



Parameter change Controller Drive

Lenze Controller / Lenze Drive

Controller content

1	General information	3
1.1	Read first, then start	3
1.2	About this manual.....	3
2	Safety instructions	4
2.1	Basic safety measures.....	4
2.2	Residual dangers	4
2.3	Conventions used.....	5
2.4	Variable identifiers.....	5
3	Introduction.....	6
4	Parameter set handling in the Controller-based Automation system	7
4.1	Use cases	9
4.1.1	Changing parameters online	9
4.1.2	Changing parameters offline.....	9
4.1.3	Save parameters non-volatile beyond mains switching.....	9
4.1.4	Upload parameters and save them in the controller boot project.....	10
4.2	"EASY Starter" - transfer parameter set	11
4.2.1	Save current parameterization in the Lenze Controller in a fail-safe manner	12
4.2.2	Upload current parameterization to the engineering PC and save it there	12
4.3	Exchange parameter sets between "PLC Designer" and "EASY Starter"	13
5	Procedure for different scenarios	14
5.1	Change parameters via "PLC Designer" (online).....	14
5.2	Change parameters via "PLC Designer" (offline)	15
5.3	Change parameters via "EASY Starter" or keypad	16
5.4	Using the Auto-Tuning function.....	18

Illustrations

Figure 1: Axis mode (sub-index 27).....	6
Figure 2: Parameter set transfer from the "PLC Designer" via the 3231 C controller to the i700 servo inverter.....	8
Figure 3: Parameter set transfer from the 3200 C controller to the i700 servo inverter during a boot-up.....	10
Figure 4: Parameter set transfer with the "EASY Starter"	11
Figure 5: Saving the parameter set in the controller via "EASY Starter"	12
Figure 6: Upload and save parameter set.....	12
Figure 7: Parameter set transfer between "PLC Designer" and "EASY Starter"	13
Figure 8: Parameter set difference→ Download all.....	14
Figure 9: Parameter set difference→ Download all.....	15
Figure 10: Saving the parameter set in the controller via "EASY Starter"	16
Figure 11: Parameter set difference→ Upload all.....	17
Figure 12: Auto-tuning function.....	18
Figure 13: Create boot project.....	19
Figure 14: Execution of auto-tuning function.....	19
Figure 15: Save parameter set.....	19
Figure 16: Execution of the Save parameter set function	20
Figure 17: Note when logging in with PLC Designer.....	20
Figure 18: Example Details view.....	20
Figure 19: Upload everything.....	21
Figure 20: Save PLC Designer project	21

1 General information

1.1 Read first, then start

} WARNING !

Read this documentation carefully before installation and commissioning.

f Observe the safety instructions!



Information and aids relating to Lenze products can be found on the Internet:

→ <http://www.Lenze.comDownload>

1.2 About this Manual

This manual contains detailed information on how to change the parameters of a Lenze controller in conjunction with a Lenze controller.

2 Safety instructions

2.1 Basic safety measures

Failure to observe the following basic safety measures may result in serious personal injury and damage to property!

Observe all specifications in the enclosed and associated documentation. This is a prerequisite for safe and trouble-free operation and for achieving the specified product characteristics.

The procedural instructions and circuit sections shown in this document are suggestions whose applicability to the respective application must be checked. The manufacturer assumes no liability for the suitability of the specified procedures and circuit suggestions.

Please observe the specific instructions in the other chapters!

Notes used:

} DANGER !

This warning indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.

} WARNING !

This warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.

} CAUTION !

This symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTE

This notice indicates a hazardous situation which, if not avoided, could result in material damage.

2.2 Residual hazards

The user must take the residual hazards mentioned into account in the risk assessment for his machine/system.

Failure to do so may result in serious personal injury and damage to property!

2.3 Conventions used

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

Type of information	Labeling	Example
Names of dialog boxes, input fields and selection lists	<i>italic</i>	The <i>Options</i> dialog box
Buttons	Bold	Click OK to...
Menu commands	bold	You can use the Messages command to...
		If several commands are required in succession to execute a function, the individual commands are separated from each other by an arrow: Select File → Open to...
Keyboard commands	< bold >	Press < F2 > to open the input help.
		If a key combination is required for a command, a "+" is placed between the commands: With < Shift >+< ESC > you can...
Program listing	Courier	IF var1 < var2 THEN...
Keywords	Courier bold	...starts with FUNCTION and ends with END FUNCTION .

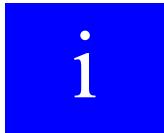
2.4 Variable identifiers

The conventions used by Lenze for the variable identifiers of Lenze system blocks, function blocks and functions are based on the so-called "Hungarian notation", whereby the most important properties (e.g. the data type) of the corresponding variable can be inferred immediately from the identifier, e.g. DIGIN_xIn1_b.

3 Introduction

In the Controller-based Automation system, Lenze supports the central storage of parameter sets for Lenze devices on the Lenze controller.

All parameters of the connected Lenze devices, e.g. drive controllers, are stored on the controller and transferred to the respective devices when switching on (boot-up).



Central parameter set management is supported exclusively via the EtherCAT fieldbus.

The following Lenze controllers currently support the centralized management of parameter sets (as of 2023).

- Lenze Controller series c5xx
- Lenze Controller 3200C series
- Lenze Controller p500 series
- Lenze Controller c300 series
- Lenze Controller p300 series (only for i550 in "Simple" axis mode and for IO-1000 series)

Achsmodus (Subindex 27)

☐ Virtuelle Achse ☐ 9400 HighLine ☒ Inverter i500 ☒ Servo-Inverter i700 ☒ Servo-Inverter i950 ☐ Encoder	
Achsmodus	
Auswahlliste (Lenze-Einstellung fettgedruckt)	Info
0 Einfach	Minimaler Funktionsumfang und Ressourcenbedarf in der Steuerung. Verwendung für einfache Inverter-Applikationen (z. B. Förderband). Für diesen Modus steht der FB L_MC1P_BasicActuatingSpeed zur Verfügung.
1 Standard	Intelligente Ansteuerung eines Antriebs mit Nutzung der Standardfunktionen für Positionieren, Kurvenscheibe, etc.
☒ Lesezugriff ☒ Schreibzugriff ☒ Änderung nur im Zustand "Disabled" möglich ☐ Kein Download UNSIGNED_16	

Figure1 : Axis mode (subindex 27)

The following Lenze devices currently support the central management of parameter sets (as of 2023).

