

SCE Training Curriculums

Siemens Automation Cooperates with Education | 05/2017

TIA Portal Module 032-420 Diagnostics via the Web with SIMATIC S7-1500



Matching SCE trainer packages for these training curriculums

SIMATIC Controllers

- SIMATIC ET 200SP Open Controller CPU 1515SP PC F and HMI RT SW Order no.: 6ES7677-2FA41-4AB1
- SIMATIC ET 200SP Distributed Controller CPU 1512SP F-1 PN Safety Order no.: 6ES7512-1SK00-4AB2
- SIMATIC CPU 1516F PN/DP Safety Order no.: 6ES7516-3FN00-4AB2
- SIMATIC S7 CPU 1516-3 PN/DP Order no.: 6ES7516-3AN00-4AB3
- SIMATIC CPU 1512C PN with Software and PM 1507 Order no.: 6ES7512-1CK00-4AB1
- SIMATIC CPU 1512C PN with Software, PM 1507 and CP 1542-5 (PROFIBUS) Order no.: 6ES7512-1CK00-4AB2
- SIMATIC CPU 1512C PN with Software Order no.: 6ES7512-1CK00-4AB6
- SIMATIC CPU 1512C PN with Software and CP 1542-5 (PROFIBUS) Order no.: 6ES7512-1CK00-4AB7

SIMATIC STEP 7 Software for Training

- SIMATIC STEP 7 Professional V14 SP1 Single license Order no.: 6ES7822-1AA04-4YA5
- SIMATIC STEP 7 Professional V14 SP1- Classroom license (up to 6 users) Order no.: 6ES7822-1BA04-4YA5
- SIMATIC STEP 7 Professional V14 SP1 Upgrade license (up to 6 users) Order no.: 6ES7822-1AA04-4YE5
- SIMATIC STEP 7 Professional V14 SP1 Student license (up to 20 users) Order no.: 6ES7822-1AC04-4YA5

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Additional information regarding SCE

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We wish to thank the TU Dresden, especially Prof. Dr.-Ing. Leon Urbas, the Michael Dziallas Engineering Corporation and all other involved persons for their support during the preparation of this training curriculum.

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WEB SERVER AND ADVANCED DIAGNOSTICS

1 Goal

In this module, the reader will become acquainted with additional tools that are helpful for troubleshooting.

In particular, we will show you how automated alarm texts can be generated in the TIA Portal for hardware faults and system errors. These can then be displayed not only in the TIA Portal but also on the display of the CPU as well as via the web server of the CPU 1516F-3 PN/DP. It is also possible to bring these into the message windows of HMI systems for viewing.

This module will present advanced diagnostic functions that, for example, you can test with the TIA project from the SCE_EN_032-410_Basics_Diagnostics with the SIMATIC S7-1500 module.

The SIMATIC S7 controllers listed in Chapter 3 can be used.

2 Prerequisite

This chapter builds on the hardware configuration of the SIMATIC S7 CPU1516F-3 PN/DP. However, other hardware configurations can be used. You can use the following project for this chapter, for example:

SCE_EN_032-410_Basics_Diagnostics_2_R1503.zap13

3 Required hardware and software

- 1 Engineering station: requirements include hardware and operating system (for additional information, see Readme on the TIA Portal Installation DVDs)
- 2 SIMATIC STEP 7 Professional software in TIA Portal as of V13
- SIMATIC S7-1500/S7-1200/S7-300 controller, e.g. CPU 1516F-3 PN/DP Firmware as of V1.6 with memory card and 16DI/16DO and 2AI/1AO Note: The digital inputs should be fed out to a control panel.
- 4 Ethernet connection between engineering station and controller



4 Theory

4.1 System diagnostics: Automated creation of error messages

In the TIA Portal, the diagnostics of devices and modules is collectively referred to as system diagnostics. The monitoring functions are automatically derived from the hardware configuration.

All SIMATIC products have integrated diagnostic functions which you can use to detect and remedy faults. The components automatically signal a possible disruption of operation and provide additional detailed information. Undesired downtimes can be minimized with plantwide diagnostics.

The following states are monitored by the system in the running plant:

- Device failure
- Pull/plug error
- Module fault
- IO access error
- Channel fault
- Parameter assignment error
- Failure of the external auxiliary voltage

4.2 Diagnostics via web server

The web server enables monitoring and administering of the CPU by authorized users over a network.

This permits evaluation and diagnostics over long distances. Monitoring and evaluation is possible without the TIA Portal; all you need is a web browser.

The web server is deactivated in the delivery state of the CPU. This means that you must load a project in which the web server is activated to enable access using the web browser.

The web server offers the following security functions:

- Access via secure "https" transmission protocol
- User authorization by means of a user list
- Restriction of access from certain interfaces

You need a web browser to access the HTML pages of the CPU.

The following web browsers have been tested for communication with the CPU:

- Internet Explorer (Version 8)
- Mozilla Firefox (Version 21)
- Mobile Safari (iOS5)

						12 English 💌
Name	Alarms					
Log in	entries 1-	50 💌				🔡 😂 <u>Off</u> 🞩
	AlarmNr.	Date	Time	Alarm text	State	Acknowledgement
▶ Start page	34	01/01/2012	12:25:02.177 am	Error: Supply voltage missing on Q0 CPU1516F / AQ 4xU/I ST_1.	incoming	
Diagnostics						
Diagnostic Buffer						
▶ Module information						
► Alarms						
► Communication						
► Topology						
▶ Tag status						
▶ Watch tables	Details on a	alarm number:	34			
	Short name	: AQ 4xU/I ST O	rder number: 6ES7	532-5HD00-0AB0		
Customer pages						
	Incomina e	vent				

Figure 1: Web server of the CPU 1516F-3 PN/DP with alarm text from the system diagnostics

Note: Make sure that you protect the CPU from manipulation and unauthorized access through the use of different methods (e.g., limiting network access, using firewalls).

