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Introduction

1

Startdrive

SINAMICS Getting Started - SINAMICS Startdrive

Getting Started

Legal information

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This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

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indicates that death or severe personal injury **may** result if proper precautions are not taken.

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

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Introduction

1.1 SINAMICS Startdrive - Drive commissioning

SINAMICS Startdrive tutorial



This tutorial will provide you with a brief overview of working with Startdrive. The different steps for creating a project, and the commissioning and diagnostics tools are shown briefly using a typical example.

Note

The tutorial is indicative only and makes no claim to be technically complete. For commissioning you require the online help of SINAMICS Startdrive and the drive documentation.

1.1 SINAMICS Startdrive - Drive commissioning

Connecting the drive unit to the PC

2.1 USB wiring

Wiring via USB

The drive unit must be wired to the PC in order for the commissioning to be performed. Depending on the connection options you can connect the drive unit to the PC via PROFINET or PROFIBUS DP and via USB for all drive units.

How to connect the drive to the PC:

- 1. Switch the drive on and wait until ramp-up has completed.
- 2. Plug the micro USB connector into the corresponding socket on the front of the drive and the USB connector into a USB port on the PC.



2.1 USB wiring

Windows detects the USB device with the initial connection and automatically installs the driver. Note the procedure in the installation wizard. Windows XP is used as an example here. The driver is installed automatically under Windows 7.



Once the driver is installed you can create a new project and go online on the drive.

Creating a project

3.1 Creating project portal view

Portal view

Upon opening Startdrive you will find yourself in the so-called portal view of the new TIA Portal.



The portal view offers a task-oriented view of the tools and provides the basic functions for the individual task areas, e.g. project management and diagnostics.

3.1 Creating project portal view



The TIA Portal also continues to provide the project view for the classic display. You can switch to this view easily via the relevant button.



3.1 Creating project portal view

Save project 🛎 🗶 🗓 🗔 🗙 🄊	* (** 項 公田田田岡 /	Goonline 🖉 Goolline 🏠 🖪 🛛		rouny mayeree m	PORT
				Tasks	
Devices				Options	
900	2				1
				 Find and replace 	_
sample_01					
Add new device				Find:	100
Devices & networks					
Common data				Whole words anly	
Cocumentation settings				Match case	
Deline access				Find in substructures	
and Reader/US8 memory				() Find in hidden texts	
				Use wildcards	
				Use regular expressions	
				O sthele day man	
				O muse cocurrent	
				Hom current position	
				() Selector	
				Dean	
				O Up	
	the second se			Find	
				Replace with:	
		de a se e		Replace Replace all	
		🖲 Properties 🛛 🍡 Info 🔒	Diagnostics	Replace Replace all	
	Device information	Properties Sinfo Connection Information	Diagnostics	Replace Replace all Languages & resources	
Details view	Device information All devices offline	Connection Information	Diagnostics	Episce Replace all Replace all Canguages & resources Editing language:	
Details view	Device information All devices offline V onin_ & Open. D	Properties Sinfo Connection information	Alarm display Desels	Feplace Replace all Feplace Replace all V Languages & resources Editing language:	
Details view	Device information All devices offline W Onlin, Se Open, D	Properties Tuinfo Connection information exicemodule Message	Diagnostics	Feplace Replace att Feplace Technologies Compares & resources Eding languages Trénome Language	[
Details view	Device information All devices offline ₩ Onlin_ Se Opera. D	Properties Ginfo Connection information exicemodule	Diagnostics	Replace Replace all	
Details view	Device information All devices offline ₩ Onlin_	Properties Tu Info Connection Information excemodule Message	Diagnostics Alarm display Details	Beplace Replace all Ending anguages & resources Eding languages Eding languages Reference languages Reference languages	
Details view	Device information All devices offline ♥ Onlin_ ℃ Open_ D	Connection Information	2 Diagnostics Alarm display Details	Peptace Replace attain Implace Resources Editing languages Editing languages Reference languages Editing languages	
Details view	Device information All devices of fine ₩ onin.	Properties Tu Info Connection Information excemtoule Message	2 🔀 Diagnostics Alarm display Dessils	Beplace Resources Constant Anguages & resources Constant Anguages Reference language	
Details view	Device information All devices offline ♥ Onin_ € Opers_ D	Connection Information	Diagnostics Alarm display Deals	Replace Replace attain Edits language: Edits language: Edits language: Edits language:	
Details view	Device information All devices offline ♥ Onin. Se Opera. D	Connection Information	2 🔀 Diagnostics	Replace Regulate attribute Replace A resources Cating language: Reference language:	
Details view	Device information All devices offline ♥ Onin.	Importion Info Connection information exicemcould Message Message	Disgnostics Alarm display Desails	Beplace Replace all Epidace Reslace all V Languages & resources Editing languages Editing languages Reference languages Editing languages	

The portal view is the important view first of all in the tutorial. You will create a new project from this view in the next step.

3.2 Creating a new project

How to create a new project

- 1. Click "Create new project" in the portal view.
- 2. Enter a name under "Project name" and select the pathway for saving the project.

₩ Siemens - Projekt1				_ ¤ ×
			Totally Inte	grated Automation PORTAL
Start 🦾		Create new project		
Devices & networksImage: Constraint of the second of the	 Open existing project Create new project Migrate project Close project Close project Welcome Tour First steps Installed software Help 	Project name: Path: Author Comment:	Project1 D:05_Projektel01_Standrivel01_Proj Istandrive	
Project view	Opened project: D:\03_Projekte\01		rojekt1	



3. Confirm with "Create". The project is created.

4. Switch to project view for the next steps, e.g. going online.



Creating a project

3.2 Creating a new project

Going online and incorporating devices

4.1 Online mode and connected devices

Online mode



The Startdrive provides the option of going to the drive online via the "Accessible devices" function. For this the drive unit can be connected to the PC via USB, PROFIBUS DP, or PROFINET. This depends on the relevant version of the drive unit.

You will now learn how to identify connected drive units via Accessible devices and incorporate these into the existing project.

4.2 Finding the drive unit via USB with Accessible devices

4.2 Finding the drive unit via USB with Accessible devices

How to find connected drive units with Accessible devices

1. Select "Accessible devices" in the "Online" menu.



4.2 Finding the drive unit via USB with Accessible devices

 In the "Accessible devices" window select "S7USB" as the "PG/PC interface type" and click "Update"

		Ту	pe of the PG/PC interface PG/PC interface	e [Please select Please select	-) ®]
	Accessible device	es in target subnet:			PROFIBUS STUSB Automatic prote Studentic prote	ocol detection	
	Device	Device type	Туре	Add	TeleService		
Flash LED							
	_					Ref	rech
ine status informa	tion:						Cali

Startdrive automatically scans the selected interface and displays the drive units found.

- Accessible devices Type of the PG/PC interface: L \$7058 -PG/PC interface: NUSB • • • Accessible devices in target subnet: Device Device type Type Address MAC address G120 CU240E-2 ... S7USB XAC831-003919 Antrieb_1 Flash LED Befresh Online status information: Found accessible device Antrieb_1 [XACB31-003919] ^ Scan completed. 1 devices found. * "? Retrieving device information Show Cancel
- 3. Select the drive unit found and click "Display."

4.3 Integrating the drive unit into the project

The drive unit is displayed under "Online access" in the project navigator.



4.3 Integrating the drive unit into the project

Integrating the drive unit

You can access the drive unit from Startdrive via Accessible nodes. You can now integrate the drive unit into the project.

4.3 Integrating the drive unit into the project

How to integrate drive units into the project online

1. Select the drive unit under "Online access" in the project navigator.



2. Select "Upload device to PG/PC" in the online menu.

Online	Options	Tools	Window	Help
💋 Go o	nline			Ctrl+K
🗖 Go o	ffline			Ctrl+M
🖳 Simu	lation			•
Stop	runtime/si	mulation	10	
Dowr	nload to de	vice		Ctrl+L
Exter	nded down	load to d	levice	
Dowi	nload and i	reset PLC	C program	
Dowi	nload user	program	nto Memory	/ Card
Uplo	ad from de	vice		
Back	up from on	line dev	ice	
Uplo	ad device t	o PG/PC.		
HML	Device mai	ntenanc	e	•
Acce	ssible devi	ces		Ctrl+U
Start	CPU		Ctrla	Shift+E
📕 Stop	CPU		Ctrl+	Shift+Q
🗞 Onlin	ne & diagno	ostics		Ctrl+D

4.3 Integrating the drive unit into the project

The data is loaded to the PG/PC.



The drive unit is integrated into the project and is displayed in the project navigator.



Commissioning the drive

5.1 Commissioning with Startdrive

Commissioning with Startdrive



You can complete the commissioning in a short space of time with the Startdrive Commissioning wizard. For this Startdrive supports offline commissioning in the project or online directly on the drive unit. After offline commissioning you load the configuration from the PG/PC into the device, with online commissioning you load the configuration from the drive unit into your project.

Online commissioning will be introduced to you in the next step.

5.2 Going online and starting the wizard

Basic commissioning online

You must connect Startdrive Online with the drive unit before commissioning.

How to go online and start the commissioning

1. Select the drive unit in the project navigator and then select "Connect online" from the shortcut menu.

5.2 Going online and starting the wizard

A typical icon is displayed next to the drive unit once the connection has been established. In the example, this is the icon for maintenance required because the drive still has to be commissioned.

VA	Siemens - sample_01		
Pr	oject Edit View Insert Online Optio	ns Tools Window Help	
	😚 🎦 🔒 Save project 📕 🐰 🧾 🗎 🗙	<u>ちょべょ 雨 品 🏽 匠 盟 </u> 幕 🖉 Go	online
	Project tree		
	Devices		
	1 O O 1		
See.	▼ sample_01	e	
ar	Add new device		
S.	n Devices & networks		
	Drive_1 [G120 CU240E-2 PN]		
	Device configuration		
	🎬 Parameter		
	Commissioning		
	Conline & diagnostics		
	Traces		
	Unassigned devices		
	Common data		_
	Documentation settings		
	Languages & resources		
	Online access		
	N Cand Deadardu C Demander		

2. Double-click "Commissioning" in the project navigator. A window is shown in the working area.

- sample_01 * Drive_1 [G120 CU240E-2 PM] * Commissioning
 Image: Commissioning wizerd

 Commissioning wizerd
 Step-bystep basic commissioning of the drive
Notice: The online wizer cannot be cancelled after it
has been started!

 Motor optimization
 Save/Reset

 Control panel
 Menual control of the drive from the PC

 Motor optimization
 Automatic determination of motor parameters through
different measurements

 Save/Reset
 Save/Reset

 Save/Reset
 Save parameter assignment on memory card or load
from memory card.
Reset device to factory setting.
- 3. Double-click "Commissioning wizard" in the working area. The wizard will start.

You will complete the commissioning in the next step.

5.3 Basic commissioning with the wizard

Basic commissioning online with the wizard

Select the relevant parameters in the wizard for basic commissioning of the drive. Startdrive is already online with the drive unit connected and the Commissioning wizard is open in the working area.

How to perform basic commissioning

1. You configure the open-loop/closed-loop control type, determine the drive settings and select the motor in the open wizard.

Commissioning wizard - (Online)	? X	
	Data sets Selection of command and drive data sets for which settings are to be specified when running through the wizard	
🔵 Data sets	Data set selection:	
Open-loop/closed-loop	Command data set: 0 (Active) Drive data set: 0 (Active)	
Defaults of the setpol		
Drive setting		
Motor		
Important parameters		
Drive functions	Previously made settings are lost through a reconfiguration; It is not possible to cancel the configuration online.	
Summary		
	«Back Next » Finish Cancel	

2. Run through the Commissioning wizard. You move to the next step in each case by clicking "Next".

3. Use standard telegram 1 as telegram. This is preset through the selection of the macro.



4. Carry out the motor data identification when the motor is at standstill is recommended for the first commissioning. This is performed with the first ON command, e.g. when testing the drive with the control panel.



5. All parameters are displayed in the Summary at the end of the wizard. You can check the values entered once again here and make any changes by clicking "Back."



6. Click "Finish".

This completes the basic commissioning.