- IO-System 1000 (only with EPM-S130 and EPM-S131)
- Inverter i550 (from firmware 4.01)
- Servo inverter i700
- Servo inverter i750
- Servo inverter i950 (only with "Base" variant, TA Cia402)

NOTE

In addition to the central storage of the parameter set in the higher-level controller, the i550 inverter also supports local parameter set storage on the device itself. The parameter set can be stored on the i550 using parameter 0x2022:003. This parameter set is overwritten when the controller is started (boot-up).

For all other devices, the parameter settings are not stored in a fail-safe manner and are transferred from the controller to the devices during initialization (boot-up).

4 Parameter set handling in the Controller-based Automation system

Parameter set handling is described using the example of the Lenze 3200C controller in conjunction with the i700 drive controller.

This behavior can be transferred analogously to the devices described above.

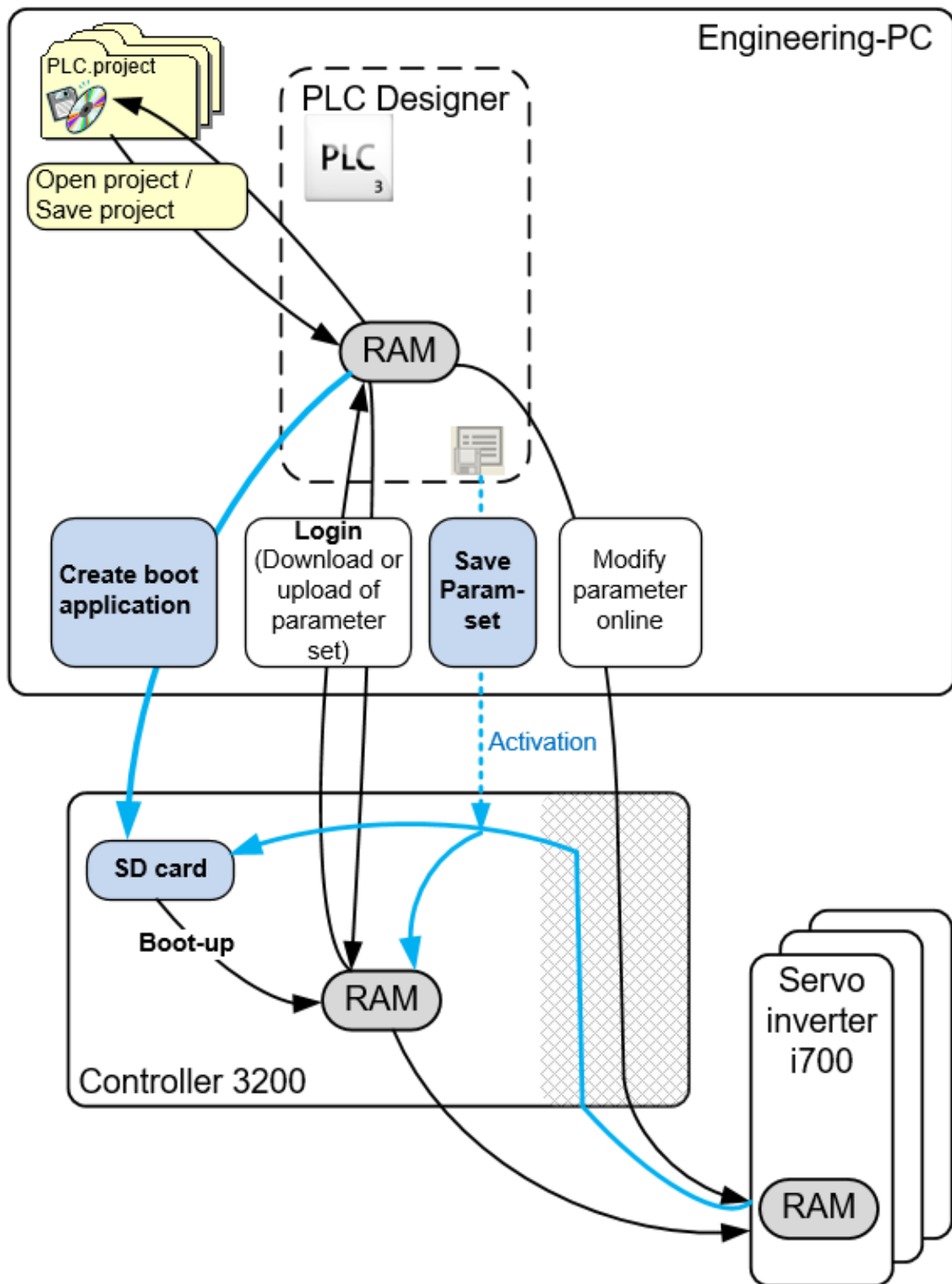


Figure2 : Parameter set transfer from the "PLC Designer" via the 3231 C controller to the i700 servo inverter

Parameter set handling in the Controller-based Automation system

The parameters of the Servo Inverter i700 are managed within the "PLC Designer" project. The "PLC Designer" memory function is used to save the "PLC Designer" project including the i700 parameter sets on the engineering PC.

When logging into the Lenze Controller, the "PLC Designer" transfers the i700 parameter sets to the controller. This in turn then transfers the parameter sets to the subordinate i700 servo inverters.

Each time the system boots up, the parameter sets are written to the Servo Inverter i700 again by the Lenze Controller.

4.1 Use cases

There are four use cases for managing and changing parameters:

4.1.1 Changing parameters online

If a parameter is changed online, the "PLC Designer" writes the parameter directly to the corresponding servo inverter and changes the parameter in the "PLC Designer" project at the same time.

NOTE

The parameter change is not recorded in the Lenze Controller.