4.3 Diagnostics with the integrated display

The S7-1500 CPU has a front flap with a display and control keys. Control data and status data can be displayed in various menus on the display and numerous settings can be made. You use the control keys to navigate through the menus.

The display of the CPU offers the following functions:

- 6 different display languages can be selected.
- Diagnostic messages are displayed in plain text.
- The interface settings can be changed locally.
- Password assignment for display operation is possible through the TIA Portal.

RUN	ırms	A
Incoming 00:32:01 AM	I 01/2	<u>↑</u> ► 1/2012
Fault: Hardy	ware compon	ent r
ESC	1/1	ок

Figure 2: Display of the CPU 1516F-3 PN/DP with alarm text from the system diagnostics

5 Task

The following advanced diagnostic functions will be shown and tested in this chapter:

- Configuration of web server of the CPU 1516F-3 PN/DP
- Configuration of display of the CPU 1516F-3 PN/DP
- Create hardware fault and system error alarms with the system diagnostics
- Display alarms via the web server of the CPU 1516F-3 PN/DP
- Display alarms via the integrated display of the CPU 1516F-3 PN/DP

6 Planning

The diagnostic functions will be performed using a finished project as an example. A project in the TIA Portal that was previously downloaded to the controller should be open for this. In our case, once you have started the TIA Portal, you will retrieve a previously created project that was archived and download it to the associated controller.

You can then configure the web server, the display and the system diagnostics in the TIA Portal. To test the system diagnostics, we will disconnect the monitored analog output module from its supply voltage.

Structured step-by-step instructions 7

You can find instructions on how to carry out planning below. If you already have a good understanding of everything, it will be sufficient to focus on the numbered steps. Otherwise, simply follow the detailed steps in the instructions.

7.1 Retrieve an existing project

 \rightarrow Before we begin with diagnostics via the web server, we need a project from the

SCE_EN_032-410 Basics_Diagnostics module.

(e.g., SCE_EN_032-410_Basics_Diagnostics_2_R1503.zap13)

To retrieve an existing project that has been archived, you must select the relevant

archive with \rightarrow Project \rightarrow Retrieve in the project view.

Confirm your selection with "Open".

Project Edit View	Insert Online	Options
New Open		Ctrl+O
Close		Ctrl+W
Save Save as	Ctrl	Ctrl+S +Shift+S
Delete project Archive		Ctrl+E
Retrieve		
Card Reader/USB mer Memory card file	mory	•
Upgrade		
D:\Automation\\032 D:\Automation\\032 D:\Automation\SKG_B D:\Automation\Projek	_200_FB-Program _100_FC-Program pregal1\SKG_Brea t1\Projekt1	nming nming gal1
Exit		

nive \rightarrow Open)

 \rightarrow The next step is to select the target directory where the retrieved project will be stored. Confirm your selection with "OK".

 $(\rightarrow \text{Target directory} \rightarrow \text{OK})$

7.2 Configure the web server

→ To configure the web server, open the device configuration of the CPU 1516F-3 PN/DP. (\rightarrow CPU_1516F [CPU 1516F-3 PNDP] \rightarrow Device configuration)



 \rightarrow Select the CPU and choose the 'Web server' menu item in the properties.

 $(\rightarrow CPU_{1516F} \rightarrow Properties \rightarrow Web server)$



 \rightarrow Activate the web server on this module and confirm the security note.

 $(\rightarrow \blacksquare$ Activate web server on this module \rightarrow OK)

CPU1516F [C	PU 1516F-3	PN/DP]			Sector Properties	🚺 Info 👔 📱 Diagnostics 👘 🗐 🖶 🤜
General	IO tags	Syste	em constants	Texts		
Communicat	on load	^	14/- h			
System and o	lock memory		web server			
System diagr	ostics		General			
▼ Web server						
General						
Automatic	update				🛃 Activate web se	erver on this module
User man	agement				Permit access o	only with HTTPS
Watch tab	es					·
User-defin	ed Web pages		Automatic undat	•		
Entry page		4	Automatic updat	b conver		
Overview	ofinterfaces		VVA	eb server		^^
Display				Δ		
User interface	e languages			<u>∕∎</u>	ecurity note	
Time of day			<u>/</u>		and a sure	
Protection			User manage	/ e	external access to functions	and data on this CPU
System power	r supply		osermanag			
Configuration	control					
Connection re	esources		Name			NOK
Overview of a	ddresses	\mathbf{v}	Everyt			
<		>	<add new<="" th=""><th>user></th><th></th><th></th></add>	user>		

→ Leave the check mark I for 'Enable automatic update', and select the security settings of the 'Everybody' user. Enable this user to carry out all possible actions and accept your settings.

CPU1516F [CPU 1516F-3	PN/DP1		Ba . But all stratics		
	1	·	The user is authorized to		
General IO tags	Syste	em constants Texts	🔽 query diagnostics		
Communication load	^	Web server	🔽 read tags	^	
System and clock memory		Web server	write tags		
 System diagnostics 		General			
✓ Web server					
General			write tag status		
Automatic update			acknowledge alarms		
User management			🖌 open user-defined web pages		
Watch tables			write in user-defined web pages		
User-defined Web pages		Automatic update	🔽 read files		
Entry page	•		write/delete files		
Overview of interfaces					
Display		-	Change operating mode		
User interface languages	-	Update inte	🛃 flash LEDs		
Time of day			Perform a firmware update		
Protection		User management	Change system parameters		
 System power supply 		oser management	Change application parameters		
Configuration control					
Connection resources		Name			
Overview of addresses	~	Everybody	Minimum 🔽		
< Ⅲ	>	<add new="" user=""></add>		~	

Notes: You can also create multiple users here with different authorizations. These users then require a password.

