

Industry Online Support

NEWS

2

# System Diagnostics with S7-1500 and TIA Portal

TIA Portal

https://support.industry.siemens.com/cs/ww/en/view/68011497

Siemens Industry Online Support



## Legal information

#### Use of application examples

Application examples illustrate the solution of automation tasks through an interaction of several components in the form of text, graphics and/or software modules. The application examples are a free service by Siemens AG and/or a subsidiary of Siemens AG ("Siemens"). They are non-binding and make no claim to completeness or functionality regarding configuration and equipment. The application examples merely offer help with typical tasks; they do not constitute customer-specific solutions. You yourself are responsible for the proper and safe operation of the products in accordance with applicable regulations and must also check the function of the respective application example and customize it for your system.

Siemens grants you the non-exclusive, non-sublicensable and non-transferable right to have the application examples used by technically trained personnel. Any change to the application examples is your responsibility. Sharing the application examples with third parties or copying the application examples or excerpts thereof is permitted only in combination with your own products. The application examples are not required to undergo the customary tests and quality inspections of a chargeable product; they may have functional and performance defects as well as errors. It is your responsibility to use them in such a manner that any malfunctions that may occur do not result in property damage or injury to persons.

#### **Disclaimer of liability**

Siemens shall not assume any liability, for any legal reason whatsoever, including, without limitation, liability for the usability, availability, completeness and freedom from defects of the application examples as well as for related information, configuration and performance data and any damage caused thereby. This shall not apply in cases of mandatory liability, for example under the German Product Liability Act, or in cases of intent, gross negligence, or culpable loss of life, bodily injury or damage to health, non-compliance with a guarantee, fraudulent non-disclosure of a defect, or culpable breach of material contractual obligations. Claims for damages arising from a breach of material contractual obligations shall however be limited to the foreseeable damage typical of the type of agreement, unless liability arises from intent or gross negligence or is based on loss of life, bodily injury or damage to health. The foregoing provisions do not imply any change in the burden of proof to your detriment. You shall indemnify Siemens against existing or future claims of third parties in this connection except where Siemens is mandatorily liable.

By using the application examples you acknowledge that Siemens cannot be held liable for any damage beyond the liability provisions described.

#### Other information

Siemens reserves the right to make changes to the application examples at any time without notice. In case of discrepancies between the suggestions in the application examples and other Siemens publications such as catalogs, the content of the other documentation shall have precedence.

The Siemens terms of use (https://support.industry.siemens.com) shall also apply.

#### Security information

Siemens provides products and solutions with Industrial Security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the Internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place. For additional information on industrial security measures that may be implemented, please visit <a href="https://www.siemens.com/industrialsecurity">https://www.siemens.com/industrialsecurity</a>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed at: <u>https://www.siemens.com/industrialsecurity</u>.

# **Table of contents**

Lega	Legal information2							
1	Introdu	ction	5					
	1.1 1.2 1.2.1 1.2.2 1.3	Overview Mode of operation Solution Overview Description of the core functionality Components used	5 6 7 8					
2	Core To	ppics of this Application	9					
	2.1 2.2 2.3 2.3.1 2.3.2 2.3.3 2.3.4 2.3.5 2.3.6 2.4 2.5 2.5.1 2.5.2 2.5.3 2.6 2.7	Diagnostics with LEDs Diagnostics with the display in the CPU S7-1500 Diagnostics in the TIA Portal Diagnostics of the hardware in the device and network view Diagnostics in the topology view Diagnostics in the project navigation Diagnostics in the project navigation Diagnostics in the Diagnostics buffer Diagnostics in the Diagnostics buffer Diagnostics in the Task Card "Online tools" Diagnostics with the web server Diagnostics with the system diagnostics display in the HMI Basics Views of the system diagnostics System diagnostics indicator Diagnostics with alarm view / alarm window in the HMI System diagnostics with the user program	9 10 10 13 14 15 16 17 19 26 26 26 28 29 30					
3	Configu	Iration and Settings	31					
	3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 3.10 3.11 3.12 3.12.1 3.12.2 3.12.1 3.12.2 3.12.3 3.12.4 3.12.5	Configuration of the systems diagnostics Configure diagnostic settings of the module DQ32 Configure diagnostic settings of the module DI32 Configure topology Configure the web server of the CPU Configure system diagnostics view in the HMI. Configure system diagnostics window in the HMI. Configure System diagnostics indicator Configure the alarm view Configure the alarm view Configure the alarm window Configure the alarm indicator. Configure system diagnostics with user programs Instruction "LED" Instruction "Device States" Instruction "GET_NAME" Instruction "ModuleStates" Instruction "GET_DIAG"	31 32 33 34 35 36 37 38 39 40 41 42 44 44 45 46 46					
4	Operati	ng the Application	47					
	4.1 4.2 4.2.1 4.2.2 4.2.3 4.3 4.3.1 4.3.2 4.3.3	Diagnostics with LEDs Diagnostics with the display in the CPU S7-1500 Diagnostics menu: Alarms Diagnostics menu: Diagnostic buffer The "Modules" menu Diagnostics in the TIA Portal Diagnostics of the hardware in the device and network view Diagnosis in the topology view Diagnosis in the project navigation	47 47 48 50 52 52 53 54					

5 6

4.3.4	Diagnostics in the inspection window	55
4.4	Diagnostics with the Web server	57
4.4.1	Login at the web server / website "Start page"	57
4.4.2	Website "Diagnostic buffer"	58
4.4.3	Website "Module information"	58
4.4.4	Website "Alarms"	59
4.4.5	Website "Topology"	59
	4.4.5.1 1 <sup>st</sup> fault scenario: Missing supply voltage	59
	4.4.5.2 2 <sup>nd</sup> fault scenario: Faulty interconnection of the port	61
4.5	Diagnostics with the system diagnostics display in the HMI	63
4.6	Diagnostics with the System diagnostics indicator and the	
	system diagnostics window in the HMI	64
4.7	Diagnostics with alarm view in the HMI	65
4.8	Diagnostics with alarm indicator and alarm window in the HMI	65
4.9	System diagnostics with the user program	66
4.9.1	Diagnostic information "LED"	66
4.9.2	Diagnostic information "DeviceStates"	66
4.9.3	Diagnostic information "GET_NAME"	67
4.9.4	Diagnostic information "ModuleStates"	67
4.9.5	Diagnostic information "GET_DIAG"	68
Basics		69
Appendi	ix	71
6.1	Service and support	71
6.2	Links and literature	72
6.3	Change documentation	72

# 1 Introduction

### 1.1 Overview

### Introduction

In the automation technology, diagnostics of devices, modules and networks is gaining importance. Diagnostics over the whole system can minimize downtimes. In the SIMATIC environment the complete diagnostics are summarized as system diagnostics.

### Overview of the automation task

The Figure below provides an overview of the automation task.

S7-1500 Alarm MI CPU Display Fault Fault

Figure 1-1: Overview of the automation task

### Description of the automation problem

The automation task consists of monitoring a PROFINET IO peripheral system with various network components. The possibility of an individual diagnosis of the components and a detailed diagnosis of the complete system should be guaranteed. The priority is on the collection and display of the diagnostic information.

### Requirements of the automation task

- Configuration and setting possibilities of the devices and modules
- Evaluation and display of the diagnostic data in the engineering tool
- · Evaluation and display of the diagnostic data directly in the controller
- Display of the diagnosis data in an operating panel
- Website access to diagnostic data
- Diagnostics of the topology (combining the devices in a network)
- Consistency of the system diagnostics

### 1.2 Mode of operation

### 1.2.1 Solution Overview

### Uniform display concept

The integrated system diagnostics of S7-1500 offer the following functions:

- All clients of a system are supplied with diagnostic information through a uniform mechanism.
- Independent of the display medium, the same system diagnostic information is used.
- System diagnostics are also possible in STOP.

Figure 1-2: Overview overall solution



- 1. The device detects a fault and sends diagnostic data to the assigned CPU.
- 2. The CPU informs the connected display media. The display of the system diagnostics is refreshed.

### Delimitation

- This application does not contain a complete discussion of all diagnostic possibilities provided by S7-1500.
- The programmed code does not cover every possible fault. The extension of the present code by the user is therefore possible and necessary.

### 1.2.2 Description of the core functionality

### **Consistent system diagnostics**

In addition to the status display of the devices with LEDs, the diagnostic data are also sent to the assigned CPU. The CPU reports the faults to the following diagnostic media:

- TIA Portal
- CPU web server
- CPU display
- HMI devices

The diagnostic information is supplied in a uniform display form all over the system.

### **Diagnostic possibilities**

In the application the possibilities for system diagnostic information is demonstrated with the example of a missing supply voltage L+ at the module DQ32.

The diagnosis of the topology is demonstrated with the faulty interconnection of the ports.

The diagnosis with the user program is described with the example of a missing supply voltage L+ in the module DI32 of an IO-device.

### 1.3 Components used

This application example has been created with the following hardware and software components: Table 1-1

Component	No.	Order number	Note
PM 1507 LC	1	6EP1332-4BA00	Alternatively, a different power supply can also be used.
CPU 1516F-3 PN/DP	1	6ES7 516-3FN01-0AB0	Alternatively, a different CPU S7-1500 can also be used.
SIMATIC Memory Card	1	6ES7954-8LF03-0AA0	24 MB
DI32	2	6ES7521-1BL00-0AB0	Diagnostics can be configured
DQ32	2	6ES7522-1BL00-0AB0	Diagnostics can be configured
IM 155-5 PN ST	1	6ES7155-5AA00-0AB0	-
SCALANCE X208	1	6GK5208-0BA10-2AA3	-
TP1200 Comfort	1	6AV2124-0MC01-0AX0	-
PG/PC mit Ethernet- Schnittstelle	1	-	Customary PC with operating system Windows
IE FC TP STANDARD CABLE	1	6XV1840-2AH10	IE connection Minimum order quantity 20m
RJ45 Steckverbinder	8	6GK1901-1BB10-2AA0	Can be finished
STEP 7 Professional V16 Update 1	1	6ES7822-1A.06	-
SIMATIC WinCC V16 Update 1	1	6AV2106-0	-

This application example consists of the following components: Table 1-2

Component	File name	Note
Documentation	68011497_S7-1500_Diagnose_DOC_v20_en.pdf	-
STEP 7 Project	68011497_S7-1500_Diagnose_CODE_v20.zip	-

## 2 Core Topics of this Application

### 2.1 Diagnostics with LEDs

Most of the modules of the SIMATIC family have an LED status and fault display in the housing. Depending on the status and/or fault one or more LEDs light up. The meaning of individual LEDs or the combination of several LEDs is different for every module.

**Note** Please find more information about the meaning of the LED display in the manual of the respective module.

### 2.2 Diagnostics with the display in the CPU S7-1500

The S7-1500 display provides a large variety of diagnostic possibilities. In the menu "Diagnostics" you can directly read out the information in the diagnostic buffer or have the pending diagnostics messages displayed. In the menu "Module", the module status is displayed symbolically.

Figure 2-1: Diagnostics message in the display of the CPU



### 2.3 Diagnostics in the TIA Portal

### 2.3.1 Diagnostics of the hardware in the device and network view

In addition to the diagnostics in the hardware, STEP 7 provides the "Online" view. When the online connection to a device, is built up, its diagnostics status and the diagnostics status of its subordinate component, if any, is also determined. If there is a fault or an error in a module and if there is diagnostic information, the status of the faulty module is displayed by means of diagnostic symbols.

### **Diagnostic symbols**

Diagnostic symbols make trouble-shooting easier. If a module has no faults, a green symbol for "no fault" is displayed. But if there is a fault event, the respective symbol for this kind of fault is displayed.