Testing and optimizing the drive

6.1 Testing and optimizing drives

Testing and optimizing



Startdrive offers a number of options for testing and optimizing the drive. For the first function test, you can operate the drive by using the drive control panel. Error conditions can be recorded and eliminated via the online and diagnostics screen forms with all the alarm and fault messages. The motor optimization helps you to improve the control properties of the motor

The drive control panel will be introduced to you initially in step one.

6.2 Testing using the drive control panel

Rotating the motor using the drive control panel

You can carry out an initial function test of the drive by using the drive control panel. The Startdrive must be connected to the drive online and Commissioning must be open in the working area.



How to carry out a test using the drive control panel

- 1. Double-click "Control panel"
- 2. Activate "Master control" and set the drive enables and the operating mode on the control panel. The motor is then ready to be switched on.

aster control: Activate Deactivate Set	ables:	Reset	Operating mode	r: 	Switch on
Nodify: Speed: 0 \$ rpm	Stop	A Backward	Forward	3	
Irive status: Ready for switching on Cperation enabled		Actual values: Speed:	0.0 rpm	M. current: [0.00 Arms
Fault Crive fault: Acknowledge faults]				0.0 Hz
		-	1011001	100	

 Motor measurement is performed once at the first ON command of the drive after commissioning. Start the drive and wait until the measurement is completed.

ter control: Drive enables: Activate Desctivate Set	Operating mode: Switz Speed specification	ch on
dify:		
Speed: 0 0 pm	Stop Backward Forward	
ve status:	Actual values:	
Ready for switching on Operation enabled Motor measurement	Speed: 0.0 pm M. current: 0.00 A	erm s
Fault		
ive fault: -	Output frequency smoothed . 0.0 H	z
Acknowledge faults	Output voltage smoothed	urrm s
	011001100	

CAUTION Rotating the drive Observe the safety instructions in the manual before you make the motor rotate.

4. Enter a "speed."

5. You can make the drive rotate by clicking the "Forward" or "Backward" buttons. The drive accelerates to the specified speed. The actual values are displayed.

Aster control: Activate Deactivate Set	Derating mode: Speed specification	Switch o
Modify:		
Speed: 1000 🗢 rpm	Stop Ackward Forward	
	Jog backward Jog forward	
Drive status:	Actual values:	
Ready for switching on	Speed: 1000.0 rom M.	current: 0.42 Arm:
Fault		
Pault 📃	Output frequency smoothed	▼ 33.3 Hz
Foult Ctive fault: Acknowledge faults	Output frequency smoothed Output voltage smoothed	▼ 33.3 Hz
Ctive fault:	Output frequency smoothed Output voltage smoothed	33.3 Hz 273.9 VHm:
Fault Acknowledge faults	Output frequency smoothed Output voltage smoothed	▼ 33.3 Hz ▼ 273.9 Vrm
Fault	Output frequency smoothed Output voltage smoothed	▼ 33.3 Hz ▼ 273.9 Vrm:
Crive fault: - Acknowledge faults	Output frequency smoothed Output voltage smoothed	33.3 Hz 273.9 Vrm:
Fault:	Output frequency smoothed Output voltage smoothed	• 33.3 Hz • 273.9 Vrm

6. Click "Stop" to stop the drive, switch off the motor, reset the drive enables and give up master control.

Parameterizing the drive

7.1 Function and parameter views

Functions and parameters



A parameterization editor with three tabs is available to parameterize the drive. In one tab, you perform the basic commissioning with the wizard. The two other tabs contain a function view and a parameter view. They are described in more detail in this section.

7.2 Displaying the function view

7.2 Displaying the function view

Function view

You parameterize the drive using screen forms with a graphical user interface in the function view.

How to open the function view:

- 1. Double-click "Parameters" below the drive in the project navigator.
- 2. Click the "Function View" tab in the working area.
- 3. The secondary navigation for calling the function-oriented screen forms is in the left-hand area of the function view.

		Wizards Functional View	Parameter View		
CDS: 0 • DDS: 0 •	X Start safety commissioning				
Basic settings					
Data sets	Data sets	Create and delete drive and command data sets			
Units					
Reference variables					
I/O configuration	Units	Selection of unit system, technology units and motor			
Inputs/outputs		31010010			
Setpoint channel					
Operating mode	Reference variables	Specification of the reference variables for parameters			
Drive functions		that are displayed/transferred in percentage or bexaderimal format			
 Application functions 					
Communication					
Interconnections	I/O configuration	Overview of I/O interconnection and fieldbus			
		communication			
	*				
	-				

The next step shows how the parameterization is performed in the function view.

7.3 Assigning parameters in the function view

Assigning parameters in the function view

You edit the most important parameters in a clearly organized, graphical user interface in the function view. The screen forms are based on function diagrams that map the functions in signal flow diagrams. The signal flow is from left to right.

		Wizards	Functional View	Parameter View
CDS: 0 💌 DDS: 0 💌 🎗	Start safety commissioning			
▼ Basic settings				^
Data sets				
Units				
Reference variables				
I/O configuration				
 Inputs/outputs 	Digital input 0		Digital input C	inverted
Digital inputs	p1055[1] Bl: Jog bit 0			
Relay outputs	Digital input 1		Digital input 1	inverted
Analog inputs	Disite Linear 2		Disite Lineart 7	
Analog outputs	Digital input 2		Digital input 2	Inverted
Measuring input	Digital input 3		Dinital input 3	inverted
Setpoint channel	p810 BI; Command data s	et se		
Operating mode	Digital input 4		Digital input 4	inverted
Drive functions	t0			
Application functions	Digital input 5		Digital input 5	inverted
Communication	0-			
Interconnections				
, interconnections				
	Digital input 11		Digital input 1	1 inverted
	Q		-0-1	
	Digital input 12		Digital input 1	2 inverted
		<u> </u>		
		-		~
	<			

How to work with the function view:

1. You can assign the signals for the inputs/outputs similar to the real terminal connections. Simply select the terminal signal from the displayed list.

7.3 Assigning parameters in the function view

2. You can parameterize the functions in the screen forms with the aid of a graphical support.

Set safety commissioning Speed limitation Speed setpoint Sip frequency bands Minimum limitation Maximum limitation Output Output 0.000 rpm 0.000 rpm			Wizards	Functional View	Parameter View
Speed limitation	X Start safety commissioning			X Cardella Contractoria (Cardo)	M
Skip frequency bands Speed setpoint 0.000 rpm Skip frequency bands Minimum limitation Maximum limitation 0.000 rpm 0.000 rpm	Speed limitation				_
Speed setpoint 0.000 rpm	dia anti-				
Speed setpoint - 0.000 rpm 0.000 rpm	Skip frequency bands	Minimum limitation	Maximum limitation		
0.000 rpm					
0.000 rpm	Speed setpoint		$\overline{}$		
0.000 rpm					
	0.000 rpm			0.000 rpm	

- 3. In addition to the secondary navigation, you can toggle between the individual screen forms of the function view with the buttons.
- 4. You are supported by help screens when entering values.


7.4 Online function view

Working online with the function view

In the function view, you can change the parameter values directly in the drive when you are connected online to the drive. The input fields of the parameters that you can change online are displayed in orange.

To go online with the function view:

1. Connect Startdrive online with the drive (So online). The input fields that can be changed are displayed in orange.



7.5 Displaying the parameter view

2. Parameter changes in the online view only affect the drive. If you want to take the changes into the offline project, you must perform an upload to the project.



7.5 Displaying the parameter view

Parameter view

The parameter list provides a clearly organized display of the parameters available for the device. To facilitate the locating of parameters, they are sorted according to topic.

How to open the parameter view:

1. Click the "Parameter View" tab in the working area.

7.5 Displaying the parameter view

2. The secondary navigation for calling the parameter groups sorted according to topic is in the left-hand area.

					Wizards	Functional View	Parameter View	
Display standard paramete	ers 💌	🐴 ± 😭						
		Number	Parameter text	Value			Unit	
All parameters	8	<all></all>	<all></all>	<all></all>			<all></all>	~
Commissioning		r2	Drive operating display	[42] Switchin	ng on inhibited	d - set "OC/OFF2" = "1" (p08		-
Save & Reset		p10	Drive commissioning parameter filter	8		[0] Read	y	
System information		p15	Macro drive unit			[7] FBw/datSetChg	1	
Basic settings		r18	Control Unit firmware version			450300		
Inputs/outputs		r20	Speed setpoint smoothed			0.0) rpm	
Setpoint channel		r21	Actual speed smoothed			0.0) rpm	
Operating mode		r25	Output voltage smoothed			0.0) Vrms	
Drive functions		r26	DC link voltage smoothed			630.4	↓ V	
Application functions		r27	Absolute actual current smoothed			0.00	Arms	
Communication		r31	Actual torque smoothed			0.00) Nm	
Diagnostics		r32	Active power actual value smoothed			0.00	kw	
		r34	Motor utilization			-200) %	
		r35	Motor temperature			20.0) ℃	
		r39[0]	Energy display, Energy balance (sum)			0.03	2 kWh	
	-	r41	Energy consumption saved			5.48	8 kWh	
	1	r46	Missing enable sig			40001C0FF	ł	
		r47	Motor data identification and speed controller.			[0] No measuremen	t	
		▶ r51	Drive Data Set DDS effective			OH	1	
		r52	Status word 1			EBCOH	ł	
		• r53	Status word 2			2E0	1	
		r54	Control word 1			0	1	
		p100	IEC/NEMA mot stds			[0] IEC-Motor (50 Hz, SI units)	
		p170	Number of Command Data Sets (CDS)				2	
		p205	Power unit application	[0] Load dut	ty cycle with hi	igh overload for vector drive:		
		r206[0]	Rated power unit power, Rated value			0.3	/ kW	
		r208	Rated power unit line supply voltage			400) Vrms	
		p230	Drive filter type, motor side			[0] No filte	r	
		p233	Power unit motor reactor	8		0.000) mH	
		p234	Power unit sine-wave filter capacitance	8		0.000	μF	
		p300[0]	Motor type selection		[1) Induction motor (rotating)	
		p301[0]	Motor code number selection			()	
		p304[0]	Rated motor voltage			400) Vrms	
		p305[0]	Rated motor current			0.43	Arms	
		p306[0]	Number of motors connected in parallel					-

3. You can either display all parameters or select special groups.

					Wizards	Functional View	Parameter View	
Display standard paramete	rs 🔻) 🐴 ± 🕋						
		Number	Parameter text	Value			Unit	
All parameters	8	<all></all>	<all></all>	<all></all>			<all></all>	-
Commissioning		p10	Drive commissioning parameter filter	<u>A</u>		[0] Ready		
Save & Reset		p15	Macro drive unit			[7] FBw/datSetChg		
System information		r47	Motor data identification and speed controller			[0] No measurement		
Basic settings		p205	Power unit application	[0] Load o	duty cycle with hig	gh overload for vector drives		
Inputs/outputs		p230	Drive filter type, motor side			[0] No filter		
Setpoint channel		p304[0]	Rated motor voltage			400	Vrms	
Operating mode		p305[0]	Rated motor current			0.42	Arms	
Drive functions		p307[0]	Rated motor power			0.12	kW	
Application functions		p308[0]	Rated motor power factor			0.750		
Communication		p309[0]	Rated motor efficiency			0.0	%	
Diagnostics		p310[0]	Rated motor frequency			50.00	Hz	
		p311[0]	Rated motor speed			1350.0	rpm	
		p322[0]	Maximum motor speed			0.0	rpm	
		p323[0]	Maximum motor current			0.00	Arms	
		p340[0]	Automatic calculation, motor/control parame			[0] No calculation		
	1	p500	Technology application			[0] Standard drive		
		p922	PROFIdrive telegram selection		[1] S	tandard telegram 1, PZD-2/2		
	-	▶ p1000[0]	Speed setpoint selection	A		[6] Fieldbus		
		p1470[0]	Speed controller encoderless operation P-gain			3.000		
		p1472[0]	Speed controller encoderless operation integr.			144.0	ms	
		p1900	Motor data identification and rotating measur			[0] Inhibited		
		p3900	Completion of quick commissioning	۵	[0] No quick parameterization		

7.6 Working with the parameter view

7.6 Working with the parameter view

Working with the parameter view

The parameters are displayed with number, text, value and unit in the parameter list. Parameters that can be changed have a light gray background.