If the controller is **cold reset**, the parameter change is lost in the servo inverter.

To avoid this, log out and log in again with the "PLC Designer". (Menu commands: **Log out online / Log in online**).

This writes the complete parameter set to the controller and transfers it to the servo inverter.

Once the parameter set has been transferred by logging in, it is only available in the servo inverter and in the controller until the next time the system is switched off (not stored in a power-failure-proof manner).

4.1.2 Changing parameters offline

If a parameter is changed offline, the "PLC Designer" changes the value directly in the "PLC Designer" project.

When logging into the Lenze Controller, the complete parameter set is written to the controller. This in turn transfers the parameter set to the servo inverter.

Once the parameter set has been transferred by logging in, it is only available in the servo inverter and in the controller until the next time the system is switched off (not stored in a fail-safe manner).

4.1.3 Non-volatile parameter storage beyond mains switching

The boot project saved in the Lenze Controller also contains the saved parameter settings for the subordinate i700 Servo Inverters. These are summarized there in a separate parameter set, which is only updated when the "PLC Designer" function "**Create boot project**" is executed. The current parameterization is then saved and is available after mains switching.

The saved parameter set is automatically written from the controller to the servo inverter during boot-up after switching on the mains.

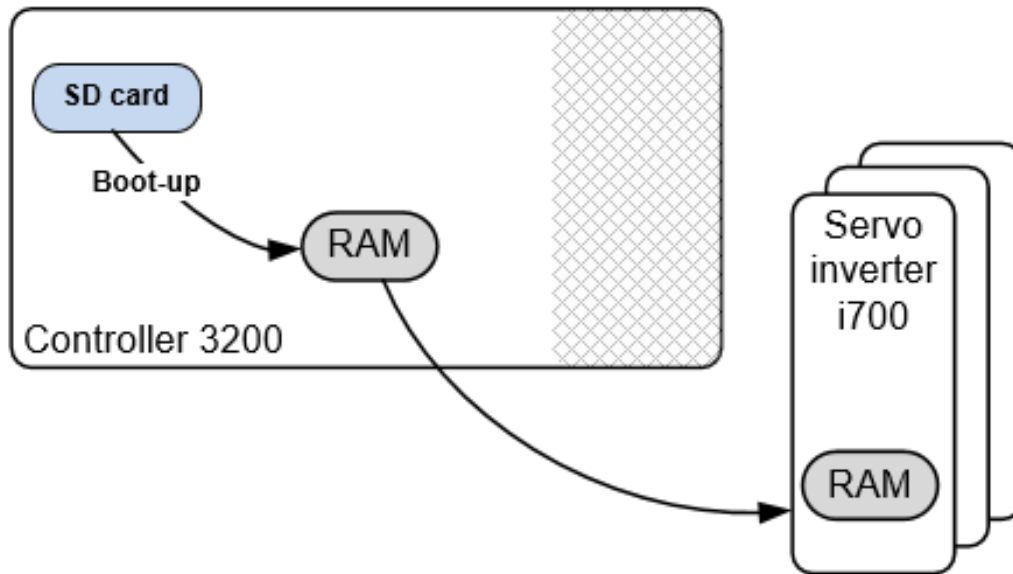


Figure3 : Parameter set transfer from the 3200 C controller to the i700 servo inverter during a boot-up

4.1.4 Upload parameters and save in the controller boot project

If a change has been made to the parameter set outside the "PLC Designer" (e.g. via the "EASY Starter"), it is possible to include this change in the PLC boot project. To do this, the PLC boot project must first be created via the "PLC Designer".

Use the button  to upload the parameter set from the i700 servo inverter to the controller and save it in the PLC boot project in a fail-safe manner.

NOTE

In this case, the value is not transferred to the offline project of the "PLC Designer".

4.2 "EASY Starter" - Transfer parameter set

To manage parameters in the "EASY Starter", you must add the Lenze Controller and the i700 servo inverters to the device list using the  button.

