

SIEMENS SINAMICS CONVERTER

Commissioning

MLD Linear drive with SINAMICS drive controller



Imprint:

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SCHUNK will increase the reliability of your production process for optimum machining results – to the complete satisfaction of your customers.

SCHUNK products are inspiring.

Our detailed assembly and operating instructions provide you with the necessary support.

Any further questions? Feel free to contact us for after sales support. You can contact us at the addresses listed in the last chapter of this manual.

Kind regards

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1 About this manual

1.1 Purpose/Applicability

This manual is part of the linear direct axis; it describes the safe and correct commissioning of the linear drive with a Siemens SINAMICS converter.

This manual applies only to the product stated on the cover.

1.2 Target groups

Target group	Task
Manufacturer, owner/operator	<ul style="list-style-type: none"> ➔ Keep this manual accessible for personnel at all times. ➔ Require personnel to read and comply with this manual and the supporting documents, especially the safety instructions and warning information.
Specialized personnel, mechanic	<ul style="list-style-type: none"> ➔ Read, observe and comply with this manual and the supporting documents, especially the safety instructions and warning information.

Table 1

1.3 Supporting documents

The following documents can be found on our website:

Document	Purpose
Catalog	Technical data and application parameters of the module and information on accessories. The most recent version applies.
Assembly and operating manuals for linear drives	Additional information on installation, adjustment and repair of the linear drives.
Manual and references for the Sinamics S120 converter.	Additional information on installation, adjustment and repair of the Sinamics S120 converters. (by the manufacturer)
General terms and conditions	Includes information on the warranty, for example.

Table 2

1.4 Symbols used in this manual

To enable fast access to information, the following symbols are used in this manual:





Symbol	Explanation
 DANGER	Dangers for personnel. Failure to observe will result in death or severe injuries.
 WARNING	Dangers for personnel. Failure to observe can result in death or severe injuries.
 IMPORTANT	Information for preventing property damage, for understanding or optimizing work processes.
	Instructions for action, also measures in a warning or note.
1. 2. 3. ...	Step-by-step instructions for action. → Observe the sequence.
< >	Menus and menu items

Table 3

2 Basic safety instructions

2.1 Intended use

The module is intended for installation in a machine. The requirements of the applicable directives must be observed and complied with.

The linear motor axis is used only for the transmission of linear motions. The driving force is transmitted directly, without mechanical transmission elements. The axis is especially suitable for applications in which a very high level of dynamics is required.

The module may be used only within the range of its defined application parameters.

Any other use beyond this definition is deemed improper and unintended use. The manufacturer will not be liable for any resulting damages.

2.2 Environmental and operating conditions

- ➔ For trouble-free operation, certain ambient and operating conditions must be complied with.
- ➔ Ambient temperature: 10°C to 40°C
- ➔ The drive must be protected against:
 - direct exposure to sunlight and heat
 - contamination by chips and dust
 - aggressive gases
 - vibrations
 - shock
 - moisture
 - oily and acidic environments
- ➔ The module may be used only within its defined application parameters (see catalog and supporting documents).
- ➔ Ensure that the environment is free of splashing water and vapors, and also of abrasive dust and process dust. This does not apply to modules designed especially for unclean environments.

2.3 Product safety

The module conforms to the state of the art and the recognized technical safety regulations at the time of delivery. However, there are potential risks associated with the module, for example if:

- the module is not used for the intended purpose;
- the module is improperly installed or serviced;
- the EC Machine Directive, the VDE regulations, the applicable safety and accident prevention regulations and the safety and installation instructions are not complied with.

2.3.1 Safety devices

- ➔ Safety devices must be provided in accordance with the EC Machine Directive.

2.3.2 Design changes, additions or modifications

Additional bore holes, threads or attachments not offered by SCHUNK as accessories may be mounted only after obtaining the approval of SCHUNK.

2.4 Personnel qualifications

The installation, commissioning, maintenance and repair of the converter may be carried out only by trained specialists.

Every person who is assigned by the owner/operator to work on the module must have read and understood the entire installation and operating manual, especially the chapter 2 "Basic safety instructions". This applies in particular to personnel who work on the module only occasionally, e.g. maintenance personnel.

2.5 Safety-conscious work procedures

Hazardous motions can occur if drives are controlled incorrectly. The drive components are monitored so that malfunctions can practically be ruled out. However, due to reasons of personal safety, the danger of injury and also the danger of property damage, you should always be prepared for the possibility of a malfunction. Incorrect drive motions can be expected until installed monitoring functions are in effect.

Causes for incorrect controlling can include:

- faulty cables and wiring
- defective components
- software errors
- operator errors
- removal of safety devices
- errors in sensors and signal transmitters
- input of incorrect parameters prior to commissioning

➔ Refrain from all work procedures that impair the proper functioning and safe operation of the converter.

➔ The applicable safety regulations and accident prevention regulations must be observed.

3 Commissioning

3.1 Description of system

3.1.1 MLD axes

MLD axes are direct driven drive modules. The driving force is transmitted directly to the slide, without mechanical transmission elements.

The axes are ideal for applications with high requirements for dynamics, speed and accuracy.

A distinguishing feature of the concept is the high degree of compatibility. The drive meets these high requirements due to the well-designed guide for the slide and the lightweight construction.

The winding (primary part) is embedded in iron and is part of the rotor.

The magnets (secondary part) are integrated in the supporting aluminum profile. The pole interval is 28.1 mm.

The axes are equipped with a linear measuring system.

Axes are available with an incremental sensor or an absolute sensor.

The incremental sensor delivers Sin/Cos signals with a period of 1 mm and a zero impulse every 20 mm. The Sin/Cos signals are resolved in the SME component with 2048 bits. This results in a path resolution of about 0.001 mm in the drive controller. The repeat accuracy of the axis is on the order of 0.01 mm.

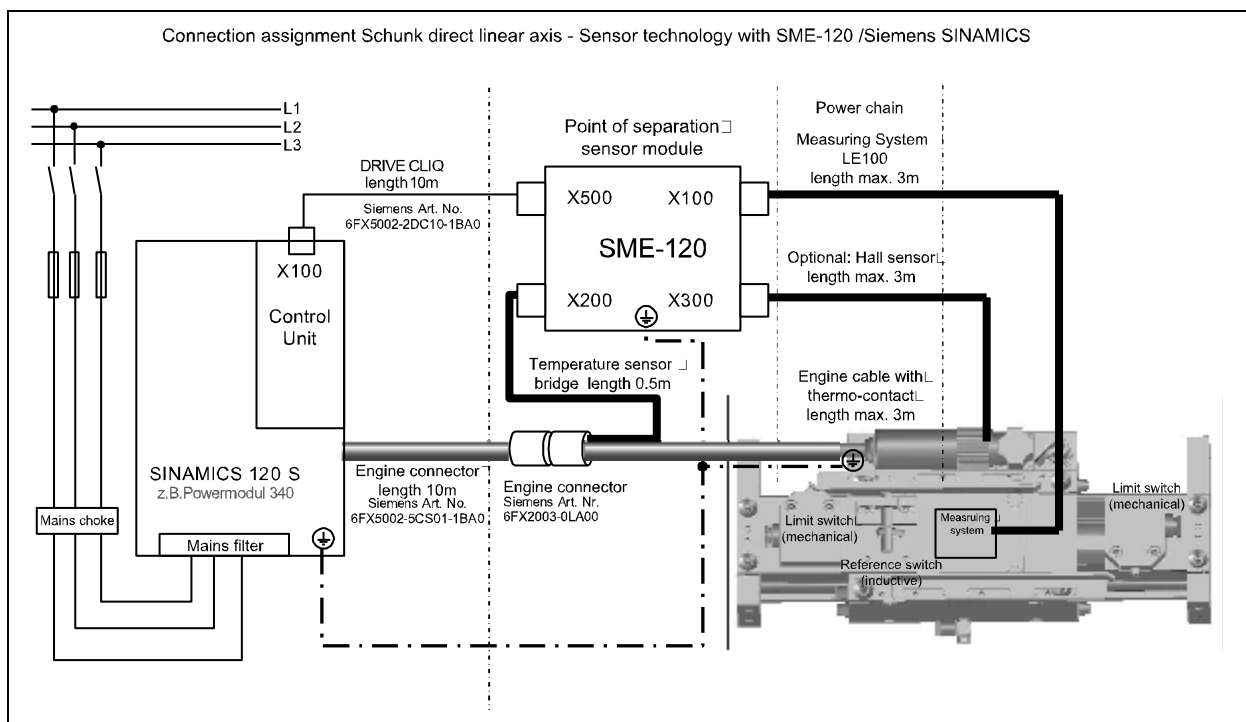
For commutation detection, the principle of saturation commutation is used.

The temperature of the rotor is monitored by means of a triple bimetal sensor and KTY84-130 (connected in series).

3.1.2 Sinamics S120

The drive controllers of the Sinamics series read in all motor-related information via DRIVE-CLiQ, a proprietary Ethernet-based interface.

The conversion of the motor information (measuring system, motor temperature) from conventional signals to DRIVE-CLiQ takes place in the SME-120 component.



Picture 1

3.2 Required auxiliary equipment

The following equipment and conditions are necessary for commissioning a drive with a SINAMICS converter:

- ✓ Drive must be completely installed with SINAMICS converter (for connection diagrams, see Chapter “Appendixes” Figure 1, page 39)
- ✓ Firmware SINAMICS min. V2.6
- ✓ PC / PG with Profibus interface
- ✓ Control software STARTER 4.12 installed on PC / PG
- ✓ Profibus connection cable PC / PG - SINAMICS
- ✓ Commissioning CD with the motor parameters and the files for the parameter selection

3.3 Preparation for commissioning

DANGER

Danger to life and limb due to electric shock!

Contact with live parts can result in death.

- All work on electrical systems or equipment must be performed by trained electricians in accordance with electrical engineering regulations.
- All work on the axes, drive controllers and control units may be performed only after the system/machine have been shut down!
- The drive control devices of the Sinamics S120 series may be operated only by trained specialists in compliance with this manual.
- The software for the Sinamics S120 drive controller is equipped with safety devices for your protection. Nevertheless, these drive devices can pose dangers if they are operated by insufficiently trained personnel or if they are used for non-approved tasks.
- Install sensor cables so they are separate from the power cables.
- Assembly and disassembly tasks may be carried out only after the MLD axes have cooled.
- Observe the technical data for the modules during installation and commissioning! This information is contained in the operating manuals for the MLD axes.
- Familiarity with PLC controllers and components of the Sinamics S120 family is a prerequisite for commissioning of the MLD axes.

IMPORTANT

Damage to the slide guide and slide support is possible!

- Never activate an automatic control circuit setting for linear motors.

3.4 Commissioning work

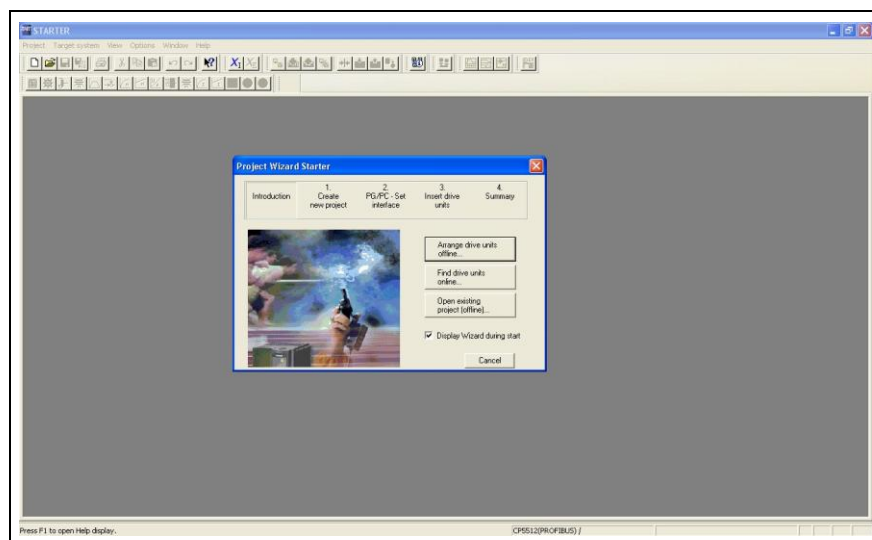
3.4.1 Creating a new drive project

This chapter describes how to create the sample project in STARTER in 4 steps

- Create a new project.
- Define an interface.
- Establish online connection.
- Configure drive device with its components.

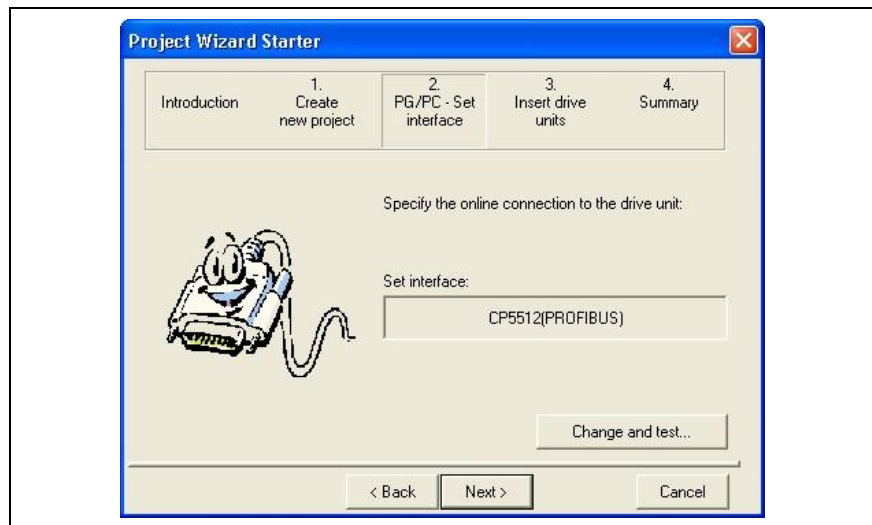
3.4.2 Create project

1. Click STARTER button, or select menu item **Start > Sinamic > STEP 7 > STARTER** in Windows start menu, to launch the commissioning tool STARTER.
2. To create a new project, first open the project assistant via the menu **Project > New with project assistant**.
3. Close online help and follow the **STARTER project assistant**.