How to work with the parameter list:

1. Click the parameter in the "Value" column that is to be changed.

				Wizards	Functional View	Parameter View
Display standard paramete	ers 💌 🌆 🛨 🔛					
	Number	Parameter text	Value			Unit
All parameters	<all></all>	<all></all>	<all></all>			<all></all>
Commissioning	p10	Drive commissioning parameter filter	(0) Ready			
Save & Reset	p15	Macro drive unit	[7] FBw/datSetChg			
System information	stem information r47 Motor data identification and speed controller				[0] No measurement	
Basic settings	p205	Power unit application	[0] Load	duty cycle with hi	gh overload for vector drives	
Inputs/outputs	p230	Drive filter type, motor side			[0] No filter	
Setpoint channel	p304[0]	Rated motor voltage			400	Vrms
Operating mode	p305[0]	Rated motor current			0.42	Arms
Drive functions	p307[0]	Rated motor power			0.12	kW
Application functions	p308[0]	Rated motor power factor			0.750	
Communication	p309[0]	Rated motor efficiency			0.0	%
Diagnostics	p310[0]	Rated motor frequency			50.00	Hz
	p311[0]	Rated motor speed			1350.0	rpm
	p322[0]	Maximum motor speed			0.0	rpm
	p323[0]	Maximum motor current			0.00	Arms
	p340[0]	Automatic calculation, motor/control parame			[0] No calculation	1
	p500	Technology application			[0] Standard drive	-
	p922	PROFIdrive telegram selection		[1] S	tandard telegram 1, PZD-2/2	
	p1000[0]	Speed setpoint selection	A		[6] Fieldbus	
	p1470[0]	Speed controller encoderless operation P-gain			3.000	
	p1472[0]	Speed controller encoderless operation integr.			144.0	ms
	p1900	Motor data identification and rotating measur			[0] Inhibited	
	p3900	Completion of quick commissioning	۵	[0] No quick parameterization	

2. Select a value from the list or enter a value and confirm it with the ENTER key.

7.6 Working with the parameter view

3. To display the online help, click the parameter and open the online help for the parameter via the displayed tooltip.

					Wizards	Functional View	Parameter View	
Display standard parameters	🔹 🕮 ± 🔛							
	Number	Parameter text		Value			Unit	-
All parameters	All>	<all></all>		<all></all>			<all></all>	
Commissioning	p10	Drive commissioning parameter	filter	8		[0] Read	у	
Save & Reset	p15	Macro drive unit				[7] FBw/datSetCh	9	
System information	r47	Motor data identification and spe	ed controller			[0] No measuremen	t	
Basic settings	p205	Power unit application		[0] Load	duty cycle with hi	gh overload for vector drive	s	
Inputs/outputs	p230	Drive filter type, motor side				[0] No filte	r	
Setpoint channel	p304[0]	Rated motor voltage				40	0 Vrms	
Operating mode	p305[0]	Rated motor current				0.4	2 Arms	
Drive functions	p307[0]	Rated motor power				0.1	2 kW	
Application functions	p308[0]	Rated motor power factor				0.75	D	
Communication	p309[0]	Rated motor efficiency				0.	D %	
Diagnostics	p310[0]	Rated motor frequency				50.0	D Hz	
	p311[0]	Rated motor speed				1350.	0 rpm	
	p322[0]	Maximum motor speed				0.	D rpm	
	p323[0]	Maximum motor current				0.0	D Arms	
	p340[0]	Automatic calculation, motor/con	trol parame			[0] No calculation	-	
	Automatic ca	lculation, motor/control parameters				[0] Standard driv	e	
	Setting to autor	natically calculate motor parameters			[1] S	tandard telegram 1, PZD-2/	2	
	and Ulf open-loo	op and closed-loop control		8		[6] Fieldbu	s	
	parameters from	n the rating plate data.	ration P-gain	1		3.00	D	
	Default value: 0		ration integr.			144.	D ms	
	Minimum value		ing measur			[0] Inhibite	d	
	Maximum value	5	p	8	[0] No quick parameterizatio	n	
	Help for the par	ameter	5	-				

- 4. You can compare the current values of the parameters with the factory settings.
- 5. The differences are displayed with icons in the Comparison column.

						Wizards	T uncuonar view	Falai	nete	er viev	1
Display standard parame	ters	- 🗠 🗃 🕀	() () () () () () () () () ()								
		Number		Parameter text	Value			Unit		Compa	risc
All parameters	16	<all></all>	-	<all></all>	<all></all>			<all></all>	-	<all></all>	
Commissioning		r2		Drive operating display	[42] Switc	hing on inhibited	-set "OC/OFF2" = "1" (p08			0	
Save & Reset		p10		Drive commissioning parameter filter	8		[0] Ready			0	
System information		p15		Macro drive unit			[7] FBw/datSetChg			•	
Basic settings		r18		Control Unit firmware version			4503001				
Inputs/outputs		r20		Speed setpoint smoothed			0.0	rpm		•	
Setpoint channel		r21		Actual speed smoothed			0.0	rpm		•	
Operating mode		r25		Output voltage smoothed			0.0	Vrms		•	
Drive functions		r26		DC link voltage smoothed			630.4	V			
Application functions		r27		Absolute actual current smoothed			0.00	Arms		•	
Communication		r31		Actual torque smoothed			0.00	Nm		•	
Diagnostics		r32		Active power actual value smoothed			0.00	kW		•	
		r34		Motor utilization			-200	%			
		r35		Motor temperature			20.0	°C		0	
		▶ r39[0]		Energy display, Energy balance (sum)			0.02	kWh		0	
	-	r41		Energy consumption saved			5.48	kWh		0	
	1	▶ r46		Missing enable sig			40001C0FH			0	
		r47		Motor data identification and speed controller.			[0] No measurement			0	
	-	▶ r51		Drive Data Set DDS effective			OH			•	
		▶ r52		Status word 1			EBCOH			0	
		▶ r53		Status word 2			2E0H			0	
		▶ r54		Control word 1			OH			•	
		p100		IEC/NEMA mot stds		1	[0] IEC-Motor (50 Hz, SI units)			•	
		p170		Number of Command Data Sets (CDS)			2			•	
		p205		Power unit application	[0] Load o	duty cycle with his	gh overload for vector drives			•	
		▶ r206[0]		Rated power unit power, Rated value			0.37	kW		0	
		r208		Rated power unit line supply voltage			400	Vrms		0	
		p230		Drive filter type, motor side			[0] No filter			•	
		p233		Power unit motor reactor	A		0.000	mH		•	
		p234		Power unit sine-wave filter capacitance	8		0.000	μF		•	
		p300[0]		Motor type selection	1	[1] Induction motor (rotating)			0	
		p301[0]		Motor code number selection			0			•	
		p304[0]		Rated motor voltage			400	Vrms		0	
		p305[0]		Rated motor current			0.42	Arms		0	

7.7 Online parameter view

7.7 Online parameter view

Working online with the parameter view

In the parameter view, you can change the parameter values directly in the drive when you are connected online to the drive.

To go online with the parameter view:

1. Switch to online mode in the parameter view. The input fields that can be changed are displayed in orange.

					Wizards	Functional View	Parameter Vie	w
Display standard paramet	ers 🔻	1 ± 13						
		Number	Parameter text	Value			Unit	
All parameters	8	<all></all>	<all></all>	<all></all>			<all></all>	-
Commissioning		r2	Drive operating display	[42] Switc	hing on inhibited	-set "OC/OFF2" = "1" (p08		=
Save & Reset		p10	Drive commissioning parameter filter			[O] Ready		
System information		p15	Macro drive unit	8		[7] FBw/datSetCho	1	
Basic settings		r18	Control Unit firmware version			4503001		
Inputs/outputs		r20	Speed setpoint smoothed			0.0	rpm	
Setpoint channel		r21	Actual speed smoothed			0.0	rpm	
Operating mode		r25	Output voltage smoothed			0.0	Vrms	
Drive functions		r26	DC link voltage smoothed			631.0	V	
Application functions		r27	Absolute actual current smoothed			0.00	Arms	
Communication		r31	Actual torque smoothed			0.00	Nm	
Diagnostics		r32	Active power actual value smoothed			0.00	kW	
		r34	Motor utilization			-200	%	
		r35	Motor temperature			20.0	°C	
		▶ r39[0]	Energy display, Energy balance (sum)			0.02	kWh	
		r41	Energy consumption saved			5.48	kWh	
	4	▶ r46	Missing enable sig			40001C0FF	1	
		r47	Motor data identification and speed controller.			[0] No measurement	1	
		▶ r51	Drive Data Set DDS effective			0+	í (*	
		▶ r52	Status word 1			EBCOH	1	
		▶ r53	Status word 2			2E0H	1	
		▶ r54	Control word 1			0H	1	
		p100	IEC/NEMA mot stds	<mark>₿</mark>		[0] IEC-Motor (50 Hz, SI units)	
		p170	Number of Command Data Sets (CDS)	<u>A</u>		2	1	
		p205	Power unit application	🔒 [0] Lo	ad duty cycle with	n high overload for vector d		
		▶ r206[0]	Rated power unit power, Rated value			0.37	kW	
		r208	Rated power unit line supply voltage			400	Vrms	
		p230	Drive filter type, motor side	8		(0) No filte	r	
		p233	Power unit motor reactor			0.000	mH	
		p234	Power unit sine-wave filter capacitance			0.000	μF	
		p300[0]	Motor type selection	<u>A</u>	[1] Induction motor (rotating)	
		p301[0]	Motor code number selection	8		(1	
		p304[0]	Rated motor voltage	8		400	Vrms	
		p305[0]	Rated motor current	8		0.42	Arms	
		p306[0]	Number of motors connected in parallel	A		1		~

2. Parameter changes in the online view only affect the drive. If you want to take the changes into the offline project, you must perform an upload to the project.

Drive with control via PROFINET

8.1 Higher-level control and drive

Controller and drive unit



With the Startdrive integrated in the TIA Portal you can easily configure a drive unit with a higher-level controller. We will briefly show you the configuration process using a SIMATIC S7-1500 and a SINAMICS G120 with CU240E-2 PN as an example. For this the drive and controller are connected and configured via PROFINET.

8.2 Connecting the drive, controller, and PC

8.2 Connecting the drive, controller, and PC

Establishing the PROFINET connection

The drive, controller, and PC must be connected with each other before starting the configuration.

- 1. Connect the PC's Ethernet port with PN interface X1 P1 on the SIMATIC S7-1500 via a PROFINET cable. The X1 interface has two ports.
- 2. Connect the second PN port X1 P2 on the SIMATIC S7-1500 with the PN interface X1 on the SINAMICS G120 drive unit.



3. Switch the devices on and wait until ramp-up has completed.

You will then be able to identify the devices with the TIA Portal via "Accessible devices"

8.3 Identifying devices via Accessible devices

8.3 Identifying devices via Accessible devices

Identifying devices via Accessible nodes

You can access the connected devices via "Accessible nodes" in the project navigator. The TIA Portal must be open for this.

 First of all check the TCP/IP properties of the PC's Ethernet interface in MS Windows and enter a unique IP address and the subnet mask. The subnet mask is identical for all nodes (PC, controller, drive).

Internet Protocol (TCP/IP) Propertie	es	<u>?</u> ×
General		
You can get IP settings assigned autor this capability. Otherwise, you need to the appropriate IP settings.	matically if your network supports ask your network administrator fo	vr
C Obtain an IP address automatical	lly	
$\vdash \odot$ Use the following IP address: —	77. Sec.	
IP address:	192.168.0.10	
S <u>u</u> bnet mask:	255 . 255 . 255 . 0	
Default gateway:		
C Obtain DNS server address autor	matically	
● Us <u>e</u> the following DNS server ad	dresses:	
Preferred DNS server:		
<u>A</u> lternate DNS server:		
	Ad <u>v</u> anced.	
	OK Can	icel

2. Switch to the TIA Portal. You have already created a new project there.

8.3 Identifying devices via Accessible devices

- 3. Open "Online access" in the project navigator. All usable interfaces for the PC are automatically displayed under Online access.
- 4. Click "Update accessible nodes" under the PC's Ethernet interface.



All devices found after scanning the interface are then displayed in the project navigator.