Please find a description of the diagnostic symbols for modules and devices and their meaning in the TIA Portal online help.

lcon	Meaning						
<b>-</b> -7	The connection with a CPU is currently being established.						
8	The CPU is not reachable at the set address.						
2	The configured CPU and the CPU actually present are of incompatible types.						
<b>a7</b>	On establishment of the online connection to a protected CPU, the password dialog was terminated without specification of the correct password.						
<b>~</b>	No fault						
Ŷ	Maintenance required						
ę	Maintenance demanded						
Ŷ	Error						
	The module or device is deactivated.						
	The module or the device cannot be reached from the CPU (valid for modules and devices below a CPU).						
0101	<ul> <li>The functionality of the module or submodule is no longer available (for example. input and output data). Possible causes:</li> <li>Difference between expected and actual configuration.</li> </ul>						
	Access error during updating the process images.						
D!	<ul> <li>Diagnostics not or only partially possible. Possible causes:</li> <li>Difference between actual online and offline configuration data.</li> <li>You have not executed the command "Compile" for the hardware.</li> <li>You have not executed the command "Download to device" for the hardware or the hardware configuration.</li> <li>The object does not support diagnostics.</li> </ul>						
2	The connection is established, but the module status has not yet been						
- F	determined or is unknown.						

Table 2-1: Diagnostic icons for modules and devices

lcon	Meaning
$\otimes$	The configured module does not support display of the diagnostics status.
0	Hardware error in lower-level component: A hardware fault has occurred in at least one lower-level hardware component (occurs as a separate icon only in the project tree).

#### Diagnostic information in the network view

In the network view, the status of the devices connected online is displayed symbolically. The network view provides an overview of the current status of the devices and of your system. Double-click on the device to go to the device view.

Figure 2-2: Diagnostic information in the network view



### Diagnostic information in the device view

In the device view, the status of the devices connected online, is displayed symbolically. The device view provides an overview of the current status of the devices and of your system. Double-click on the diagnostic symbol of a module to go to the diagnostics view of a module directly.

Figure 2-3: Diagnostic information in the network view



### Diagnostic information in the diagnose view

The diagnose status of a module is displayed in the folder "Diagnostics > Diagnostic status". The "Diagnostic status" is divided into the windows:

• Status (Status)

Here, the status is displayed from the view of the CPU and the difference between configured and connected modules is displayed.

#### • Standard diagnostics

In this window, the fault of the module is displayed.

#### Figure 2-4: Diagnostic information in the diagnostics view

0_Diagnose + PLC_1 [CP	U 1516F-3 PN/DP] > Local modules > DQ 32x24VDC/0.5A ST_1 _	·₽≡×
✓ Diagnostics General Diagnostic status Channel diagnostics	Diagnostic status	
▶ Functions	Module exists. Error Standard diagnostics	
	Message	
	Help on selected diagnostics row	
	There is no encoder or load supply voltage. Solution: Check the wiring of the encoder or load power supply. Correct the wiring error. Check to see if the power supply is switched on.	<

### 2.3.2 Diagnostics in the topology view

The online topology offers following diagnostic possibilities:

- The status of the devices is displayed symbolically.
- Faults of the subordinate components are displayed by additional diagnose symbols in the right lower corner of the device diagnose symbols.
- The states of the ports are displayed in different colors.
- The status of the line between two ports is displayed in color.

Figure 2-5: Diagnostics in the topology view

S7-1500_Diagnose > Devices & networks 📃 🖬 🗮 🗙							
	🚽 Topology view	🛗 Network view	Device view				
🕎 🖶 🔳 🖽 🔟 🗟 Ŧ			=				
			^				
			=				
	HMI_1 TP1200 Comfort						
	Switch 1	🔁 et200mp					
CPU 1516F-3 PN	SCALANCE X208	IM 155-5 PN ST					
	PLC_1	PLC_1					
	I						
			~				

### 2.3.3 Diagnosis in the project navigation

With the project navigation you have a quick and easy access to all the components in your project. If there is an online connection to a device, the following diagnostic status is automatically displayed symbolically in your project navigation.

- The status of the devices is displayed symbolically.
- Faults of the subordinate components are displayed by additional diagnose symbols in the right lower corner of the device diagnose symbols.
- For hardware components with their own operating modes, the operating mode is displayed in color in the right top corner of the hardware symbol.

Double-click on the diagnostic symbol of the respective hardware component to go to the diagnostics view of a component directly.

You can also start the function "Online & diagnostics" of the device (PLC\_1) directly from the project navigation.

Figure 2-6: Diagnostics in the project navigation

Project tree			4
Devices			
		1.	3
			_
▼ 🗖 S7-1500 Diagnose	0	•	
Add new device	Ĩ		
🚠 Devices & networks			
▼ 1 PLC_1 [CPU 1516F-3 PN/DP]	2	•	
Device configuration			
🗓 Online & diagnostics			
Software units			
💌 🙀 Program blocks		•	
📑 Add new block			
📲 Main [OB1]		•	
🥃 DiagDB [DB1]		•	
🕨 🔙 System blocks		•	
🕨 🚂 Technology objects			≡
🕨 📴 Energy objects			
🕨 🔙 External source files			
🕨 🚂 PLC tags		۲	
🕨 🛅 PLC data types		۲	
🕨 🥅 Watch and force tables			
🕨 📴 Online backups			
🕨 🔄 Traces			
🕨 🌆 OPC UA communication			
🕨 🎆 Device proxy data			
📴 Program info			
🖙 PLC supervisions & alarms			
🔄 PLC alarm text lists			
🕨 🔄 Online card data			
Local modules	0		
📜 PLC_1 [CPU 1516F-3 PN/DP]	Ŷ		
DI 32x24VDC HF_1	$\checkmark$		
DQ 32x24VDC/0.5A ST_1	Ŷ		
▼ 🛄 Distributed I/O	~		
PROFINET IO-System (100): PN/IE_1	$\sim$		
🗯 et200mp [IM 155-5 PN ST]	~		
🐜 Switch_1 [SCALANCE X208]	$\checkmark$		

### 2.3.4 Diagnostics in the inspection window

In the tab "Diagnostics" of the inspection window, you get diagnostic information in the following subordinate tabs in form of a table.

### Tab "Device-information"

In the "Device information" tab, the following information of the devices connected online are displayed.

- Online status
- Operating mode
- Device/module
- Connection established via...
- Message
- Details: contains a link to the diagnostics view of the device
- Help: contains a link to the online help for more information about the message Figure 2-7: Device Information tab

						🖳 Properties 🚺	Info 追 🖔 Diagnostics		
Γ	Device information Connection information Alarm display								
Γ	1 Device with problems								
Y	Onlin	🚡 Орег	Device/module	Connection establi	Message	Details	Help		
9	Error	💷 RUN	PLC_1	Direct	Error	For more detailed information, refer to device diagnostics.	?		

### Tab "Connection information"

The "Connection information" tab provides an overview of the connection resources of the device.

Abbildung 2-8: Connection information tab

					🔍 Properties	🛄 Info	追 🗓 Diagn	ostics	
Device information	Connection information Ala	rm display	]						
Connection resources									
				Station resourc	es		Module r	esources	
			Reserved		Dyna	mic	CPU 1516F-3	PN/DP (R0/S.	
	Maximum number of resources:		10	10	118	118	128	128	
		Maximum	Configured	Used	Configured	Used	Configured	Used	
	PG communication:	4		2		0	-	2	
	HMI communication:	4	2	0	0	0	2	0	
4	S7 communication:	0	-	0	0	0	0	0	
	Open user communication:	0		0	0	0	0	0	
•	Web communication:	2		0		0		0	
	OPC UA client/server communicat	0		0		0		0	
	Other communication:	-	-	0	0	0	0	0	
	Total resources used:		2	2	0	0	2	2	
	Available resources:		8	8	118	118	126	126	

### Tab "Alarm display"

In the "Alarm display" tab the event texts of the devices are listed with Source, Date, Time, Status, Acknowledge, Alarm class name, Event text, Help and Info text. The Status displays whether it is a coming, going or acknowledged alarm.

riguie	5 2-3. Alam	n uispiay	lab

								🔍 Properties 🛛 🏹	Info 追	🙆 Diagnostics	
[	Device informa	tion	Connection info	rmation	Alarm dis	play					
đ	Current alarms	🔄 Alarm i	archive 🔍 🔡	Receive alarr	ns: PLC_1 [C	PU 1516F-3	PN/DP] 💌 🔝 🚮 Fr	eeze alarms		🥪 A	cknowledge
	Source	Date	Time	Status	Acknowledge	Alarm cl	Event text		Help	Info text	
2	× * 🔹	*	• • •	* 💌	*	*	*	-	-	*	-
1	PLC_1 [CPU	7/15/2020	11:49:12:454 AM	Incoming	-	NA	Error: Supply voltage miss	ing PLC_1 / DQ 32x24V		Short name: DQ 32x2e	4VDC/0.5A

### 2.3.5 Diagnostics in the Diagnostics buffer

Each CPU and some other modules have their own diagnostics buffer, in which detailed information on all diagnostic events is entered in the order in which they occurred.

The diagnostics buffer is used as a log file for the diagnostics events that occurred on the CPU and the modules assigned to it. These are entered in the order of their occurrence, with the latest event shown at the top.

The entries available in the diagnostics buffer include:

- Internal and external errors on a module
- System errors in the CPU
- Operating mode transitions (e.g., from RUN to STOP)
- Errors in the user program
- Removal/insertion of modules
- Security events

To display the diagnostics buffer of a CPU in TIA Portal, first establish an online connection to the CPU and start the "Online & Diagnostics" function of the CPU directly from the project tree. In the "Diagnostics" folder, select the "Diagnostics buffer" subfolder.



	Diagnostics buffer	
Diagnostics	Diagnostics building	
General	Events	
Diagnostic status		
Diagnostics buffer	🛃 Display CPU Time Stamps i	n PG/PC local time
Cycle time		
Memory	No. Date and time	Event
Display	1 7/15/2020 11:49:	18.873 AM Communication initiated request: WARM RESTART - CPU changes fro
▶ OPCUA	2 7/15/2020 11:49:	18.845 AM Communication initiated request: WARM RESIARI - CPU changes fro
<ul> <li>PROFINET interface[X1]</li> </ul>	3 7/15/2020 11:49:	12.454 AM Supply voltage missing
<ul> <li>PROFINET interface[X2]</li> </ul>	4 7/15/2020 11:49:	10.548 AM Supply voltage missing
<ul> <li>Virtual communication in</li> </ul>	5 7/15/2020 11:49:	10.135 AM Communication initiated request: STOP - CPU changes from RUN to 20
Functions	6 7/15/2020 11:45:	24.466 AM Communication initiated request: WARM RESTART - CPU changes fro 🗹 🚺
	7 7/15/2020 11:45:	24.439 AM Communication initiated request: WARM RESTART - CPU changes fro 🗹 🚺
	8 7/15/2020 11:44:	48.024 AM Communication initiated request: STOP - CPU changes from RUN to 🗹 🚺
	9 7/15/2020 11:42:	51.426 AM Supply voltage missing 🔛 😭 😭
	Freeze display	
	Details on event:	
	Detaile an averation	
	Details on event:	3 01 554 EVENTID: 16# 08:0011
	Module:	PLC_1 / DQ 32x24VDC/0.5A ST_1.DQ32
	Rack/slot:	Rack 0 / Slot 3
	Description:	Error: Supply voltage missing
•		PLC_1 / DQ 32x24VDC/0.5A ST_1.
	Hele on events	There is no encoder or load supply voltage
	Help on event:	Solution: Check the wiring of the encoder or load power supply. Correct the wiring error.
		Check to see if the power supply is switched on.
	Plant designation:	

The "Details on event" area shows detailed information about the event. Clicking the "Open in editor" button opens the device view of the module concerned or the referenced block in the offline view at the point in the program that caused the error.