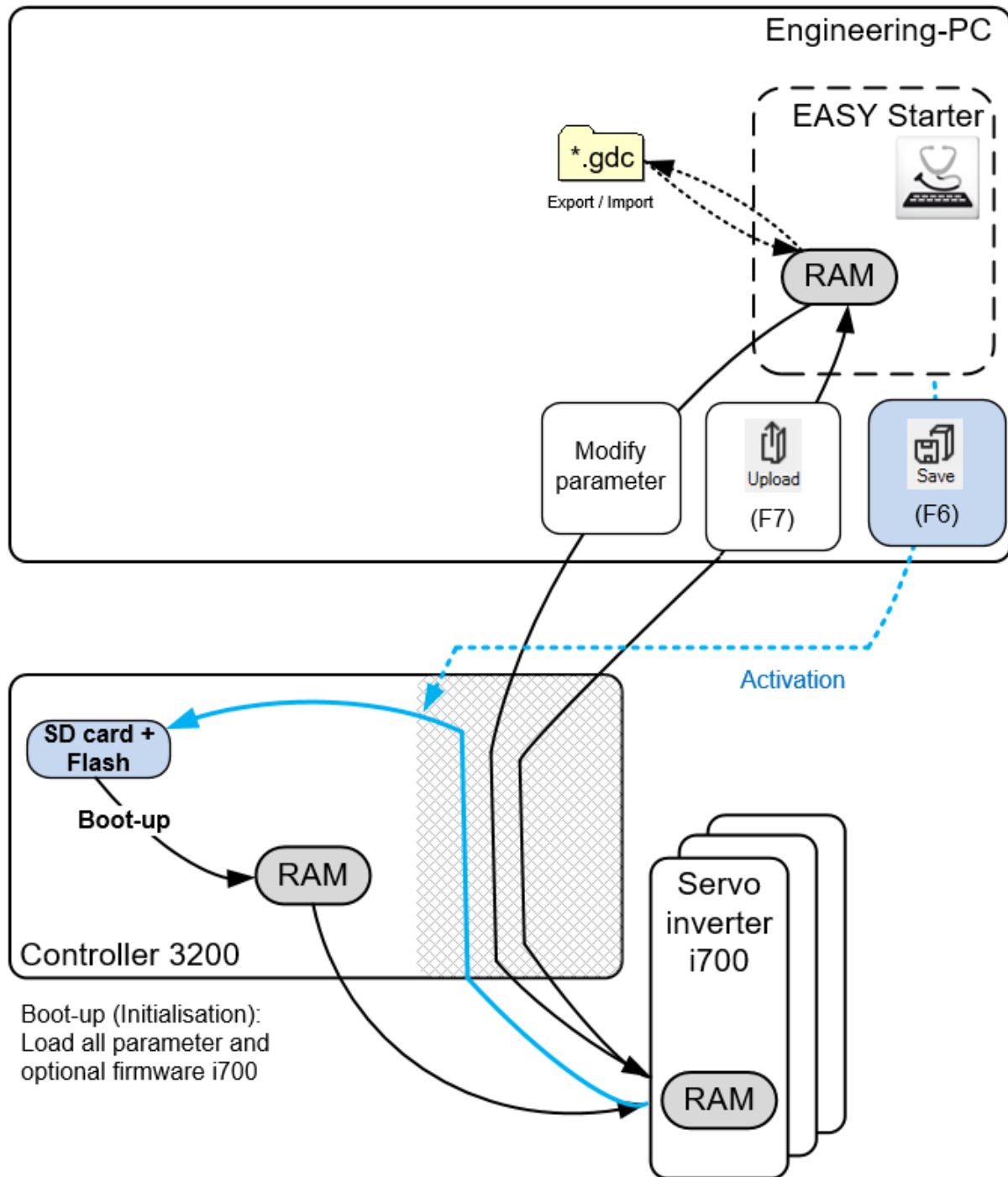


Figure4 : Parameter set transfer with the "EASY Starter"

There are two use cases for parameter management with the "EASY Starter":

4.2.1 Saving the current parameterization in the Lenze Controller in a fail-safe manner

- Select the Lenze Controller in the device list.
- Use the **Save** button or the <F6> function key to save the parameter set in the controller in a fail-safe manner.
(For this purpose, all parameter sets of the subordinate i700 servo inverters are uploaded to the PLC boot project of the controller).

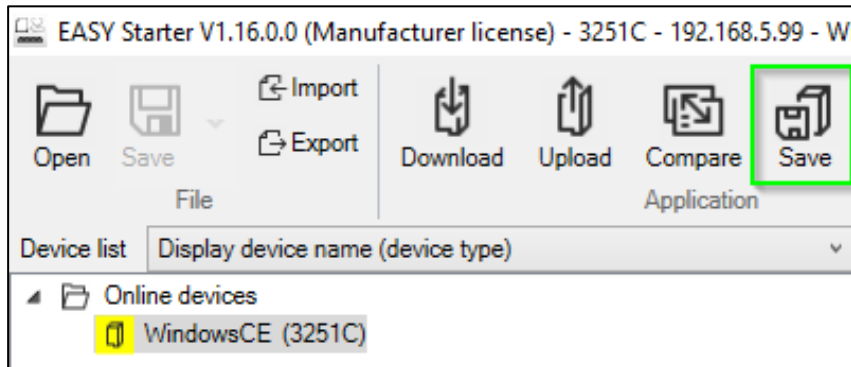


Figure5 : Saving the parameter set in the controller via "EASY Starter"

- After switching the system off and on again, the controller transfers the parameter sets back to the Servo Inverter i700.

4.2.2 Upload the current parameterization to the engineering PC and save it there

- Select a Servo Inverter i700 in the device list.
- Use the **Upload** button or the <F7> function key to upload the parameter set of the servo inverter.
(The parameter set of the servo inverter is transferred directly to the "EASY Starter" without the parameter set being saved on the controller).

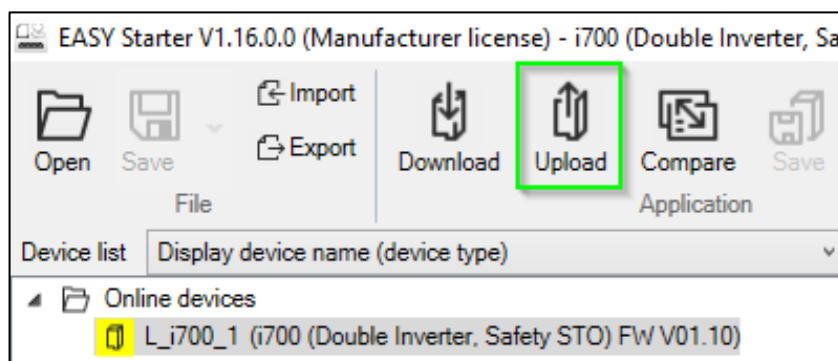


Figure6 : Upload and save parameter set

- The uploaded parameter set can then be saved in a GDC file.