	Siemens - Project2	
Pr	oject Edit View Insert Online Options Tool 著 🎦 🗔 Save project 昌 🐰 🗎 🗎 🗙 🏷 🗶	ols Window Help 🍊 🛨 🖬 🗄 🛄 🏠 🖳 🦝 🕼 Go online
	Project tree	
	Devices	
	B 0 0	
	Project2	
ti	▼ ☐ Online access	
St.	USB [S7USB]	1
	COM [RS232/PPI multi-master cable]	
	Intel(R) 82579LM Gigabit Network Connection	1
	🕶 🛅 ASIX AX88178 USB2.0 to Gigabit Ethernet Adap	<mark>7.</mark> 🤍
	Pupdate accessible devices	
	G120_CU240E_2_PN [192.168.0.12]	
	PLC_1 [192.168.0.1]	
	TeleService [Automatic protocol detection]	1
	CP5611 [PROFIBUS]	
	🕨 🛄 PC Adapter [MPI]	R.
	🕨 🛄 PC internal	
	PLCSIM [PN/IE]	<u></u>
	N 🚔 coul producture management	

8.4 Checking the IP and names of the devices via Accessible nodes

IP address and name of the node

The nodes must have a unique IP address and a PROFINET device name for PROFINET communication.

How to display the current IP and name of the nodes

1. The current IP addresses can be read next to the device with Online access. You will then use this IP later when configuring the hardware.

W	Siemens - Project2	
P	roject Edit View Insert Online Options Tools 透 📑 🔚 Save project 📕 🐰 🏥 泊 🗙 ちょく	Window Help *± 📊 🖥 🔃 🖸 🖳 🦝 💋 Goonline
	Project tree	
	Devices	
	B 0 0	
	▶ 🔄 Project2	
art	🗢 🔚 Online access	
St	USB [S7USB]	100
	COM [RS232/PPI multi-master cable]	
	Intel(R) 82579LM Gigabit Network Connection	🛛 📷
	ASIX AX88178 USB2.0 to Gigabit Ethernet Adap.	i 🔍
	Pupdate accessible devices	
	G120_CU240E_2_PN [192.168.0.12]	
	▶ 🛅 PLC_1 [192.168.0.1]	
	TeleService [Automatic protocol detection]	
	CP5611 [PROFIBUS]	
	🕨 🛅 PC Adapter [MPI]	
	🕨 🎦 PC internal	1
	PLCSIM [PN/IE]	R.?
	Cand Deciden/UCD means and	

Next we will show you how to change the IP and the name.

8.5 Changing the IP and name via Accessible nodes

8.5 Changing the IP and name via Accessible nodes

Changing the IP address and name

You can change the IP and the name under "Online & diagnostics". We demonstrate this below using a drive as an example. The procedure for the controller is identical.

How to change the IP and/or the name

1. Open "Online & diagnostics" on the drive or the controller.

调	Siemens - Project2		
Pr	oject Edit View Insert Online Options Tools Project 🔳 🔀 🗐 涌 🗙 🏷 🛨 🧭	w ∎ ±	hindow Help
	Project tree		ccess ASIX AX88178 USB2.0
	Devices		
	1 O O 1		CDS: 0 (Active DDS: 0 (Active
Start	 Project2 Online access USB [S7USB] COM [RS232/PPI multi-master cable] Intel(R) 82579LM Gigabit Network Connection ASIX AX88178 USB2.0 to Gigabit Ethernet Ad Update accessible devices G120_CU240E_2_PN [192.168.0.12] Parameter Commissioning Online & diagnostics PLC_1 [192.168.0.1] CP5611 [PROFIBUS] PC Adapter [MPI] 		 Diagnostics General diagnostics Active messages Message history Control/status words Drive enables Safety diagnostics Functions Assign name Assign IP address Restore factory settings

8.5 Changing the IP and name via Accessible nodes

2. Select "Assign IP address." Enter the IP address and subnet into the window shown and you can assign these to the drive via the "Assign IP" button.

Note

The new IP address for the controller only takes effect after the control unit has been restarted.

 Diagnostics 	Assign IP address			
General diagnostics				
Active messages				
Message history				
Control/status words	MAC address:	00 -18 -18 -00 -3C -02	Accessible devices	
Drive enables				
Safety diagnostics	IP address:	192.168.0.12		
Functions	Subnet mask:	255 . 255 . 255 . 0		
Assign name				
Assign IP address				
Restore factory settings	Router address:	192.168.0.12		
		Accien IR address		
		Assign in address		
	8			
	•			
	1			
1				

8.5 Changing the IP and name via Accessible nodes

3. You can assign a new PROFINET device name to the drive via the "Assign name" function.

 Diagnostics 	Annian name				
General diagnostics	Assign name				
Active messages					
Message history					
Controlistatus words					
Drive enables		PRC	FINET device name:	g120	
Safety diagnostics			Type:	SINAMICS G120	
 Functions 				10	
Assign name					
Assign IP address					
Restore factory settings					
			Only show devices of	the same type	
			Only show devices wi	th bad parameter se	ttings
	1		Only show devices wi	thout names	
	Acc	essible devices in the ne	twork:		
	IP address	MAC address	Туре	Name	Status
			-	Dilashas	tesian asma
				D tasties	Assign name

You will use the assigned IP addresses and names later when configuring the hardware. You will configure these in the next step.

8.6 Inserting devices into the project

Inserting devices

In the TIA Portal you can insert the hardware into the project via the Insert dialog or via the hardware catalog. You will use the hardware catalog in the example. You must create the project and select "Devices & networks" in the project navigator before starting.

M Siemens - sample_02				- 02
Project Edit View Insert Online	Options Tools Window Help		Totally Integrated Automatio	n
🔄 🖸 Save project 📓 🗶 🕅 🚺	(X 句 ± (# 초 법 표 별 별 월 Goostine 월 Gooffine 协 법 명 X ⊟ 표		POR	TAL
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Devices	🛃 Topology view 🛃 Network view 🛐	Device view	Options	E.
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Devices & networks		1	Filter	1
 Common data 			Controllers	- A
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Card Reader/US8 memory			• 📴 Network components	
			Detecting & Monitoring	
			Distributed I/O	1010
			Generatives	
				1
				- 14
				1012
				100
				1
				- 11
				- 1
		2		- 1
	NI CONTRACTOR			- 1
✓ Details view	Network data	1007 Y 12	-	- 1
	Stroperbes Stime C & Dagnostic	5 <u>10.1-0</u>	1	- 1
Name	General () Cross-references Compile			- 1
	I Path Description	Go to 7		- 1
			✓ Information	
			Device'	^
	8		>	~
Portal view Dental view	w dia Devices & ne		Project carcole 02 created	

8.6 Inserting devices into the project

How to insert the devices into the project

1. In the hardware catalog navigate to the entry for the controller being used. This is a CPU 1516-3 PN/DP in the example.

sample_02 → Devices	& networks		_ # = ×	Hardware catalog 📰 🗐	
	📑 Topology view	A Network view	Device view	Options	E
Network L Connection	15 HM_connection 💌 🐺	100%			
			^	✓ Catalog	0.00
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				riter	
				Controllers	ľ
				SIMATIC \$7-1200	
				CPU 1511.4 PN	1
				P CPU 1513-1 PN	1
				- CPU 1516-3 PN/DP	1
				6ES7 516-3AN00-0A80	10
				Im Unspecified CPU 1500	
				Communication modules	1
				SIMATIC \$7-300	ā
				SIMATIC \$7-400	eve a
				SIMATIC ET 200 CPU	
				н 🤄 НМ	
				PC systems	5
				Drives & starters	010
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				Detecting & Monitoring	1
				Distributed NO	
				Field devices	_
			~	Other field devices	
<			> 🔃		- 1
	Network data		1		- 1
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	Subpentes	I stund a la bing			- 1
General 🚺 Cross-re	ferences Compile				
1 Path	Description		Go to ?		
				a bet and a second and	
				 Information 	

2. Drag the controller to the network view using Drag&Drop.

sample_02 + Devices & netw	orks	_ 🖬 🖬 🗙 Ha	rdware catalog	- I - F
	🛃 Topology view 🛛 🛔 Network view	v 🔐 Device view Op	tions	
Network Connections	_connection 💌 👯 🖽 🍳 ± 100%			
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CPU 1516-3 PN/		· · · · · · · · · · · · · · · · · · ·	Controllar	
	2012 C		Controllers	
			- Cal Silveric 57-1200	
			- Cit Chu	
			CPU 1511-1 PN	
			Cro IST6-S PRIDE	
			6557 516-3ANUUR	UNBU
			Unspecified CPU 150	0
			Communication module	es .
			SIMATIC \$7-300	
			SIMATIC \$7-400	
			SIMATIC ET 200 CPU	
		P	а нм	
			PC systems	
			Drives & starters	
			Network components	
			Detecting & Monitoring	
			Distributed I/O	
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	Network data			
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		agreed to a second s		
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			Information	
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Network 11 Conr	nections HM_connect	ion 💌 📰	E @ 100%				1
	Loss of Loss of Loss of Loss			~	× Catalon		
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					Search>	nt m	4
PLC_1			Drive_1		Filter		
CPU 1	1516-3 PNL		G120 CU240E-2		Controllers		
					🕨 🧱 HM		
		1	Not essioned		PC systems		1
					🕶 📑 Drives & starters		
					SIRIUS motor st	arters and soft starters	
					▼ SINAMICS drives		
					SINAMICS G1	20	
					👻 📷 Control ur	nits	
					a CU240	8-2	
				_	4 CU240	8-2 DP	
					40 CU240	E-2	
					40 CU240	E-2 PN	
					40 CU240	E-2 DP	
					40 CU240	E-2 F	
					40 CU240	E-2 PN-F	
					40 CU240	E-2 DP-F	
					SINAMICS G1	20C	
					SINAMICS G1	200	
					SINAMICS G1	20P	
					Network compone	nts	1
				~	🕨 📑 Detecting & Monito	oring	1
(11				> 🐔	Distributed NO		1
		Network date			Field devices		1
			Miles a Dime	La Deserve	Other field devices		
		Properties	Linto 🕡 💆 Diag	nostics			
General (1) Cro	oss-references	Compile					
Bash	Deres	intion		Core 3			
rem	Desch	puon		G0 00 /			
					✓ Information		
							2 H

3. Now insert the drive, a CU240E-2 PN in the example, into the project using Drag&Drop.

4. Select the drive in the "Network view" and switch to the "Device view" tab.

8.6 Inserting devices into the project

author and autor	[G120 CU240E-2 PN]	💶 🖬 🖬 🗙 Hardware catalog 🛛 🗐 🖽
	🛃 Topology view 🛃 Ne	work view Device view Options
Drive_1	💌 🔛 🍕 🗄 🍳 ± 100%	
		^ ✓ Catalog
		<search></search>
		- Gilter
	ae.	
0		* 2 PH240
	ROCK MILLION	1 PH240 IP20 P34 0 400V 0.57kW
		20 PN240 IP20 P34 0 400V 0,35km
		30 PM240 IP20 F54 U 400V 1 15W
		40 PM240 IP20 ESA IL 400V 1 SKW
		an FM240 (F20 F58 A 400V 2 2kW
2		EN240 IP20 FSB U 400V 2.2kW
		PM240 IP20 F58 A 400V 3.0kW
	19	W PM240 IP20 F58 U 400V 3.0kW
		E PM240 IP20 F58 A 400V 4.0kW
		PM240 IP20 FSB U 400V 4,0kW
100		PM240 IP20 FSC A 400V 5,5kW
0 Mai		3 PM240 IP20 FSC U 400V 5.5kW
		PM240 IP20 FSC A 400V 7,5kW
		PM240 IP20 FSC U 400V 7,5kW
		3 PM240 IP20 FSC A 400V 11kW
		40 PM240 IP20 FSC U 400V 11kW
		W PM240 IP20 FSD A 400V 15kW
Ш		> 🗊 🐿 PM240 IP20 FSD U 400V 15kW
	C+1 (+1	PM240 IP20 FSD A 400V 18,5kW
Device overview		10 PM240 IP20 FSD U 400V 18,5kW
W Module	Slot Type Order	no. Firmware MI240 IP20 FSD A 400V 22kW
	in the second se	E PM240 IP20 FSD U 400V 22kW
	S. Properties 3. Info	Diagnostics MILE MARKED STREET
General () Cross-	references Compile	PM240 IP20 FSE U 400V 30kW
		PM240 IP20 FSE A 400V 37kW
Path	Description	Go to ? 4 PM240 IP20 FSE U 400V 37kW

5. Drag the power unit for the device to the free space using Drag&Drop.

 Switch back to the "Network view" and, with the left mouse button pressed, drag a connection from the drive's X1 interface to the controller's X1 interface. A PROFINET IO system is created automatically.