In the "Settings" area, you can filter diagnostic buffer entries to only display certain types of events.

### 2.3.6 Diagnostics in the Task Card "Online tools"

For modules with their own operating mode (such as CPUs), the "Online tools" task card allows you to read current diagnostics information and commands to the module.

### "CPU operator panel" pane

This area contains the following displays:

- Station name and CPU type (short designation)
- RUN / STOP (corresponds to the "RUN / STOP" LED of the CPU)
- ERROR (corresponds to the "ERROR" LED on the CPU)
- MAINT (corresponds to the "MAINT" LED on the CPU)

### "Cycle time " pane

The "Cycle time" pane displays the cycle time diagram and below it the measured cycle times as absolute values.

The following measured cycle times are displayed in the cycle time diagram:

- Shortest cycle time: Duration of the shortest cycle since the last transition from STOP to RUN.
- Current / last cycle time: Duration of the last cycle.
- Longest cycle time: Duration of the longest cycle since the last transition from STOP to RUN.

### "Memory" pane

This area contains the current memory utilization of the associated module. The available memory is shown both as a bar diagram and as a numerical value (percentage). The numerical value is rounded to an integer value.

The following memory utilizations are shown:

- Load memory The load memory is located on the SIMATIC memory card.
- Code work memory:
   work memory for program code
- Data work memory: work memory for data blocks
- Retentive memory

To display the operating status of a CPU in TIA Portal, you first have to establish an online connection to the CPU.

Online tools 🛛 🖬 🖬 🕨	
Options	<b>Q</b> .
	P.
✓ CPU operator panel	line
	đ
PLC_1 [CPU 1516F-3 PN/DP]	5
RUN/STOP RUN	
ERROR STOP	H
MAINT MRES	aska
	<i>•</i>
Mode selector: KUN	
	Libi
	rarie
	S.
✓ Cycle time	╞
	Ado
	l-ina
	<i>"</i>
, ms	
1.039 150	
Shortesti 1 012 mg	
Current/last: 1.039 ms	
Longest: 4.205 ms	
Memory	
Load memory	
Free:95%	
Work memory code	
Free:99.53 %	
Work memory data	
Free:99.97 %	
Retain memory	
Free:100 %	

Figure 2-11: Task Card "Online tools"

### 2.4 Diagnostics with the web server

With the web server you have the possibility of monitoring the CPU via the Internet or the corporate Intranet. Evaluations and system diagnostics over great distances and from anywhere where there is an Internet access, become possible.

In addition to general information, the web server of the CPU offers the following diagnostics:

- Start page
- Diagnostics
- Diagnostic buffer
- Module information
- Alarms
- Topology

#### Start page

On the website "Start page", the representation of the CPU with LEDs shows the current status of the CPU. The "Status" window contains information about the operating mode and the status of the CPU.

Figure 2-12: Start page website

SIEMENS	S7-1500 station_1/PLC_1				
		12:35:21 pm	07/15/2020	PLC local time (UTC +01:00	)) 🗸 English 🗸
User name Log in	PLC_1				C <u>of</u> 🛎
→ Start page		General			
<ul> <li>Diagnostics</li> </ul>	SIEMENS SIMATIC	Project name:	S7-1500_Diag	inose	
Diagnostic Buffer	S7-1500	TIA Portal:	V16		
Motion control diagnostics	CPU 1516F-3 PN/DP	Step 7 Safety:			
· Modern control alognostics		Station name:	S7-1500 statio	in_1	
<ul> <li>Module information</li> </ul>	11 N N N	Module name:	PLC_1		
► Alarms		Module type:	CPU 1516F-3	PN/DP	
Communication		Statuo			
Topology	6ES7 518-3FN01-0AB0	Operating Mode:	RUN		
, lopology		Status:	C Error		
<ul> <li>Tag status</li> </ul>		Mode selector:	RUN		
<ul> <li>Watch tables</li> </ul>					
▶ Trace		Fail-safe:			
▶ DataLogs	ESC OK	Safety mode:			
<ul> <li>User Files</li> </ul>		Collective F-signature:			
• User Files		Last fail-safe modification:			
<ul> <li>User-defined pages</li> </ul>		incatori.			
<ul> <li>Filebrowser</li> </ul>		CPU operator panel:			
▶ Introduction			RUN STO Flash L	N P EDs	

### Diagnostics

The "Diagnostics" web page provides more information about the tabs:

- Identification: This tab contains the characteristics of the CPU (serial number, article number, hardware and firmware version, etc.).
- Program protection: This tab provides information on whether the PLC program contains know-how protection or copy protection.
- Memory: This tab contains current values on the memory currently in use.
- Runtime information: Current information on program/communication load and cycle time can be found in this tab.
- Fail-safe (only with an F CPU)

#### Figure 2-13: Diagnostics website

SIEMENS	S7-1500 station_1/	PLC_1				
		12:46:58 pm	07/15/2020	PLC local time (UTC +01:00)	✓ English	~
User name Log in	Diagnostics					=
▶ Start page	Identification Program pr	otection Memory Runtime information F	ail-safe	_		
▶ Diagnostics	Identification:					
▶ Diagnostic Buffer	Location identifier:					
Motion control diagnostics	Serial number:	S C-F8SA04042015				
<ul> <li>Module information</li> </ul>	Order number:					
► Alarms	Hardware:	6ES7 516-3FN01-0AB0				
Communication	Version					
<ul> <li>Topology</li> </ul>	Hardware:	10005				
▶ Tag status	Firmware:	R 2.8.0_30.50				
<ul> <li>Watch tables</li> </ul>	Bootloader:	V 2.2.1				
► Trace	Development Info:					
▶ DataLogs	Internal FW Version:	R28.30.50				
	Developer:					
<ul> <li>User Files</li> </ul>	View Name:	s7pcpu				
<ul> <li>User-defined pages</li> </ul>	Build Time FW:	2019-10-09 12:37:54				
▶ Filebrowser	PCB Number:	not supported				
	Product Name:	CPU 1516F-3 PN/DP				
	MiniWeb Core Version:	V5.4.3				
<ul> <li>Introduction</li> </ul>						

### **Diagnostic buffer**

You can read out the entries in the diagnostic buffer without an engineering tool from the website "Diagnostic buffer". In the "Details" window, the detailed information of a selected event is displayed.

Figure 2-14: Diagnostic buffer website

				12:48:3	37 pm 07/15/2020	PLC local time (UTC +01:00)	✓ English	
sername	Diagno	stic Buffer						
Log in	Diagnost	ic buffer entries 1-	50 🗸				🔠 🞜 <u>Off</u>	=
	Number	Time	Date	Status	Event			
Start page	1	12:34:31.108 pm	07/15/2020	outgoing event	Diagnostics availa	able and is being processed		
Diagnostics	2	12:34:31.106 pm	07/15/2020	incoming event	Error on partner -	No neighbor could be detected		
Diagnostic Buffer	3	12:34:31.085 pm	07/15/2020	incoming event	Diagnostics availa	able and is being processed		
Notion control diagnostic:	4	12:34:31.084 pm	07/15/2020	outgoing event	IO device failure -	(pending faults indicated)		
Andule information	5	12:34:24.587 pm	07/15/2020	outgoing event	Error on partner -	No neighbor could be detected		
	6	12:34:24.573 pm	07/15/2020	incoming event	Error on partner -	Wrong partner port		
Alarms	7	12:34:05.525 pm	07/15/2020	incoming event	IO device failure -	IO device not found		
Communication	8	12:34:05.525 pm	07/15/2020	outgoing event	IO device failure -	Watchdog time expired		
lopology	9	12:34:02.032 pm	07/15/2020	incoming event	Error on partner -	No neighbor could be detected		
Fag status	10	12:34:02.018 pm	07/15/2020	incoming event	IO device failure -	Watchdog time expired		
Watch tables	11	12:21:57.127 pm	07/15/2020	incoming event	Communication in from STARTUP to	nitiated request: WARM RESTART RUN mode	- CPU changes	
Frace	12	12:21:55.933 pm	07/15/2020	incoming event	Communication in from STOP to STA	nitiated request: WARM RESTART RTUP mode	- CPU changes	
DataLogs	13	12:21:53.467 pm	07/15/2020	incoming event	Supply voltage mi	ssing		
loor Filos	14	12:21:51.657 pm	07/15/2020	outgoing event	Supply voltage mi	ssing		
JSELFIRS	15	12:21:51.228 pm	07/15/2020	incoming event	Communication in STOP mode	nitiated request: STOP - CPU cha	nges from RUN to	
Jser-defined pages	Details: 13	3					Event ID: 16#	¢ 08
Filebrowser	Error: Sup PLC_1 / D	ply voltage missing Q 32x24VDC/0.5A	) BT_1.					

### **Module information**

The website "Module information" displays symbols to show whether the components of a station are OK or whether there is a fault. Click to the links of the components to navigate to the detailed information about the fault. The display of the module levels above the table is taken into account. With this link, you can go directly to the higher module level.

Figure 2-15: Module information website

SIEMENS	S7-1500 st	ation_1/PLC_1					
				12:52:00 pm 07/15/2020	PLC local time (UTC +01:00)	✓ English	n 🗸
User name Log in	Module inf	ormation				<mark>8</mark> <u>Of</u>	( 🛎
	Module informat	tion				Search in	table
Istart page	Status	Name		Gateway	Comment		
<ul> <li>Diagnostics</li> </ul>		S7-1500 station 1	Details				
▶ Diagnostic Buffer	0	PROFINE LID-aystem	Details				
Motion control diagnostics	i						
Module information							
► Alarms							
Communication							
▶ Topology							
▶ Tag status							
<ul> <li>Watch tables</li> </ul>							
▶ Trace							
▶ DataLogs							
▶ User Files	✓ Identifi	cation					•
<ul> <li>User-defined pages</li> </ul>							
<ul> <li>Filebrowser</li> </ul>							

Figure 2-16: Detail view DQ 32 website

SIEMENS	S7-1	500 station_	1/PLC_1							
				12:56:4	1 pm 07/15/2020	PLC local time (UTC -	H01:00) 🗸	English	~	
User name Log in	Mod	ule informati	on					<mark>C</mark> <u>Off</u>	3	
	Module i	ule information - 57-1500 station_1 Search in								
<ul> <li>Start page</li> </ul>	Slot	Status	Name		Order number	l address	Q address	Comme	ent	
<ul> <li>Diagnostics</li> </ul>	1		CPU proxy 1	Details	6ES7 516-3FN01-0A	80				
Diagnostic Buffer	2		DI 32824VDC HF_1 DQ32	Details	6ES7 521-18L00-0A	B0 03 B0	03			
Motion control diagnostics     Module information     Alarms     Communication     Topology     Tag status     Watch tables	)									
<ul> <li>Trace</li> <li>DataLogs</li> </ul>										
User Files	∢ Status	Identification F	irmware						•	
<ul> <li>Filebrowser</li> </ul>	Error: PLC_1	Supply voltage mi 1 / DQ 32x24VDC/	issing /0.5A ST_1.							

### Alarms

Current messages are displayed chronologically in the website "Alarms". The window "Details on alarm number" provides you with detailed information about the selected alarm.