→ As a result of these authorizations, the 'Everybody' user is now automatically assigned the access level 'Administrative'.

Name	Access level	Password		
Everybody	Administrative	-	-	
<add new="" user=""></add>				

→ In the 'Watch tables' menu item, the 'Watch table_Cylinder' can now be entered in the web server.

 $(\rightarrow Watch table_Cylinder \rightarrow \blacktriangleright)$

CPU1516F [C	PU 1516F-3 I	PN/DP]			Q Properties	🗓 Info 🔒 🗓 I	Diagnostics	∎∎ ▼
General	IO tags	System	m constants	Texts				
Cycle Communicati	ion load	^	Watch tables					_
 System and d System diagr 	nostics		Name		Access			
▼ Web server			Watch ta	ble_Cylinder	Read	-		
General Automatic	update		E. For	ce table	inder			
User mana	agement		004	S S				
Watch tab	ed Web pages							
Entry page	•	-						
Overview (ofinterfaces	_				Add new	X	
User interface	e languages							
Time of day								
 System power 	er supply	-						
Configuration	control							
Overview of a	esources addresses							
<		>						

 \rightarrow Accessing is read-only. (\rightarrow Read)

atch tables	
Name	Access
Watch table_Cylinder	Read 👻
<add new="" table="" watch=""></add>	Read
	N

→ User-defined web pages will not be created here. For reasons of plant safety / security, we will enable only PROFINET interface_1 for access to the web server.

 $(\rightarrow \text{Enabled web server access} \rightarrow \square \text{ PROFINET interface}_1)$

CPU1516F [CPU 1516F-3	DP] 🧕 💽	operties 🗓 Info 追 🗓 Diagnostics 💿 🖃 🔻
General IO tags	ystem constants Texts	
PROFINET interface [X2]	Default HTML page: inde	x.htm A
DP interface [X3]	Application name:	
Startup	Status	
Cycle	status.	
Communication load	Generate blocks	Delete blocks
System and clock memory		
 System diagnostics 	 Advanced 	
✓ Web server		
General	Files with dynamic content:	: html
Automatic update	Thes with dynamic content.	,,num
User management	Web DB number: 333	•
Watch tables	Fragment DB start number: 334	۵
 User-defined Web pages 	=	
Entry page	Entry page	
Overview of interfaces		=
Display		
User interface languages	Select entry page: Intro	page 💌
Time of day		
 Protection 	Overview of interfaces	
 System power supply 		
Configuration control	Davies	
Connection resources		IET interface 1
Overview of addresses		
<	- Croision PROPIN	<pre>krintenace_2</pre>

7.3 Configure the display

- → The settings for the display of diagnostics data can also be changed on the integrated display of the CPU 1516F-3 PN/DP. First, the general settings are selected as shown here.
 - $(\rightarrow \text{Display} \rightarrow \text{General})$

CPU1516F [CPU 1516F-3 PN/DP]	🖳 Properties 🚺 Info 👔 🗓 Diagnostics 👘 🖛	
General IO tags Syste	em constants Texts	
General Fail-safe	Display	*
PROFINET interface [X1] PROFINET interface [X2]	General	-
DP interface [X3]	Display standby mode	
Startup Cycle Communication load	Time to standby mode: 30 minutes	
System and clock memory	Energy saving mode	
System diagnostics Web server Display	Time to energy saving mode: 15 minutes	
General Automatic undate	Display language	
Password Watch tables	Default language on display: English	
User-defined logo	Automatic update	
Time of day		
Protection Sustem power supply	lime until update: 5 seconds 🔍	~

→ In the 'Watch tables' menu item, the 'Watch table_Cylinder' can now be entered in the display.

CPU1516F [CPU 1516F-3	PN/DP]		Q Properties	🗓 Info 🚺 🗓 Diagnostics	┛₿▼		
General IO tags	System cons	tants Texts					
General	Passv	vord			^		
Fail-safe	Dis	nlay protection					
PROFINET interface [X1]	DIS	pluy protection					
PROFINET interface [X2]			Enable displ	avprotection	-		
 DP interface [X3] 				-,,			
Startup		Passv	vord:				
Cycle		Confirm passv	vord:				
Communication load		Time until automatic logoff: 15 minutes					
System and clock memory	= -						
 System diagnostics 	* Watch	Watch tables					
 Web server 	- Hater						
 Display 	•						
General		Name	Access				
Automatic update		Watch table_Cylinder	Read	-			
Password		Force table					
Watch tables		Watch table_Cylin	nder				
User-defined logo		13					
User interface languages							
Time of day							
Protection	-			📑 Add new 🖌 🖌	< <u> </u>		

 $(\rightarrow Watch table_Cylinder \rightarrow \bigtriangledown)$

 \rightarrow If desired, a user-defined logo can also be shown on the display

 $(\rightarrow \text{User-defined logo page})$

CPU1516F [CPU 1516F-3 PN	I/DP] Strength Streng	s 🗓 Info 👔 🖫 Diagnostics 📰 🖃 🤝
General IO tags	System constants Texts	
General	User-defined logo	
Fail-safe PROFINET interface [X1]	User-defined logo	
PROFINET interface [X2]	User-defin	ed logo page
 DP interface [X3] Startup 	Adapt logo	
Cycle	Resolution: 240 x 260 pix	els 💌
Communication load	Background color: 📃 👻	
 System diagnostics 	Upload image file: Browse	e
Webserver	Preview:	SIMATIC
General	SIE	ST-1500
Automatic update		
Password Watch tables	RUN	
User-defined logo		
User interface languages		

7.4 Configure system diagnostics

→ An important function for effective troubleshooting is the integrated system diagnostics. This is always activated for the SIMATIC S7-1500. The alarm categories can be selected in the alarm settings and, if desired, an 'Acknowledgment' can be specified.