Picture 3

4. The picture shows how to establish an online connection with the button **Search drive devices online**.

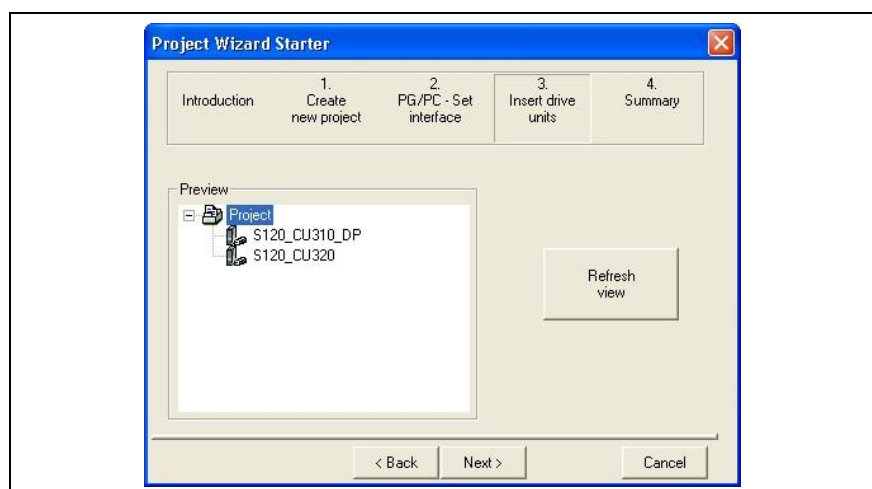


Picture 4 Select Profibus interface

5. To do this, select the Profibus interface in the project assistant. You can then create a project name and path. **Click** the button **Continue >** to set up a PROFIBUS interface in the PC/PG.

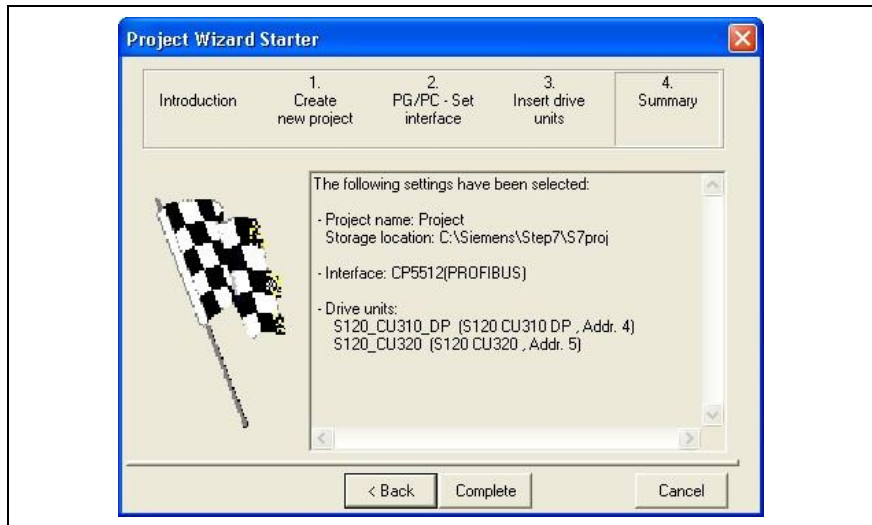
If the required interface is not configured, the desired interface can be configured via the button **Change and test....**

6. Click **continue >**



Picture 5

The **STARTER** now displays the Profibus modules found online and the CU units of the converters.



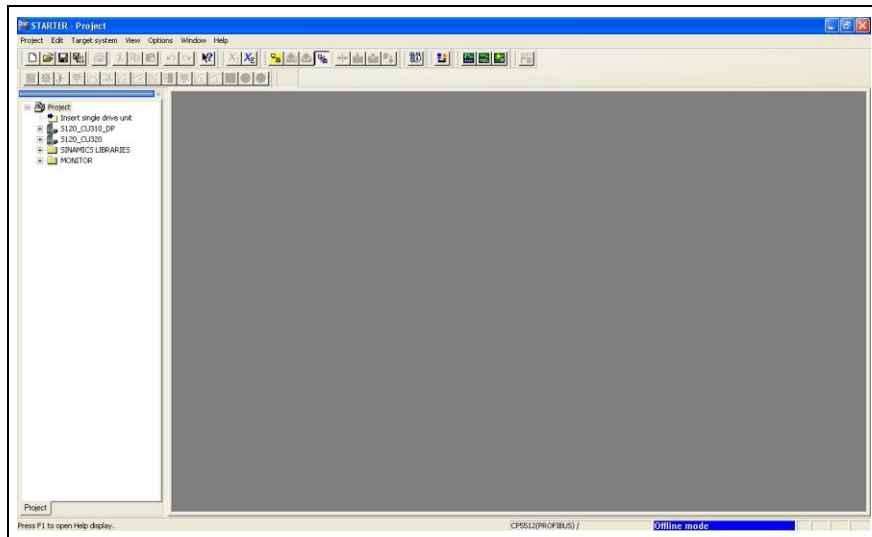
Picture 6

7. Click **Continue**.

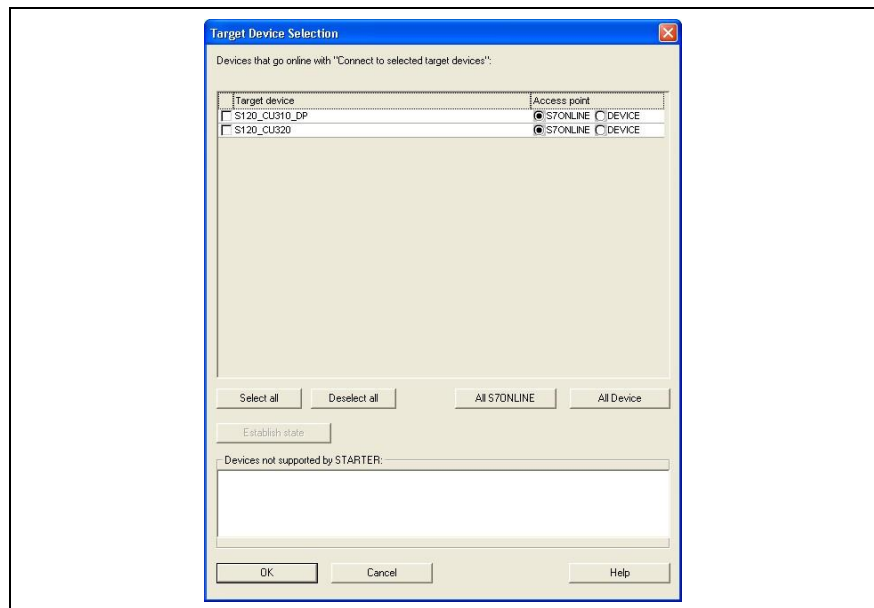
The unit displays a summary of the available devices, the interface and the project path.

8. Click **FINISH**.

The window closes.



Picture 7 Main window of the **STARTER** in **Offline mode**.



Picture 8

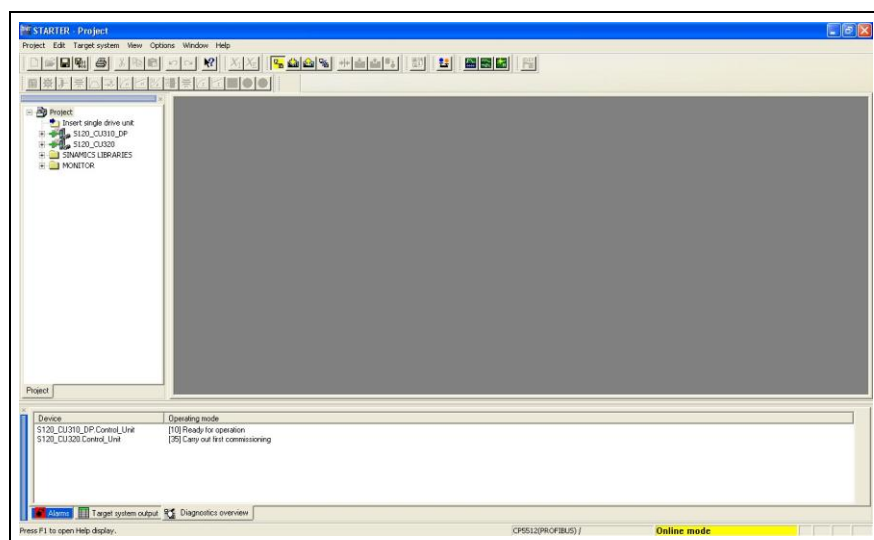
9. Click button **Connect with target system**

The available devices are listed.

10. The required single drive devices can be selected here.

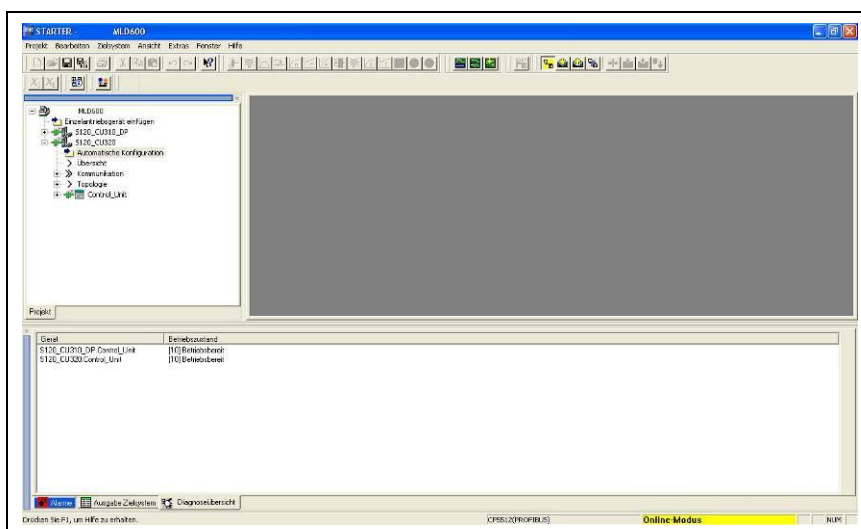
11. Click **OK**

The unit switches from **Offline mode** to **Online mode**.



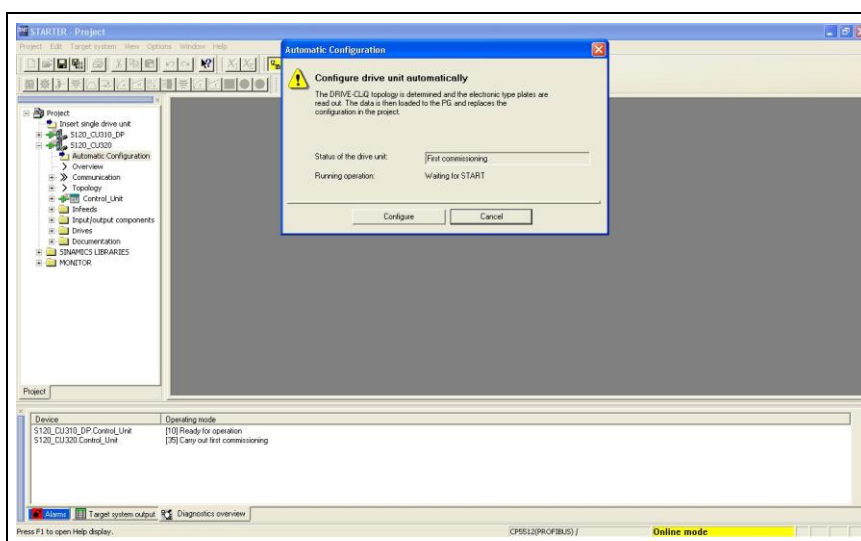
Picture 9

The lower third of the main window in **Online mode** displays a **diagnosis overview** with the operating states.



Picture 10

12. In the project explorer on the left side of the monitor, the CU units marked with a cross can be expanded to show additional folders with details.



Picture 11

13. Select folder **Automatic configuration**

A window opens in which the drive devices can be configured automatically.

14. Click **Configure**.

Another window opens.

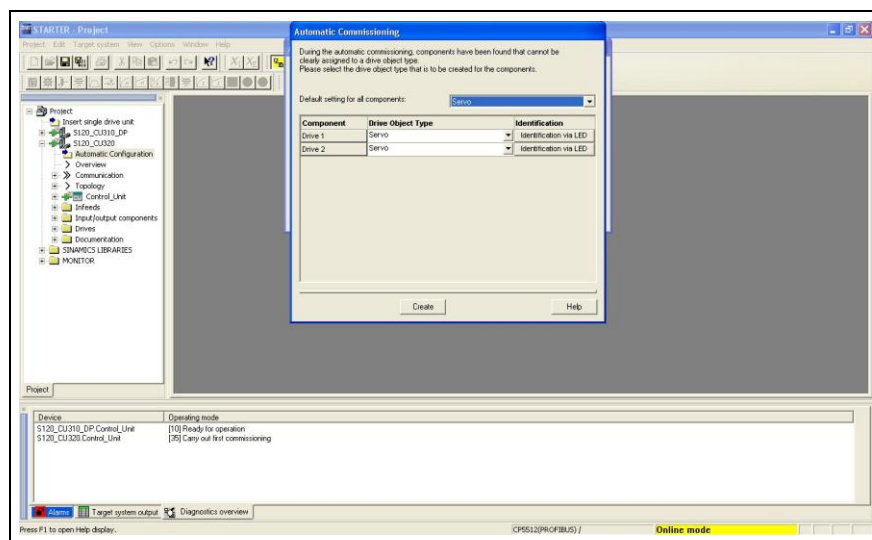
After the data is read into the **STARTER** the factory settings are restored.



Picture 12

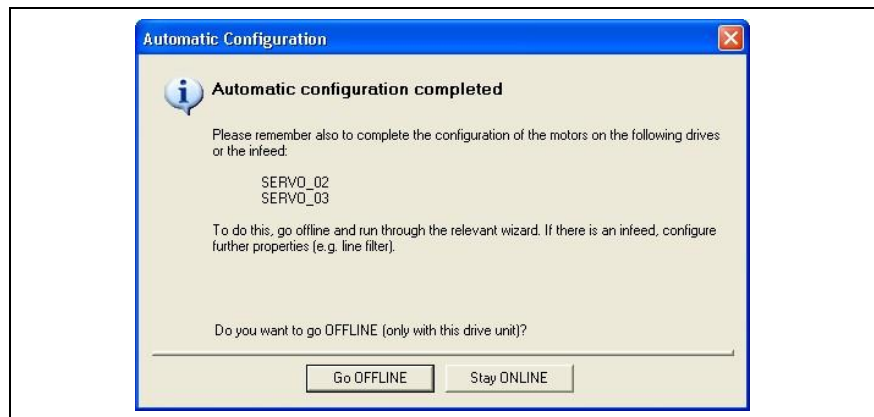
15. Click **OK**

The **factory settings** are restored.



Picture 13

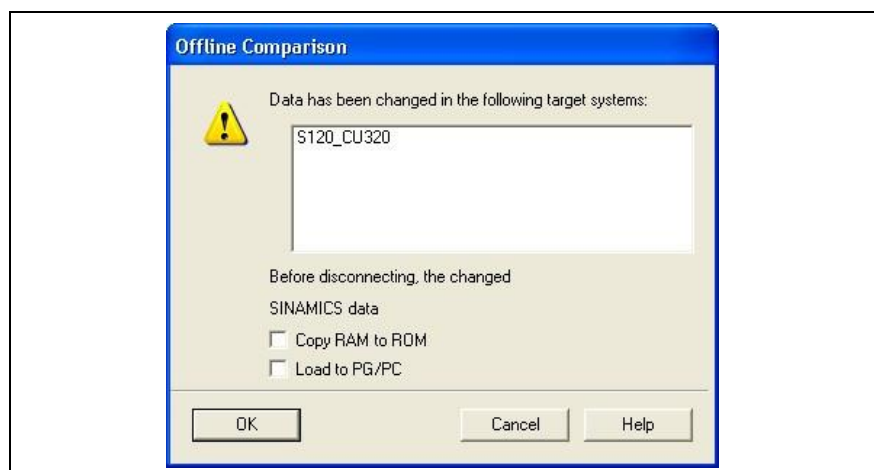
16. In the window **Automatic commissioning**, assign the drives the drive object type **SERVO**. Confirm by clicking **Create**



Picture 14

17. Click **Go OFFLINE**

The connection to the drive control devices is closed.
The automatic configuration is ended.