F	igure	2-17:	Alarms	website
---	-------	-------	--------	---------

SIEMENS	S7-1500	station_1/P	LC_1				
				12:58:58 pm 07/15/2020	PLC local time (UTC	+01:00)	✓ English ✓
User name Log in	Alarms Entries 1-	50 🗸					🛙 🗘 <u>off</u> 🛎
	AlarmNr.	Date	Time	Alarm text		Status	Acknowledgement
<ul> <li>Start page</li> </ul>	24	07/15/2020	12:21:53.467 pm	Error: Supply voltage missing PLC_1 32x24VDC/0.5AST_1.	/DQ	incoming	
<ul> <li>Diagnostics</li> </ul>	38	07/15/2020	12:34:24.573 pm	Error: Error on partner - Wrong partne Switch_1.Port_3	r port Switch_1 /	incoming	
<ul> <li>Diagnostic Buffer</li> </ul>	38	07/15/2020	12:34:31.106 pm	Error: Error on partner - No neighbor ( et200mp / et200mp.Port_1	could be detected	incoming	
Motion control diagnostic:	5						
<ul> <li>Module information</li> </ul>							
▶ Alarms							
Communication							
<ul> <li>Topology</li> </ul>							
<ul> <li>Tag status</li> </ul>							
<ul> <li>Watch tables</li> </ul>							
▶ Trace							
▶ DataLogs							
<ul> <li>User Files</li> </ul>							
<ul> <li>User-defined pages</li> </ul>	Details on	alarm number: 1	24	_	_		_
▶ Filebrowser	Error: Supp PLC_1 / DO	oly voltage missi 2 32x24VDC/0.5	ng AST_1.				
Introduction	incoming e	vent					

### Topology

The website "Topology" provides you with information about the topology and the status of the PROFINET devices in your system.

The following views are available:

- Graphic view
- Table view
- Status view

### Topology "Graphic view"

In the graphic view, you can choose between the "Set topology" and the "Actual topology". If a topology is configured, the status of the connections is displayed in colors in the "Set topology" as follows:

Table 2-2

Color of the connection	Status of the connection
green	The actual connection matches the configured one.
yellow	Diagnostics of the connection are not possible, for example because there is no connection.
red	The actual connection does not match the configured connection, for example because the ports were exchanged.

In the "Actual topology", the actual topology is determined. The connections are displayed in green.



SIEMENS	S7-1500 station_1/PLC_1	
	02:32:30 pm 07/15/2020 PLC local time (UTC +01:00) 👻 English	~
User name Log in	Topology     ● Set topology       PLC 1 [X1]▼     ○ Actual topology	Ĩ
▶ Start page	Sraphic view Table view Status overview	
Diagnostics	Sr1500/ET20 ScALANCE X	
▶ Diagnostic Buffer	P1 P2 P1	
Motion control diagnostics	P2 P3 P4	
Module information	PB	
▶ Alarms	P7	
Communication	РВ	
▶ Topology		
▶ Tag status		
<ul> <li>Watch tables</li> </ul>	et200mp IM 155-5 PN	
▶ Trace	P1 P2	

### Topology "Table view"

The "Table view" only shows the "Actual topology". In the first column of the table the status of the port and the module status are displayed symbolically.

Figure 2-19: Topology website - table view

SIEMENS	S7-1500 stat	ion_1/PLC_1						
			02:34:13 pm	07/15/2020	PLC local time	(UTC +01:00)	✓ English	~
User name	Topology PLC 1 [X1] ¥						<mark>2</mark> <u>of</u> f	3
	Graphic view Tab	le view Status ove	erview					
<ul> <li>Start page</li> </ul>	Port					Partner port		
	Status	Name	Module type		Port	Name	Port	
<ul> <li>Diagnostics</li> </ul>	L 🔛 🛛	plc 1	S71500/ET200MP station					
					port-001	switch 1	port-002	
<ul> <li>Diagnostic Buffer</li> </ul>					port-002	_		
	L 🖸 🗸	et200mp	IM 155-5 PN ST					
<ul> <li>Motion control diagnostics</li> </ul>					nort-001			
					port-002	switch 1	port-003	
<ul> <li>Module information</li> </ul>		switch 1	SCALANCE V208		pontoon		pontoco	
		Switch 1	BOADANOE A200		port 001			
► Alarms					port-001	nic 1	nort 001	
					port 002	ot200mn	port-002	
<ul> <li>Communication</li> </ul>					port-003	etzoonip	p01002	
					port-004	vmeitrain	nort-001	
Topology					port-005	viriolitalii	poreour	
					nort-007			
<ul> <li>Tag status</li> </ul>					port-008			
	2	vmeitrain						
<ul> <li>Watch tables</li> </ul>					port 001	cwitch 1	nort 005	
					poreout	Switch_1	μυτευυσ	

### Topology "Status overview"

In the "Status overview", the module status of the PROFINET devices is displayed with symbols. You get a quick overview of the faulty modules.

Figure 2-20: Topology website - status view

SIEMENS	S7-1500 station_1/PLC_1	
	02:36:30 pm 07/15/2020 PLC local time (UTC +01:00)	✓ English ✓
User name Log in	Topology PLC 1 [X1] V	😂 <u>on</u> 🛎
<ul> <li>Ctart page</li> </ul>	Graphic view Table view Status overview	
Diagnostics	D svitch_1 S71500/ET200 M 155-5 PN S D Svitch_1 SCALANCE X2	
Diagnostic Buffer		
Motion control diagnostics		
Module information		
▶ Alarms		
Communication		
▶ Topology		

- **Note** The two websites "Topology" and "Module information" are linked. When you click on the head of a configured module in one of the topology views, you go to this module in the "Module information" website immediately.
- **Note** For further information about website, please refer to <u>S7-1500 Web server</u> <u>Function Manual</u>.

# 2.5 Diagnostics with the system diagnostics display in the HMI

### 2.5.1 Basics

For displaying diagnostic information in the HMI, the TIA Portal provides two complete objects for a quick localization of the fault. These objects are only available on Comfort Panels.

#### System diagnostics display

The system diagnostics display provide you with a diagnostic overview of the status of all available devices in your system that can be diagnosed. In case of a fault, please navigate through the different views directly to the cause of the fault in the detailed view of the faulty module.

#### System diagnostics window

The window "System diagnostics" is not substantially different from the "System diagnostics display". The "System diagnostics window" can only be configured in the Global View. Therefore, there is an extra "window" area in the properties. Here you can choose whether the window can be closed.

### 2.5.2 Views of the system diagnostics

The diagnostics information is displayed in the system diagnostics display and in the system diagnostics window in different views.

#### **Device view**

In the device view, the status of all available devices of one level are displayed.

Figure 2-21: Device view of the system diagnostics display

System	n Diagnostics with S7-1500 a	and TIA Portal					Ξ
	Operator	•••• Date/Time •••• 7/15/2020 2	::35 PM	Language English		1	$\odot$
<mark>\$7-15</mark> 00	station_1						
Status	Name		Operatin	Slot	Туре	Address	
3	S7-1500 station_1				S71500/ET200MP	32*	
	CPU proxy_1			1	CPU 1516F-3 PN/DF	49*	
	PROFINET IO-Syste	em				260*	
	DI 32x24VDC HF_1			2	DI 32x24VDC HF	258*	
2	DQ32			3	DQ 32x24VDC/0.5	. 259*	
> Status							
Name	S7-1500	station 1					1
<sup>2</sup> Opera	ting state	station_1					
Back	0						
<sup>2</sup> Slot							
<sup>&gt;</sup> Type	S71500/E	T200MP station					
Order	number 22*						
Addre	55 JZ <sup>°</sup>						•
	← →						

### **Detailed view**

In the detailed view, the diagnostics information of the selected device is displayed. In addition to general data you will find a description of the fault and possible remedies here.

### Figure 2-22: Detailed view of the system diagnostics

System Diagnostics wit	h 57-1500 and T	TIA Port	al					
Operator			Date/Time		Language English			$\odot$
E7 1E00 station 11 DO			7/15/2020 2.50 FM		English	_		
S7-1500 station_11DQ.								
> Status	0033							
Name	DQ3Z							
Deale	0							
Clot	2							
SIOL	3		CT					
Coden musch en	003222400	L00.04	.51					
· Order number	0ES/ 5ZZ-10	L00-0A	(BU					
Address	239"							
Plant designation								
Location identifier								
Manuracturer ID	SIEIVIENS AG	1						
Brafile ID	12800							
Constitution	0002							
Specific profile data	0003							
Financial data version	L.I.							
Error text	Supply volta	ige mis	sing 					
	Calutiana Cha	encode	r or load supply volt	age.				
	Solution: Che	eck the	e wiring of the encod	aer or ioad p	bower supply. Co	rrect the will	ring error.	
	Check to see	e ir the	power supply is swi	tchea on.				
♠ ↔ ≫ 🕾								

#### Matrix view

The matrix view only pops up if you have configured a PROFIBUS\_DP or PROFINET IO master system in your system. The matrix view shows the status of the devices in the master system.

Figure 2-23: Matrix view of the system diagnostics

System Diagnostics w	ith 57-1500 aı	nd TIA Po	rtal				≡
Operator			Date/Time 7/15/2020 2:51 PM				
S7-1500 station_1 \ CF	PU proxy_1\1	PROFINE	Tinterface_1 \ PROFIN	NET IO-	System		
PROFINET IO-S	ystem	🖌 et2	00mp		Switch_1		
103 169 0 1	(	001 IM	155-5 PN ST	002	SCALANCE X208		
> Status	<b>~</b>						
<sup>&gt;</sup> Name	PROFINET	0-Syst	em				ī
Operating state		,					
<sup>&gt;</sup> Rack	0						
<sup>&gt;</sup> Slot							
<sup>&gt;</sup> Туре							
<sup>&gt;</sup> Order number							
<sup>&gt;</sup> Address	260*						
<sup>&gt;</sup> Plant designation							
<sup>&gt;</sup> Location identifier							•

### **Navigation buttons**

With the navigation buttons you can navigate through the systems diagnosis. Table 2-3: Navigation buttons in the system diagnostics

Button	Кеу	Function
	Enter key	Opens the child devices or the detail view if there are no child devices.
	Esc key	Opens the parent device or the device view if there is no parent device.
	Home key	Opens the device view.
	Configured function key, e.g. F1.	Opens the diagnostic buffer view. Only visible in the device view.
G	Configured function key, e.g. F2.	Updates the diagnostic buffer view.

### 2.5.3 System diagnostics indicator

The system diagnostics indicator is a graphical object in a global library. The object is inserted in a picture or a picture template and connected to the system diagnostics window. The system diagnostics indicator changes its graphic when there is a fault in the system. With a click on the system diagnostics indicator, the system diagnostics window opens up. The detailed view of the faulty device is automatically displayed.

Figure 2-24: Graphics of the system diagnostics indicator



### 2.6 Diagnostics with alarm view / alarm window in the HMI

With the objects "Alarm view" and/or "Alarm window", the TIA Portal offers you more possibilities of displaying diagnostics information in the HMI.

#### Alarm view

The object "Alarm view" shows you the diagnostics information as alarms in the operating panel, if you selected the respective alarm states and alarm classes. Depending on the configuration, different columns with information about a message are displayed in the "alarm view".

Figure 2-25: Alarm view in the HMI

System Diagnostics with S7-1500 and TIA Portal							≡
			Date/Time 7/15/2020 3:29 PM	Language English			
No.	Time	Status	Text				
24	3:34:43 PM	I	Error: Supply voltage missing PLC_1 / DQ 32x24VDC/0.5A ST_	1.			

#### Alarm window

The object "Alarm window" is not substantially different from the "Alarm view". The "Alarm window" can only be configured in the Global View. Therefore, there is an extra "Mode" area in the properties. For example, you can set whether the "Alarm window" is to pop up automatically for every new message.

### Alarm indicator

The "Alarm indicator" is a graphic symbol that indicates pending alarms or messages that have to be acknowledged, depending on the configuration. The "Alarm indicator" can have two states:

- Flashing: At least one alarm that has to be acknowledged is pending.
- Static: At least one of the acknowledged alarm has not yet been sent. The number indicated means the number of alarms still pending.

The "Alarm indicator" can only be configured in the Global View.