CPU1516F [C	PU 1516F-3	PN/DP]				🔍 Properties	🔄 Info	٤	Diagnostics	▎▝▘▋▝
General	IO tags	Syster	m constants	Texts						
GeneralFail-safe		^	System diagno	ostics						
 PROFINET inte PROFINET inte 	erface [X1] erface [X2]		General							
DP interface Startup Orels	[X3]		Activate system diagnostics for this device Alarm settings							
Communicat System and o	ion load :lock memory									
✓ System diagr General	nostics	≡ _	Category		Alarm	Alarm class		Ac	knowledgement:	
Alarm sett • Web server	tings	-	Fault Maintenance	demanded		No Acknowledge No Acknowledge	ment 💌			
 Display User interfact 	e languages		Maintenance Info	required		No Acknowledge No Acknowledge	ment			
Time of day										

Notes: The indicated alarm class is important so that it can be selected in the alarm windows of the operator panel (e.g., TP1500, TP700, etc.).

7.5 Activate the diagnostics of the power supply for the analog output module and download the PLC

→ Once the web server, display and system diagnostics have been configured in the controller, we also activate the diagnostics for the supply voltage for the analog output module. The controller can then be selected and downloaded together with the created program.

(→ Device configuration → AQ 4xU/I ST_1 → Output 0 – 3 → Outputs → Channel 0 → Diagnostics → \blacksquare No supply voltage L+→ CPU_1516F [CPU 1516F-3 PN/DP]→ \blacksquare)



 \rightarrow Select the correct interface and click 'Start search'.

(\rightarrow PN/IE \rightarrow Selection of the network adapter of the PG/PC \rightarrow Direct at slot '1 X1' \rightarrow Start search)

Once "Scan and information retrieval completed" appears, click 'Load'.

	Configured acces	s nodes of "CPU1516F"				
	Device	Device type	Slot	Туре	Address	Subnet
	CPU1516F	CPU 1516F-3 PN/	1 X3	PROFIBUS	2	
		CPU 1516F-3 PN/	1 X1	PN/IE	192.168.0.1	PN/IE_1
		CPU 1516F-3 PN/	1 X2	PN/IE	192.168.1.1	
		Time of the PC/PC inte	rfa ca:	DN//E		-
		type of the Fold Clinte	face.			
		PG/PC inte	rface:	%AX88772	A.DeviceDesc%	• •
		Connection to interface/su	ibnet:	PN/IE_1		₹
		1st gat	eway:			
	Compatible devic	es in target subnet:			🛃 Show all compati	ible devices
	Compatible devic	es in target subnet: Device type	Туре	A	Show all compati	ible devices Target device
	Compatible devic Device CPU1516F	es in target subnet: Device type CPU 1516F-3 PN/	Type . PN/IE	A	Show all compati ddress 92.168.0.1	ible devices Target device CPU1516F
	Compatible devic Device CPU1516F 	es in target subnet: Device type CPU 1516F-3 PN/ 	Type PN/IE PN/IE	A 1 A	Show all compati ddress 92.168.0.1 cccess address	ible devices Target device CPU1516F
1	Compatible devic Device CPU1516F 	es in target subnet: Device type CPU 1516F-3 PN/ —	Type PN/IE PN/IE	A 1 A	Show all compati ddress 92.168.0.1 access address	Target device Target device CPU1516F
120	Compatible devic Device CPU1516F -	es in target subnet: Device type CPU 1516F-3 PN/ 	Type PN/IE PN/IE	A 1 A	Show all compatiddress 92.168.0.1 access address	ible devices Target device CPU1516F —
Flash LED	Compatible devic Device CPU1516F -	es in target subnet: Device type CPU 1516F-3 PN/ —	Type PN/IE PN/IE	A 1 A	Show all compat ddress 92.168.0.1 access address	Target device CPU1516F –
TEISH LED	Compatible device Device CPU1516F —	es in target subnet: Device type CPU 1516F-3 PN/ 	Type PN/IE PN/IE	A 1 A	Show all compat ddress 92.168.0.1 access address	Target device CPU1516F –
TEISH LED	Compatible device Device CPU1516F —	es in target subnet: Device type CPU 1516F-3 PN/ 	Type PN/IE PN/IE	A 1 A	Show all compat ddress 92.168.0.1 access address	Target device CPU1516F
Flash LED	Compatible device Device CPU1516F —	es in target subnet: Device type CPU 1516F-3 PN/ -	Type PN/IE PN/IE	A 1 A	Show all compat ddress 92.168.0.1 access address	ible devices Target device CPU1516F
Flash LED	Compatible device CPU1516F 	es in target subnet: Device type CPU 1516F-3 PN/ 	Type PN/IE PN/IE	A 1 A	Show all compat ddress 92.168.0.1 access address	Target device CPU1516F -
Flash LED	Compatible device <u>CPU1516F</u> - on: nformation	es in target subnet: Device type CPU 1516F-3 PN/ 	Type PN/IE PN/IE	A 1 A	Show all compati ddress 92.168.0.1 .cccess address	ible devices Target device CPU1516F
Flash LED	Compatible device Device CPU1516F 	es in target subnet: Device type CPU 1516F-3 PN/ ed.	Type PN/IE PN/IE	A 1 A	Show all compati ddress 92.168.0.1 cccess address	ible devices Target device CPU1516F
Flash LED	Compatible device Device CPU1516F 	es in target subnet: Device type CPU 1516F-3 PN/ ed.	Type PN/IE PN/IE	A 1 A	Show all compati ddress 92.168.0.1 .cccess address	ible devices Target device CPU1516F

→ Before downloading can be started, other actions may have to be selected. Click 'Load' again.