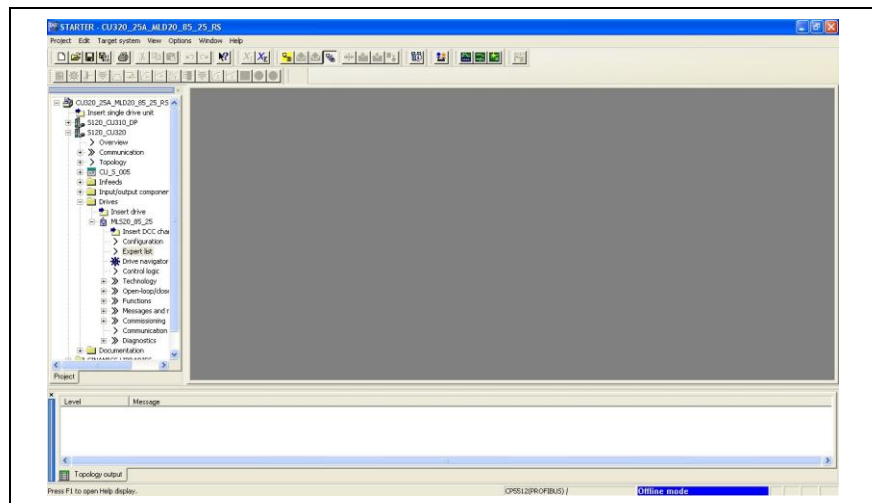
Picture 15

After clicking **Go OFFLINE** the offline comparison generates a message that shows for which target system data were changed.

18. The data can be copied from **RAM to ROM**,
or
saved offline by clicking **Load changes to PG/PC**.

Both of these actions can only be carried out after completion of the commissioning.

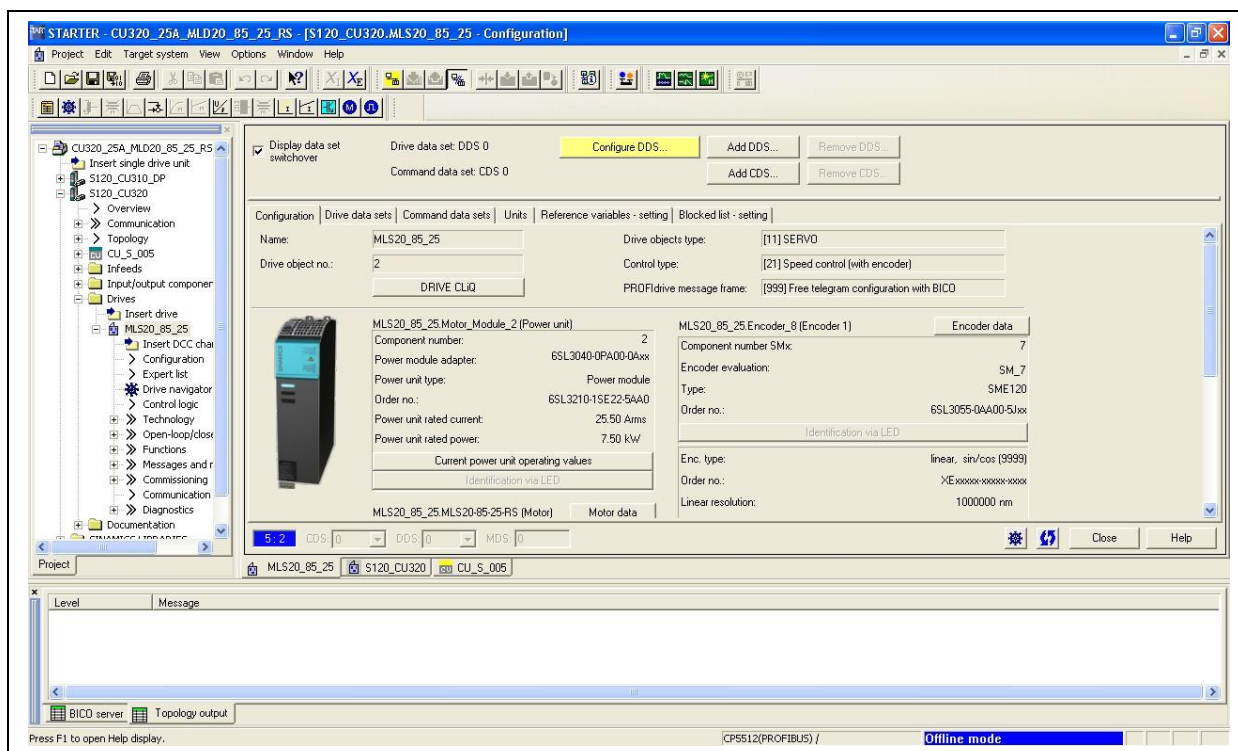
Close the window by clicking **OK**.



Picture 16

Picture 16 shows the main screen of the STARTER after the settings have been configured.

3.4.3 Parameterization



Picture 17

Select the folder **Drives/Servo...** and the sub-folder **CONFIGURATION** in the left monitor path of the respective SERVO drive to configure the individual CU units.

The actual parameterization is then selected by clicking the button **Configure DDS**.

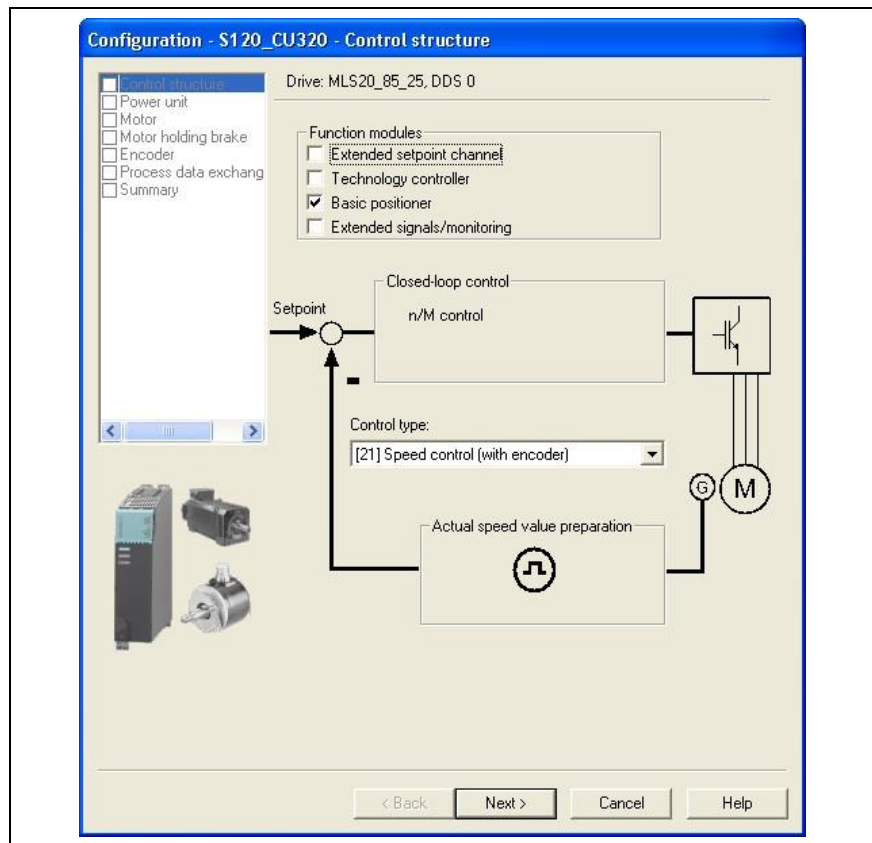
The new window shows all Sinamics modules that have to be parameterized at this point. They are processed one after the other.

! IMPORTANT

The following settings are standard settings. Customized solutions can require other parameter settings.

1. Regulation structure

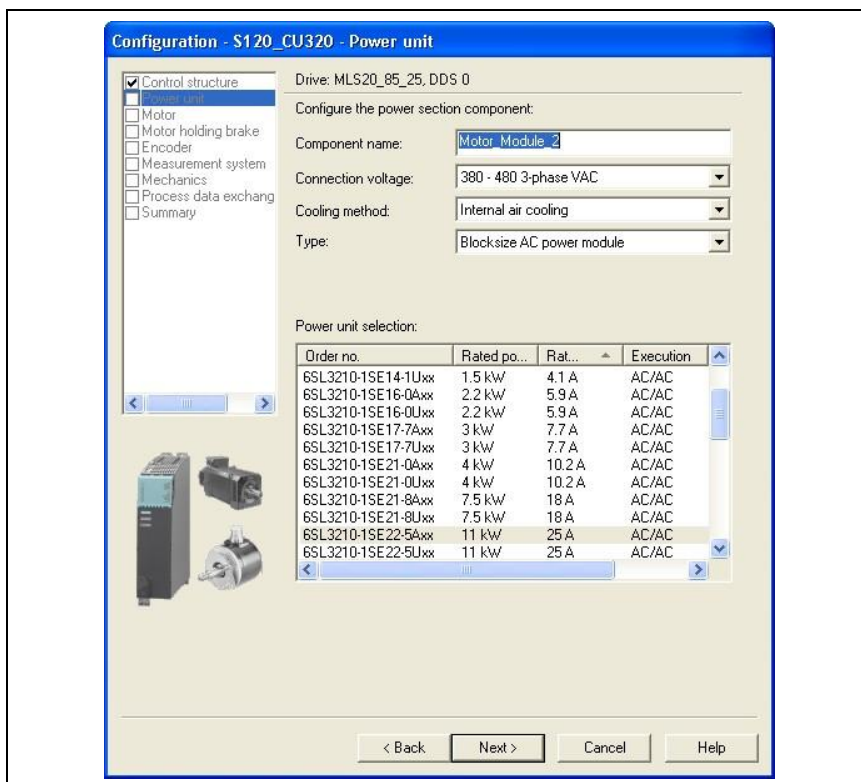
1. In the regulation structure, set the input of the function modules to **SINGLE POSITION**.



Picture 18

2. Set the control type [21] to speed regulation (with sensor)
3. Click **CONTINUE**.

2. Power component:



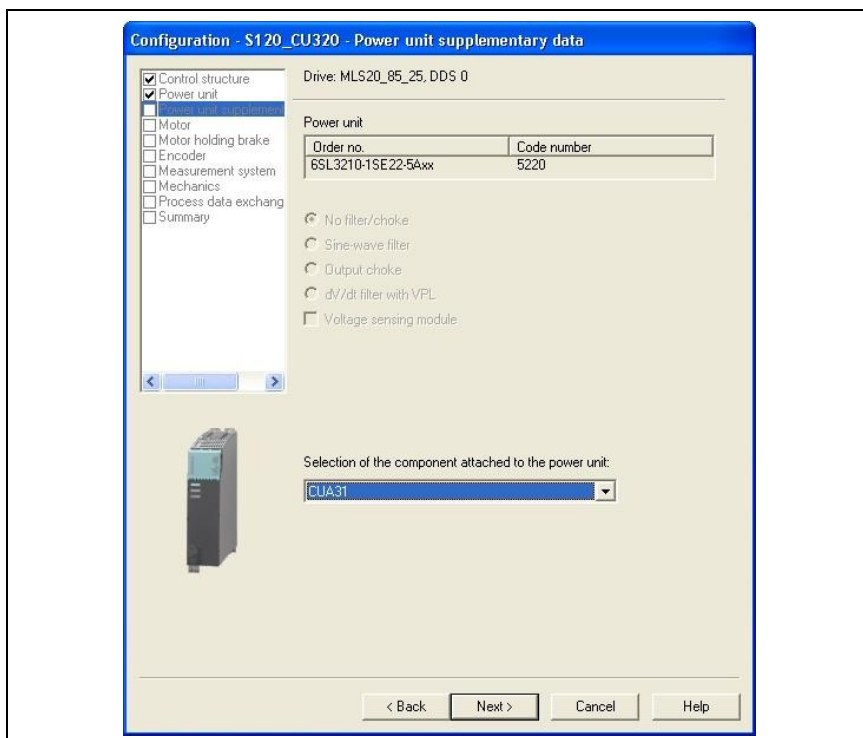
Picture 19

4. Give the power component a **name** and then define the **connected voltage**, the **heating type** and the **model**. This depends on the power components used by the customer.

The **STARTER** offers a selection of the available power components that can be selected.

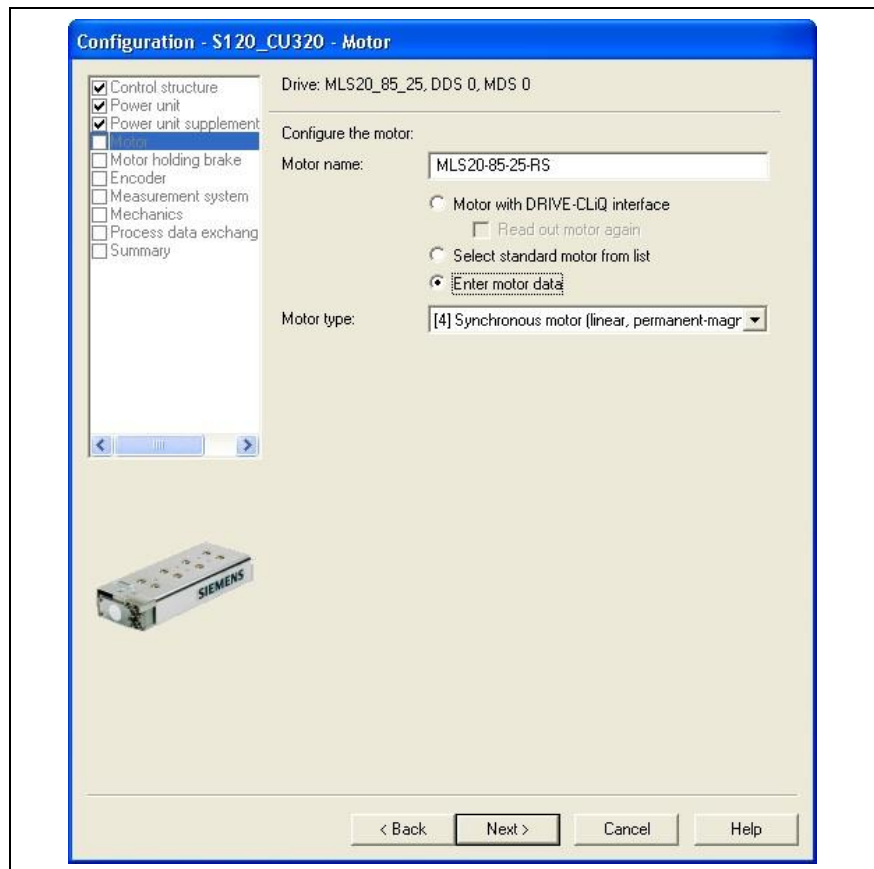
5. Click **CONTINUE**.