Depending on the configuration, an alarm window opens up when the alarm indicator is used. The alarm indicator can only be operated with a mouse or the touch screen.

Figure 2-26: Alarm indicator



### 2.7 System diagnostics with the user program

In the user program you can configure reactions to certain diagnostic messages. With the integrated diagnostics instructions in the TIA Portal, you read out the system diagnostics information from the faulty modules. With the information, you can define to stop the system if certain faults occur, for example.

You can send the system diagnostics information read out to a higher-level station for further evaluation.

### **Diagnostics instructions**

For the determination of the system diagnostics information in the user program, the following instructions are available in STEP 7.

Table 2-4

Instruction	Description
RD_SINFO	Read out start information of the current OBs
LED	Read LED status
GET_NAME	Read out the name of the module
DeviceStates	Read the module status information of an IO system
ModuleStates	Read the module status information of a module
GEN_DIAG	Generate diagnostics information
GET_DIAG	Read diagnostics information
RDREC	Read data set. The STATUS output parameter contains error information.
RALRM	Receive alarm. The STATUS output parameter contains error information.
DPNRM_DG	Read diagnostics data of a DP slave
T_DIAG	Check connection

# **Note** For more detailed information about the instructions, please refer to the TIA Portal Online Help.

# 3 Configuration and Settings

### 3.1 Configuration of the systems diagnostics

The system diagnostics cannot be deactivated for S7-1500. In the "Messages" window you can define which message categories are to be put out and whether they have to be acknowledged. Please proceed as follows:

No.	Action	Remark
1.	In the device view, of "PLC_1", please double-click on "Device Configuration" in the project navigation.	S7-1500_Diagnose → PLC_1 [CPU 1516F-3 PW/DP]       ■ ■ ■ ★
2.	Click on "Multilingual support" in the inspector window of the "PLC_1" under "Properties> General". Assign the configured project languages to the languages of the device and the web server.	PLC_1 (PU 1515F-3 PVDP)       Properties       Info       Diagnostics       Image: Construct State St
3.	Double-click the "System diagnostic settings" in the "Common data" folder in the project tree.	Project tree     \$7.1500_Diagnose > Common data > System diagnostic settings       Devices       Image: State of the settings       Image: State of the settings <t< td=""></t<>
4.	Activate the categories to be displayed.	> → HAL_T [171:200 Cons/ncl]         Activate the categories and associate them to alarm dasses           > → Unsprouged devices         Category         Activation           > Sig Security estimates         1 threat         Admovidedgement           > > O cost-device functions         2 Maintenance demanded         No Advovidedgement           > > Workenance data         > Maintenance demanded         No Advovidedgement
5.	Select the "Acknowledgment" alarm class for the "Error" category.	Alem dassas     4     Mo     No AdinovideSgement       V2 System disposition settings     3     Supervision settings

### 3.2 Configure diagnostic settings of the module DQ32

You can release the module-specific diagnostic settings for every module separately. For displaying the missing supply voltage L+ in the module DQ32, please proceed as follows:



### 3.3 Configure diagnostic settings of the module DI32

You can release the module-specific diagnostic settings for every module separately. For displaying the missing supply voltage L+ in the module DI32 of the IO device "et200mp", please proceed as follows:

No.	Action	Remark
1. 2.	The device view is still open. In the device list, select "et200mp". Select the module "DI32" in the	S7-1500_Diagnose > Ungrouped devices > et200mp [IM 155-5 PN ST] _ = ₹ = X
	device view.	ReiLO 0 1 2 3 4 5 6 7 15 23 51 8 16 24 15 29 51
3.	In the inspector window under "Properties > General > Module parameters", click on "Channel template".	DI 32x24VDC HF_1       [DI 32x24VDC HF]       Properties       [] Info       [] Diagnostics       Image: Comparison of the composition of the composition of the comparison of the composition of the comparison of the comparis
4.	Activate the option box "no supply voltage L+"	Diagnostics  Diagnostics  No supply voltage L+  Wire break  Input parameters  Input delay: 3.2 ms

### 3.4 Configure topology

For displaying the faulty interconnection of the ports in our example, the topology must be configured. Please proceed as follows:

No.	Action	Remark
1.	Open the device and network editor with a double click on "Devices & networks" in the project navigation.	S7-1500_Diagnose > Devices & networks
2.	Change to the graphic view of the topology view.	TP1200 Comfort
3.	Click on port 1 of "PLC_1" with the left mouse button. Move the mouse cursor while keeping the mouse button pressed to Port 2 of "SCALANCE X208". Release the mouse button.	PLC_1 CPU 1516F-3 PN Switch_1 SCALANCE X208 FLC_1
4.	Now interconnect port 1 of "et200mp" with port 3 of "SCALANCE X208" in the same way.	

### 3.5 Configure the web server of the CPU

The web server of the CPU allows for system diagnostics via PROFINET IO. For this, the web server must be activated in the following way:

т	'əł	ماد	ີ	-5
	ar	710	ັ	-0

No.	Action	Remark
1. 2.	In the device view, of "PLC_1", please double-click on "Device configuration" in the project navigation. Click on "Web server" in the inspector window of the "PLC_1", under "Properties > General".	PIC_1 [CPU 1516F-3 PKVDP]       Properties       Info       Diagnostics       Image: Constants         Fail-sate       Fail-sate       Meb server       Image: Constants       Image: Constan
з.	web server on this module".	Web server     Enable automatic update     Display     Update interval: 10 s Mulblingual support
4.	Create a new user "admin" with the password "s7".	PLC_1     [CP 1516F-3 PVDP]       General     O tags       System constants     Texts       PLC alarms     User management       Web server     General       General     User management       Update password encryption       Name     Access level       Password       Encryl       User management       Update password encryption       Name       Access level       Password       Entry page
5.	Give the user "admin" the authorizations you need for your project.	The user is authorized to         •query diagnostics         •dlow diagnostics         •deardwardege alarms         •deardwardege aparameter         •deardwardege aparameter         •deardwardege aparameter of the F-System         •deardwardege apages         •deardwardege apages         •deardwardege apages         •deardwardege apages         •write tags is automation web pages

### 3.6 Configure system diagnostics view in the HMI

The template for the SIMATIC TP1200 Comfort was used for the application example. You can find this template at: https://support.industry.siemens.com/cs/ww/en/sc/2054

For displaying the diagnostic information in the HMI, the complete control "Systems diagnostics view" is available in the TIA Portal. The following table shows you how to insert the control into your HMI configuration.

Table 3-6

No.	Action	Remark
1.	Open the screen "03_Diagnostics" from the project navigation under "HMI_1 > Screens > Application > Template"	
2.	Open the TaskCard "Toolbox".	✓ Controls
3.	Drag the Control "Systems diagnostics view" to the screen.	
4.	Adapt the size of the control to the screen.	iagnose > HML1 [TP1200 Comfort] > Screens > Application > Template > 03_Diagnostics
5.	Click on "Columns" in the inspector window under "Properties > Properties".	System diagnostics view (System dia     Properties     Info     Diagnostics     Plug-ins     IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
6.	Activate the columns you want to display in the device/detailed view.	Appearance Border       Imme       Column header       Device view visi.       Device view visi.         Layout       Status       Status       Status       Status       Il 2         Totabar       Name       Operating state       Operating state       Il 2       Imme         • Columns       Made       Packat       Il 2       Imme       Imme         • Columns       Made       Operating state       Il 205       Imme       Imme       Imme         • Columns       Status       Stat       Stat       Stat       Imme       Imme<
No.	Action	Remark
-----	---	--
7.	Activate the columns you want to display in the diagnostic buffer detail view.	System diagnostics view (System dia)     Properties     1 Info     Diagnostics     Plug-ins       Propertyist     Columns of diagnostics buffer view       General     Appearance       Border     No.       Text format     No.       Propertyinst     24       Columns of diagnostics buffer view     24       Deter     Date       Doter     Time       Develoderatiview     910       Develoderatiview     24       Deter     100       Deter     100       Develoderatiview     310       Mattenance status     24
8.	Click on "Layout" in the inspector window under "Properties > Properties".	System diagnostics view (System dia         Properties         Animations         Events         Texts           Properties         Animations         Events         Texts         Events         Events
9.	Activate "Show split view" if you wish to display the device and detailed views at the same time, or deactivate "Show split view" if you only wish to display one view.	Apperance         Border         Border         Border         Border         Visible Diagnose entries         Y toolbart         Display         Columns         Syles/Designs         Miscelleneous         Security         Column settings            exercle columns          Time in milliseconds

# 3.7 Configure system diagnostics window in the HMI

For displaying the diagnostic information in the HMI, the complete control "System diagnostics window" is available in the TIA Portal. The following table shows you how to insert the control into your HMI configuration.

Table 3-7

No.	Action	Remark
1.	Open the "Global Screen" from the project navigation under "HMI_1 > Screen management".	
2.	Open the TaskCard "Toolbox".	✓ Controls
3.	Drag the Control "System diagnostics window" to the Global screen.	
4.	Configure the "System diagnostics window" like a "System diagnostic view" (see chapter <u>3.6</u> ).	
5.	Click on "Window" in the inspector window under "Properties > Properties".	System diagnostics window @ Properties 11 Info 12 Diagnostics Plug-ins 12 = 1 Properties Animations Events Texts Property list General Settings
6.	Activate the window properties "Close button" and "Size adjustable".	Appearantice Layout Text format Columns Siges Designs Miscellaneous Security Close button: Close button: Clos

# 3.8 Configure System diagnostics indicator

The "System diagnostics indicator" is for displaying troubles in the HMI. If you want to be able to use the "System Diagnostic Indicator", a "System diagnostic window" must have been configured in the global screen.

I able 3-0	Ta	ble	3-8
------------	----	-----	-----

No.	Action	Remark
1.	Open the screen "11_Module1" from the project navigation under "HMI_1 > Screens > Application > ApplicationName".	
2.	Open the TaskCard "Libraries > Global Libraries".	✓ Global libraries びひ吸し ● 生 簡 目・
3.	Open the folder "Buttons-and- Switches > Master copies > DiagnosticsButtons> Comfort Panels and RT Advanced".	Ui Buttons-and-Switches     Vi Buttons-and-Switches     Vi DiagnosticsButtons     Vi ComposticsButtons     Vi ComposticsIndicator     JiagnosticsIndicator     Vi M Professional
4.	Drag and drop the object "DiagnosticsIndicator" to the place in the screen where you want it to be.	
5.	Click on "Click" in the inspector window under "Properties > Events".	DiagnosticsIndicator     [But ]     Properties     1 Info     Diagnostics     Plug-ins     □ = ▼       Properties     Animations     Events     Texts
6.	Now select the system diagnostic window "System diagnostics window_1" from the global screen for the pre-set system function "ShowSystemDiagnosticsWindow"	Imitalities     ShowSystemDiagnosticsWindow       Press     ShowSystemDiagnosticsWindow       Release     Object name     System diagnostics window_1       Activate <add function="">       Deactivate        Change</add>
7.	Alternative: In the "TemplateGeneral" screen under "HMI_1> Screen management> Templates" a diagnostic display with a button is configured. In the inspector window under "Properties > Events" the opening of screen "03_Diagnostics" is configured for this button under "Click".	tMl_1 [TP1200 Comfort] > Screen management > TemplateS > TemplateGeneral       Image:

# 3.9 Configure the alarm view

The "Alarm view" is for displaying troubles in the HMI. The following table shows you how to insert the pre-defined control "Alarm view" into your HMI configuration.