 $(\rightarrow \blacksquare$ override all \rightarrow Load)

status	1	Target	Message Read (relation	Action
*0	v	• CP01516F	Ready for loading.	
	0	Stop modules	The modules are stopped for downloading to device.	Stop all
	0	Software	Download software to device	Consistent download
:			111	>

 \rightarrow After loading, first select the "Start all" check box and click 'Finish'.

 $(\rightarrow \blacksquare$ Start all \rightarrow Finish)

Load re	sults			×
?	Status	and actions after downloa	ding to device	
Status	1	Target	Message	Action
tî	<u> </u>	▼ CPU1516F	Downloading to device completed without error.	
	4	 Start modules 	Start modules after downloading to device.	Start all
	1		The module "CPU1516F" can be started.	Start
۲			III.	>
			Finish	Load Cancel

7.6 Trigger error message

→ The power supply of the analog output module is via terminals 41-44 of the supply element. Remove this supply element, as shown here, from the front connector to trigger an error message. Result: the red ERROR LED on the CPU is lit and an error message is triggered. The following pages describe where and how you can view this error message.



7.7 Display alarms in Online & diagnostics

→ To get started with the diagnostic functions, we will select our controller 'CPU_1516F' and click 'Online & diagnostics'. Under 'Online access' select (Receive alarms' for the 'Alarms' item.

 $(\rightarrow CPU_1516F \rightarrow Online \& diagnostics \rightarrow Online access \rightarrow Alarms \rightarrow \square Receive alarms)$

Project Edit View Insert Online Options Tools Window Help Totally Integrated Image: State project	Automation PORTAL
Image: Seve project	
Project tree □ 4 032_200_FB-Programming ➤ CPU1516F [CPU 1516F-3 PN/DP] Devices <th></th>	
Devices	
	^
n 🖹 🖸 🖸 💼 📷 🖉 Online access	
Diagnostics	=
V 032_200_FB-Programming A Functions Status	
Add new device	
B Devices & networks	1
▼ [j] CPU1516F [CPU 1516F-3 PN/DP]	
IT Device configuration	
😵 Online & diagnostics	
▼ 😓 Program blocks	
Add new block	
The Main [OB1]	
The MOTOR_AUTO [FB1]	
MOTOR_AUTO_DB1 [DB1]	
> 🙀 Technology objects	
Grinne access	
> PLC tags	
I get C data types	
PG/PC interface: 🙀 %AX88772A.DeviceDesc% 💌 🧐 💁	
▶ 300 Online backups Connection to interface/subnet: PN/E_1 ▼	
► Traces	
2 Program info	
Device proxy data	
□ PLC alarms	
🖺 Text lists 🌽 Go online	
In Local modules	
Common data	
E Documentation settings	
► Calest "Bereive alarms"	
Gonine access	
V Dicolaubide interfacer	

 \rightarrow Select the correct interface and click 'Go online'.

 $(\rightarrow$ Go online)

Online access		
Type of the PG/PC interface:	PN/IE	•
PG/PC interface:	NAX88772A.DeviceDesc%	- 💿 💽
Connection to interface/subnet:	PN/IE_1	▼ ⑦
1st gateway:		- 🐨
Device address:	192.168.0.1	
	Go online	

 \rightarrow The error message can now be checked in the 'Alarm display' under 'Diagnostics'.

 $(\rightarrow \text{Diagnostics} \rightarrow \text{Alarm display})$

🐘 Siemens - G:Automation'032_200_FB-Programming032_200_FB-Programming 💶 🗆 🗛					
Project Edit View Insert Online Options To 📑 🎦 🔒 Save project 📑 🐰 🗐 🗎 🗙 🎝 🗄	is Window Help ﷺ 🖥 🗓 🚺 🔛 🔛 💋 Goonline 🖉 Gooffline 🛔 👔 🖪 🕼 🗶 🖃 🛄	Totally Integrated Automation PORTAL			
Project tree 🔲 🖣	032_200_FB-Programming CPU1516F [CPU 1516F-3 PN/DP]	_ # = × 🖌			
Devices	Online access Diagnostics Functions Online Online I I I I I I I I I I I I I I I I I I				
Motion Biology Motion Autor [FB1] Motion Autor [FB1] Motion Autor _ Ball [BB1] Motion Autor _ Ball [BB1] Eachnology objects	< m >	v v ■ Info U Diagnostics ■ I v v			
	Device information Connection information Alarm display Image:				
Supreture and force tables Supreture and force tables Supreture tables Supreture tables Supreture tables Supreture tables Supreture tables Supreture tables	Source Uate Imme jst., Event text 571500/ET2, 1/1/2012 1:10:26:958 AM I Error: Supply voltage missing on Q0 CPU1516F / AQ 4xU/I ST_1.	Into text Help Short name: AQ 4xU/i ST Order number:			
> Details view	K III	>			
◆ Portal view	PU1516F 🔹 Main 😨 Online & dia	✓ Connected to CPU1516F, address IP=1			

7.8 Diagnostics for the S7-1500 via the web

→ To be able to access the Web server of the CPU 315F-2 PN/DP we open any Web browser on a PC that is connected to the CPU via TCP/IP.