3. Additional power component data:



Picture 20

6. If necessary, select the required control unit CU in the additional power component data.
7. Click **CONTINUE**.

4. Motor:*Picture 21*

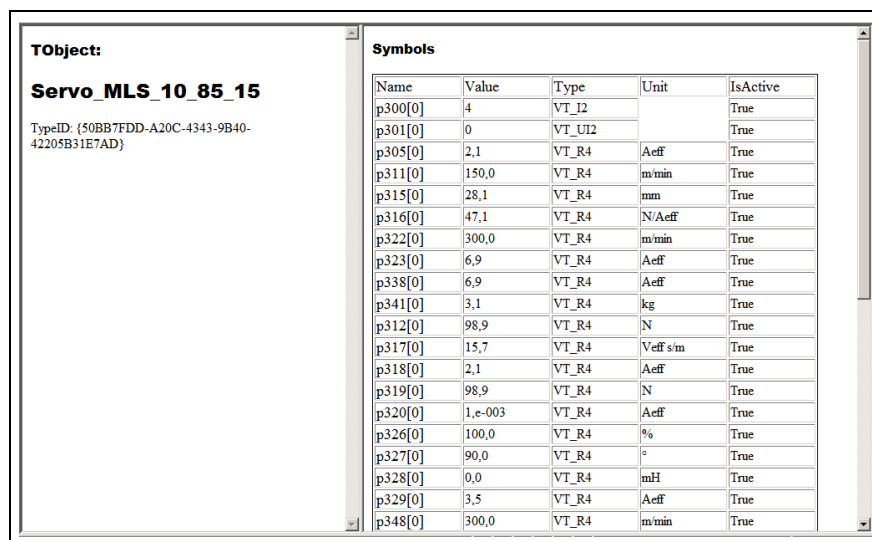
8. In the motor configuration, give the motor a **name**.
 - Select the option field **Enter motor data**.
 - In the dropdown field, select **motor type, (4) synchronous motor (linear permanent excited)**.
9. Click **CONTINUE**.

5. Motor data: The motor data, which have to be entered next, are on the commissioning DVD (included with the linear axis).

The folder structure is based on the

- **Drive controller type**
- Open the folder **Motor parameters** there
- **Axis type**
- **Axis version**

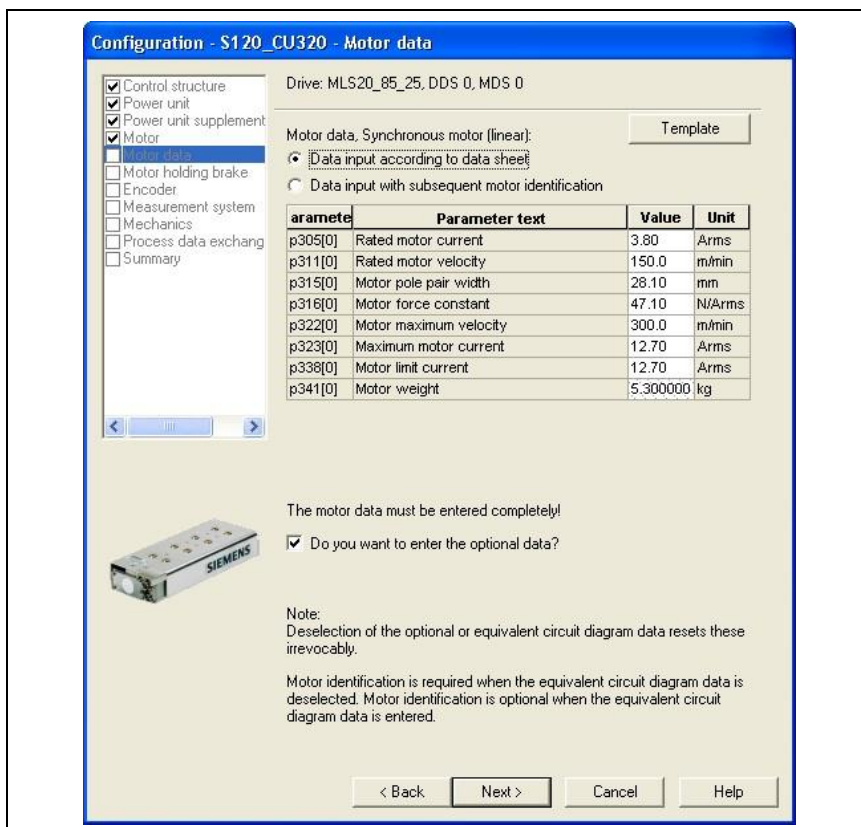
On this level you will find the XML files with the parameters, which can be opened with the explorer and which have the following appearance



Name	Value	Type	Unit	IsActive
p300[0]	4	VT_I2		True
p301[0]	0	VT_UI2		True
p305[0]	2,1	VT_R4	Aeff	True
p311[0]	150,0	VT_R4	m/min	True
p315[0]	28,1	VT_R4	mm	True
p316[0]	47,1	VT_R4	N/Aeff	True
p322[0]	300,0	VT_R4	m/min	True
p323[0]	6,9	VT_R4	Aeff	True
p338[0]	6,9	VT_R4	Aeff	True
p341[0]	3,1	VT_R4	kg	True
p312[0]	98,9	VT_R4	N	True
p317[0]	15,7	VT_R4	Veff s/m	True
p318[0]	2,1	VT_R4	Aeff	True
p319[0]	98,9	VT_R4	N	True
p320[0]	1.e-003	VT_R4	Aeff	True
p326[0]	100,0	VT_R4	%	True
p327[0]	90,0	VT_R4	°	True
p328[0]	0,0	VT_R4	mH	True
p329[0]	3,5	VT_R4	Aeff	True
p348[0]	300,0	VT_R4	m/min	True

Picture 22

10. Under **Name** in the first column there is a list of the **PARAMETERS** that are also used in the **STARTER**. Take the **value** from column 2 and the **unit** from column 4.



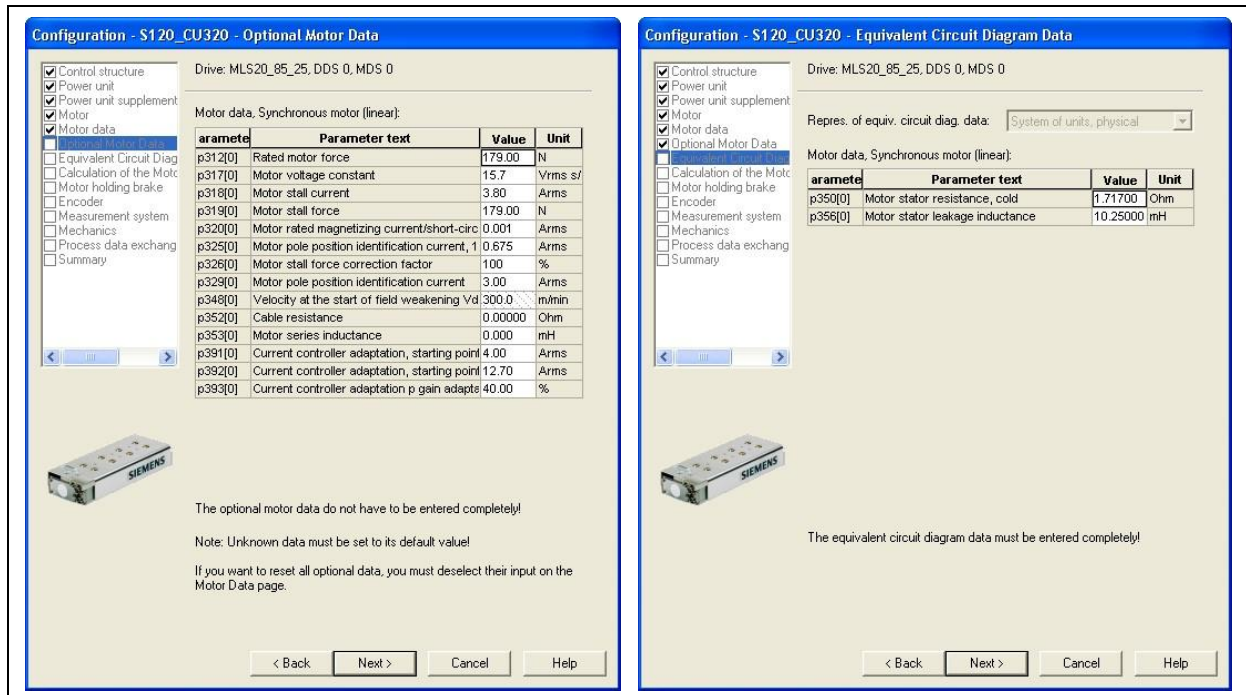
Picture 23

11. In the white fields, enter all parameters with the values from the parameter file (not the values from this documentation!).
12. In addition, further motor data must be entered, which are also saved in the parameter file. To make the selection, check the option **DO YOU WANT TO ENTER OPTIONAL DATA** (Picture 23).

Parameters that do not exist in the parameter file but can be entered in the STARTER must be left at the default values.

13. Click **CONTINUE**.

6. Optional motor data and equivalent circuit diagram data



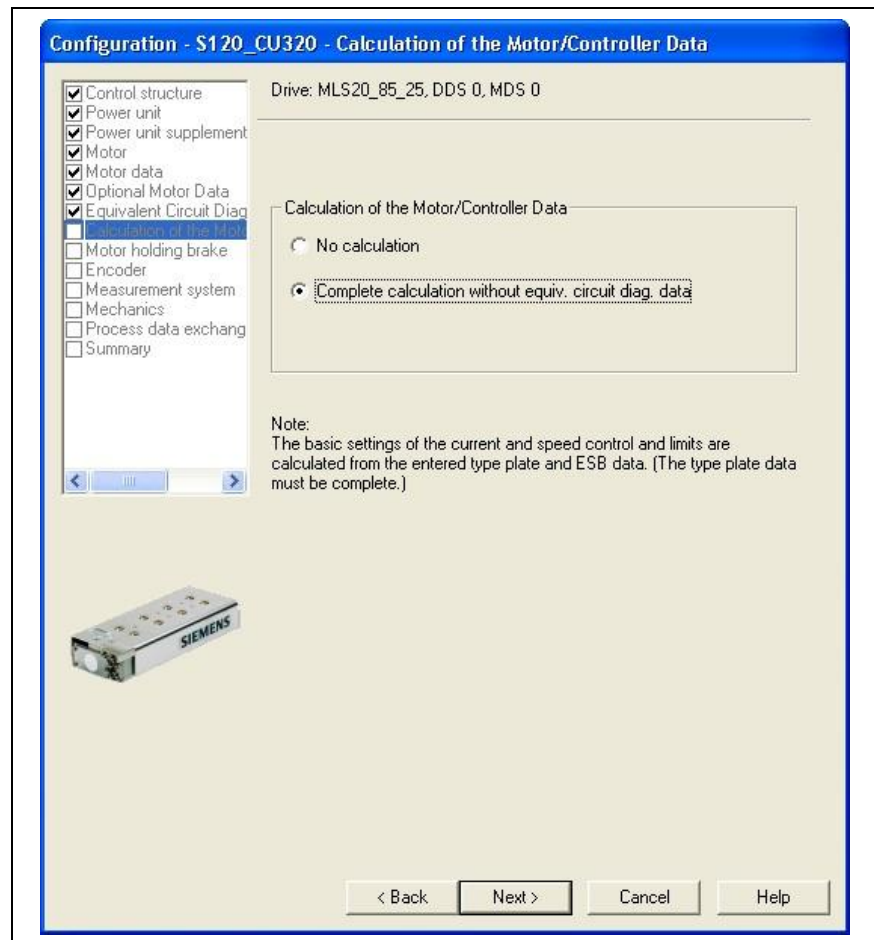
Picture 24

14. Enter the additional parameters according to the parameter file.

Parameters that do not exist in the parameter file but can be entered in the STARTER must be left at the default values.

15. Click **CONTINUE**.

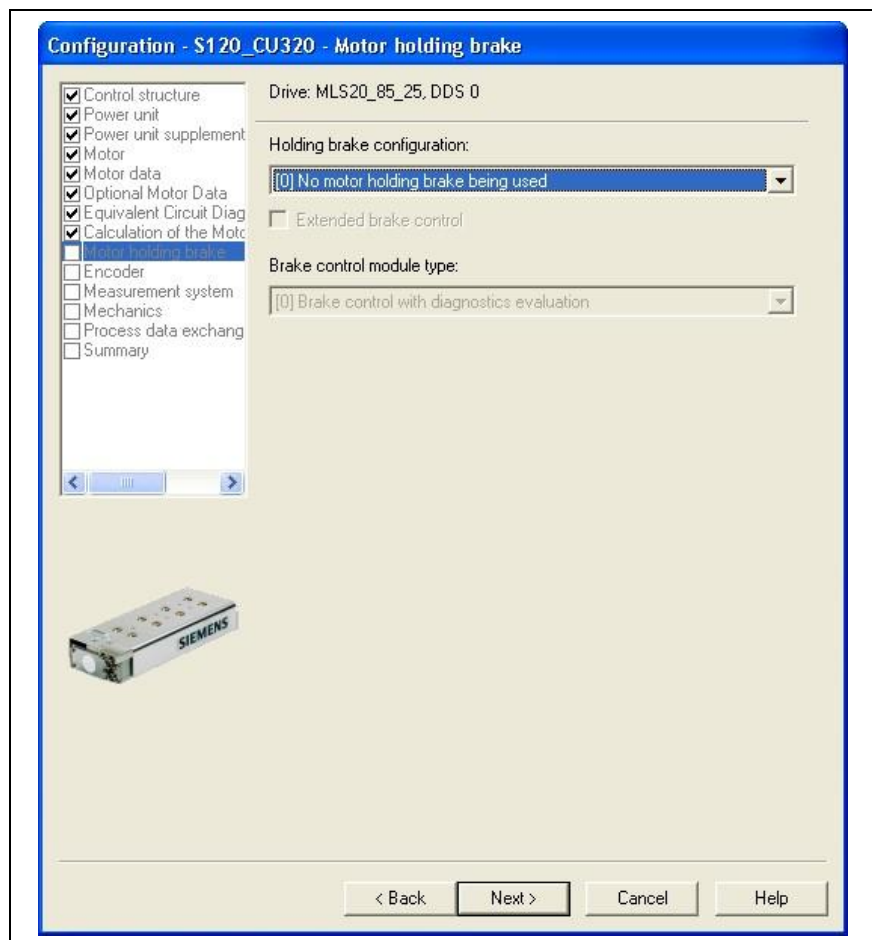
7. Calculation of the motor/controller data



Picture 25

16. In this window select the option **Complete calculation without equivalent circuit diagram data**, which conducts a calculation of basic settings on the basis of previously entered data.
17. Click **CONTINUE**.