Table	3-9
i abio	00

No.	Action	Remark				
1.	Open the screen "02_Messages" from the project navigation under "HMI_1 > Screens > Application > Template".					
2.	Open the TaskCard "Toolbox".	V Controls				
3.	Drag the Control "Alarm View" to the screen.					
4.	Adapt the size of the control to the screen.	- →Jagnose → HML1 [TP1200 Comfort] → Screens → Application → Template → 02_Messages - → → → → → → → → → → → → → → → → → →				
5.	Click on "General" in the inspector window under "Properties > Properties".	Alarm view     C Properties       Properties     Animations       Events     Texts       Property ist     General       General     Display				
6.	Under "Display > Current alarm states", activate the "Pending alarms" and "Unacknowledged alarms".	Appearance Border Layout Display Text format Toolbar Button Bilg Pattern Button Bilg Pattern Column Beaders Button Bilg Pattern Column Beaders Display Pattern Display Pattern Display Button Border Button Bilg Pattern Column Beaders Display Pattern Displ				
7.	Activate the alarm classes "Acknowledgement" and "No Acknowledgement".	Columns Table header 5 Table header fill				

No.	Action	Remark			
8.	Click on "Columns" in the inspector window under "Properties > Properties".	Alarm view     Properties     Alarm view       Properties     Animations     Events       Property list     Columns       General     Visible columns			
9.	Under "Visible columns" select the columns you wish to be output in "Alarm view".	Apperance       Imme         Border       Imme         Layout       Imme         Display       Imme         Tock format       Imme         Tockor       Imme         Button border       Imme         Button border       Imme         Button border       Imme         Button birder       Imme         Display       Imme         Display       Imme         Display       Imme         Button birder       Imme         Button birder       Imme         Button birder       Imme         Display       Imme         Button birder       Imme         Button birder       Imme         Button birder       Imm			

# 3.10 Configure the alarm window

The "Alarm window" is mainly configured like the "Alarm view". The following table shows you how to insert the pre-defined control "Alarm window" into your HMI configuration.

Table 3-10

No.	Action	Remark
1.	Open the "Global Screen" from the project navigation under "HMI_1 > Screen management".	
2.	Open the TaskCard "Toolbox".	✓ Controls
3.	Drag the Control "Alarm window" to the global screen.	
4.	Configure the "Alarm window" like an "Alarm view" (see chapter <u>3.9</u> ).	
5.	Click on "Window" in the inspector window under "Properties > Properties".	Alarm window_1     [Alarm window_2]     [Alarm window_2]     [Alarm window_2]     [Alarm window_2]       Properties     Animations     Events     Texts       Property list     Window
6.	Deactivate the window properties "Display automatically" and activate the window properties "Close button" and "Sizeable".	Capedraline     Display automatically:       Usyout     As model dialog:       Display     Sizeable:       Toolbar     Sizeable:       Button fill pattern     Caption       Column headers     Close button:       Table header b     Close button:

# 3.11 Configure the alarm indicator

The "Alarm indicator" indicates pending alarms in the HMI. If you want to be able to use the "Alarm indicator", an "Alarm window" must have been configured in the global screen.

Table 3	3-11				
No.	Action	Remark			
1.	Open the "Global Screen" from the project navigation under "HMI_1 > Screen management".				
2.	Open the TaskCard "Toolbox".	✓ Controls			
3.	Drag and drop the control "Alarm indicator" to the place in the screen where you want it to be.				
4.	Select the alarm classes you wish to be displayed by the alarm indicator in the inspector window under "Properties > Properties > General". In the column "Pending alarms" activate the alarm classes "Errors", "Acknowledgment" and "No Acknowledgment". In the column "Acknowledged", activate the alarm classes "Errors" and "Acknowledgment".	Alarm Indicator       [Alarm Indindicator       [Alarm Indicator       <			
5.	Click on "Click when flashing" in the inspector window under "Properties > Events". The function list opens up.	Alarm indicator Meldeindika      Properties     14 Info     2 Diagnostics     Plug-ins     ■ ■ ■       Properties     Animations     Events     Texts       Properties     Animations     Events     Texts       If Cick     If Cick when flashing     ShowNamWindow       Object name     Alarm window_1			
6.	Click on the first line of the function list and choose the system function "ShowAlarmWindow" under "Alarms". The alarm window "Alarm window_1" is selected automatically.	Add functions			
7.	<b>Optional:</b> The "vbsActivateAlarmControlScreen" script is configured for the "Click" event. This opens the "02_Messages" picture.	Alarm indicator_1 [Alarm indic     Properties     1 Info     Diagnostics     Plug-ins     Image: Constraint of the state o			

# 3.12 Configure system diagnostics with user programs

For the system diagnostics in user programs, complete instructions are available in the TIA Portal. For more detailed information about the instructions, please refer to the TIA Portal Online Help. The use of several applications in the user program is described below.

No further evaluation of the System Diagnostics information will be described in this example.

In this application the parameter structure of the individual diagnostic instructions is displayed in the data block "DiagDB" (see <u>Figure 3-1</u>). The parameters of the instructions are not linked to the variables of the data block.

Figure 3-1: Data block "DiagDB"

\$7	S7-1500_Diagnose → PLC_1 [CPU 1516F-3 PN/DP] → Program blocks → DiagDB [DB1] 🛛 🗕 🖬 🗮 🗙								
		•		🎩 🚬 😤 Keep actual va	ues 🔒 Snapshot	🖦 🖳 🗠	py snapshot:	s to start value:	s 🕨 📑
	Dia	: IaC	B			• •			_
	_	Na	me		Data type	Start value	Retain	Accessible	Writable f.
1	-	•	St	atic	,,				
2	-	•	Ŧ	led	Struct				
з	-		•	laddr	HW_IO	50			
4	-		•	led	UInt	2			
5	-		•	retVal	Int	0			
6	-	•	•	deviceStates	Struct			<b></b>	
7	-		•	laddr	HW_IOSYSTEM	260			$\checkmark$
8			•	mode	UInt	2		$\checkmark$	<b></b>
9	-		•	retVal	Int	0		$\sim$	<b></b>
10	-		•	<ul> <li>state</li> </ul>	Array[01023] of Bool			$\sim$	<b></b>
11		•	•	getName	Struct			<b></b>	
12	-00		•	laddr	HW_IOSYSTEM	260		<b></b>	
13	-00		•	stationNr	UInt	1		<b></b>	
14			•	done	Bool	false			
15			•	busy	Bool	false			
16			•	error	Bool	false		$\checkmark$	
17			•	len	Dint	0		$\checkmark$	
18	-		•	status	Word	16#0		$\checkmark$	
19			•	data	String	"			
20		•	٠	moduleStates	Struct				
21			•	laddr	HW_DEVICE	263			
22			•	mode	UInt	2			
23			•	retVal	Int	0			
24			•	<ul> <li>state</li> </ul>	Array[0127] of Bool				
25		•	•	getDiag	Struct				
26			•	laddr	HW_ANY	269			
27	-		•	mode	UInt	1			
28			•	retVal	Int	0			
29	1		-	cntDiag	UINT	U			
30	1		-	<ul> <li>diagDis</li> <li>Maintainana Otait</li> </ul>	DIS	4.6.40			
31				MaintainanceState	Dword	16#0			
32				ComponentStateDetail	Dword	16#0			
33	1			OwnState	Unt	0			
34				<ul> <li>IOState</li> </ul>	Word	16#0			
35				<ul> <li>OperatingState</li> </ul>	UInt	U		$\checkmark$	$\checkmark$

Please find the value and/or the symbolic name of the respective parameters "LADDR" (HW-ID) in the tab "System constants" of the "Default tag table" (see Figure 3-2).

Figure 3-2: System constants

			Jan Tar		ar constants	- Systom	constants
			- I aí			system	
	Defa	ult tag table					
		Name	Data	a type		Value	
35	1	Local~PROFINET_interface_2~Port_1	Hw_	Interface		73	~
36	1	OB_Main	OB_	PCYCLE		1	
37	1	Local~DI_32x24VDC_HF_1	Hw_	SubModule		258	
8	×	Local~DQ_32x24VDC_0_5A_ST_1	Hw_	SubModule		259	
19	1	Local~PROFINET_IO-System	Hw_	loSystem		260	
10	1	et200mp~Proxy	Hw_	SubModule		265	
11	1	et200mp~lODevice	Hw_	Device		263	
12	1	et200mp~PROFINET_interface	Hw_	Interface		266	
13	7	et200mp~PROFINET_interface~Port_1	Hw_	Interface		267	
14	1	et200mp~PROFINET_interface~Port_2	Hw_	Interface		268	
15	1	et200mp~DI_32x24VDC_HF_1	Hw_	SubModule		269	
46	1	et200mp~DQ_32x24VDC_0_5A_ST_1	Hw_	SubModule		270	
17	<b>F</b>	Switch_1~Proxy	Hw_	SubModule		273	
8	<b>F</b>	Switch_1~IODevice	Hw_	Device		271	
9	<b>F</b>	Switch_1~SCALANCE_interface	Hw_	Interface		275	
0	Ţ	Switch_1~SCALANCE_interface~Port_1	Hw_	Interface		276	
1	Ţ	Switch_1~SCALANCE_interface~Port_2	Hw_	Interface		277	
2	Je	Switch_1~SCALANCE_interface~Port_3	Hw	Interface		278	
3	Je	Switch_1~SCALANCE_interface~Port_4	Hw	Interface		279	
4	Ĵ,	Switch 1~SCALANCE interface~Port 5	Hw	Interface		280	_
5	Ĵ,	Switch 1~SCALANCE interface~Port 6	Hw	Interface		281	=
6	Ĵ.	Switch 1~SCALANCE interface~Port 7	Hw	Interface		282	
7	Ĵ.	Switch 1~SCALANCE interface~Port 8	Hw	Interface		283	
8		Local	Hw	SubModule		49	
9		Local~Exec	Hw	SubModule		52	
10	×	et200mp~Head	Hw	SubModule		262	
1	×	Switch 1~Head	Hw	SubModule		274	
2	×	Local~Display	Hw	SubModule		54	
 53	×-	Local=MC	Hw/	SubModule		51	
54	×	Local~PBOFINET interface 1	Hw	Interface		64	
5	×-	Local~PBOFINET_interface_2	Hw	Interface		72	
6	×	Local-DP interface 1	Hw	Interface		60	
.7	×-	Local-PROFINET interface 1.Port 1	Hw.	Interface		45	
0	×-	Local-ROFINET interface 1-Rort 2	H	Interface		66	
0	×-	Local-Virtual communication interface	Hw_	Interface		195	
0	×	Local-Virtual_communication_interface	HW_	SubMadula		135	
0	×	Local Device	HW_	Device		30	
1	×	Local-Device	HW_	Device		32	
2	×	Local~Configuration	Hw_	SubModule		33	
/3	5	Local~FExec	Hw	SubModule		55	

Note

Assign the symbolic names of the variable table and the variables of the data block to the parameters of the instructions per drag & drop.

## 3.12.1 Instruction "LED"

With the instruction "LED", you can read out the status of a certain module LED. The following example shows you that your status of the ERROR-LED (parameter LED = 2) of the "PLC\_1".

Figure 3-3: Instruction LED



## 3.12.2 Instruction "Device States"

With the instruction "Device States" you put out the status of the modules of an I/O system (PROFIBUS DP or PROFINET IO). The following example detects the trouble modules (Parameter MODE =") of the "PROFINET\_IO\_Systems."