4.3 Exchanging parameter sets between "PLC Designer" and "EASY Starter"

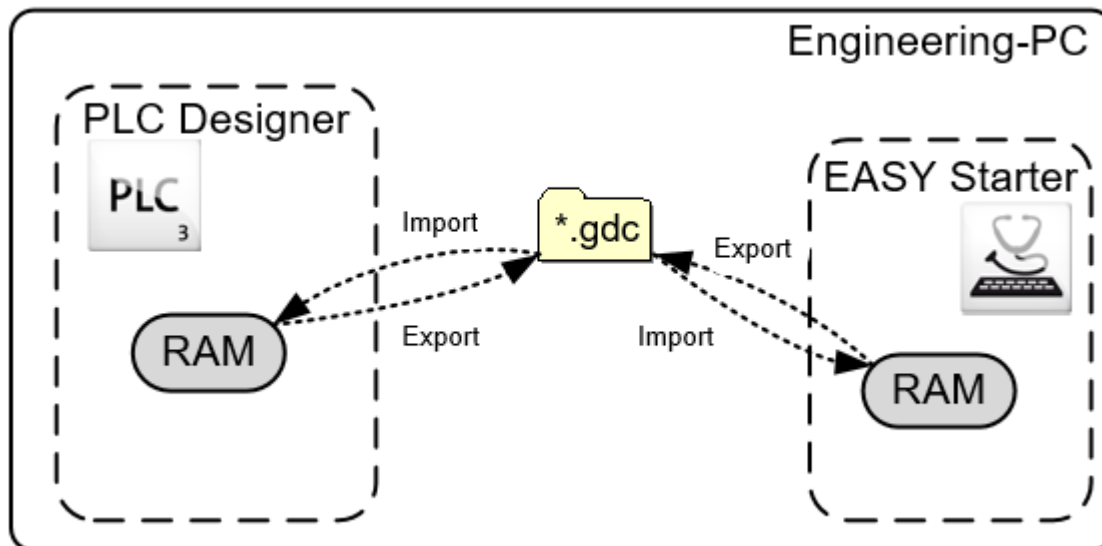


Figure7 : Parameter set transfer between "PLC Designer" and "EASY Starter"

The parameter sets can be exchanged using so-called **GDC files** (*.gdc).

The **GDC files** that were saved on the engineering PC using the "EASY Starter" can be imported into the "PLC Designer".

Conversely, it is possible to export GDC files with the "PLC Designer", which can then be imported into the "EASY Starter".

As part of this import/export functionality, the parameterization of a single axis can also be imported into a double axis, for example.

How to import parameters in the "PLC Designer":

- **Log out** of the Lenze Controller with the menu command **Online**→ or <Ctrl>+<F8>.
- Select the corresponding i700 servo inverter in the project tree.
- Use the menu command **Project**→ **EASY Import** to select and import the corresponding GDC file.
- Log into the Lenze Controller using the menu command **Online**→ **Log in** or <Alt>+<F8>.
- The PLC program must be error-free.
- The complete parameter set is written to the controller. This in turn transfers the parameter set to the i700 servo inverter

The parameter export in the "PLC Designer" is carried out accordingly via the menu command **Project**→ **EASY Export**.

5 Procedure for different scenarios

5.1 Parameter change via "PLC Designer" (online)

A parameter of a drive controller (e.g. i700) is changed while the "PLC Designer" is connected to the controller online.

- **Log out** of the Lenze Controller with the menu command **Online**→ or <Ctrl>+<F8>
- **Log in** again to the Lenze Controller with the menu command **Online**→ **Log in** or <Alt>+<F8>.
- A parameter set difference is displayed. Confirm this dialog with **Download all**.

Field device data have changed ...

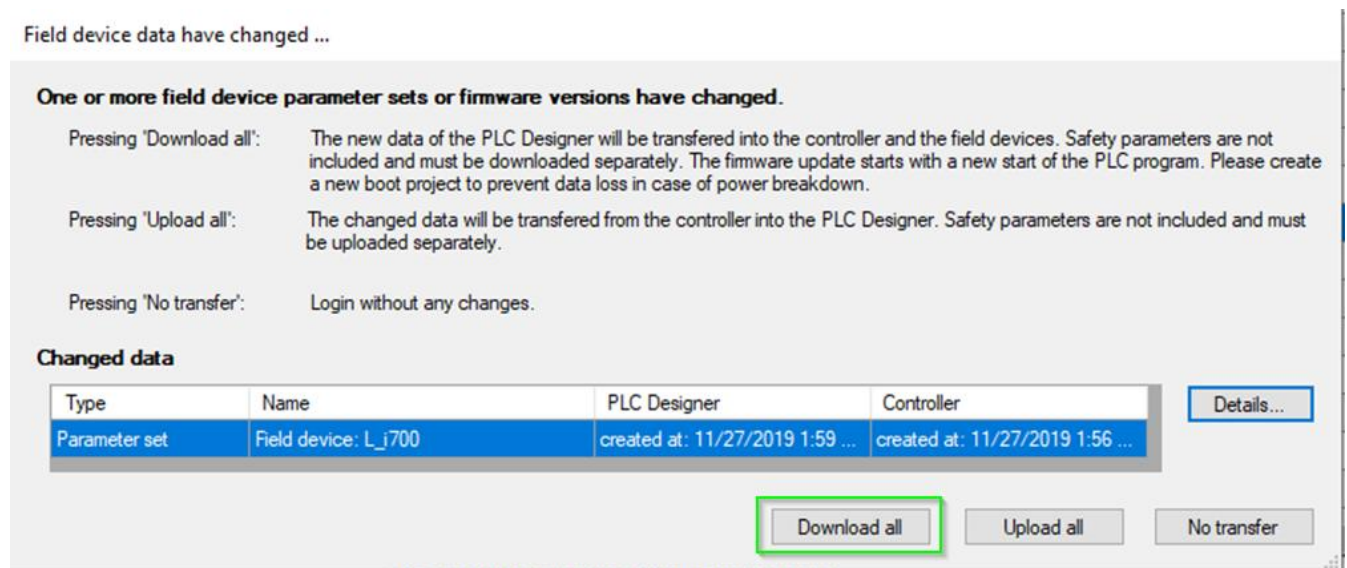


Figure8 : Parameter set difference→ Download all

- Create boot application.

5.2 Parameter change via "PLC Designer" (offline)

A parameter of a drive controller (e.g. i700) is changed while the "PLC Designer" is not connected to the controller.

- Use the menu command **Online**→ **Log in** or <Alt>+<F8> to log in to the Lenze Controller.
- A parameter set difference is displayed. Confirm this dialog with **Download all**.

Field device data have changed ...