8. Motor holding brake



Picture 26

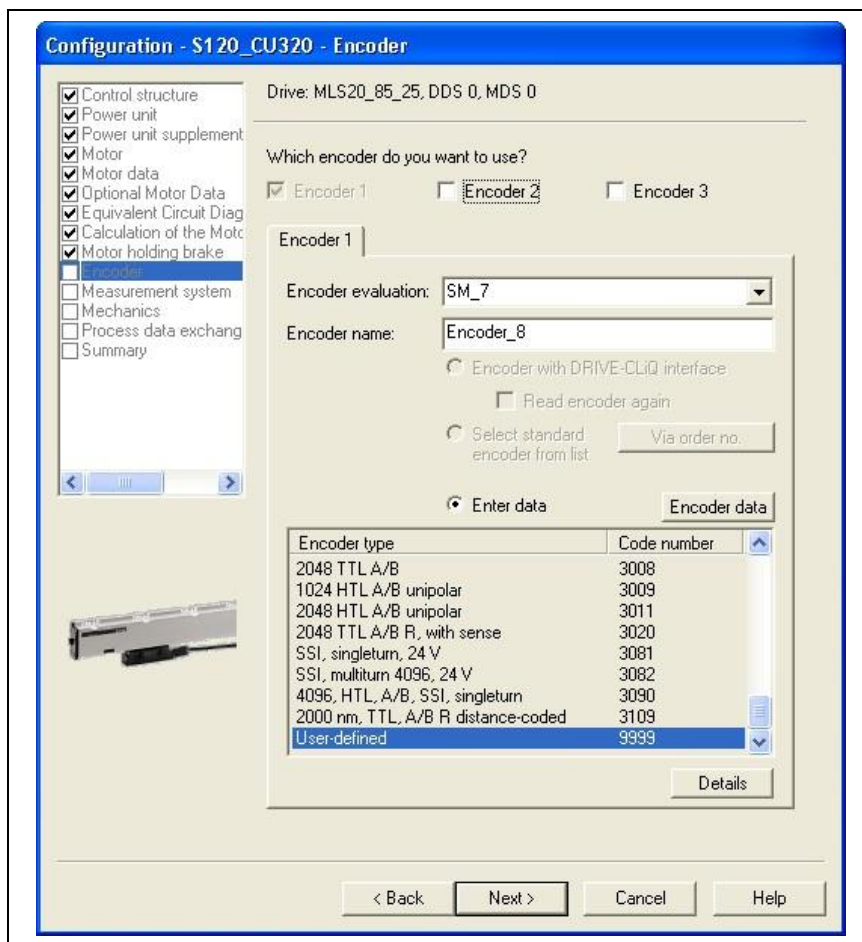
18. Corresponding to the actual use of a brake and its integration in the controller, select the option motor holding brake.

! IMPORTANT

Never operate the axis with the holding brake engaged. This is essential and must be ensured by corresponding controls and wiring.

19. Click **CONTINUE**.

9. Sensor



Picture 27

20. The sensor 1 must be entered according to the following information and refers to the LE100 position measuring system, which is standard. To access the sensor data, use the option **Enter data** and the button **Sensor data**.

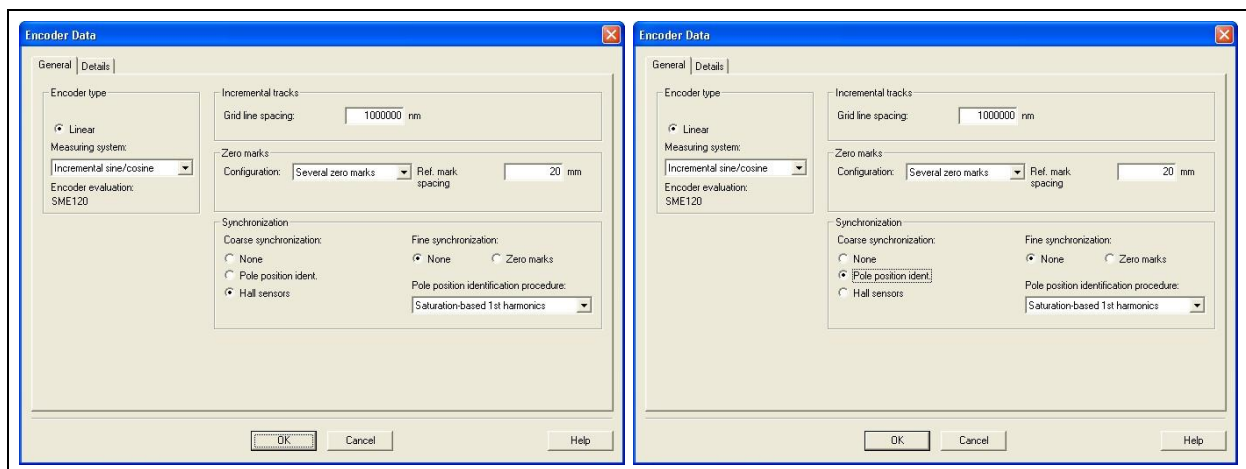
10. Sensor data

Alternatively, two variants of the sensor data configuration are possible, depending on the hardware.

There are systems with and without hall effect sensors. Hall effect sensors used with the linear direct axis execute a commutation when the axis is switched on, to optimize impressing of the current during operation.

Accordingly there are two types of commutation:

- - Commutation via hall effect sensors
- - Commutation via pole position identification



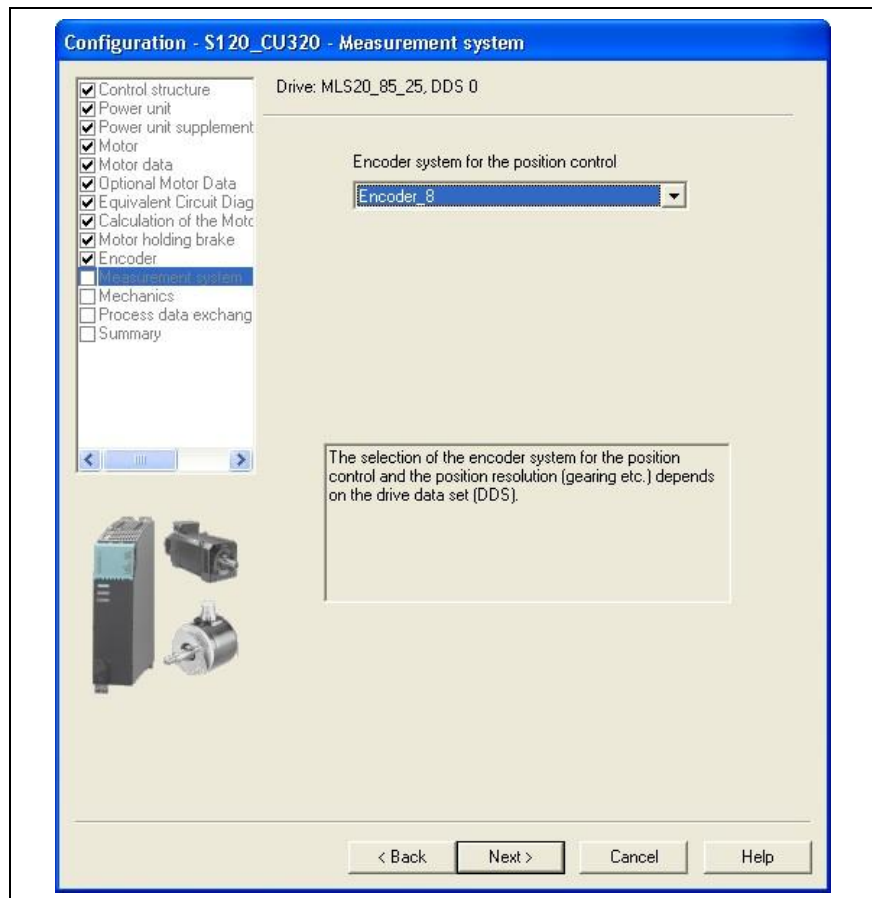
Picture28

21. For commutation via hall effect sensors, the settings apply as in picture 28 at the left.

22. Alternatively, for commutation via pole position identification, the settings apply as in picture 28 at the right:

23. Click **CONTINUE**.

11. Measuring system

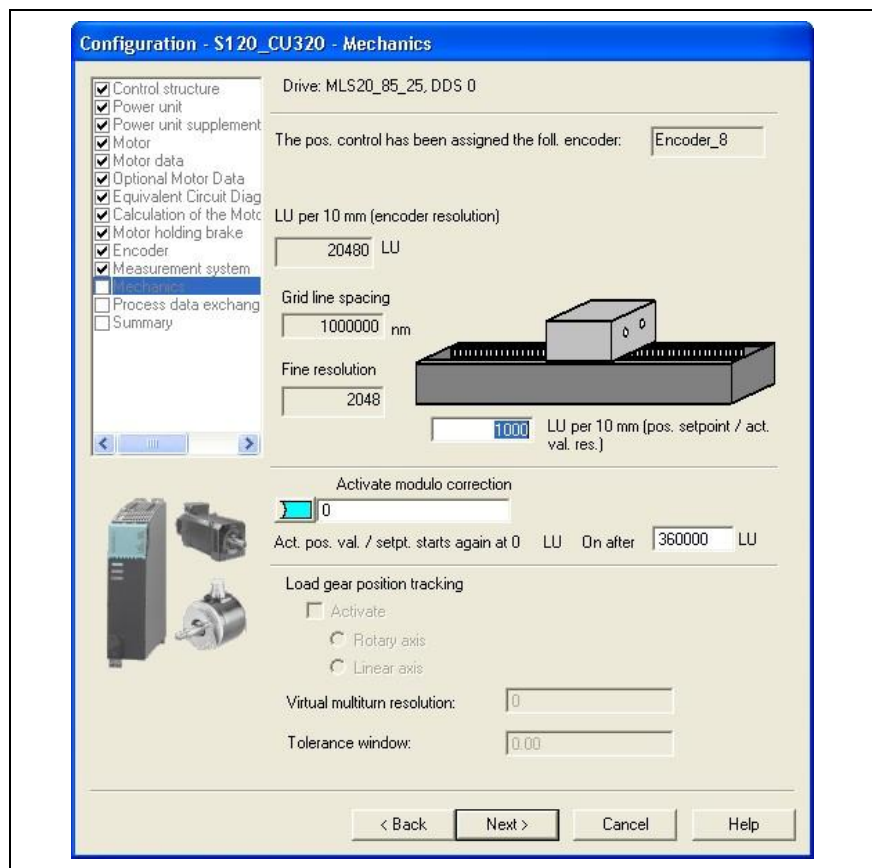


Picture 29

24. To define the **sensor system for position control** set the sensor defined previously as **Sensor1**. Generally, the default value is retained.

25. Click **CONTINUE**.

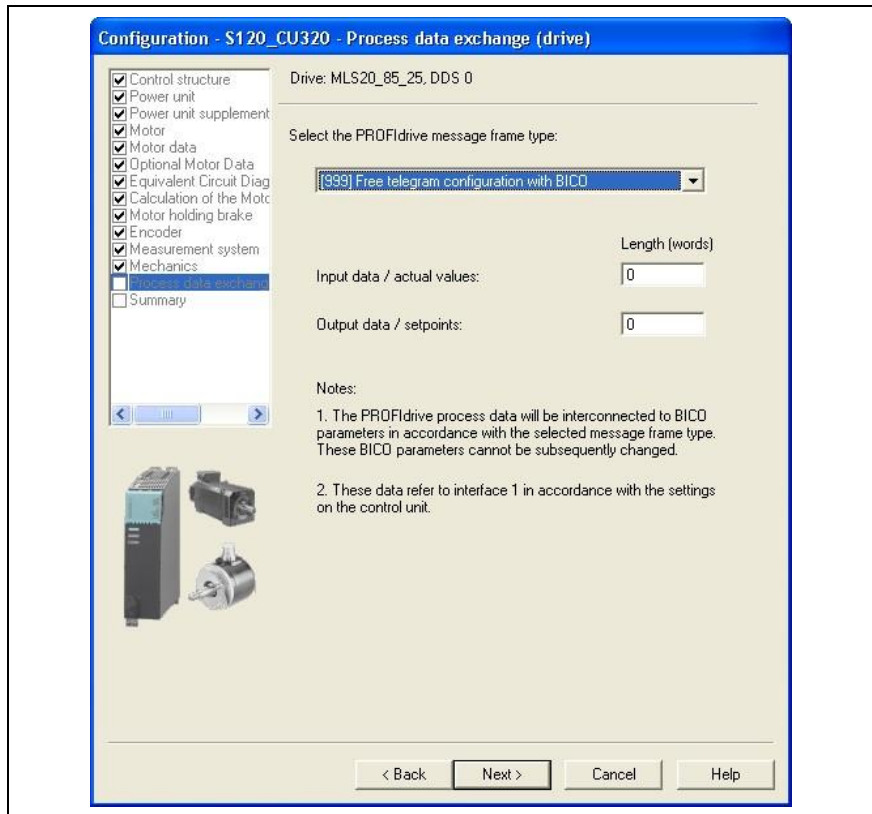
12. Mechanical properties



Picture 30

26. For standardization of the axis, set the sensor resolution. Enter the value shown in the picture for the **linear units (LU) per 10 mm**, if the system used is an LE100 position measuring system. Other position measuring systems may require a different standardization.
27. Enter position actual/target value, at which this has the value 0 again. Generally, this value should be so high that it is not reached.
28. Click **CONTINUE**.