This completes the process for inserting the hardware.

8.7 Adapting the IP and name in the project

IP address and name

The IP addresses in the project and in the target hardware must match for PROFINET communication. You have already checked the IP and the name of the target hardware via Accessible nodes. These must now be entered in the project. Upon download the name in the target hardware is overwritten by the name from the project and does not therefore have to be adapted.

How to display the IP address and name

1. In the "Network view", click the Ethernet port used for the controller. Additional information is displayed in the "Properties" tab of the inspector window.



8.7 Adapting the IP and name in the project

2. Enter the IP address, the subnet mask, and where applicable the name under "Ethernet addresses". You can have the name generated automatically or enter a new one.

	General	IO tags	Texts									
	General Ethernet ad	dresses		Ethernet addresses								
	Time synchr Operating m	neral IO tags Te neral lemet addresses are synchronization erating mode vanced options b server access rdware identifier		Interface networked with								
	Advanced o			Subnet:	PN/IE_1							
	Web server a	access			Add new subnet							
	Hardware id	entifier										
				IP protocol								
					Set IP address in the project							
					IP address: 192 . 168 . 0 . 1							
					Subnet mask: 255 , 255 , 255 , 0							
					Use router							
					Router address: 0 0 0 0							
					Set IP address using a different method							
					See and a set							
			- 1	PROFINET								
					 Set PROFINET device name using a different method. Generate PROFINET device name automatically 							
				PROFINET device name	plc_1.profinet interface_1							
				Converted name:	plcxb1.profinetxainterfacexb1036c							
				Device number:	0 *							

3. Click also on the Ethernet port used for the drive.

Siemens - sample_02		-
ect toit View Insert Online O	ptions Tools Hindow Help X > ± (* ±) = 3; [] [] [] [] [] [] [] [] [] [] [] [] []	Totally Integrated Automation
Project tree	sample_02 + Devices & networks	_@=×
Devices		🛃 Topology view 🛔 Network view 📑 Device view
900	📑 🚰 Network 🖞 Connections Hull_connection 💌 🖏 🖽 🔍 ±	100%
		10 system: PLC_1.PROFINET IO-System (100)
 sample_02 Add name dening 	the second se	
Devices & networks	PLC_1 Drive_1	
• T PLC_1 (CPU 1516 3 PNDP)	CPU 1516-3 PNL. 6120 CU240	02 (B)
Drive_1 [G120 CU240E-2 PN]		BU
Common data Documentation settings		1
Languages & resources	PLC_1.PROPINETIO Syste	
Contine access		
. Card Reader/USB memory		
	3	2
	N	letwork deta
	PROFINET interface (IE1)	Properties Diamostics
	General 10 tans Texts	The Sector
	General	
	Ethernet addresses	
	Cyclic data exchange Interface networked with	
	Advanced options Dissection addresser	
	sucher in sucher in	Add man a share
		- Severe and the severe se
	IP protocol	
D. a. m. d		
Details view	IPaddress: 19	92.168.0.2
Time	Subnet mask: 25	55 255 255 0
INSTRU		
	Fouter address: 0	
	PROFINET	
		Generate PROPINET device name automatically
	PROFINET device name dri	ive_1
	Converted name: dri	ivesb1 afe3
	Device number: 1	 [*]

4. Enter the Ethernet address and where applicable the name.

General Ethernet addresses Cyclic data exchange Advanced options Diagnostics addresses Interface networked with Subnet: PN/IE_1 Add new subnet IP protocol	
Cyclic data exchange Advanced options Diagnostics addresses Interface networked with Subnet: FNilE_1 Add new subnet IP protocol	
Diagnostics addresses Subnet: PN/IE_1 Add new subnet IP protocol	
Add new subnet	
IP protocol	
IP address: 192 . 168 . 0 2	
Subnet mask: 255 . 255 . 255 . 0	
Use router	
Router address: 0 . 0 . 0	
PROFINET	
Generate PROFINET device nam	e automatically
PROFINET device name drive_1	
Converted name: drivexb14fe3	
Device number: 1	

The hardware configuration is complete. You can load the project into the target system following the commissioning.

8.8 Configuring a telegram

8.8 Configuring a telegram

Telegram configuration

A telegram must be configured for the cyclic communication between the drive and the controller. You have already selected a telegram in the wizard during the commissioning of the drive. Telegram 1 was used in the example. You can configure and also change the telegram subsequently.

Proceed as follows:

1. In the parameter view of the drive, you can display and configure the address ranges of the telegram in the "Communications" screen form. This is separated according to receive and send direction. It is recommended that you use the default settings.



 Click the button for the telegram configuration. The cyclic data exchange as well as the telegram configuration for the actual values and setpoints are displayed in the "Properties" tab of the inspector window.

PROFINET interface [IE1]				Reporties	1 Info	1 Diagnostics	
General IO tags	Texts						
General I to tags General Ethermet addresses Ethermet addresses Cyclic date exchange Actual value Setpoint Advanced options Diagnostics addresses	Texts Cyclic data exchange Name Role I ^P address Telegram Slot	Drive_1 Device 192_168_02 Standard telegram 1 2	→	Partner PLC_1 Controller 192 . 168 . 0 . 1 V			
	Start address Length Extension Process image Alarm 08	PZD 1 Image: Comparison of C		16 2 words 0 words Automatic update 40 *			

3. You can also open the telegram configuration from the network or device view. Click the Ethernet port used for the drive in these views. The cyclic data exchange is displayed in the "Properties" tab of the inspector window.

sample_01_V12_SP1 → [Devices &	networks							- 6	
					21	Copology vie	w 占	Network view	Device v	iew
Network R Connections	HMI Verb	indung 🔽 🖳 🖼							1	
· · · · · · · · · · · · · · · · · · ·	1					-	1.10 m	tom: BLC 1 BROEL	NET IO System (1001
							4 10 sys	dem. PEC_1.PROT	inter 10-system (=
1. S.				1000						
Drive G120 <u>PLC</u>	=_1 0 CU240E-2 <u>1</u>	PLC_1.PROF	PLC_1 CPU 1:	513F-1 PN						
										~
<										> 🗉
				Network data						~
PROFINET interface [IE1]					10	Properties		nfo 🚯 🖏 Diag	inostics	
General 10 tags	Toxts	1								
General Ethernet addresses	Te	elegram configuration _								^ =
 Cyclic data exchange 										
Actual value	_	Drive object	Link Tel	egram	Length	Extension		Partner	Partner data area	
Setpoint		Actual value	Sti	indard telegram 1	2 words	0 words	→ CD	PLC_1	169	
Diagnostics addresses		setpoint	5ti	indaro telegram I	2 Words	U words	- 0	PLC_1	Q 69	
		<pre><>dd telegram> </pre>								
		<								>

4. You can change or configure the telegram in the "Cyclic data exchange", "Actual value" and "Setpoint" screen forms.

PROFINET interface [IE1]			Properties	🗓 Info 🔒 🗓 Diagnostics	
General IO tags General	Texts Cyclic data exchange				
Currente audresses (Actual value Setpoint > Advanced options Diagnostics addresses	Name Role IP address Telegram Slot Start address Length Extension	Drive	Partner PLC_1 Controller 192 . 168 . 0 . 1 V		
	Process image Alarm OB		Automatic update 💌		

5. If you want to configure a drive with safety functionality, enter the safety telegram at "Cyclic data exchange".

PROFINET interface [IE1]							Rroperties	s	1 Ir	nfo 追 🗓	Diagnostics	
General IO tags	Texts											
General Ethernet addresses		Telegram configuratio	n									•
 Cyclic data exchange 												
Actual value		Drive object	Link	Telegram		Length	Extension			Partner	Partner data	area
Setpoint		Actual value		Standard telegram 1		2 words	0 words	+	CD	PLC_1	169	
 Advanced options 		Setpoint		Standard telegram 1		2 words	0 words	+	CD	PLC_1	Q 69	
Diagnostics addresses		<add td="" telegrams<=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></add>										
		Add safety telegram	n									
	1											
	- F.											
		<										
		Cyclic data exchange _						_	_			
					0							
			Drive		ranner							
			Name Drive	_1	→ PLC_1		-					
			Role Devi	e	Controller							

Saving and loading into the target system

After the hardware configuration you have completed the online basic commissioning for the drive. The overall project now just needs to be saved, compiled, and loaded into the target system.

VA Pr	Siemens - sample_02 oject Edit View Insert Online Options	Te	ools Wind	low	Help		🧭 Go online
	Project tree	sai	mple_02	• [Devices & I	netwo	rks
	Devices						
10	BOO	58	Network	U (Connections	HMI_c	connection
Devices & networl	 sample_02 Add new device Devices & networks PLC_1 [CPU 1516-3 PN/DP] Drive_1 [G120 CU240E-2 PN] Gommon data Documentation settings Languages & resources 	<		P	PLC_1 PU 1516-3 F	۳N/	
	Gard Reader/USB memory	PR	OFINET in	nterf	face [IE1]		
			General	1	O tags	Texts	5
		E	General Ethernet ad	dres	ses		Ethernet ad

Follow the steps below

1. Save the current project via "Project" > "Save."

2. Compile the current settings to the devices via the shortcut menu.

Open Open in new editor	6	
X Cut	Ctrl+X	
Сору	Ctrl+C	
Paste	Ctrl+V	
X Delete	Del	
Rename	F2	
문 Go to topology view 品 Go to network view		
Compile	•	Hardware and software (only cha
Download to device	•	Hardware (only changes)
ダ Go online	Ctrl+K	Software (only changes)
🖌 Go offline	Ctrl+M	Software (rebuild all blocks)
🖗 Online & diagnostics	Ctrl+D	Software (reset memory reserve)
Compare	•	
Cross-references	F11	
Call structure		
🔝 Assignment list		
🕂 Export module labeling	strips	

 Load the data into the devices after saving. Select "Download to device" > "Hardware and software" in each case in the shortcut menu. For this the TIA Portal Online must be connected with the devices and the relevant online access configured, e.g. USB or PROFINET.

This completes the configuration.

Safety Integrated

9.1 Safety Integrated overview

Safety Integrated

The safety functions integrated in the SINAMICS inverters can be parameterized intuitively using graphic screens with Startdrive that is part of TIA Portal. Most drives of the G120 family are equipped with the "Safe torque off (STO)" drive-autonomous safety function. This function is also available for Standard Control Units (without F suffix). The extended functions make available further safety functions, such as Safe Stop 1 (SS1) and Safely-limited Speed (SLS).

A brief overview of safety configuring in Startdrive follows.

9.2 Activating the safety commissioning mode

Activating the commissioning mode

Safety Integrated can be commissioned offline in the project or online directly on the drive. For the offline commissioning, you must explicitly activate the safety functions after the download. In the example, you perform both an online and an offline commissioning.

How to activate the safety commissioning mode for online commissioning

For the online commissioning, you have already configured the drive and performed a first commissioning.

- 1. Double-click "Parameters" below the drive device in the project navigation. The parameters will be displayed in the working area.
- 2. Switch to the "Function view" tab.
- Connect Startdrive online with the drive (Go online).

9.2 Activating the safety commissioning mode

Activate the commissioning mode of the safety functions by clicking the
 Start safety commissioning "Activate safety commissioning mode" button.

		Wizards Functional View	Parameter View
CDS: 0 (Active) DDS: 0 (Active)	Start safety commissioning		
Basic settings	Activate safety		
Inputs/outputs	Shutdown runctions	Interconnection of the shutdown functions	
Setpoint channel			
Operating mode	1998 1997 C 11 1 1 1997		
 Drive functions 	Brake control	Setting of the various brake types	
Shutdown functions			
Brake control	Safaty Integrated	Setting of the safety functions	
Safety Integrated	Sarety integrated	Setting of the safety functions	
Vdc controller			
Automatic restart		Closed-loop control of the DC link voltage	
Flying restart			
Messages/monitors			
Application functions	Automatic restart	Automatic restart after power failure or other faults	
Communication			
Interconnections	Flying restart	Flying restart provides the capability of switching a converter on a motor that is still turning	
	Messages/monitors	Monitoring of process variables and specification of the reactions to overshoot/undershoot	

5. The safety functions are protected against unauthorized changes by a password. Enter a new password and confirm the dialog. Only with this password can the safety parameterization be re-edited.

