	5	Warning		
	6	Information		

5.14.4 FollowingErrorScaling

Is an instance of	Function		
L_TbNormalize	Scaling of the following error to a parameterisable reference variable		

Parameter	Possible settings			Information
C04035	-2147483647		2147483647	Reference variable • Setting "0" is not possible. • Initialisation: 65536

5.14.5 HysteresisFollowingError1

Is an instance of	Function		
L_SdSetPosition	Conversion of the following error hysteresis 1 selected in the real units of the machine via C03917 into a position in [increments]. ▶ Following error monitoring (📖 54)		

Parameter	Possible settings			Information
C03917	-214000.0000	unit	214000.0000	Position value • Initialisation: 0.0000 unit
C03918	String of digits			Position unit • Read only
C03919	-2147483647		2147483647	State • Read only

5.14.6 HysteresisFollowingError2

Is an instance of	Function
L_SdSetPosition	Conversion of the following error hysteresis 2 selected in the real units of the machine via C03920 into a position in [increments]. ► Following error monitoring (📖 54)

Parameter	Possible settings	Information
C03920	-214000.0000 unit 214000.0000	Position value Initialisation: 0.0000 unit
C03921	String of digits	Position unit Read only
C03922	-2147483647 2147483647	State Read only

5.14.7 L_PosPositionerTable1

Is an instance of	Function
L_PosPositionerTable	► Profile data management (📖 44)

Parameter	Possible settings	Information
C04700/1	071 The position applied at the input <i>dnPos_p</i> is saved to the VTPOS table position selected via the input <i>dwPosTableNumber</i>.	Teach position For execution via parameter channel.
C04700/2	071 The speed applied at the input <i>dnSpeed_s</i> is saved to the VTSPEED table position selected via the input <i>dwSpeedTableNumber</i>.	Teach speed For execution via parameter channel.
C04700/3	071 The acceleration/deceleration applied at the input <i>dnAcc_s</i> is saved to the VTACC table position selected via the input <i>dwAccTableNumber</i>.	Teach acceleration For execution via parameter channel.
C04700/4	071 The S-ramp time applied at the input <i>dwJerk</i> is saved to the VTJERK table position selected via the input <i>dwJerkTableNumber</i>.	Teach S-ramp time For execution via parameter channel.
C04701/1...75	-214748.3648 unit 214748.3648	VTPOS: variable positions For selecting the target positions and TP window start and end positions for the profiles.
C04702/1...50	-214748.3648 unit/s 214748.3648	VTSPEED: variable speeds For selecting the traversing and final speeds for the profiles.
C04703/1...50	-214748.3648 unit/s ² 214748.3648	VTACC: variable accelerations For selecting the accelerations and decelerations for the profiles.

Parameter	Possible settings			Information
C04704/1...50	-2147483.648	s	2147483.648	VTJERK: variable S-ramp times • For selecting the S-ramp times for the profiles.
C04705/1				DIS:bPosTeach
	0	FALSE		• Display of the input signal <i>bPosTeach</i> .
	1	TRUE		
C04705/2				DIS:bSpeedTeach
	0	FALSE		• Display of the input signal <i>bSpeedTeach</i> .
	1	TRUE		
C04705/3				DIS:bAccTeach
	0	FALSE		• Display of the input signal <i>bAccTeach</i> .
	1	TRUE		
C04705/4				DIS:bJerkTeach
	0	FALSE		• Display of the input signal <i>bJerkTeach</i> .
	1	TRUE		
C04706/1	0		100	DIS:VTPosNum • Display of the input signal <i>dwPosTableNumber</i> .
C04706/2	0		100	DIS:VTSpeedNum • Display of the input signal <i>dwSpeedTableNumber</i> .
C04706/3	0		100	DIS:VTAccNum • Display of the input signal <i>dwAccTableNumber</i> .
C04706/4	0		100	DIS:VTJerkNum • Display of the input signal <i>dwJerkTableNumber</i> .
C04706/5	0		100	DIS:ProfileNum • Display of the input signal <i>dwProfileNumber</i> .
C04707/1	-214748.3648	unit	214748.3648	DIS:dnTeachPos • Display of the input signal <i>dnPos_p</i> in the real unit of the machine.
C04707/2	-214748.3648	unit/s	214748.3648	DIS:dnTeachSpeed • Display of the input signal <i>dnSpeed_s</i> in the real unit of the machine.
C04707/1	-214748.3648	unit/s ²	214748.3648	DIS:dnTeachAcc • Display of the input signal <i>dnAcc_x</i> in the real unit of the machine.
C04707/1	-214748.3648	s	214748.3648	DIS:dnTeachJerk • Display of the input signal <i>dwJerk</i> in the real unit of the machine.
C04708	-2147483647		2147483647	State • Display of the bit-coded output signal <i>dnState</i> .