13. Process data exchange

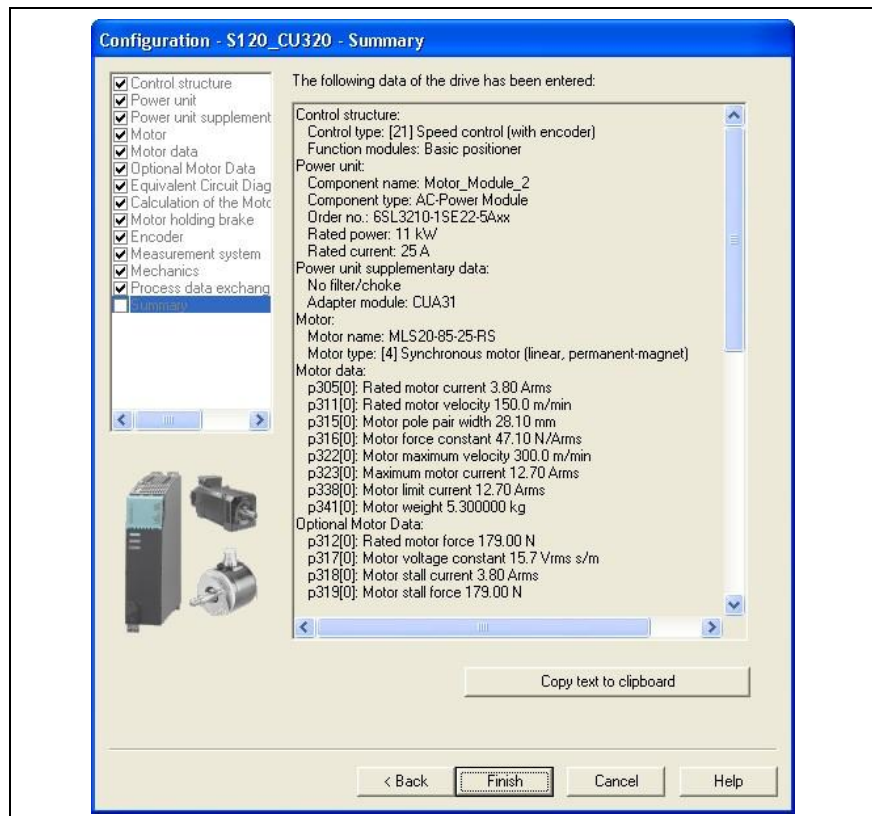


Picture 31

29. Based on the system communication, select the telegram type of the Profidrive telegram, as well as its input and output data.

30. Click **CONTINUE**.

14. Summary



Picture 32

At the end, a summary of the input data is displayed and can be saved via an export function.

In addition, further parameters for temperature monitoring must be set in the expert list.

31. In the project explorer under **DRIVE**, select **SERVO**. and open the sub-menu with the right mouse button. Select **EXPERT** and **EXPERT LIST** there.

For temperature monitoring of the motor, set the parameters p601, p604, p605, p606 and p4601 as follows:

- p604=85°C
- p605=90°C
- p606=5s

Expert list

Parameter	Data	Parameter text	Offline value MLS20_85_25	Unit	Modifiable to	Access level	Minimum	Maximum
All	A	All	All	All	All	All	All	All
248	p600[0]	M Motor temperature sensor...	[1] Temperature sensor via encoder 1		Operation	2		
249	p601[0]	M Motor temperature sensor...	[10] Evaluation via several temperature channels		Operation	2		
250	p603	Ct: Motor temperature sign...	0		Ready to run	2		
251	p604[0]	M Motor overtemperature al...	85.0	*C	Operation	2	0	200
252	p605[0]	M Motor overtemperature fa...	100.0	*C	Operation	2	0	200
253	p606[0]	M Motor overtemperature timer	5.000	s	Operation	2	0	600

Picture 33

Expert list

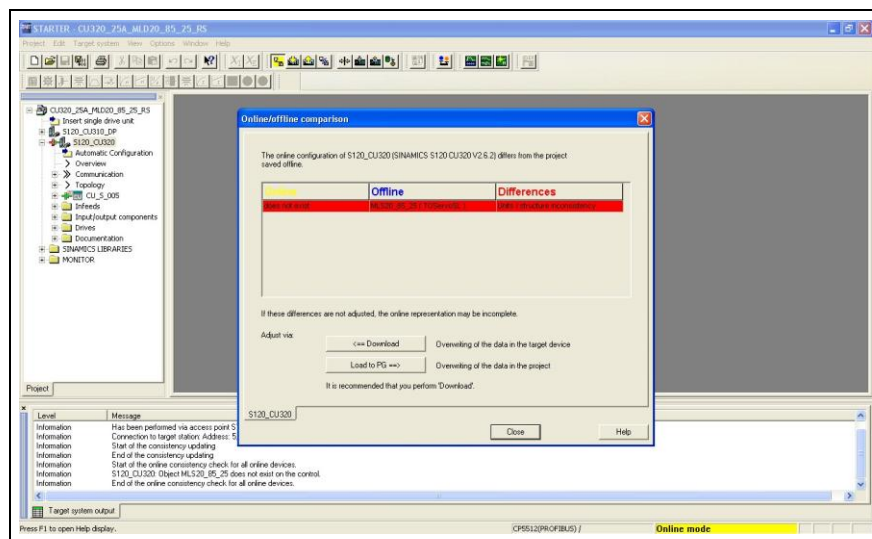
Parameter	Data	Parameter text	Offline value MLS20_85_25	Unit	Modifiable to	Access level	Minimum	Maximum
All	A	All	All	All	All	All	All	All
925	p4600[0]	E Motor temperature sensor...	[0] No sensor		Operation	2		
926	p4601[0]	E Motor temperature sensor...	[20] KTY84		Operation	2		
927	p4602[0]	E Motor temperature sensor...	[0] No sensor		Operation	2		
928	p4603[0]	E Motor temperature sensor...	[0] No sensor		Operation	2		
929	r4620	Motor temperature measu...						
930	r4620[0]	Temperature channel 1	-200	*C		3		
931	r4620[1]	Temperature channel 2	49	*C		3		
932	r4620[2]	Temperature channel 3	-200	*C		3		
933	r4620[3]	Temperature channel 4	-200	*C		3		

Picture 34

3.5 Controlling the axes in inching mode

Proceed as follows to operate the axis in inching mode:

1. Save the project on the computer.
2. Click **Connect with target system** to switch to **ONLINE MODE**.

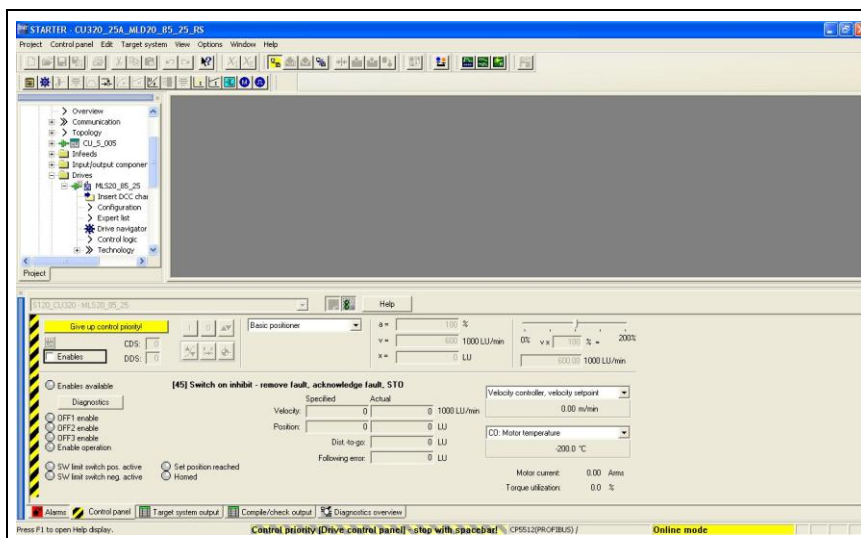


Picture 35

3. In the window **ONLINE/OFFLINE comparison**, click the button **LOAD TO TARGET DEVICE**.
4. Confirm the prompt **START LOADING** with **YES**.

After download:

5. Click **CLOSE**.
6. In the project navigator under **Drive_1 > Commissioning** double click the function **control panel**.



Picture 36

7. The control panel appears in the STARTER.
The control panel can be used to control the drive directly via the PC/PG.
If there are no errors, the LEDs are green with the exception of “OFF 1 Release”.
8. Click **Get master control** to connect the control panel with the interface to the drive.
9. Click **Accept**.
10. Check **Release**.
11. Enter speed **0 m/min**
12. Confirm with **GREEN BUTTON “I”**.
→ Axis is controlled
13. Enter very low speed (e.g. 1 m/min or –1 m/min)
14. Click red-green inch button.
The axis moves slowly.
15. In case of an error, you can open the alarm window at the bottom left via the **ALARM** tab, where you can reset errors with the buttons RESET or RESET ALL.
16. The **CONTROL PANEL** tab takes you back to the control panel.

4 Appendixes

4.1 SINAMICS connection diagram

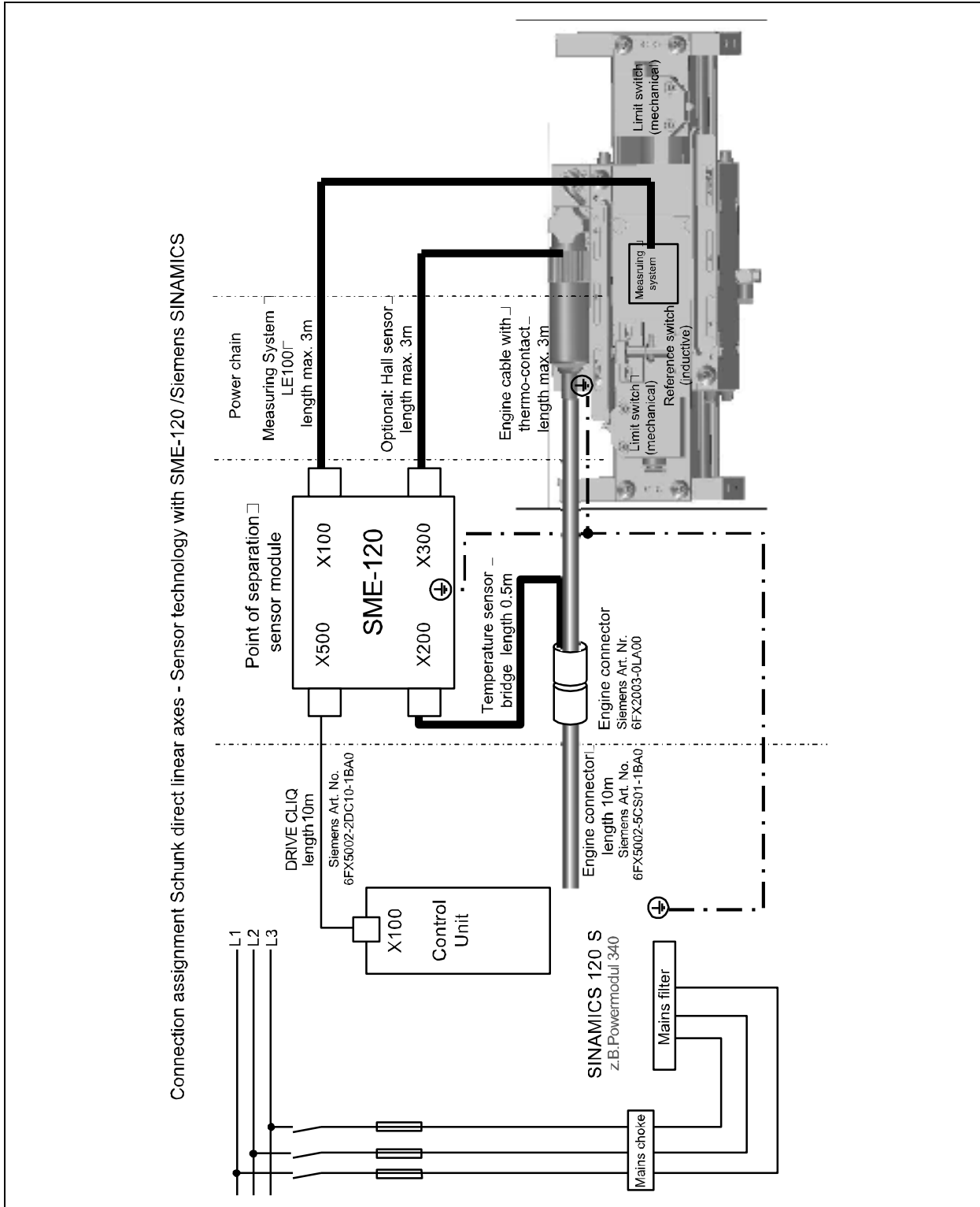


Figure 1 Sinamics connection diagram

4.2 Identification key of files for linear motors

Available from Schunk on request.

4.3 Parameter lists

Motorparameter MLD						
Motortyp			MLS 05-85-15	MLS 10-85-15	MLS10-250-15	MLD 20-85-15
Achsbezeichnungen	Dim.	Param.	LD50	LD100	LD100T	LD200N
Motor-Bemessungsstrom	A	P0305	1,1	2,1	3,1	3,2
Motortemperatur-Zeitstufe	s	P306	1	1	1	1
Motor-Bemessungsgeschwindigkeit	m/min	P0311	150	150	150	150
Motor-Bemessungskraft	N	P0312	49,5	98,9	146,0	150,7
Motor-Polpaarweite	mm	P0315	28,1	28,1	28,1	28,1
Motor-Kraftkonstante	N/A	P0316	45	47,1	47,1	47,1
Motor-Spannungskonstante	V s/m	P0317	15	15,7	15,7	15,7
Motor-Stillstandstrom	A	P0318	1,1	2,1	3,1	3,2
Motor-Stillstandskraft	N	P0319	49,5	98,9	146,0	150,7
Motor-Bemessungs-kurzschlussstrom	A	P0320	0,001	0,001	0,001	0,001
Motor-Maximalgeschwindigkeit	m/min	P0322	300	300	300	300
Motor-Maximalstrom	A	P0323	3,2	6,9	6,4	12,7
Motor-Lastwinkel optimal		P0327	90	90	90	90
Motor-Positionidentifikation Strom	A	P0329				
Motor-Grenzstrom	A	P0338	3,2	6,9	6,4	12,7
Motor-Masse	kg	P0341	1,8	3,1	5,8	7,6
Motor-Ständerwiderstand kalt	Ohm	P0350	8,04	3,50	3,43	1,71
Motor-Vorschaltinduktivität	mH	P0353	0,00	0,00	0,00	0,00
Motor-Ständerstreinduktivität	mH	P0356	40,00	20,20	18,65	10,25
Stromregleradaptation Ein satzpunkt unten	A	P0391	1,1	2	3,2	3,2
Stromregleradaptation Ein satzpunkt oben	A	P0392	3,2	6,9	6,4	12,7
Stromregleradaptation P-Verstärkung Skalierung	%	P0393	40	30	50	50
Motorüber temperatur-Warnschwelle	°C	P0604	85	85	85	85
Motorüber temperatur-Störschwelle	°C	P0605	100	100	100	100