 \rightarrow There we enter the IP address of the CPU 1516F-3 PN/DP. (\rightarrow 192.168.0.1)



 \rightarrow On the displayed web page, we first select the language and then click 'ENTER'.

 $(\rightarrow \text{English} \rightarrow \text{ENTER})$



 $\rightarrow~$ On the 'Home Page' we see general information about the PLC and its status.

 $(\rightarrow$ Home Page)

			12:20:20 am 0)1/01/2012	English 💌
Name	CPU1516F				
Log in					😂 <u>Off</u> 🚢
Start page	1516 F-3 PN/DP	Connects			
Diagnostics		General:	V12.0.0D1		
/ Diagnostics		Stop 7 Sofetr	V15.0 SF 1		
Diagnostic Buffer	ST-1500	Station name:	971500/ET200MP station 1		
Module information	CPU 1516F-3 PM/DP	Module name:	CPU1516F		
· module mornation		Module type:	CPU 1516F-3 PN/DP		
▶ Alarms		inclusio (jpc)			
▶ Communication		Status:			
Communication		Operating Mode:	RUN		
▶ Topology		Status:	😢 Error		
▶ Tag status	6ES7 516-3FN00-0AB0	Mode selector:	RUN		
· Tug Status					
Watch tables					
Customer naries		Fail-sate:			
r customer pages		Collective signature:			
▶ Filebrowser		Lost foilogfo modification:			
DataLogo		Lastialisale mounication.		-	
, DataLogs		CPU operator panel			
		or o operator parter	RUN		
► Introduction			STOP		
Warten auf 192.168.0.1			LED flashes		

→ Hardware, Firmware Version and Serial number are displayed besides other information under 'Diagnostics'.

 $(\rightarrow \text{Diagnostics})$

Name Log in	Diagnostics			
► Start page	Identification Memory			
Diagnostics	Identification:			
b Diagnostic Duffer	Plant designation:			
P Diagnosuc Burier	Location identifier:			
Module information	Serial number: S C-F2SE01192015			
▶ Alarms	Order number:			
▶ Communication	Hardware: 6ES7 516-3FN00-0AB0			
▶ Topology	Version:			
	Hardware: 3			
▶ Tag status	Firmware: V 1.7.0			
• Watch tables	Bootloader: V 1.0.2			

Name	Diagnostics				
Log in					
	Identification Memory				
Start page					
Diagnostics	Load memory				
Disconcello Duffer	1.2% in use				
► Diagnostic Butter	23.72 MB free of 24.01 MB				
► Module information					
	Code work memory				
▶ Alarms	0.0% in use				
▶ Communication	1.50 MB free of 1.50 MB				
. Transform	Data work momony				
► Topology					
▶ Tag status	0.0% In use				
	5.00 MB free of 5.00 MB				
Watch tables	Detertive memory				
). Customor nogon	Retentive memory				
 Customer pages 	0.0% in use				
▶ Filebrowser	472.66 KB free of 472.66 KB				

→ Under 'Diagnostics Buffer' we see descriptive information for all events in the CPU. Event information is recorded in a circular buffer. The most recent alarm is displayed in the top line.

					12:25:44 am 01/01/2012 English 💌	
Name	Diagn	ostic Buffer				
Log in	Diagno	ostic buffer entrie	s 1-50 💌			
	Number	Time	Date	State	Event	
 Start page 	1	12:25:06.003 am	01/01/2012	incoming event	Communication initiated request: WARM RESTART Pending startup inhib - No startup inhibit set - CPU changes from STARTUP to RUN mode	
▶ Diagnostics	2	12:25:05.982 am	01/01/2012	incoming event	Communication initiated request: WARM RESTART Pending startup inhib - No startup inhibit set - CPU changes from STOP to STARTUP mode	
Diagnostic Puffor	3	12:25:02.177 am	01/01/2012	incoming event	Supply voltage missing	
P Diagnostic Buller	4	12:25:01.475 am	01/01/2012	outgoing event	Supply voltage missing	
 Module information 	5	12:25:01.389 am	01/01/2012	incoming event	Communication initiated request: STOP Pending startup inhibit(s): - No startup inhibit set - CPU changes from RUN to STOP mode	
▶ Alarms	6	12:23:51.030 am	01/01/2012	incoming event	Supply voltage missing	
▶ Communication	7	12:23:46.084 am	01/01/2012	outgoing event	Supply voltage missing	
▶ Topology	8	12:19:21.717 am	01/01/2012	incoming event	Follow-on operating mode change Power-on mode set WARM RESTART to RUN (if CPU was in RUN before Pending startup inhibit(s): - No startup inhibit set - CPU changes from STARTUP to RUN mode	
▶ Tag status	4				Follow-on operating mode change	
▶ Watch tables	tables Event ID: 16# 08:001 Error: Supply voltage missing on Q0_CPU1516F / AQ_4xU/I ST_1.					
▸ Customer pages	incoming e	vent				

 $(\rightarrow \text{Diagnostics Buffer})$

→ The status of the individual modules of our SIMATIC S7-1500 is displayed with additional details in the 'Module Information' view.