		Wizards	Functional View
CDS: 0 (Active) DDS: 0 (Active)	🔀 Start safety commissioning		
Basic settings			
Inputs/outputs	Shutdown functions	Interconnection of the shutdown functions	
 Setpoint channel 			
Operating mode			
 Drive functions 	Brake control	Setting of the various brake types	
Shutdown functions			
Brake control	S Enter password		X
Safety Integrated	Si Enter password		
Vdc controller	Drive 1 [CU240E-2	PN	
Automatic restart	V		
Flying restart			
Messages/monitors	Enter the current passoword	d:	
Application functions	A		ults
Communication			
Interconnections	Enter the new password:		
	Peneatyour entry		y a
	Repeat your entry.		
	M	OK Canad	n of the
		OK Cancel	

The safety commissioning can now be performed. In the next step, select the safety functionality.

9.3 Selecting the safety functionality in the Startdrive

Safety functionality

To edit the safety functions, you must first select the appropriate safety functionality.

- 1. Click "Select safety functionality" below "Drive functions" > "Safety Integrated" in the "Function view" tab.
- 2. In the opened window, you can choose between "Basic functions" and "Extended functions" depending on the type of the drive device.

Basic settings	Soloction of the safety functionality				
Inputs/outputs					
Setpoint channel					
Operating mode	No. of the American				
 Drive functions 	No safety function				
Shutdown functions	Basic functions				
Brake control	Extended functions				
 Safety Integrated 					
Selection of the safety functionality					

Figure 9-1 Selecting the safety functionality

3. After selecting the safety functionality, the possible safety functions are displayed in the secondary navigation and in the project window where they can be configured.

9.3 Selecting the safety functionality in the Startdrive

4. This is the STO (Safe Torque Off) safety function for the basic functions.

Basic settings	Coloction of the sofety functionality	
Inputs/outputs	Selection of the safety functionality	
Setpoint channel		
• Operating mode		
Drive functions	Basic functions	
Shutdown functions		
Brake control	Basic functions contain the safety function STO	
 Safety Integrated 		
Selection of the safety functionality	Control type /	
 Functions 	safety functions	
Control type / safety functions		
STO	Test ston	
Test stop	(cstatop	
F-DI/F-DO/PROFIsafe		
Vdc controller	F-DI/E-DO/PROFisafe	
Automatic restart		
Flying restart		
Messages/monitors		

Figure 9-2 Safety functionality basic functions

5. The extended functions also contain the Safe Stop 1 (SS1), Safely-limited Speed (SLS), Safe Direction (SDI) and Safe Speed Monitor (SSM) safety functions.

Basic settings	Soloction of the safety functionality
Inputs/outputs	
Setpoint channel	
Operating mode	
 Drive functions 	
Shutdown functions	
Brake control	Extended functions contain the safety functions STO, SS1, SLS, SDI and SSM.
 Safety Integrated 	
Selection of the safety functionality	Actual value acquisition
Actual value acquisition	Actual value acquisition
 Functions 	
Control type / safety functions	Control type /
STO	safety functions
SS1	
SLS	Test cton
SDI	icst stop
SSM	
Test stop	E-DI/E-DO/PROFILe fe
F-DI/F-DO/PROFIsafe	4
Acceptance	
Vdc controller	Accentance
Automatic restart	/ ccepture
Flying restart	

Figure 9-3 Safety functionality extended functions

The following example illustrates the commissioning of a safety function of the basic functions and one of the extended functions.

9.4 Commissioning the basic functions

9.4.1 Commissioning the Safety Integrated basic functions

Basic functions

Based on the example of a G120 CU240E-2 PN-F, commission the Safe Torque Off (STO) by means of terminals. A drive device with active STO function prevents the inadvertent starting of machine components. The safety commissioning is performed online.

Note

Prior to the safety commissioning, the drive device must be connected online with the Startdrive and the safety commissioning mode activated.

9.4.2 Commissioning basic functions with STO

STO commissioning

As first step, activate the safety functionality and then configure the Safe Torque Off (STO) safety function. The safety commissioning is performed online directly on the drive.

- 1. Select the "Basic functions" safety functionality in the "Function view" tab.
- 2. To configure the basic functions, you can display the individual screens directly via the buttons or the secondary navigation.

Note

For a structured commissioning, you should process the screens via the secondary navigation sequentially from top to bottom.

3. Click "Control type / safety functions" in the secondary navigation.

9.4 Commissioning the basic functions

4. In the opened screen, select "Via terminals" as control type.

Basic settings	
Inputs/outputs	Control type / safety functions
Setpoint channel	
Operating mode	Control type:
 Drive functions 	
Shutdown functions	 via terminals
Brake control	🔘 via PROFIsafe
 Safety Integrated 	 via terminals and PROFIsafe
Selection of the safety functionality	
 Functions 	Safety functions:
Control type / safety functions	STO
STO	
Test stop	
F-DI/F-DO/PROFIsafe	<u>, 1</u>
Vdc controller	
Automatic restart	

Figure 9-4 Selecting via terminals control type

5. Click "STO" in the secondary navigation. Because the Control Unit input is permanently wired with the emergency stop, you do not need to make any further settings. If, for example, you want to interconnect the emergency stop with a signal lamp, you can use the "STO active" output.

Basic settings	STO
Inputs/outputs	310
Setpoint channel	
Operating mode	
 Drive functions 	
Shutdown functions	
Brake control	STO active "STO active" output
 Safety Integrated 	
Selection of the safety functionality	STOP A
 Functions 	
Control type / safety functions	
STO	
Test stop	

Figure 9-5 Configuring the STO basic function

This completes the configuration of STO. In the next step, configure the test stop.

9.4.3 Configuring test stop

Test stop

The test stop of the basic functions is a self-test of the inverter in order to test the circuits for the safe torque off. The test stop is restarted after each selection of the STO function and after the connection of the supply voltage (switch on). A time block monitors whether the test stop is performed regularly.

- 1. Click "Test stop" in the secondary navigation.
- 2. In the opened screen, enter the duration of the time interval in which the test stop must be performed.

Figure 9-6 Configuring the test stop basic functions

3. You can specify the time interval. The permitted maximum value is 8760 hours (one year) that is normally determined with a risk analysis. Eight hours are entered as default setting. Alarm A1699 (test stop required) is issued when the time interval expires.

Note

The remaining time until the occurrence of the alarm A1699 is also displayed in the screen. This timer is reset for each test stop to the previously configured value.

You have now configured the test stop of the basic functions.

9.4 Commissioning the basic functions

9.4.4 Configuring the discrepancy time and the filter time

Discrepancy/filter time

If Safety Integrated is active, the inverter checks whether the signals at both inputs always have the same signal state. Because of the technical characteristics of the sensors, brief discrepancies or signal changes between the two input signals that are not safety relevant can occur. A fail-safe logic with safe outputs connected with the SINAMICS G120 can also be used for the activation. Some such fail-safe outputs provide test pulses that can be suppressed by the filter. The discrepancy or filter time can be used to prevent a faulty initiation or discrepancy error because of transient different signal levels of the safety function.

- 1. Click "F-DI/F-DO/PROFIsafe" in the secondary navigation.
- You can set the discrepancy time and the input filter time in the displayed screen. Adapt these values to the connected sensors and to the duration of the test pulses for the deployed fail-safe outputs.

F-DI/F-DO/PROFIsafe				
F-DI configuration:				
F-DI discrepancy time	F-DI input filter 1.00 ms			

Figure 9-7 Configuring the discrepancy time and filter time basic functions

The safety commissioning is completed in the next step.
9.4.5 Completing the safety commissioning

Safety commissioning completion

To complete the commissioning, the safety parameterization must be copied to the ROM of the drive and into the project.

- 1. Click the 🔀 End safety commissioning button to exit the safety commissioning mode.
- Click "Yes" to confirm the opened dialog. The drive parameters are copied from RAM to ROM.

Activate settings	×
For the changes to the safety parameterization to take effect, they must be saved in the drive (Copy RAM to ROM), and the system restarted. An acceptance test is also required. Do you want to save the parameters to the ROM now?	
Yes No	

Figure 9-8 Safety commissioning: Copy RAM to ROM

- 3. Close the online connection to the drive device.
- 4. Click the "Load from device (software)" button in the toolbar to save the safety parameterization in the Startdrive project.
- 5. Switch the drive device Off and On so that the safety commissioning in the drive device acts.

This completes the safety commissioning.

9.5 Commissioning extended functions

9.5.1 Commissioning Safety Integrated extended functions

Extended functions



Based on the example of a G120 CU240E-2 PN-F drive device and a higher-level SIMATIC S7-1500 CPU 1516F-3 PN/DP controller, commission the Safely-limited Speed (SLS) safety function by means of PROFIsafe.

You have already included the controller and the drive device, and configured the communication in the project. The safety commissioning is performed offline in the Startdrive, and after the download safety is activated in the drive device.

9.5.2 Configuring SLS

Safety function and actual value acquisition

As first step, activate the safety functionality and then configure the actual value acquisition.

- 1. Select the "Extended functions" safety functionality in the "Function view" tab.
- 2. To configure the extended functions, you can display the individual screens directly via the buttons or the secondary navigation.

Note

For a structured commissioning, you should process the screens via the secondary navigation sequentially from top to bottom.

- 3. Click "Actual value acquisition" in the secondary navigation.
- 4. For safety functions without encoders, the pole pair number of the motor is included in the conversion from the motor side to the load side. You must first configure them.

Basic settings	Actual value acquisition
Inputs/outputs	
Setpoint channel	
Operating mode	Configuration of the actual value acquisition
 Drive functions 	Safety without encoder
Shutdown functions	
Brake control	
 Safety Integrated 	
Selection of the safety functionality	
Actual value acquisition	
 Functions 	
Control type / safety functions	
STO	
SS1	
SLS	

Figure 9-9 Actual value acquisition extended functions

5. Click the "Actual value acquisition configuration" button.



6. The pole pair number of the motor is displayed grayed-out in the opened dialog. This value must be considered for the input of the gear ratio. No mechanical gearbox is used in the example. Consequently, the gear ratio consists only of the pole number (2 in the example).

Actual value tolerance:	12.0000 °			
Gear ratio:				
	Number of load revolutions	Number of motor revolutions x pole pair number		
Gear stage 1	1	2		
Motor pole pair number:	2			
Delay and filter time:				
Pulse enable				
Ļ	Act. val. acquis. delay time		Actual value acqui	
°-0	1	<u> </u>	filter time 0 rpm	Velocity
	0 t 100.00 ms	0-0		monitoring
Actual speed value	et val accuia accuidas		25.00 ms	
v	alid actual value	-0'		
olerances and minim	um current:			
Fault tolerance:	-1	Minimum current act. val. acquisition:	10.00 %	
Velocity	0 rpm			
tolerance:				

Figure 9-10 Actual value acquisition pole pair number configuration extended functions

7. Click "OK" to confirm.

This completes the configuration of the actual value acquisition. In the next step, configure the safety function.

9.5.3 Configuring the control type and the SLS

Configuring the control type and the SLS

Now configure the control type and the SLS safety function.

- 1. Click "Control type / safety functions" below "Functions" in the secondary navigation.
- Select "via PROFIsafe" as control type. Insert the PROFIsafe telegram later during the safety commissioning.

Safety Integrated

9.5 Commissioning extended functions

 You must enable the associated SLS safety function. Select "Enable" in the selection list in front of the required safety function. The other safety functions also enabled but not deployed are deactivated later in the safety program.



Figure 9-11 Extended functions: Enable PROFIsafe control type and safety function

4. Click "SLS" in the secondary navigation.

- 5. Select the monitoring mode. In the example, safety without encoder with a braking ramp ("with SBR" in the example) is selected.
- 6. For SLS via PROFIsafe, you can select as many as four monitoring levels. Only level 1 is used in the example. Enter a value for the maximum speed (500 rpm in the example) and the "stop response" when the monitoring is triggered (STOP A in the example). Leave the other parameters at their standard values.



Figure 9-12 Extended functions: Configure SLS

This completes the configuration of SLS. In the next step, configure the test stop.