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Parameter setting & configuration

Parameterisable function blocks

Parameter	Possible settings	Information
C04710/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)		Positioning mode For absolute positioning, the home position must be known.
	1 Absolute	
	2 Absolute TP	
	5 Relative	
	6 Relative TP	
	7 Speed	
	8 Speed TP	
	11 Absolute CW	
	12 Absolute CW TP	
	13 Absolute CCW	
	14 Absolute CCW TP	
	15 Absolute ShortestWay	
	16 Absolute ShortestWay TP	
C04711/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)		Position from VTPOS Reference to VTPOS table position for defining the profile parameter "position".
	1 VTPOS position 1 (C04701/1)	
	2 VTPOS position 2 (C04701/2)	
		
	75 VTPOS position 75 (C04701/75)	
C04712/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)		Speed from VTSPEED Reference to VTSPEED table position for defining the profile parameter "speed".
	1 VTSPEED position 1 (C04702/1)	
	2 VTSPEED position 2 (C04702/2)	
		
	50 VTSPEED position 50 (C04702/50)	
C04713/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)		Acceleration from VTACC Reference to VTACC table position for defining the profile parameter "acceleration".
	1 VTACC position 1 (C04703/1)	
	2 VTACC position 2 (C04703/2)	
		
	50 VTACC position 50 (C04703/50)	
C04714/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)		Deceleration from VTACC Reference to VTACC table position for defining the profile parameter "deceleration".
	1 VTACC position 1 (C04703/1)	
	2 VTACC position 2 (C04703/2)	
		
	50 VTACC position 50 (C04703/50)	
C04715/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)		S-ramp time from VTJERK Reference to VTJERK table position for defining the profile parameter "S-ramp time".
	1 VTJERK position 1 (C04704/1)	
	2 VTJERK position 2 (C04704/2)	
		
	50 VTJERK position 50 (C04704/50)	
C04716/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)		Final speed from VTSPEED - Reference to VTSPEED table position for defining the profile parameter "final speed". - An existing sequence profile is required.
	1 VTSPEED position 1 (C04702/1)	
	2 VTSPEED position 2 (C04702/2)	
		
	50 VTSPEED position 50 (C04702/50)	

Parameter	Possible settings		Information
C04717/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)			TP window start position from VTPOS - Reference to VTPOS table position for defining the profile parameter "TP window start position". - For the position value "0", the start position is the negative travel range limit.
	1	VTPOS position 1 (C04701/1)	
	2	VTPOS position 2 (C04701/2)	
	...	...	
	75	VTPOS position 75 (C04701/75)	
C04718/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)			TP window end position from VTPOS - Reference to VTPOS table position for defining the profile parameter "TP window end position". - For the position value "0", the end position is the positive travel range limit.
	1	VTPOS position 1 (C04701/1)	
	2	VTPOS position 2 (C04701/2)	
	...	...	
	75	VTPOS position 75 (C04701/75)	
C04719/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)			Sequence profile with TP Sequence profile for touch probe residual path positioning.
	1	Profile no. 1	
	...	...	
	75	Profile no. 75	
C04720/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)			Sequence profile without TP Sequence profile for profile linkage.
	0	No sequence profile (End of profile linkage)	
	1	Profile no. 1	
	...	...	
	75	Profile no. 75	
C04721/1...75 (subcode 1 ... 75 ≡ profile no. 1 ... 75)	Value is bit-coded:		Touch probe configuration The touch probe channels to be used are selected by setting the corresponding bits to "1".
	Bit 0	TP channel 1, rising edge	Digital input 1
	Bit 1	TP channel 1, falling edge	
	Bit 2	TP channel 2, rising edge	Digital input 2
	Bit 3	TP channel 2, falling edge	
	Bit 4	TP channel 3, rising edge	Digital input 3
	Bit 5	TP channel 3, falling edge	
	Bit 6	TP channel 4, rising edge	Digital input 4
	Bit 7	TP channel 4, falling edge	
	Bit 8	TP channel 5, rising edge	Digital input 5
	Bit 9	TP channel 5, falling edge	
	Bit 10	TP channel 6, rising edge	Digital input 6
	Bit 11	TP channel 6, falling edge	
	Bit 12	TP channel 7, rising edge	Digital input 7
	Bit 13	TP channel 7, falling edge	
	Bit 14	TP channel 8, rising edge	Digital input 8
	Bit 15	TP channel 8, falling edge	
	Bit 16	TP channel 9	Motor encoder zero pulse
	Bit 18	TP channel 10	Load encoder zero pulse
	Bit 20	TP channel 11	DFIN zero pulse
	Bit 22	TP channel 12	DFOUT zero pulse

5.14.8 L_PosSequencer1

Is an instance of	Function
L_PosSequencer	Sequence control ▶ Program flow (□ 32)



Note!