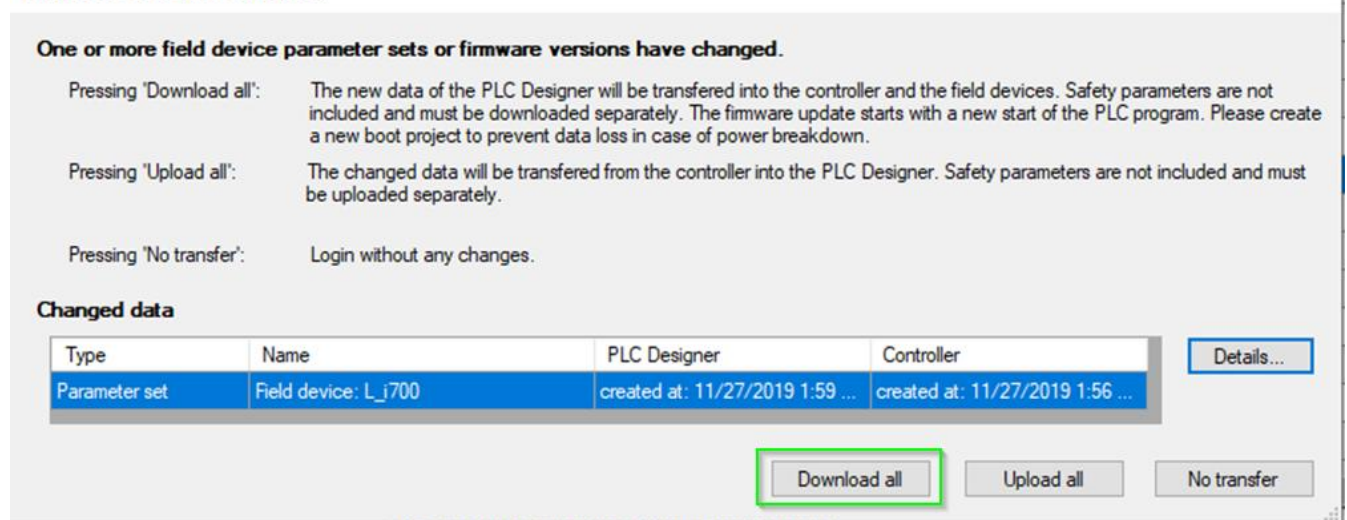


Figure9 : Parameter set difference→ Download all

- Create boot application.

5.3 Parameter change via "EASY Starter" or keypad

A parameter of a drive controller (e.g. i700) is changed via the "EASY Starter" or a keypad. The "PLC Designer" project or the PLC boot application are not yet updated as a result.

- Establish an additional connection to the controller in the "EASY Starter"
- Use the **Save** button or the <F6> function key to save the parameter set in the controller in a fail-safe manner.
(This uploads all parameter sets of the subordinate devices to the PLC boot project of the controller)

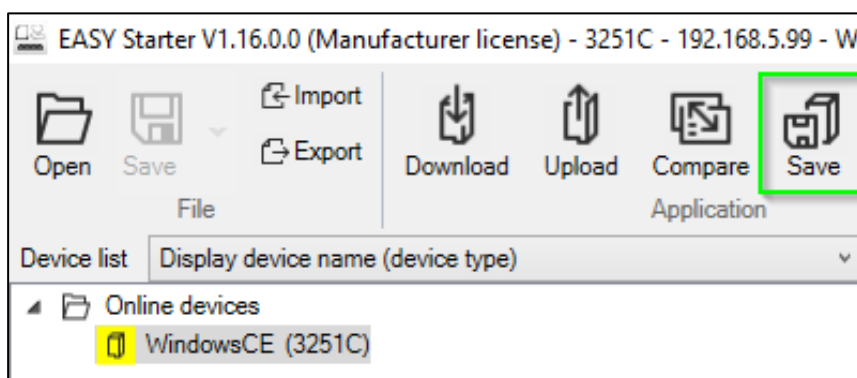


Figure10 : Saving the parameter set in the controller via "EASY Starter"

NOTE

After the upload has been initiated, it may be necessary to wait several minutes before the system can be switched off. The completion of the upload is not displayed in the "EASY Starter" but in the controller logbook:

```
05351 I PLC 2020-01-22 01:38:39 Parameter set upload done
05350 I PLC 2020-01-22 01:38:07 Parameterset upload service is started
```

- **Log in** to the Lenze Controller using the "PLC Designer" menu command **Online**→ **Log in** or <Alt>+<F8>.
- A parameter set difference is displayed. Confirm this dialog with **Upload all**.
(This uploads all parameter sets to the "PLC Designer" project)

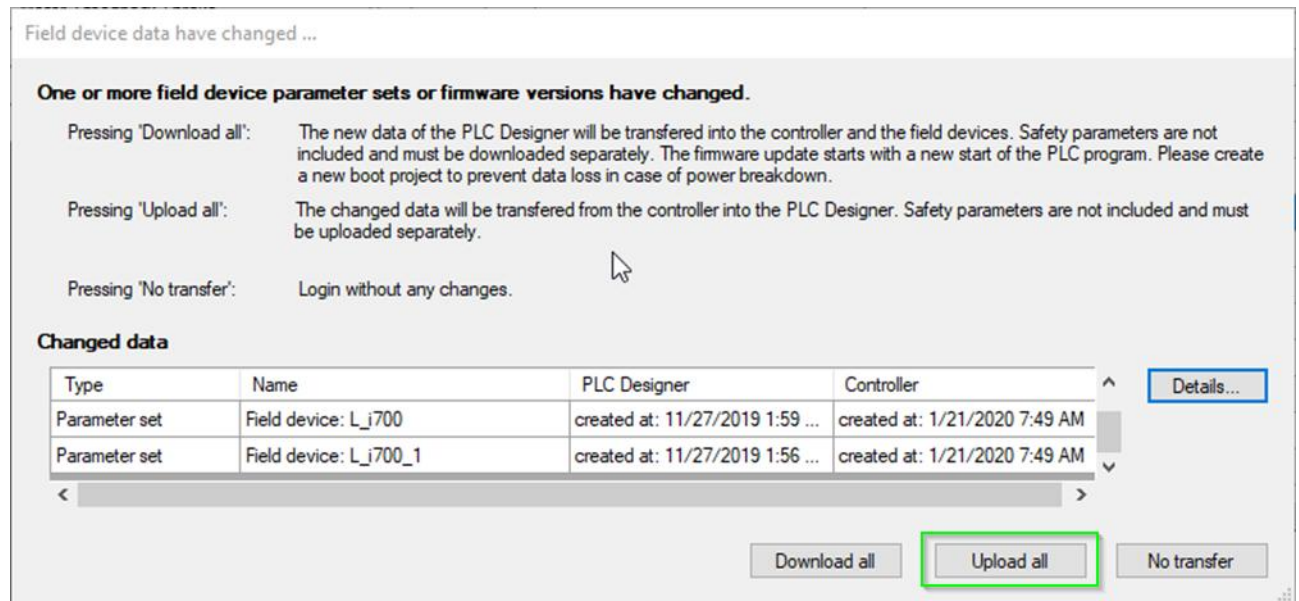


Figure11 : Parameter set difference→ Upload all

- Save "PLC Designer" project

5.4 Using the auto-tuning function or motor calibration

The same procedure must also be used for motor calibration.