					12	2:27:19 am 0	1/01/2012 Er	nglish 💌
Name	Mo	dule informa	tion					
Log in							4	C Off 🚨
	<u>\$71500</u>	D/ET200MP static	n 1 - \$71500/ET200MP station_1					
 Start page 	Slot	State	Name		Order number	l address	Q address	Comment
	1	~	CPU1516F	Details	6ES7 516-3FN00-0AB0			
Diagnostics	2	_	DI 32x24VDC HF_1	Details	6ES7 521-1BL00-0AB0	0		
	3	_	DQ 32x24VDC/0.5A ST_1	Details	6ES7 522-1BL00-0AB0		0	
Diagnostic Buffer	4	~	AI 8xU/I/RTD/TC ST_1	Details	6ES7 531-7KF00-0AB0	64		
-	5	¥	AQ 4xU/I ST_1	Details	6ES7 532-5HD00-0AB0		64	
Module information								
▶ Alarms								
▶ Communication								
► Topology								
▶ Tag status								
▶ Watch tables	State	Identification	Firmware					
▶ Customer pages	Erro	Error: Supply voltage missing on Q0 CPU1516F / AQ 4xU/I ST_1.						

 $(\rightarrow Module Information)$

 \rightarrow The alarm texts generated in the CPU 1516F-3 PN/DP are available in 'Alarms'.

 $(\rightarrow A | arms)$

					12:28:13 a	m 01/01/20	12 English 💌
Name	Alarms						
Log in	entries 1-5	i0 🔽					🔛 😂 <u>Off</u> 📕
	AlarmNr.	Date	Time	Alarm text		State	Acknowledgement
 Start page 	34	01/01/2012	12:25:02.177 am	Error: Supply voltage missing on Q0 CPU1516F / AQ 4xU/I ST_1.		incoming	
Diagnostics							
Diagnostic Buffer							
Module information							
► Alarms							
Communication							
➤ Topology							
→ Tag status							
Natch tables	Details on a	larm number: 3	34				
· waten table5	Short name	AQ 4xU/I ST Or	der number: 6ES7 5	i32-5HD00-0AB0			
Customer pages							
	Incoming ev	ent					

Note: Here we see the failure of the supply voltage for the digital input module with activated diagnostic error interrupt.

- → Details about communication settings and communication errors are displayed under 'Communication'.
 - $(\rightarrow \text{Communication})$

Name	Communication							
Log in								
	Parameter S	tatistics Re	esources	Connection	3			
 Start page 								
► Diagnostics	PROFINET I	iterface [X1]	:					
Diagnostic Buffer	Network connection:							
Module information	MAC address: 28-63-36-87-F3-05							
	Name: cpu1516f.profinet interface_1							
► Alarms								
• Communication	IP parameter:							
Communication	IP Address: 192.168.0.1							
▶ Topology	Default router:							
	IP settings: IP address set in project							
▶ Tag status								
Watch tables	Physical pro	operties:						
	Port number	Link status	s Setti	ngs Mode		Connection medium		
Customer pages	X1 P1	OK		100 ME	it/s full-duplex	Copper cable		
	X1 P2	disconnec	ted			Copper cable		

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Name Log in	Commu	nication				
	Parameter	Statistics	Resources	Connec	tions	
 Start page 		1				
▶ Diagnostics					Total	statistics
Diagnostic Ruffer			Sent data pa	ckages:		
P Diagnostic Dunei			Sent without	ut errors:	3243	312 Bytes
Module information		Collision d	uring sending	attempt:	0	
A larme		Cancel	ed due to othe	er errors:	0	
AldIIIIS		Rec				
Communication		R	7553	70 Bytes		
. Tourism			Rejected due	to error:	0	
▶ Topology	R	ejected due t	o resource bo	ttleneck:	0	
▶ Tag status						
					Statis	stics X1 P1
Watch tables			Sent data pa	ckages:		
Customer pages			Sent without	ut errors:	3242	928 Bytes
		Collision d	uring sending	attempt:	0	
Filebrowser		Canceled due to other errors: 0				
▶ DataLogs		Rec	eived data pa	ckages:		
		R	eceived withou	ut errors:	7553	70 Bytes
			Rejected due	to error:	0	
► Introduction	Re	jected due t	o resource bo	ttleneck:	0	

Name Log in	Communication					
	Parameter	Statistics	Resources	Connections		
 Start page 						
Diagnostics		Number o	f connections	5:		
		Maximur	n connections	s: 256		
Diagnostic Buffer						
Module information						
▶ Alarms			C			
. Communication			Connections	s: reserve	a in use	
Communication		ES o	ommunicatio	n 4	0	
		HMI c	ommunicatio	n 4	0	
► lopology		S7 c	ommunicatio	n 0	0	
		OpenUser o	ommunicatio	n 0	0	
▶ Tag status		Webo	ommunicatio	n 2	6	
		Other of	ommunicatio	n	0	

							:32:27 am 01/01/2012	English	-
Name	Commu	inication							
Log in								C Off	-
	Parameter	Statistics	Resourc	es Connections					
Start page	State			Local ID (Hex)	Slot of Gateway	Remote address type	Remote address	Туре	Туре
	Connecti	on is establ	shed	0		IPv4	192.168.0.108	Adhoc	WEB
 Diagnostics 	Connecti	on is establ	shed	0		IPv4	192.168.0.108	Adhoc	WEB
	Connecti	on is establ	shed	0		IPv4	192.168.0.108	Adhoc	WEB
Diagnostic Buffer	Connecti	on is establ	shed	0		IPv4	192.168.0.108	Adhoc	WEB
	Connecti	on is establ	shed	0		IPv4	192.168.0.108	Adhoc	WEB
Module information	Connecti	on is establ	shed	0		IPv4	192.168.0.108	Adhoc	WEB
► Alarms									
Communication									

→ Devices that are connected to the individual ports of the CPU 1516F-3 PN/DP and the addresses of these devices can be displayed under 'Topology'. There are various views for this. In the case of larger network structures, the entire network structure of a plant can be displayed and faulty connections shown in the status, provided this function is supported by the individual components.