Figure 3-4: Instruction DeviceStates



# 3.12.3 Instruction "GET\_NAME"

With the instruction "GET\_NAME" you can read out the device name of, let's say a faulty module of an IO system (PROFIBUS DP or PROFINET IO) for example. The following example determines the device names of the module with the "Device Number" "1". Please find the "Device number" in the network view under "Properties of the module (see <u>Figure 3-5</u>). The "Device number" "1" is assigned in the data block "DiagDB" of the variable "STATION\_NR".



et200mp [IM 155-5 PN ST	🖸 Properties 🚺 Info 👔 🗓 Diagnostics 👘 🖃 🔻
General IO tags	System constants Texts
▶ General	Router address: 0 . 0 . 0 . 0 . 0
▼ PROFINET interface [×1]	
General	PROFINET
Ethernet addresses	
Advanced options	Generate PROFINET device name automatically
Module parameters	PROFINET device name: et200mp
<ul> <li>System power supply</li> </ul>	
	Converted name: etz00mp
	Device number: 1

Figure 3-6: Instruction GET\_NAME



## 3.12.4 Instruction "ModuleStates"

With the instruction "ModuleStates" you can read out the module state of a module. The following example detects the trouble modules (Parameter MODE =2) of the IO device "et200mp".

Figure 3-7: Instruction ModuleStates



## 3.12.5 Instruction "GET\_DIAG"

With the instruction "GET\_DIAG" you can read out the diagnose information of a module. In the following example the diagnostic status of the DI module "DI32x24VDC\_HF\_1" is put out according to the structure "DIS" (Parameter MODE = 1) in the parameter "DIAG".

**Note** The structure "DIS" is already integrated in TIA Portal and does not need to be created. However, variables with the data type "DIS" can only be defined in the block interface or in data blocks (see Figure 3-1).

Figure 3-8: Instruction GET\_DIAG



# 4.1 Diagnostics with LEDs

The missing supply voltage L+ in the module DQ32 is displayed by a flashing red LED in the module and in the CPU.

# 4.2 Diagnostics with the display in the CPU S7-1500

The S7-1500 display has a large variety of diagnostic possibilities. The missing supply voltage L+ in the module DQ32 is displayed in various places in the display.

## 4.2.1 Diagnostics menu: Alarms

No.	Action	Remark
1.	Navigate to the "Diagnostics" menu with the arrow buttons and open it with the "OK" button.	RUN A Diagnostics CPU 1516-3 PN/DP 6ES7 516-3AN00-0AE0 OK
2.	Select "Alarms" and open it with the "OK" button.	RUN       ▲         Image: Diagnostics       Alarms         Alarms       ▲         Diagnostic buffer       ►         Esc       OK

No.	Action	Remark
3.	Select the alarm and open the message details with "OK".	RUN A Control Alarms Incoming A 02:20:40 AM 05/08/2012 Fault: No sensor or load volta ESC 1/1 OK
4.	Check the message.	RUN         A 

# 4.2.2 Diagnostics menu: Diagnostic buffer

No.	Action	Remark
1.	Navigate to the "Diagnostics" menu with the arrow buttons and open it with the "OK" button.	RUN A Diagnostics CPU 1516-3 PN/DP 6ES7 516-3AN00-0AB0 OK

No.	Action	Remark
2.	Select "Diagnostic buffer" and open it with the "OK" button.	RUN A Construction Diagnostics Alarms A ► Diagnostic buffer ► ESC OK
3.	Select the alarm and open the message details with "OK".	RUN       ▲
4.	Check the message in the diagnostic buffer.	RUN       A

# 4.2.3 The "Modules" menu

No.	Action	Remark
1.	Navigate to the "Modules" menu with the arrow buttons and open it with the "OK" button.	RUN A The second secon
2.	Select "Local modules" and open it with the "OK" button.	RUN A Modules Local modules O PROFINET IO-Syst > ESC 1/1 OK
3.	Select the faulty module DQ32 on "Slot3" and open the status with "OK" button.	RUN       A         Image: Local modules         Slot 1:       Image: PLC_1         PLC_1       Image: PLC_1         Slot 2:       Image: PLC_1         DI 32x24VDC HF_1       Image: PLC_1         Slot 3:       Image: PLC_1         DQ 32x24VDC/0.5A ST_1       Image: PLC_1         ESC       1/1

No.	Action	Remark
4.	Select "Status" and open it with the "OK" button.	RUN A DQ 32x24VDC/ Status ● ► ESC OK
5.	Select the "Module state" and open the message details with "OK".	RUN   Module name:   DQ 32x24VDC/0.5A ST_1   Module state:   Error   Subordinate state:   Good   Slot:   3   Manufacturer:   SIEMENS   ESC   1/3
6.	Check the message.	RUN       A         Image: Module state         Error: No sensor or load voltage in  > Component:         / Rack_0 / DQ 32x24VDC/0.5A         ST_1. in  > Path: 0 / 0 /         3.1 in  > HW_ID= 00259         ESC

Note

Quit the currently selected menu by hitting the "ESC" button.

# 4.3 Diagnostics in the TIA Portal

# 4.3.1 Diagnostics of the hardware in the device and network view

For the diagnostics of the missing supply voltage L+ in the module DQ32 in the device and network view, please proceed as follows:

#### Diagnostic information in the network view

Table 4-4

No.	Action	Remark
1.	Open the device and network editor with a double click on "Devices & networks" in the project navigation.	
2.	Select the "PLC_1" in the network view.	
3.	In the toolbar, click the "Connect online" button.	When a connection is first established, the dialog "Connect online" opens up. Select the PG/PC interface with which the PLC is connected to the PG/PC and click on "Connect".
4.	In the network view, the diagnostic symbol "Fault" is displayed at "PLC_1". The additional diagnostic symbol in the lower right hand corner of the diagnostic symbol indicates that a fault has occurred in a lower-level component.	S7.1500_Diagnose > Devices & networks

## Diagnostic information in the device view

No.	Action	Remark
1.	Double-click on the device "PLC_1" in the network view. The online device view opens up. For every hardware component, the corresponding diagnostic symbol is displayed. Therefore, the faulty module can be detected immediately in the display.	S7-1500_Diagnose + PLC_1 [CPU 1516F-3 PWDP]       ■ ■ ■ ■         Topology view       Network view       Device view                 • ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

### Diagnostic information in the diagnostics view

Table 4-6

No.	Action	Remark
1.	Double-click on the diagnostic symbol of the module "DQ32". The diagnostics view of the module is displayed.	
2.	Open the folder "Diagnostics > Diagnostic status". The diagnostic message is displayed in the window "Standard diagnostics".	Dlagnaste + RC_1 (CRU 13167-3 RMOR) + Local modules + DQ 32x24VD003A S1_1 # # X      Olagnastic     General     Diagnostic status     Status     Status     Status     Standard diagnostics     Functions     Standard diagnostics     Message     Standard diagnostics     Help on selected diagnostics row     Their is no encoder or load apply visiting.     Status or encoder or load apply visiting.     Status or encoder or load apply visiting.     Check to take if the power supply. Correct the     Check to take if the power supply is switched on.     Vertice

# 4.3.2 Diagnosis in the topology view

#### Fault scenario: Missing supply voltage

For the diagnostics of the missing supply voltage L+ in the module DQ32 in the topology view, please proceed as follows:

No.	Action	Remark
1.	The online connection to PLC_1 has already been established. Change to the topology view of the device and network editor. In the topology view, the diagnostic symbol "Fault" is displayed at "PLC_1". The additional diagnostic symbol in the lower right hand corner of the diagnostic symbol indicates that a fault has occurred in a lower-level component.	\$7-1500_Diagnose > Devices & networks       _ P = X         Plot       Topology view       Metwork view       P Device view         Plot       Plot       Plot       Plot       Plot         Switch_1       Switch_1       Switch_1       Plot       Plot         Plot       Switch_1       ScAuvice x208       Plot       Plot
2.	Double-click on the device to change the device view, see <u>Diagnostic information in the</u> <u>device view</u>	

## Fault scenario: Faulty interconnection of the port

For this fault scenario, remove the Ethernet cable from port 1 of the ET 200MP and insert it into port 2 of the ET 200MP.

For the diagnostics of the faulty interconnection in the topology view, please proceed as follows

Table 4-8

No.	Action	Remark
1.	The online connection to PLC_1 has already been established. Change to the topology view of the device and network editor. In the topology view, the diagnostic symbol "Fault" is displayed at "PLC_1" and faults in the lower-level component are displayed at "Switch_1" and "et200mp". The faulty interconnection and the respective port at "Switch_1" and "et200mp" are displayed in red.	S7-1500_Diagnose > Devices & networks       ■ ■ ×         Topology view       Network view       Device view         Image: State of the stat

# 4.3.3 Diagnosis in the project navigation

For the diagnostics of the missing supply voltage L+ in the module DQ32 in the device and network view, please proceed as follows:

Г	а	bl	le	4-	.9
	u	~	0		~

No.	Action	Remark
1.	The online connection to PLC_1 has already been established. Go to the project navigation. In the project navigation, view, the diagnostic symbol "Fault" is displayed at "PLC_1". The additional diagnostic symbol in the lower right hand corner of the diagnostic symbol indicates that a fault has occurred in a lower-level component.	Project tree       Image: Comparison of Compar
2.	Open the "PLC_1" folder. The symbol for the fault in lower- level components is displayed in the folder "Local modules".	Energy objects   External source files    PLC tags     Querter of the source files     Control of the force tables    Control of the control of the source force tables
3.	Open the folder "Local modules". In the module "DQ32", the diagnostic symbol "Fault" is displayed.	

No.	Action	Remark
4.	Double-click on the module "DQ32 to go to the device view, see <u>Diagnostic information in the</u> <u>device view</u>	
5.	Double-click on the diagnostic symbol of a module to go to the diagnostics view of a module, see <u>Diagnostic information in the</u> <u>diagnostics view</u> .	

# 4.3.4 Diagnostics in the inspection window

For the diagnostics of the missing supply voltage L+ in the module DQ32 in the inspector window, please proceed as follows:

## "Device information" tab

No.	Action	Remark
1.	The online connection to PLC_1 has already been established. Change to the inspector window.	
2.	Open the "Diagnostics" tab.	
3.	Open the lower-level tag "Device information". The "Online status" shows you that a fault has occurred in a lower-level component. The "Device/module" "PLC_1" has the "operating mode" "RUN". Click on the link under "Details" to go to the diagnostics view of a module. Click on the link under "Help" to receive online help and further information about the message.	Properties     Linfo     Diagnostics     Device information     Connection information     Alarm display     Device with problems     Oper.     Device orbit problems     Oper.     Device information     Prove     Device information     Device     Device information     Device     Device information     Device     Device

# "Alarm display" tab

No.	Action	Remark
1.	The online connection to PLC_1 has already been established.	
2.	Click on "PLC_1" in the project navigation with the right mouse button. The context menu opens up.	Open       Open       Open in new editor       Open block/PLC data type       F7       Image: Source of the second se
3.	Activate "Receive alarms" in the context menu.	Image: Solution of the second sec
4.	Go to the inspector window and open the tab "Diagnostics > Alarm display".	Connection information     Alarm display     Current alarms     Source Date     Time     Status     Alarm display     V + V + V     V + V + V     V + V
5.	Click on the symbol "Current alarms". The alarm about the faulty module "DQ32" is displayed with the source, date and time. The status "I" indicates that it is a coming alarm.	1 PLC_17/16/2020 3:03:33:8 Incoming — NA Error: Supply-voltage missing PLC_1 / DQ 32:24V Short name: DQ 32:24V

# 4.4 Diagnostics with the Web server

For the diagnostics of the missing supply voltage L+ in the module DQ32 with the web server, please proceed as follows:

## 4.4.1 Login at the web server / website "Start page"

Table 4-12

No.	Action	Remark
1.	Open the web browser, for example the Internet Explorer.	
2.	Enter IP address of "PLC_1" as address, for example <u>http://192.168.0.1</u> . The intro page opens up.	SIEMENS mail simale-controler sentical-controler English v
3.	Click "ENTER". The start page of "PLC_1" opens up.	SIMATIC S7-1500 CPU 1516F-3 PN/DP
4.	Enter the name "admin" and the password "s7".	SIEMENS         S7-1600 station_1/PLC_1           04.9938 pm         07/16/2020         PLC local time (UTC +01:00) <ul></ul>
	Then click on "Log in".	User atmin PLC_1
	The complete start page of	Start page     General     Disgnostics     Serverse     SMATC     Protestname: S7-1500_Disgnose
	The pending fault is displayed at the status LED and in the box "Status".	Disposts Euffer • Module information • Module information • Module information • Module information • Communication • Communication • Trace • Dataloga • User-defined pages • Filebrowser • Introduction