The parameters of the different actions for the sequence table are described in the chapter "[Overview of action types](#)". (□ 33)

Parameter	Possible settings	Information
C04500/1...100	0 Program end	Sequence table - The calls of the actions required for the positioning program are stored in the subcodes. - In this way, the basic process sequence (except for branches) is described.
	xyyy Action call - xx ≡ action type - yyy ≡ action number	
C04501	1 100	Current program step Read only
C04502	0 READY: Positioning program ready to start/program end reached.	State of sequence control Read only
	1 RUN: Positioning program is running.	
	2 PAUSE: Current step interrupted, pause is active.	
	3 BREAK: Positioning program interrupted.	
	4 RESET: Positioning program reset.	
C04503	Bit 0 Start	Sequence control - Bit-coded code for sequencer control via a PC or a higher-level control by means of the parameter channel. - Setting a bit to "1" activates the corresponding function.
	Bit 1 Pause	
	Bit 2 Break	
	Bit 3 Cancel	
	Bit 4 Reset	
	Bit 5 NextStep	
C04504	0 Sequence step	Program step for abort This step is processed when the input <i>bCancel</i> is set to TRUE.
	1...100 Step 1 ... 100	
	101 Program end	
C04505	Text	Current comment Read only

5.14.9 L_SdSwitchPoint1

Is an instance of	Function			
L_SdSwitchPoint	Position switch points (cams)			

Parameter	Possible settings			Information
C04395/1...8				State of switching range 1 ... 8 Read only
	0	Switch is off		
	1	Switch is on		
C04396	String of digits			Position unit Read only
C04397/1...8	-2147483648	unit	2147483648	Switch-on position switching range 1 ... 8
C04398/1...8	-2147483648	unit	2147483648	Switch-off position switching range 1 ... 8
C04399/1...8				Enable switching range 1 ... 8
	0	Switching range not enabled		
	1	Switching range enabled		

5.14.10 LimitFollowingError1

Is an instance of	Function		
L_SdSetPosition	Conversion of the following error switching threshold 1 selected in the real units of the machine via C03911 into a position in [increments]. ► Following error monitoring (54)		

Parameter	Possible settings			Information
C03911	-214000.0000	unit	214000.0000	Position value • Initialisation: 100.0000 unit
C03912	String of digits			Position unit • Read only
C03913	-2147483647		2147483647	State • Read only

5.14.11 LimitFollowingError2

Is an instance of	Function		
L_SdSetPosition	Conversion of the following error switching threshold 2 selected in the real units of the machine via C03914 into a position in [increments]. ► Following error monitoring (54)		

Parameter	Possible settings			Information
C03914	-214000.0000	unit	214000.0000	Position value • Initialisation: 200.0000 unit

Parameter	Possible settings	Information
C03915	String of digits	Position unit • Read only
C03916	-2147483647 2147483647	State • Read only

5.14.12 MonitFollowError1

Is an instance of	Function
L_LdMonitFollowError	► Following error monitoring (□ 54)

Parameter	Possible settings	Information
C03960	-214748.3647 unit 214748.3647	Following error at the input • Display of the input signal <i>dnFollowErrorIn_p</i> in the real unit of the machine.
C03961	String of digits	Position unit • Read only
C03963	FALSE Following error smaller than set switching threshold TRUE Following error larger than set switching threshold	Following error out of tolerance • Read only
C03964	FALSE Deactivated TRUE Activated	Following error monitoring activated • Read only

5.14.13 MonitFollowError2

Is an instance of	Function
L_LdMonitFollowError	► Following error monitoring (□ 54)

Parameter	Possible settings	Information
C03965	-214748.3647 unit 214748.3647	Following error at the input • Display of the input signal <i>dnFollowErrorIn_p</i> in the real unit of the machine.
C03966	String of digits	Position unit • Read only
C03968	FALSE Following error smaller than set switching threshold TRUE Following error larger than set switching threshold	Following error out of tolerance • Read only
C03969	FALSE Deactivated TRUE Activated	Following error monitoring activated • Read only

5.14.14 PosStarted

Is an instance of	Function
L_TbTransition	Edge generation for resetting the "drive at the target" state

Parameter	Possible settings	Information
C04000		Trigger edge
	0 Rising edge	Lenze setting
	1 Falling edge	
	2 Both edges	
C04001	0.001 s 60.000	Pulse duration • Initialisation: 0.001 s

5.14.15 RestartPosTransition

Is an instance of	Function
L_TbTransition	Edge generation for restart of positioning

Parameter	Possible settings	Information
C04002		Trigger edge
	0 Rising edge	Lenze setting
	1 Falling edge	
	2 Both edges	
C04003	0.001 s 60.000	Pulse duration • Initialisation: 0.005 s



Your opinion is important to us

These instructions were created to the best of our knowledge and belief to give you the best possible support for handling our product.

If you have suggestions for improvement, please e-mail us to:

feedback-docu@Lenze.de

Thank you for your support.

Your Lenze documentation team



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