9.5.4 Configuring a test stop (forced checking procedure)

Test stop

The test stop (forced checking procedure) of the extended functions is a self test of the inverter that tests its circuits for monitoring the speed and for the safe torque shutdown. A time block monitors whether the test stop is performed regularly. The test stop is started with a freely selected signal.

- 1. Click "Test stop" in the secondary navigation.
- In the opened screen, use "Test stop selection" to interconnect a signal or a bit of a control word in order to start the test stop. In the example, digital input DI1 (r722.1) is interconnected.
- 3. You can specify the time interval. The permitted maximum value is 8760 hours (one year) that is normally determined with a risk analysis. Eight hours are entered as default setting. Alarm A1699 (test stop required) is issued when the time interval expires.

Note

The test stop of the extended functions includes the test of the basic functions (STO). Consequently, you should set the two timers to the same value.



Figure 9-13 Extended functions: Configure test stop

Leave the other parameters at their default settings. You have now configured the test stop of the extended functions.

9.5.5 Configuring PROFIsafe

PROFIsafe

In the example, Safety Integrated via PROFIsafe is configured. For the fail-safe communication between the controller and the drive, a PROFIsafe telegram must be added and the PROFIsafe address entered.

- 1. Click "F-DI/F-DO/PROFIsafe" in the secondary navigation.
- The PROFIsafe address of the drive is displayed in the opened screen (0x5 in the example). You can change it offline. The PROFIsafe address corresponds to the F address (F_Dest_Add).

Note

The PROFIsafe address can be changed in this screen only as of SINAMICS V4.7 or Startdrive V13 SP1. To change the PROFIsafe address for earlier versions, use the telegram configuration (F address) in the details display.

- 3. Click the "Telegram configuration" button to open the telegram configuration in the details view. "Cyclic data exchange" is displayed in the "Properties" tab in the details view footer.
- 4. Click <Add telegram> below the actual value and the setpoint in the table, and select "Add safety telegram" in the opened context menu.



Figure 9-14 Configuring a PROFIsafe telegram

5. The PROFIsafe telegram 30 is added.

PROFisafe Telegramm 30	6 bytes	0 bytes	→ F-C	D PLC 1	10 E
PROFicate Talagramm 20					105
rkorisale lelegramm 50	6 bytes	0 bytes	← F-C	D PLC_1	Q 05
Standard Telegramm 1	2 words	0 words	→ CE	PLC_1	1710
Standard Telegramm 1	2 words	0 words	+ C	PLC_1	Q 710
	Standard Telegramm 1 Standard Telegramm 1	Standard Telegramm 1 2 words Standard Telegramm 1 2 words	Standard Telegramm 1 2 words 0 words Standard Telegramm 1 2 words 0 words	Standard Telegramm 1 2 words 0 words → CD Standard Telegramm 1 2 words 0 words ← CD	Standard Telegramm 1 2 words 0 words → CD PLC_1 Standard Telegramm 1 2 words 0 words ← CD PLC_1

Figure 9-15 PROFIsafe telegram 30

6. Also check the "F address" in the "Safety setpoints" and "Safety actual values" fields in the same screen. It is used for the safety configuring and corresponds to the PROFIsafe address for the safety commissioning. Address 0x5 is used in the example.

>	Safety actual values				
		Drive		Partner	
	Name	SINAMICS	→	PLC_1	•
	Role	Device		Controller	
	IP address	192.168.0.2		192.168.0.1	
	Telegram	PROFIsafe Telegramm 30			-
	F-address	5		1	
	Slot	2			
	Start address	PZD 1	*	11	
	Length	6	bytes	6	bytes
	Extension	0	bytes	0	bytes
	F-1/O DB number	F-I/O DB manual number assignmen	ıt		
>	Safety setpoints	F00001_Safety_setpoints_Safety_]
		Drive		Partner	
	Name	SINAMICS	→	PLC_1	•
	Role	Device		Controller	
	IP address	192.168.0.2		192.168.0.1	
	Telegram	PROFIsafe Telegramm 30			
	E-address	5		1	•
	T dddress				
	Slot	2			
	Slot Start address	2 PZD 1		Q 1	
	Slot Start address Length	2 PZD 1 6	bytes	Q 1 6	bytes

Figure 9-16 Configuring the PROFIsafe address (F address)

The PROFIsafe telegram is now configured. The safety commissioning is completed in the next step.

9.5.6 Completing the safety commissioning

Activating safety

To complete the commissioning, the safety parameterization must be loaded into the drive device and activated.

- 1. Save the project and select "Load to device" in the context menu of the drive device.
- 2. Connect Startdrive online to the drive unit (So online).
- 3. Activate the commissioning mode of the safety functions.
- 4. A password protects the safety functions against unauthorized changes. Enter a new password and confirm the dialog.

DDS: 0 (Active) CDS: 0 (Active)	🔀 End s	safety commissioning
 Basic settings 	~	A potion of the sofety functionality
Data sets		
Units		
Reference variables		Enter password X
I/O configuration		
Inputs/outputs		
Setpoint channel		
Operating mode		Enter the current passoword:
 Drive functions 		(Default password: 0)
Shutdown functions		
Brake control	=	Enter the new parsured:
 Safety Integrated 		
Selection of the safety functionality	•	Repeat your entry:
Actual value acquisition		
Functions		
Test stop		OK Cancel
F-DI/F-DO/PROFIsafe		
Acceptance		
Vdc controller		
Automatic restart		

Figure 9-17 Activating Safety Integrated in the drive

- 5. Click the 🔀 End safety commissioning button to exit the safety commissioning mode.
- 6. Click "Yes" to confirm the opened dialog. The drive parameters are copied from RAM to ROM.
- 7. Close the online connection to the drive device.
- 8. Click "Load from device (software)" in the context menu of the drive device in the project navigation to save the safety parameterization in the Startdrive project.
- 9. Switch the drive device Off and On so that the safety commissioning in the drive device acts.

This completes the safety commissioning.

9.5.7 Safety program and F-runtime group

Security program

To use the safety functions of the SINAMICS drive device in conjunction with an F-CPU, you must create the safety programs. For each F-peripheral of the SIMATIC S7-1500F CPU, an F-block with the associated instance DB and an F-runtime group are created automatically during the configuring so that you can begin immediately with programming the safety program.

To display the F-runtime group, proceed as follows:

1. Click "Safety Administration" below the SIMATIC CPU in the project navigation. In the working area, you can use the secondary navigation to access the individual functions of the Safety Administration.



Figure 9-18 Safety Administration for SIMATIC CPU

 Click "F-runtime group" to display the automatically created F-blocks. The F-peripheral DB contains tags that you can evaluate in the safety program. The F-runtime group consists of an F-OB that calls the main safety block in which the safety functions are programmed.

This example does not require any change to be made to the F-runtime group.

General	Add F-runtime group
F-runtime group F-runtime group 1 [RTG1] F-blocks	An F-runtime group consists of an F-OB (cycle OB or cyclic interrupt OB) that calls a main safety block (FB or FC). Additional user-specific safety functions must then be called from this main safety block. More
F-compliant PLC data types Protection	Add new F-runtime group
Settings	F-runtime group 1 [RTG1]
	Fail-safe organization block Main safety block
	Name FOB_1 Calls Main_Safety [FB1]
•	Number 123 ↓ Cycle time 100000 µs Phase shift 0 µs
	Priority 12 Main_Safety_DB [DB1]
	F-runtime group parameters
	Warn cycle time of the F-runtime group 120000 µs
	Maximum cycle time of the F-runtime group 120000 µs
	DB for F-runtime group communication (None)
	F-runtime group information DB RTG1SysInfo
	Delete F-runtime group

Figure 9-19 F-runtime group for safety programs

In the next step, program the main safety block.

9.5.8 Programming the main safety block

Main safety block

In the main safety block, the F-peripheral is acknowledged and re-integrated concurrently in the F-runtime group. The superfluous safety functions are deselected and the deployed safety functions are selected. In the example, the main safety block is programmed in F-FUP.

Note

Further information about the general programming and about the F-peripheral is contained in the online help of the TIA Portal.

- 1. Create in the project navigation under "PLC tags" a new tag table with the following tags:
 - STO (%Q1.0)
 - SS1 (%Q1.1)
 - SLS (%Q1.4)
 - ACK (%Q1.7)

Devices				- I	Tags 🗉 Us	er constan	ts 🔎	System	constants
1 O O 1	1	¢ 🛒	🖻 🎌 🗰						
		Defa	ult tag table	e					
👻 🔄 ProjSafeT	-		Name	Data type	Address	Retain	Visibl	Acces	Comment
📑 Add new device	1		STO	Bool	%Q1.0				
Devices & networks	2		SS1	Bool	%Q1.1				
PLC_1 [CPU 1516F-3 PN/DP]	3		SLS	Bool	%Q1.4				
Transformation	4		ACK	Bool	%Q1.7				
😼 Online & diagnostics	5		<add new=""></add>				\checkmark	 Image: A start of the start of	
Safety Administration									
🕨 🚘 Program blocks									
🕨 🙀 Technology objects									
🕨 🔚 External source files		1							
🕶 🚂 PLC tags									
lange Show all tags									
📑 Add new tag table									
Default tag table [60]									

Figure 9-20 Creating tags for the safety program

Note

The addresses of the tags result from the PROFIsafe control word and are used for the selection or deselection of the safety functions. To improve clarity, the tag names correspond to the name of the safety function.

							Contr	ol wor	d						
			Byte	e 1							Byt	e 0			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
		SDI	SDI		SLS-	-Limit		ACK			SLS			SS1	STO
		nog.	1 poo.		00.0	otion	Statu	is word	k						
			Byte	e 1						22	Byt	e 0	377		471)
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status	1	SDI	SDI		active	SLS-	2	Int.			SLS			SS1	Power
SSM		neg.	pos.		Lir	mit		event			active	-		active	removed

Figure 9-21 PROFIsafe control word 1

 Click "Main_Safety [FB1]" below the "Program blocks" of the project navigation. The program block opens in the editor.

 Click the "ACK_GL" block below the "Safety functions" in the "Basic instructions" instruction window and drag-and-drop it to the program editor. A positive edge must be present as user acknowledgment at the block input.

	Ma	ain_Safety				>	Favorites		
		Name	Data type	Default value	1	~	Basic instructions		
5		Static			^	Na	me	Description	Version
6		I ▶ Temp			~	•	General		
and the	<			>			Bit logic operations		
					<u> </u>	-	Safety functions		V1.4
4	•	>=1 1?? -1 -ol ->	-[=]				ESTOP1	Emergency STOP up to	V1.2
	Blo	ock title:			~		TWO_H_EN	Two-hand monitoring	V1.1
	5.0				-		🖶 MUT_P	Parallel muting	V1.2
•		Network 1: Reintegration			=		🖶 EV1oo2DI	1002 evaluation with d	V1.1
	C	Comment					EDBACK	Feedback monitoring	V1.2
							SFDOOR	Safety door monitoring	V1.1
			%DB2				ACK_GL	Global acknowledgme	V1.1
			"ACK_GL_DB"			•	Timer operations		V1.4
			ACK_GL			•	+1 Counter operations		V1.4
		— EN					Comparator operations		
		"Data block				•	1 Math functions		
		1".F_				•	Move operations		
		Acknowledge — ACK_GLOB	EN	o —		•	Conversion operations		V1.4
							Program control operati		

Figure 9-22 ACK_GL block: Global acknowledgment of all F-peripherals

4. Insert a new network. All safety functions other than SLS with a fail-safe "High" signal are deselected in this network. To do this, create a new static tag vke1 of the "Bool" type with default value "true" in the block parameters table.

	Ma	in_	Safety							
		Na	ime	Data type	Default	Retain	Accessible	Visible in	Setpoint	Comm
5		•	Static			-				^
6			vke1	Bool	true	Non-retain				
7		۲	Temp							
8		•	Constant							~

Figure 9-23 Creating a static vke1 tag for the high signal

 Assignments of the vke1 "High" signal at the Q1.0 and Q1.1 outputs deselect the STO and SS1 safety functions.



Figure 9-24 Deselecting safety functions with logical "high"

6. In a new network, the SLS safety function is deselected with "high" at the Q1.4 output, otherwise the function remains active.