 $(\rightarrow \text{Topology})$

Name	Тороlogy
Log in	
	Graphic view Table view Status overview
Start page	
Diagnostics	cpu1516f svensons S71500/ET20
► Diagnostic Buffer	P1 P1
Module information	
▶ Alarms	
► Communication	
Topology	

				12:	34:58 am 01/01/201	2 English 💌
Name	Topology					
Log in						😂 <u>Off</u> 🞩
	Graphic view Ta	ble view Status ove	rview			
 Start page 	Port				Partner port	
	State	Name	Module type	Port	Name	Port
Diagnostics	I 🖌 😖	cpu1516f	S71500/ET200MP station			
				port-001	svensons	port-001
Diagnostic Buffer				port-002		
	2	svensons				
Module information				port-001	cpu1516f	port-001
▶ Alarms						
Autilis						
. Communication						
▶ Communication						
Topology						

Name	Topology	_	_
Log in			
). Chard an an	Graphic view	Table view	Status overview
 Start page 			
► Diagnostics	⊻ ₀ s715	00/ET200	
Diagnostic Buffer			
Module information			
▶ Alarms			
▶ Communication			
► Topology			

 \rightarrow Values of the individual tags can be displayed under 'Tag status'.

 $(\rightarrow \text{Tag status})$

Name Log in	Tag status		
	Enter the address of a tag here whi	ich you want to monitor	
Start page	Address	Display format	Value
	-КО	Bin 💌	2#0
Diagnostics	-A1	BOOL	FALSE
Diagnostic Buffer	New variable	•	
Module information	Apply		
▶ Alarms			
▶ Communication			
► Topology			
► Tag status			

→ 'Tag tables' that are linked with the web server, such as the 'Watch table_Cylinder', can also be displayed.

 $(\rightarrow \text{Tag tables} \rightarrow \text{Watch table_Cylinder})$

Name	Watch table	Watch tables					
Log in	Watch table_C	ylinder 💌					
	Watch table_C	Sylinder					
Start page	Name	Address	Format	Value			
	"-B1"	%E0.5	BOOL	FALSE			
Diagnostics	"-B2"	%E0.6	BOOL 🔻	FALSE			
b Disessetia Duffee	"-M2"	%A0.3	BOOL	FALSE			
Diagnostic Butter							
Module information							
► Alarms							
Communication							
r communication							
▶ Topology							
▶ Tag status							
Watch tables							

→ Individually created pages for the visualization and also for operator control of processes would be seen under 'Customer pages'.

 $(\rightarrow \text{Customer pages})$

Name		Customer pages
	Log in	
▶ Start page		The page is not available.
Diagnostics		
Diagnostic Buffer		
Module informatio	n	
▶ Alarms		
► Communication		
▶ Topology		
▶ Tag status		
• Watch tables		
Customer pages		

- → Data can be stored directly on the memory card in the CPU or loaded from there using the 'Filebrowser'.
 - $(\rightarrow$ Filebrowser)

Name	Filebrowser				
Log in					
	I				
 Start page 	Name	Size	Changed	Delete	Rename
	LOG	32768	12:25:42 pm 07/19/2015		
 Diagnostics 	crdinfo.bin	512	12:25:42 pm 07/19/2015		
► Diagnostic Buffer					
	Directory operations:				
Module information			<u> </u>		
▶ Alarms	Search No I	File selected.	Upload file		
► Communication					
▶ Topology					
▶ Tag status					
▶ Watch tables					
▶ Customer pages					
Filebrowser					

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→ This means, for example, that you can read and edit the log files written by the CPU without having to use the TIA Portal. (→ DataLogs)

			12	:40:57 am	01/01/2012	English	-
Name	DataLogs						
Log in						2 <u>Off</u>	<u>-</u>
	Name	Size	Changed	Retrieve	and clear		
▶ Start page	No entries currently available						
▶ Diagnostics							
▶ Diagnostic Buffer							
▶ Module information							
▶ Alarms							
► Communication							
► Topology							
► Tag status							
▶ Watch tables							
► Customer pages							
▶ Filebrowser							
► DataLogs							

7.9 Diagnostics for the S7-1500 via the integrated display

→ The user also has the ability to call up a variety of diagnostic information via the display. For example, the alarm texts generated by the system diagnostics can be displayed in the 'Diagnostics' menu under 'Alarms'.

 $(\rightarrow \text{Diagnostics} \rightarrow \text{Alarms})$



7.10 Checklist

No.	Description	Completed
1	Project 032-410_Basics_Diagnostics_2 successfully retrieved.	
2	Web server for the CPU 1516F from project 032-410_Basics Diagnostics_2 successfully configured.	
3	Display for the CPU 1516F from project 032-410_Basics Diagnostics_2 successfully configured.	
4	System diagnostics for the CPU 1516F from project 032- 410_Basics Diagnostics_2 successfully configured.	
5	Diagnostics of the supply voltage for the analog output module activated.	
6	CPU 1516F from project 032-410_Basics Diagnostics_2 successfully downloaded.	
7	Power supply disconnected from analog output module.	
8	Display of alarm text from the system diagnostics in the alarm display of the TIA Portal.	
9	Display of the alarm text from the system diagnostics via the web server of the CPU 1516F.	
10	Display of the alarm text from the system diagnostics on the display of the CPU 1516F.	

8 Additional information

You can find additional information as an orientation aid for initial and advanced training, for example: Getting Started, videos, tutorials, apps, manuals, programming guidelines and trial software/firmware, at the following link:

www.siemens.com/sce/s7-1500