The procedure is shown using auto-tuning.

This function can be used to optimize certain control parameters using automated procedures.

Optimize the setting of speed and position controller in just 1 minute while moving.

⚠ Activate function without payload.

⚠ Suspended loads must start from the lowest level.

Goal for auto-tuning

Strategy: User defined ⓘ

Velocity gain factor: % resettime factor:

Position gain factor: %

Motion parameter for auto-tuning movement

	Suggested values	Transfer suggested values	Actual values
1 Maximum acceleration	1440 Unit/s ²		1440 Unit/s ²
2 Maximum velocity	360 Unit/s		360 Unit/s
3 Maximum distance	180 Unit		180 Unit

Figure 12: Auto-tuning function

The following steps are necessary to save the determined parameters both in the controller and in the PLC Designer project:

Note

When using the i550, the following must also be observed

If parameters with the question mark value (?) are to be saved in the controller in a fail-safe manner, they must first be described with a numerical value.

Example 0x2C03:5

0x2C03:005	P352:005	Motor parameter (PSM): D-axis inducta...	?
------------	----------	--	---

Is to be replaced with a numerical value (e.g. 0.000)

0x2C03:005	P352:005	Motor parameter (PSM): D-axis inducta...	0.000
------------	----------	--	-------

Only then carry out steps 1-4

1. If there is no boot project in the controller, this must be created first.

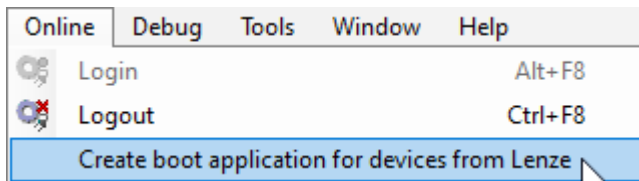


Figure 13: Create boot project

2. The **auto-tuning** function can now be carried out

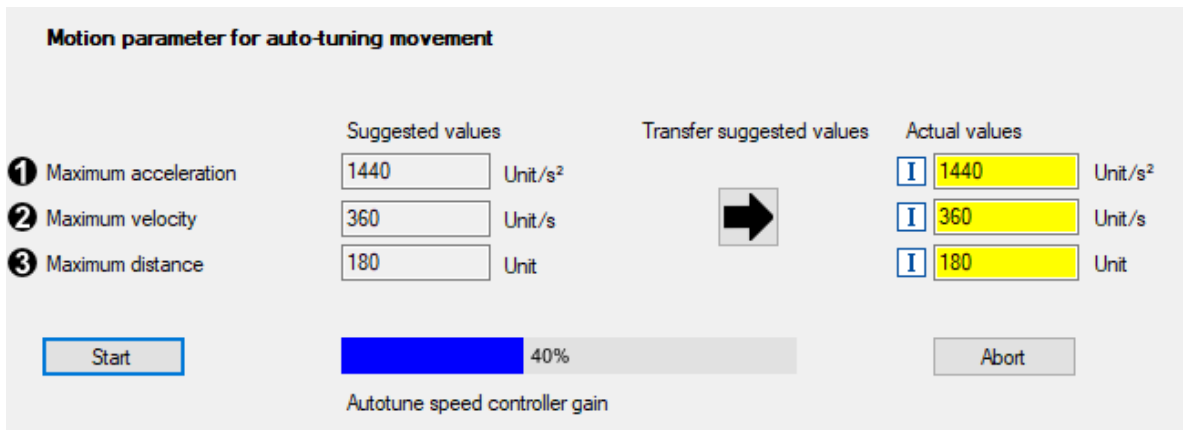


Figure 14: Carrying out the auto-tuning function

3. After successful optimization, the determined parameter values must be saved manually to the storage medium in a power-failure-proof manner (**save parameter set** must be executed).

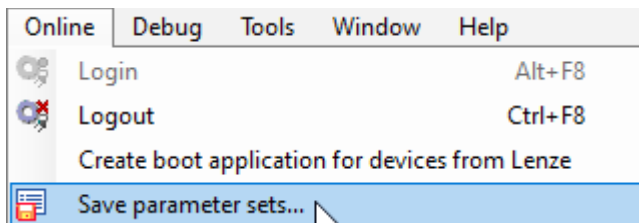


Figure 15: Saving the parameter set

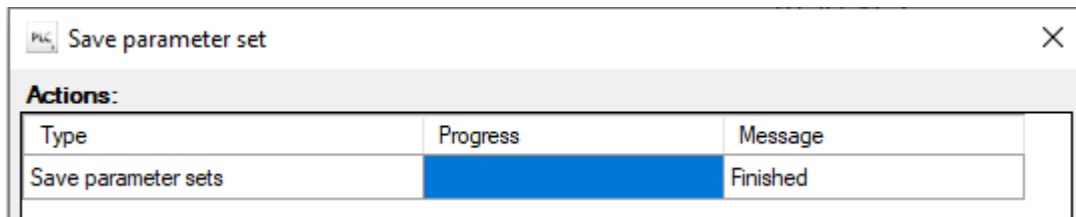


Figure 16: Executing the Save parameter set function

The parameters are now saved in the controller. They must now be saved in the PLC Designer project

4. To do this, first log out of the controller using the PLC Designer and then log back in. You will receive this message when logging in:

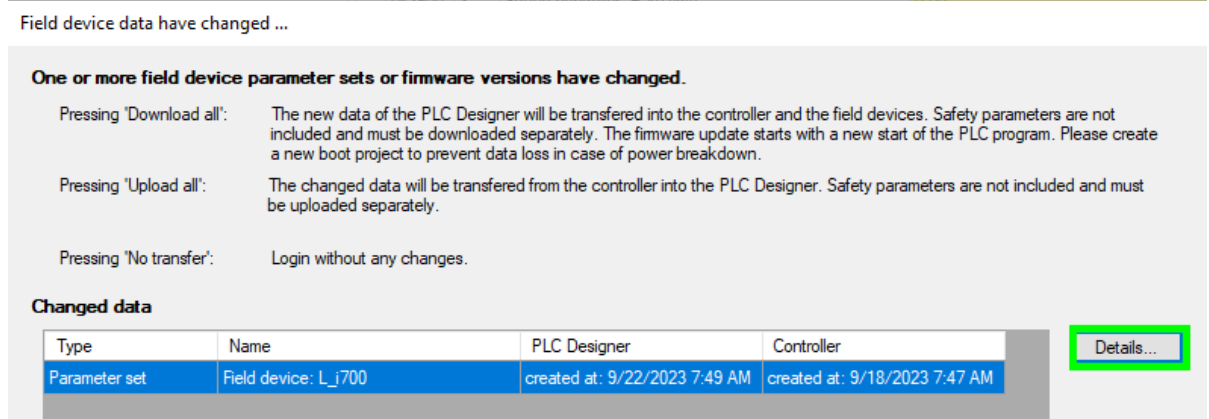


Figure 17: Message when logging in with PLC Designer

The parameters have changed as a result of the Auto-Tuning function. The parameters can be displayed via **Details**.

Index/Code	Subi	Name	Value PLC Designer	Value Controller	Unit
0x2900	1	Speed controller: Gain	0.00033	0.00022	Nm/rpm
0x2900	2	Speed controller: Reset time	17.6	187.6	ms
0x2980	0	Position controller: Gain	28.40	8.52	1/s

Figure 18: Example Details view

The values displayed in **Value Controller** are those determined by the Auto-Tuning function.

By uploading **everything**, these parameters are transferred to the PLC Designer project.

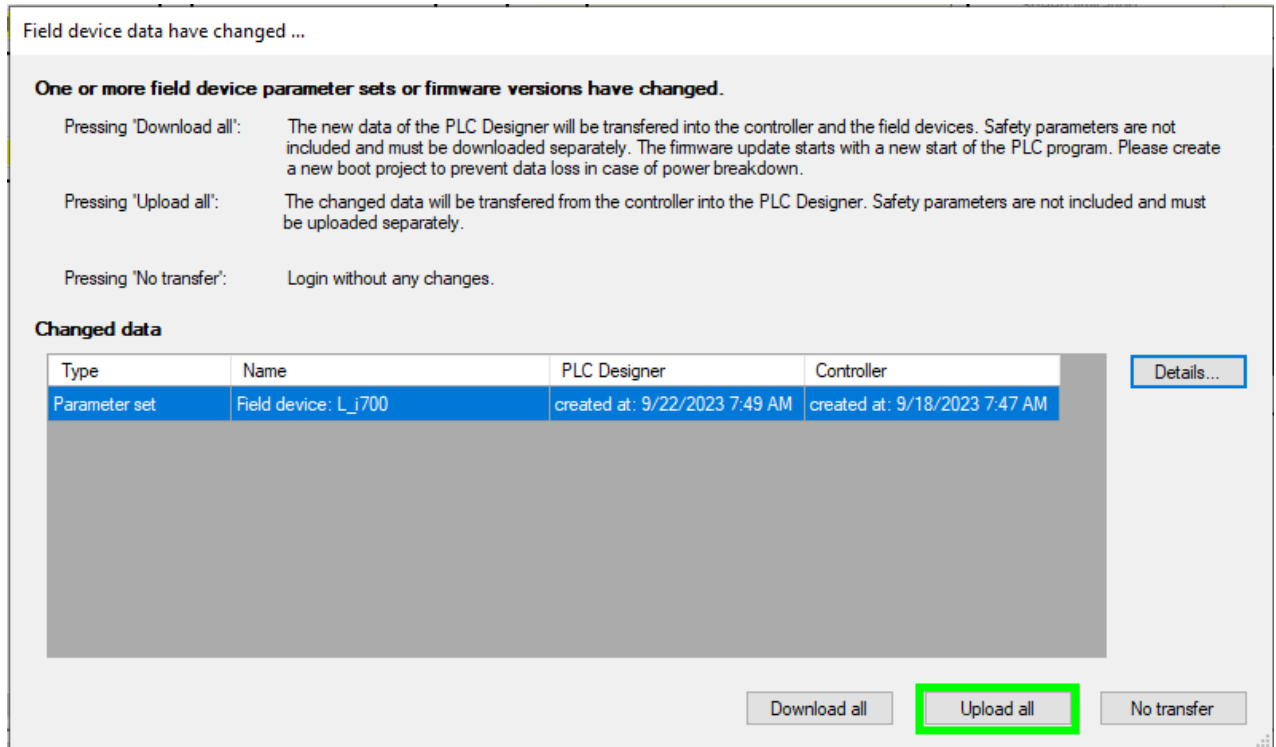


Figure 19: Upload all

The PLC Designer project must now be saved.

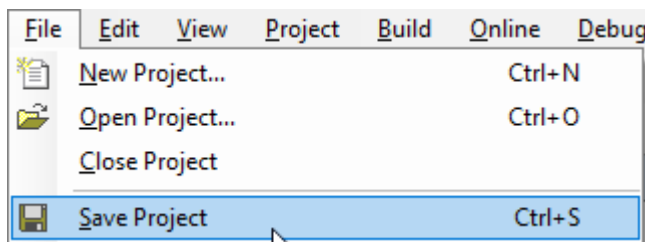


Figure 20: Save PLC Designer project

This saves the values determined by the Auto-Tuning function in the boot project of the controller and in the PLC Designer project.

Do not delete the following section changes