Figure 2 Parameter lists

Motorparameter MLD						
Motortyp			MLS 20-85-25	MLS20-250-15	MLS20-250-25	MLS 30-85-35
Achsbezeichnungen	Dim.	Param.	LD200L	LD200T	LD200TL	LD300
Motor-Bemessungsstrom	A	P0305	3,8	4,2	5,2	5,6
Motorüber Temperatur Zeitstufe	s	P306	1	1	1	1
Motor-Bemessungsgeschwindigkeit	m/min	P0311	150	150	150	150
Motor-Bemessungskraft	N	P0312	179,0	197,8	244,9	263,8
Motor-Polpaarweite	mm	P0315	28,1	28,1	28,1	28,1
Motor-Kraftkonstante	N/A	P0316	47,1	47,1	47,1	47,1
Motor-Spannungskonstante	V s/rm	P0317	15,7	15,7	15,7	15,7
Motor-Stillstandsstrom	A	P0318	3,8	4,2	5,2	5,6
Motor-Stillstandskraft	N	P0319	179,0	197,8	244,9	263,8
Motor Bemessungs kurzschlussstrom	A	P0320	0,001	0,001	0,001	0,001
Motor-Maximalgeschwindigkeit	m/min	P0322	300	300	300	300
Motor-Maximalstrom	A	P0323	12,7	12,7	12,7	19,1
Motor-Lastwinkel optimal		P0327	90	90	90	90
Motor-Poolageidentifikation Strom	A	P0329				
Motor-Grenzstrom	A	P0338	12,7	12,7	12,7	19,1
Motor-Masse	kg	P0341	5,3	6,9	8,7	8
Motor-Ständerwiderstand kalt	Ohm	P0350	1,71	1,81	1,71	1,13
Motor-Vorschaltinduktivität	mH	P0353	0,00	0,00	0,00	0,00
Motor-Ständerstreinduktivität	mH	P0356	10,25	9,75	10,25	6,90
Stromregleradaption Einsatzpunkt unten	A	P0391	4,0	4,5	4,8	7,0
Stromregleradaption Einsatzpunkt oben	A	P0392	12,7	12,7	12,7	19,1
Stromregleradaption P-Verstärkung Skalierung	%	P0393	40	40	40	40
Motorüber Temperatur-Warnschwelle	°C	P0604	85,0	85,0	85,0	85,0
Motorüber Temperatur-Störschwelle	°C	P0605	100,0	100,0	100,0	100,0

Figure 3 Parameter lists

Motorparameter MLD						
			MLS30-250-15	MLS40-250-25	MLS60-250-25	2xMLS 20-85-25
Achsbezeichnungen	Dim.	Param.	LD300T	LD400TL	LD600TL	LD400L
Motor-Bemessungsstrom	A	P0305	5,6	7,2	9,8	5,6
Motorüber Temperatur Zeitstufe	s	P306	1	1	1	1
Motor-Bemessungsgeschwindigkeit	m/min	P0311	150	150	150	150
Motor-Bemessungskraft	N	P0312	263,8	339,1	461,6	263,8
Motor-Polpaarweite	mm	P0315	28,1	28,1	28,1	28,1
Motor-Kraftkonstante	N/A	P0316	47,1	47,1	47,1	47,1
Motor-Spannungskonstante	V s/rm	P0317	15,7	15,7	15,7	15,7
Motor-Stillstandsstrom	A	P0318	5,6	7,2	9,8	5,6
Motor-Stillstandskraft	N	P0319	264	339	462	264
Motor Bemessungs kurzschlussstrom	A	P0320	0,001	0,001	0,001	0,001
Motor-Maximalgeschwindigkeit	m/min	P0322	300	300	300	300
Motor-Maximalstrom	A	P0323	19,1	25,5	38,2	25,5
Motor-Lastwinkel optimal		P0327	90,0	90,0	90,0	90,0
Motor-Poolageidentifikation Strom	A	P0329				
Motor-Grenzstrom	A	P0338	19,1	25,5	38,2	25,5
Motor-Masse	kg	P0341	7,2	10,5	11,3	6,9
Motor-Ständerwiderstand kalt	Ohm	P0350	1,03	0,93	0,48	1,08
Motor-Vorschaltinduktivität	mH	P0353	0,00	0,00	0,00	0,00
Motor-Ständerstreinduktivität	mH	P0356	6,05	4,95	3,10	4,95
Stromregleradaption Einsatzpunkt unten	A	P0391	8,0	10,0	15,0	8,0
Stromregleradaption Einsatzpunkt oben	A	P0392	19,1	25,5	38,2	25,5
Stromregleradaption P-Verstärkung Skalierung	%	P0393	40	40	40	40
Motorüber Temperatur-Warnschwelle	°C	P0604	85,0	85,0	85,0	85,0
Motorüber Temperatur-Störschwelle	°C	P0605	100,0	100,0	100,0	100,0

Figure 4 Parameter lists

Motorparameter MLD					
Motor typ			2xMLS30-85-35	2xMLS60-250-25	MLS40-170-25
Achsbezeichnungen	Dim.	Param.	LD600	LD1200TL	LD400M(U/L)
Motor-Bemessungsstrom	A	P0305	7,9	19,6	6,9
Motorbertemperatur Zeitstufe	s	P306	1	1	1
Motor-Bemessungsgeschwindigkeit	m/min	P0311	150	150	150
Motor-Bemessungskraft	N	P0312	372,1	923,2	332 (331)
Motor-Polpaarweite	mm	P0315	28,1	28,1	28,1
Motor-Kraftkonstante	NA	P0316	47,1	47,1	48,1
Motor-Spannungskonstante	V s/m	P0317	15,7	15,7	15,7
Motor-Stillstandsstrom	A	P0318	7,9	19,6	6,9
Motor-Stillstandskraft	N	P0319	372		332
Motor Bemessungs kurzschlussstrom	A	P0320	0,001	0,001	0,001
Motor-Maximalgeschwindigkeit	m/min	P0322	300	300	300
Motor-Maximalstrom	A	P0323	38,2	76,4	20,7
Motor-Lastwinkel optimal		P0327	90,0	90,0	90
Motor-Positionierung Strom	A	P0329			
Motor-Grenzstrom	A	P0338	38,2	76,4	20,7
Motor-Masse	kg	P0341	9,9	12	6,9
Motor-Ständerwiderstand kalt	Ohm	P0350	0,64	0,29	?
Motor-Vorschaltinduktivität	mH	P0353	0,00	0,00	0,00
Motor-Ständerstreinduktivität	mH	P0356	3,45	1,75	4,777
Stromreglerdaption Einsatzpunkt unten	A	P0391	8	20	~8,3
Stromreglerdaption Einsatzpunkt oben	A	P0392	38,2	76,4	20,7
Stromreglerdaption P-Verstärkung Skalierung	%	P0393	40	40	40
Motorbertemperatur-Warnschwelle	°C	P0604	85,0	85,0	85
Motorbertemperatur-Störschwelle	°C	P0605	100,0	100,0	100

Figure 5 Parameter lists

4.4 Assignment of motors and drives to the axes

Linear axis	Engine type	Inom [A]	Imax [A]	Recommended driver board 3x400 V	Inom [A]	Imax [A]
MLD 50	MLS 05-58-15	1,1	3,2	6SL3210-1SE11-7UAA0	1,7	3,4
MLD 50KT	MLS 05-58-15	1,1	3,2	6SL3210-1SE11-7UAA0	1,7	3,4
MLD 100	MLS 10-85-15	2,1	6,9	6SL3210-1SE14-1UAA0	4,1	8,2
MLD 100U	MLS 10-85-15	2,1	6,9	6SL3210-1SE14-1UAA0	4,1	8,2
MLD 100K	MLS 10-85-15	2,1	6,9	6SL3210-1SE14-1UAA0	4,1	8,2
MLD 100T	MLS 10-250-15	3,1	6,4	6SL3210-1SE14-1UAA0	4,1	8,2
MLD 100TU	MLS 10-250-15	3,1	6,4	6SL3210-1SE14-1UAA0	4,1	8,2
MLD 200	MLS 20-85-15	3,2	12,7	6SL3210-1SE17-7AA0	7,7	15,4
MLD 200K	MLS 20-85-25	3,8	12,7	6SL3210-1SE17-7AA0	7,7	15,4
MLD 200L	MLS 20-85-25	3,8	12,7	6SL3210-1SE17-7AA0	7,7	15,4
MLD 200UL	MLS 20-85-25	3,8	12,7	6SL3210-1SE17-7AA0	7,7	15,4
MLD 200T	MLS 20-250-15	4,2	12,7	6SL3210-1SE17-7AA0	7,7	15,4
MLD 200TU	MLS 20-250-25	4,2	12,7	6SL3210-1SE17-7AA0	7,7	15,4
MLD 200TL	MLS 20-250-25	5,2	12,7	6SL3210-1SE17-7AA0	7,7	15,4
MLD 200TUL	MLS 30-85-35	5,2	12,7	6SL3210-1SE17-7AA0	7,7	15,4
MLD 300	MLS 30-85-35	5,6	19,1	6SL3210-1SE17-7AA0	7,7	15,4
MLD 300U	MLS 30-85-35	5,6	19,1	6SL3210-1SE17-7AA0	7,7	15,4
MLD 300TU	MLS 30-250-15	5,6	19,1	6SL3210-1SE17-7AA0	7,7	15,4
MLD 400L	2*MLS 20-85-25	5,6	25,5	6SL3210-1SE21-8AA0	18	26,4
MLD 400TL	MLS 40-250-24	7,2	25,5	6SL3210-1SE21-8AA0	18	26,4
MLD 400TUL	MLS 40-250-25	7,2	25,5	6SL3210-1SE21-8AA0	18	26,4
MLD 600	2*MLS 30-85-35	7,9	38,2	6SL3210-1SE22-5AA0	25	38
MLD 600TL	MLS 60-250-24	9,8	38,2	6SL3210-1SE22-5AA0	25	38
MLD 600TUL	MLS 60-250-25	9,8	38,2	6SL3210-1SE22-5AA0	25	38
MLD 1200TL	2*MLS 60-250-25	19,6	76,4	6SL3210-1SE22-5AA0	45	76