•	Network 3: SL	.s
	Comment	
		%Q1.4
		"SLS"
		=
	"Data_block_ 1".Selection_ of_SLS_	_

Figure 9-25 Selecting/deselecting the SLS safety function

7. To reliably acknowledge the SINAMICS safety fault, the Reset pushbutton is interconnected with the acknowledge bit (Q1.7) from the PROFIsafe control word.



Figure 9-26 Acknowledging safety faults with the Reset pushbutton

8. Mark the CPU in the project navigation and click on "Compile" and then save the project.

The programming is complete after a fault-free compilation. It only remains to load the project to the target system.

9.6 Acceptance of the safety functions

Acceptance test



The acceptance test of the drive device is part of the acceptance test of the complete machine or system. The acceptance test checks whether the drive-integrated safety functions are set to match the configured safety function of the machine. The results of the acceptance test and the settings of the drive-integrated safety functions must be documented.

The safety commissioning and programming are completed after performing and documenting the acceptance.

Note

A detailed description of the acceptance test and the documentation scope is contained in the *SINAMICS G120 Safety Integrated* Function Manual.

Because the acceptance documentation is not generated automatically in the Startdrive, use the tabular overview of the acceptance logs contained in the Function Manual appendix.

Safety Integrated

9.6 Acceptance of the safety functions

10

Diagnostics

10.1 Diagnostics overview

Diagnostics



The TIA Portal with integrated Startdrive offers a range of diagnostic options. You can identify the drive and have the most important information displayed via general diagnostics. In the event of an error you receive support in the form of proposed solutions for any faults and warnings displayed. For targeted diagnostics you can record signal sequences with the trace and analyze these.

You will find a brief overview of diagnostic options below.

10.2 Drive diagnostic options

10.2 Drive diagnostic options

Diagnostic options

A series of diagnostic options are available to you in online mode.

How to display the diagnostics

1. Connect the TIA Portal Online with the drive unit. This is a PN connection in the example.

Go online								
	Configured access no	des of "Drive_1"						
	Device	Device type	Slot	Туре	Address		Subnet	
	Drive_1			S7USB	-			
		CU240E-2 PN	0 X1	PN/IE	192.168.	0.12	PN/IE_1	
	¢			in				>
		Тур	e of the	PG/PC interface	e: 🛃 PN/IE		-]
				PG/PC interface	e: 🔛 ASIX /	AX88178 US82.	0 to 🔻) 🖲 🖪
			Conne	ection to subne	t; PN/IE_1		-) 🐨
				1st gatewa	y:) 🕐
	Device	Device type	Туре		Address	Target d	levice	
	Device G120 CU240E 2 RN	Device type	Туре		Address	Target d	levice	
Flash LED								
							Bef	esh
Online status information	on:							18 2
A connection to the	e device with address 192	.168.0.12 could be est	ablishe	d.				^
Scan completed. 1	compatible devices of 1 a	accessible devices fou	nd.					
ry setrieving device in	mormation							~
						Go <u>o</u> nline	Se	ncel

2. Unique icons for the diagnostic status are displayed in the TIA Portal. These can be found e.g. in the project navigator, in the "Diagnostics" tab or "Info" tab in the inspector window, or directly in the network view.

Má Siemens - Project2				_ ¤ ×
Project Edit View Insert Online Options Tools W	ndow Help		Tota	Ily Integrated Automation
📑 📴 🖬 Save project 📇 🐰 注目 🗊 🗙 ちょつき C# さ	🎧 🔁 🖸 🖺 📮 🖉 Go online 🖉 Go offline 🏠 🖪 🖪	× 🗆 🗉		PORTAL
Project tree	Project2 + Devices & networks			_ # = × <
Devices			🛃 Topology view 🛛 🛔 Networ	k view 📑 Device view 💷
B00 B	💦 Network 🚹 Connections HM_connection 💌 👯			E Har
**			# 10 system: PLC	1.PROFINET IO-System (100)
• Project2 0				= 0
Add new device	PLC_1 Drive 1			
PLC_1 [CPU 1516-3 PN/DP]	G120 CU240E-2			g
- 🙀 Drive_1 [G120 CU240E-2 PN]				
Device configuration	PLC_1			<u>v</u>
2' Parameter	PLC 1.PROFINET IO-System	<u>n</u>		
Conline & diagnostics				net
Traces				00
Common data				
Construction settings				
Canguages a resources				Tas
Card Reader/USB memory				is a second s
				bra
	21 m			- is
	2	Network data	100	
			Properties Info 🚺	Diagnostics
	Device information Connection information A	larm display		
	1Devices with problems			
Reference projects	min ' Opera Device/module Message	Details Help		
	Maintenance required	For more becalled information, refer to mod?		
Screenshots_DriveLib				
✓ Details view				
Name				
Portal view 🗄 Overview 🔥 Devices	& ne 18 Commissioni		Connected to	Drive 1, address IP=192

10.2 Drive diagnostic options

3. You can open more detailed explanations for the icons via online help.

	available icons and their respective meaning.
Icon	Meaning
	The connection with a CPU is currently being established.
a a	The CPU is not reachable at the set address.
2	The configured CPU and the CPU actually present are of incompatible types.
• - 2	On establishment of the online connection to a protected CPU, the password dia
~	No fault
φ.	Maintenance required
2	Maintenance demanded
Ϋ́.	Error
0	The module or device is deactivated.
la la	The module or the device cannot be reached from the CPU (valid for modules a
0:	Diagnostics data are not available because the current online configuration data

4. Double-click "Online & diagnostics" below the drive. You can have the general diagnostics, active messages, or the message history displayed in the window shown.



5. "Active messages" displays, e.g. all faults and warnings in tabular form.

ctiv	/e messages			
🛷 Fau	ults			
	Fault buffer	Fault code	Message	
1	Fault 1	7011	Drive: Motor overtemperature (0)	
2				
3				
4				
5				
6				
7				
8				
Ala	rms			
	Alarm buffer	Alarm code	Message	
1	Alarm 1	8526	PROFINET: No cyclic connection	
2				
З				
4				
5				

6. Pending alarms are displayed in the message display. Click the question mark for the error to display the online help correction options.



10.2 Drive diagnostic options

7. For drives with a higher-level controller, the drive alarms are shown directly on the drive unit and as group faults on the controller.

						🔍 Prope	rties	Lighto 🚺 🖞 Diagnostics
F	Device information	Connection in	nformation Al	arm di	splay			
	□ 3 3 4 B							
	Source	Date	Time	St	Event text	Info text	Help	
	g120cpn	9/19/2013	12:13:50:735 PM	1	F07011, Drive: Motor overtemperature (0)		?	
	S7-1500 station_1⇒PLC_1	2/4/2012	2:43:48:094 AM	I	Fault: Motor overload - \$7-1500 station_1 > Component: PROFINETIO-System / SINAMICS G_1 / g120cpn.Module Access Point > Path: 100 / 1 / 1.1 HW_ID= 265	Short name: IDevice Order number:		

8. The selected alarms can be acknowledged using the ♀ button after the fault has been resolved.

					🖳 Prope	rties	🗓 Info 🤢 🗓 Diagnostics
Device information	Connection in	formation A	larm dis	play			
Source	Date Time		St	Event text	Info text	Help	
g120 Acknowledge	9/19/2013	12:15:37:969 PM	10	F07011, Drive: Motor overtemperature (0)		?	
S7-00 station_1-PLC_1	2/4/2012	2:43:48:094 AM	1	Fault: Motor overload - 57-1500 station_1 - Component: PROFINET IO-System / SINAMICS G_1 / g120cpn.Module Access Point - Path: 100 / 1 / 1.1 HW_ID= 265	Short name: IDevice Order number:		

9. After updating, acknowledged alarms are no longer shown in the alarm display.

Device information	Connection	information	Alarm display			
Source	Date	Time	St Event text	Info text	Help	

Diagnostics with trace

You can record signal sequences from drive parameters with the trace. Using a SINAMICS drive as an example, you will configure a trace recording that is started with a pretrigger when an error occurs. Startdrive is connected online to the drive unit.

How to work with the trace

1. Double-click "Add new trace" below "Traces". A new trace is created in the project tree. You can click it to rename it.

VA	Siemens - D:\Startdrive\Startdrive G120\p	rojekte\Projekt5\Projekt5	
Pr	oject Edit View Insert Online Optio 🖥 🎦 🔒 Save project ا 💥 🗐 🏹	ns Tools Window Help うさでき 🗟 🛄 🏠 🖳 🙀 🖉 Go onlin	e 🔊 G
	Project tree	□	CU 240
	Devices		
	B 0 0		
	🔻 🛅 Projekt5	Control panel	
벌	📫 Add new device		
St	🛗 Devices & networks		
	PLC_1 [CPU 1516-3 PN/DP]		
	Drive_1 [G120 CU240E-2 PN]	Master control:	
	Device configuration	🕷 Activate 📲	Deacti
	😭 Parameter		
	👫 Commissioning		
	😨 Online & diagnostics	Modify:	
	🔻 🔀 Traces	Speed: 0	
	🗳 Add new trace	speed.	
	🕨 📴 Measurements		
	Drive_2 [G120 CU240E-2 PN]	ju j	
	🕨 🙀 Common data	Drive status:	
	Documentation settings	E. Drive status.	

2. Double-click the new trace in the project tree. The trace configuration is displayed in the working area. The trace configuration can be created offline or online. However, the signals can only be recorded online.

					Diagram
	₫				E
onfouration	П				
Signals	Signals				
Recording conditions					
	Name	Address	Data type	Comment	
	1 📲				
	Recording conditions				
		r: Start recording immediately	-		
	•	A			
		1.274			
	Cycle	2: 0.5 🔷 (min.	0.5 ms)		
	Duration (a): 1000 🗢 (max.	16383.5 ms)	Duration = max. duration	
			Q Prop	erties 🛛 🚺 Info 🚺 🗓 Diagr	nostics
evice information	Connection information Alarn	n display			



- Configuration 🔀 Diagram 획 : 1 응 역 역 영 : 3 3 Configuration ^ Signals Signals = Recording conditions Name Address Data type Comment 1 Constant Speed actual value, Unsmoothed 2 Constant Motor temperature r63[0] FLOAT Recording conditions -Trigger: Start recording immediately (min. 0.5 ms) Cycle: 0.5 Duration (a): 1000 (max. 4095.5 ms) Duration = max. duration **Q** Properties 🗓 Info 🤢 🗓 Diagnostics Device information Connection information Alarm display 💷 🖂 🥪 🖧 🔡 🔝 🔝
- 3. Select the signals for the trace recording.

4. Configure the trace, e.g. trigger and recording conditions. In the example the trigger is set when an error occurs.

								Configuration	🔚 Diagram
🍕 🛃 📽 🗣 🧏 😤 🛃	Z								
Transfer trace configuration	to de	avica							
- Comparation	10 04	Signa	ls						^
Signals Recording conditions		5							
Recording conditions				Name	Address	Data tuna	Comment		
		1	-	Speed actual value, Unsmoothed	r63[0]	FLOAT	comment		
		2	-	Motor temperature	r35	FLOAT			
		3							
		Recor	ding	conditions					
	-			Trigger: Trigger on error		-			
	•			↑	a				
					2				
						· · · · ·			
				Cycle: 0.5	(min. (0.5 ms)			
				Duration (a): 2000	(max.	2047.5 ms)	Duration :	= max. duration	
				Pretrigger (b): 500.0	🗢 ms				
									*
						Q Prop	erties 11	nfo 追 🛿 Diagnost	ics 🗖 🗖 🗖
Device information	onn	ection	info	mation Alarm display			1.00		
		cettoll	into	Alamuspiay					
	1								

5. Transmit the trace configuration to the drive unit and activate the recording.

6. The drive is started via the drive control panel and the trace recording runs once the error occurs in the drive, as configured for the trigger. An icon in the project navigator also displays the error in the drive.



7. You can display the recorded signals graphically in the Editor and save them locally on the PC.



11

Summary

11.1 Summary of the tutorial

Summary



You will have gained an overview of Startdrive after working through the tutorial. You can integrate a drive into a project, complete a basic commissioning, and rotate the motor.

Please use the drive unit documentation and the Startdrive help system for further training. Startdrive can be found on the Internet at www.siemens.com/startdrive

Thank you for your attention.

Summary

11.1 Summary of the tutorial