Figure 6 Assignment of motors and drives to the axes

4.5 Overview of motor types and their parameters

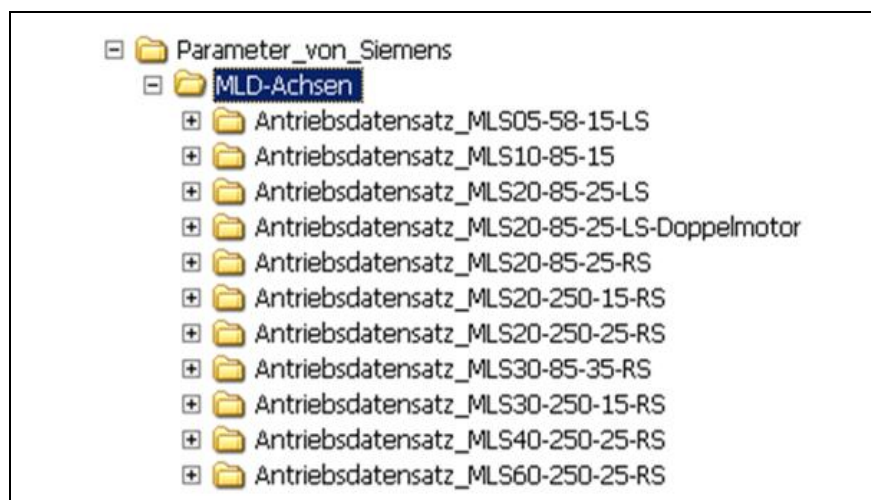


Figure 7 Overview of motor types and parameters

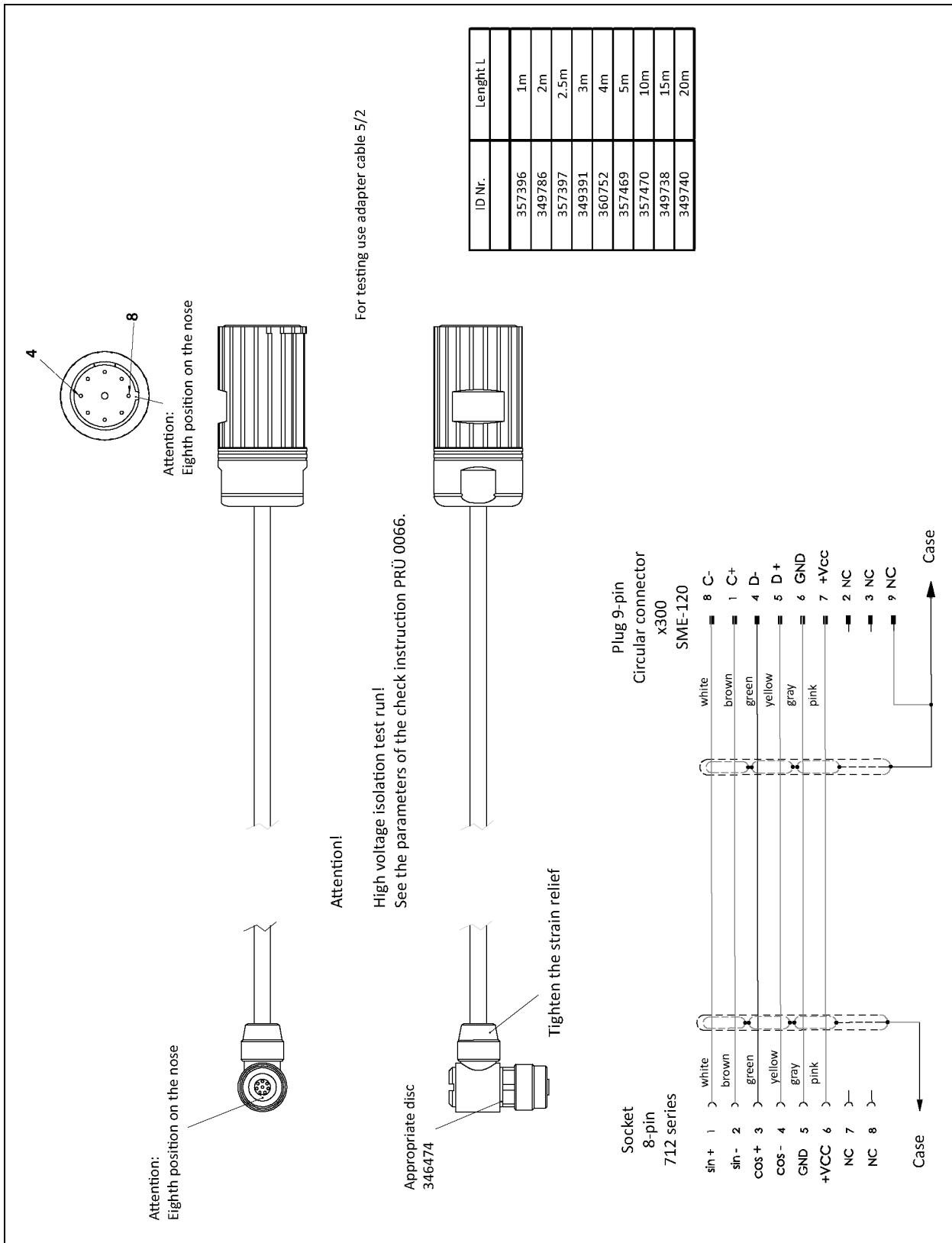


Figure 8

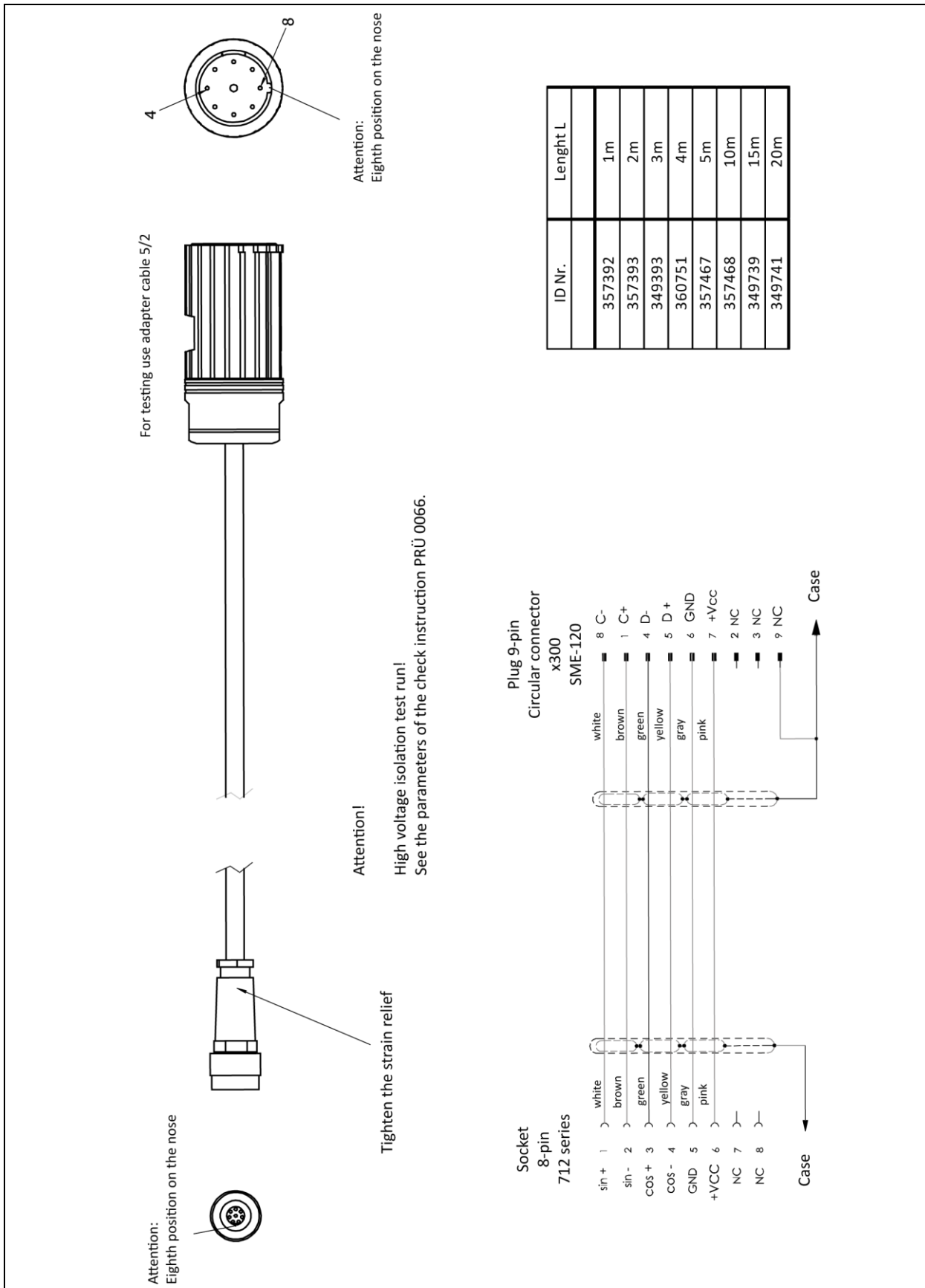


Figure 9

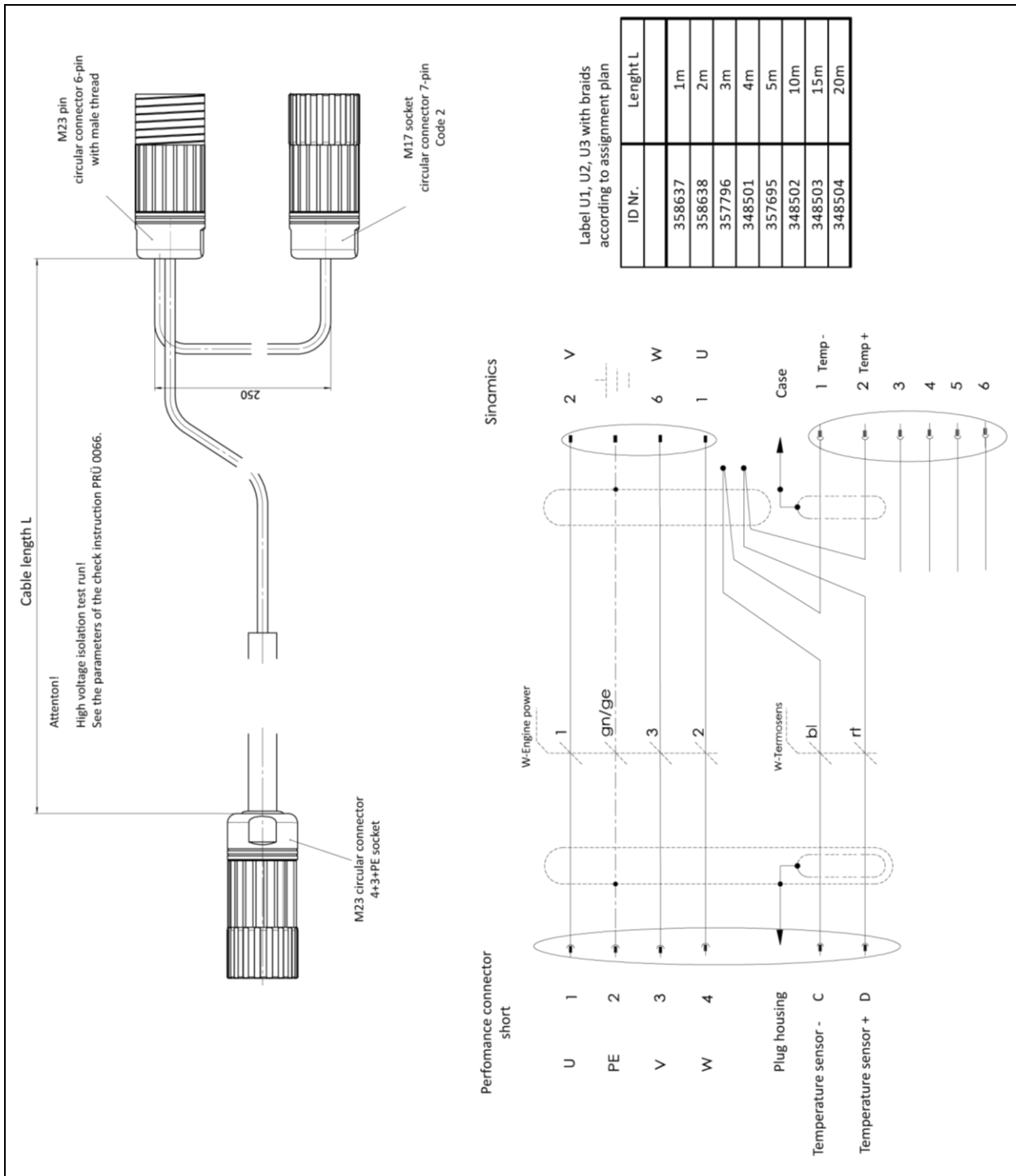


Figure 10

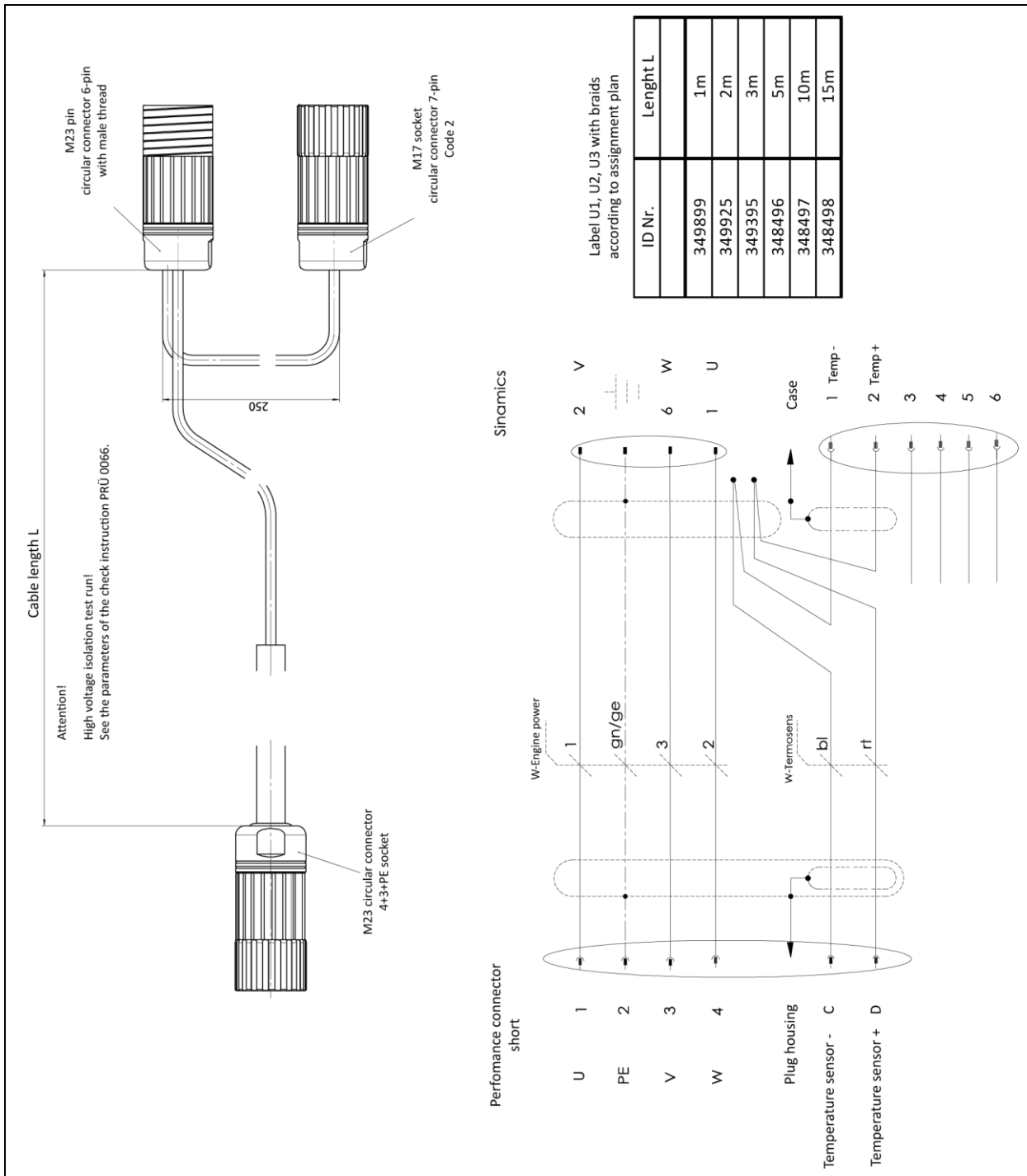


Figure 11

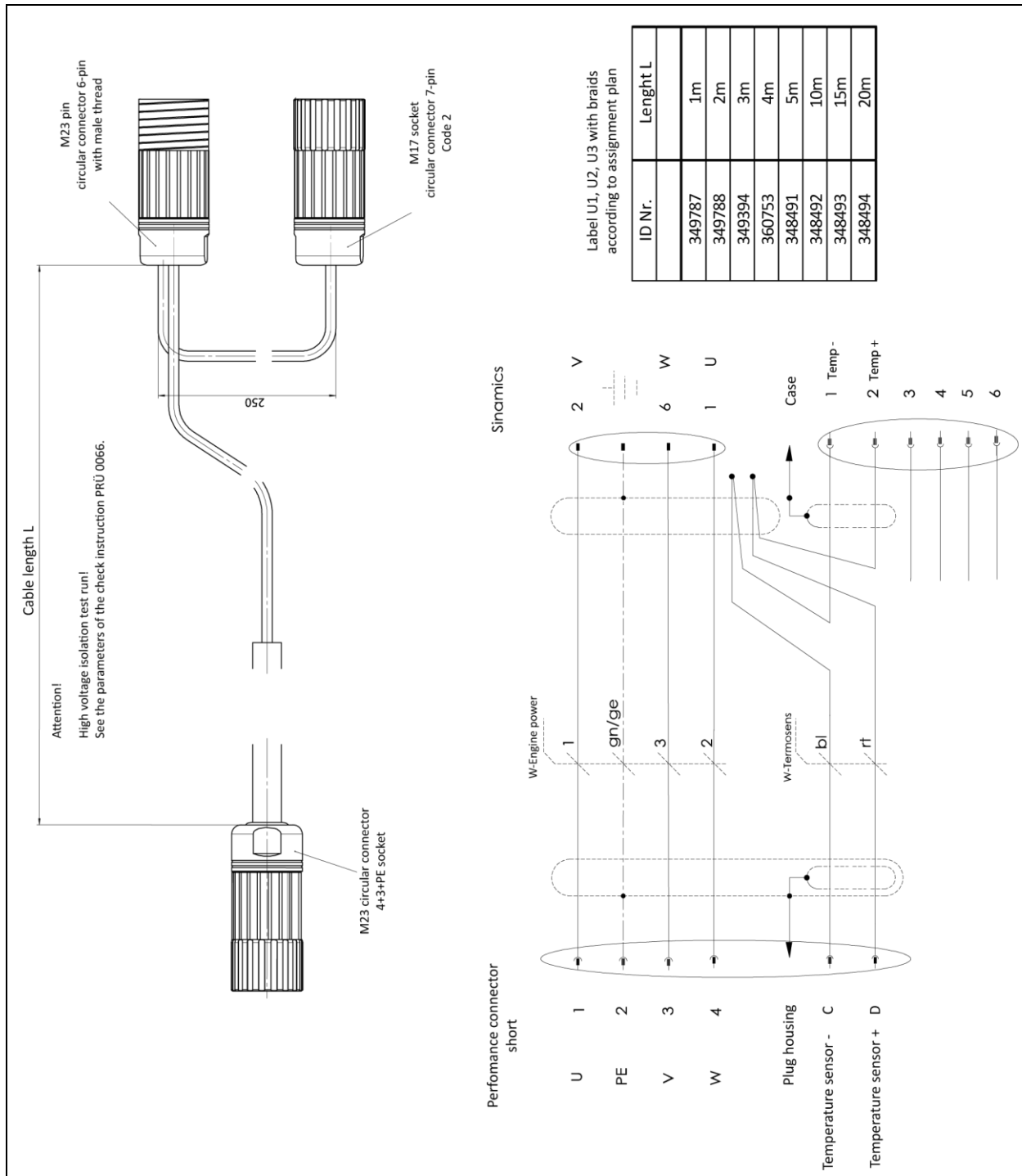


Figure 12