# 4.4.2 Website "Diagnostic buffer"

Table	4-13
-------	------

No.	Action	Remark						
1.	Click on "Diagnostic Buffer" to open the website.	SIEMENS	S7-1500	) station_1/PL	.C_1	04:44:	26 pm 07/16/2020 PLC local time (UTC +01:00)	▼ English ▼
2	Select the alarm Under "Details"	Log.out	Diagnost	ic buffer entries 1-	50 <b>v</b>			Bio or a
2.	you get more diagnostic information about the alarm.	Start page     Start page     Clagnostics     Diagnostic Buffer     Module information     Adams     Communication     Topology     Trace     Datatiogs     User-defined pages     Filebrowser     Inthroduction	Number 1 2 3 4 5 6 7 7 8 9 10 11 12 3 Details 1 Error. Sup PLC_1 / D Incoming	Time ph 44230542 ph 44230542 pm 044230542 pm 032014007 pm 032014007 pm 033013618 pm 033013618 pm 033013612 pm 033013622 pm 033013622 pm 033013622 pm 0330136522 pm 033016552 pm 033005546 aby obtase missing a 532449C055546 aby obtase missing a 532449C05555 aby obtase missing a 532449C05555 aby obtase missing a 532449C05555 aby obtase missing a 532449C05555 aby obtase missing a 5324555 aby obtase missing a 53245555 aby obtase missing a 53245555 aby obtase missing a 53245555 a 53245555 a 53245555 a 53245555 a 53245555 a 53245555 a 53245555 a 53245555 a 532455555 a 532455555 a 532555555 a 532555555 a 53255555555555555555555555555555555555	Date 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020 07/16/2020	Status incoming event autgoing event autgoing event autgoing event autgoing event autgoing event autgoing event autgoing event autgoing event autgoing event	Event Display violage missing Dupplay violage missing Dupplay violage missing Display violage missing Event on partner - No neighbor could be diffeted Disposition available and in being processed Disposition available and Disposition available Disposition availab	Lever ID: 164 003011

# 4.4.3 Website "Module information"

No.	Action	Remark
1.	Click on "Module information" to open the website. In "S7-1500-station_1", the diagnostic symbol "Fault" is displayed. The additional diagnostic symbol in the lower right hand corner of the diagnostic symbol indicates that a fault has occurred in a lower-level component.	SIEMENS S7-1500 station_1IPLC_1
2.	Click on the link "S7-1500- station_1" to get an overview of the status of the local modules. In the faulty module "DQ32", the diagnostic symbol "Fault" is displayed.	Trace     T
3.	Click on the link "Details" of the module "DQ32". Under "Status" you get more diagnostic information about the alarm.	Additional Public State     Additional Public State

# 4.4.4 Website "Alarms"

#### Table 4-15

No.	Action	Remark						
1. Clic web	ick on "Alarms" to open the ebsite.	SIEMENS	S7-1500	station_1/P	LC_1	04:51:56 pm 07/16/2020 PLC local time	(UTC +01:00)	▼ English ▼
2. Sel Uno dia alai	elect the alarm. nder "Details" you get more agnostic information about the arm.	Luer semin Los ad Start page Diagnostics Diagnostics Diagnostic Buffer Module information Communication Communication Communication DataCogs Communication Trace DataCogs User Files User Files User Files Filebrowser Filebrowser	Entres 1 Entres 1 Alarmite 24 Details on PLC_1 ( <i>D</i> PLC_1 ( <i>D</i> )	50 V Date 0771 6/2020	Time 04423939 pm 24 24 09 03 45T_1.	Alam Ind Grave Support of the missing PLC_1109 3204/0005448T_1	Stabus	B Con a Acatowergement

# 4.4.5 Website "Topology"

# 4.4.5.1 1<sup>st</sup> fault scenario: Missing supply voltage

For the diagnostics of the missing supply voltage L+ in the module DQ32 in the device and network view, please proceed as follows:

## Topology "Graphic view"

No.	Action	Remark
1.	Click on "Topology" to open the website. The "Graphic view" of the "Set topology" is displayed. The red diagnostic symbol at "plc_1" shows you that a fault has occurred in a lower-level component.	SIEMENS \$71600 station_1/PLC_1  User_adm Listat  Topology PLC 1pt  PLC 1pt
2.	With a click on "plc_1" you can call the website "Module information".	Contemporation  Topology  Trace  DataLogs  User-defined pages  Filebrowser  introduction

# Topology "Table view"

Table 4-17

No.	Action	Remark					
1.	Click on "Table view" in the website "Topology" to have a table view displayed in the actual topology. The red diagnostic symbol at "plc_1" shows you that a fault has occurred in a lower-level component.	SIEMENS         S7-1600 station_1IPLC_1           (05.9.5.9 cm (77.62000)           User: admin         Topology PLC 1 (pl)         PLC boal time (VIC +01.00)         Image: Colspan="2">Image: Colspan="2">Image: Colspan="2"           Stat page         Pather pot           Stat page         Pather pot           Image: Colspan="2">Pather pot           Image: Colspan="2"           Pather pot           Image: Colspan="2"           Pather pot           Image: Colspan="2"           Pather pot           Image: Colspan="2">Pather pot           Image: Colspan="2"           Pather pot           Image: Colspan="2"           Image: Colspan="2" <td <<="" colspan="2" th=""><th>English V Port port-002 port-003 port-003</th></td>	<th>English V Port port-002 port-003 port-003</th>		English V Port port-002 port-003 port-003		
2.	With a click on "plc_1" you can call the website "Module information".	Communication     control = extra state     port-003     extra state     port-003     port-003     vinitiaun     port-003     vinitiaun     port-003     vinitiaun     port-003     vinitiaun     port-003     vititum     vititum     port-003     vititum     vitum     vititum     viti	port-001 port-001 port-005				

# Topology "Status overview"

No.	Action	Remark				
1.	Click on "Status overview" in the website "Topology" The red diagnostic symbol at "plc_1" shows you that a fault has occurred in a lower-level component.	SIEMENS S7-1500 station_1/PLC_1   Uter: admin  Topology  PLC total time (UTC 401 00)  English  Topology  Stats page Stats service  Stats page Display  Stats page Display  Common Stats  Common Stats  Display  Common Stats  Display				
2.	With a click on "plc_1" you can call the website "Module information".	Moule Information     Adams     Communication     Topology     Trace     DataLogs     User-defined pages     Filebrowser				

# 4.4.5.2 2<sup>nd</sup> fault scenario: Faulty interconnection of the port

For this fault scenario, remove the Ethernet cable from port 1of the ET 200MP and insert it into port 2 of the ET 200MP.

No.	Action	Remark
1.	Click on "Topology" to open the website. The "Graphic view" of the configured "Set topology" is displayed. The diagnostic symbol at the devices shows you that a fault has occurred in a lower-level component. The missing connection is displayed in red.	SEEMENS       S7-1600 station_1/FPLC_1         User: attrine       OddS1/3 gam. 07/05/000       Explais         User: attrine       Topology       Control         Start page       Diagnostics       Control         Oddprosts:       Adamts         Adamts       Connuncision         Topology       Explais         Isser-defined pages       Explais         Istroduction       Hatronics         Viser-defined pages       Explais         Istroduction       Hatronics
2.	Click on "Actual topology" to display the actual interconnection of the ports.	SECCENS S14500 station_IPLC_1          Ver admin       01144 min (07.00.00)       PL: loc at times (UTC +01.00)       Explain         Ver admin       01144 min (07.00.00)       PL: loc at times (UTC +01.00)       Explain         I start gage       01144 min (07.00.00)       PL: loc at times (UTC +01.00)       Explain         I start gage       01144 min (07.00.00)       PL: loc at times (UTC +01.00)       Explain         I start gage       01145 min (07.00.00)       PL: loc at times (UTC +01.00)       Explain         I start gage       01145 min (07.00)       PL: loc at times (UTC +01.00)       PL: loc at times (UTC +01.00)       PL: loc at times (UTC +01.00)         I start gage       01145 min (07.00)       PL: loc at times (UTC +01.00)       PL: loc

# Topology "Table view"

1. Click on "Table view" in the website "Topology" to have a table view displayed in the actual Topology Level to the actual to the actual Topology Level to the actual Topology Level to the	No.	Action	Remark						
topology. The diagnostic symbol at the devices shows you that a fault has occurred in a lower-level component. The actual interconnection of the ports is displayed in a table.	No.	Click on "Table view" in the website "Topology" to have a table view displayed in the actual topology. The diagnostic symbol at the devices shows you that a fault has occurred in a lower-level component. The actual interconnection of the ports is displayed in a table.	SIEMENS Uter: admin Execution State Diagnostics Diagnostics Diagnostics Buffer Diagnostics Module information Adams Communication Adams Communication Toppology Trace Distal.ogs User-Files User-defined pages Filebrowser Filebrowser Introduction	S7-1600 Topology FLC 1 pt Graphic view Port E C1. E	station_1/PLC_ V Tate Vew Status 0t.1 e200me avitch_1 vensitian	Remark         1           control         051880.pm         077           control         071500ET200MP station         071500ET200MP station           M155-5PN 87         6CALMACE X208         071500ET200MP station	20202 PLC local time port-012 port-012 port-012 port-012 port-012 port-012 port-012 port-014 port-012 port-014 port-012 port-014 port-012 port-014 port-012 port-014 port-012 port-014 port-012 port-014 port-012 port-012 port-014 port-012 port-014 port-012 port-014 port	(UTC +01.00) Partner port Name evitch_1 evitch_1 pic_1 evitch_1 pic_1 evitch_1 evitch_1	Part Part Part Part Part Part Part Part

# 4.5 Diagnostics with the system diagnostics display in the HMI

For the diagnostics of the missing supply voltage L+ in the module DQ32 in the system diagnostics view, please proceed as follows:

No.	Action	Remark
1.	Open the "Diagnostics" screen by clicking the corresponding button in the slide-in menu.	
2.	The additional diagnostic symbol in the lower right hand corner of the diagnostic symbol at "S7-1500 station_1" indicates that a fault has occurred in a lower- level component. Double-click on "S7-1500 station_1" to go to the device view.	Status     Name     Operatin Slot     Type     Address       Image: Status     S7:1500/ET200MP     32*       Image: S7:1500 station 1     S7:1500/ET200MP     32*
3.	In the device view you get an overview of the status of the local modules. In the faulty module "DQ32", the diagnostic symbol "Fault" is displayed. Double-click on "DQ32" to go to the detailed view.	Status       Operatin
4.	The detailed view shows you the cause of the fault and possible remedies.	V 1500 station       110032         Status       Value         Name       DQ3         Operating state       Rack         Rack       0         Status       Constrained and the state of the state

# 4.6 Diagnostics with the System diagnostics indicator and the system diagnostics window in the HMI

For the diagnostics of the missing supply voltage L+ in the module DQ32 with the system diagnostics indicator in the operating device, please proceed as follows:

No.	Action	Remark			
1.	Open the "Module 1" screen. If a fault occurs, the button of the system diagnostics indicator changes its status from green (no fault) to red (fault). Click on the button of the System diagnostics indicator. The System diagnostics window opens in the detailed view of the faulty module "DQ32".	System Diagnostics with 57.1500 and TAA Portal			
2.	The detailed view shows you the cause of the fault and possible remedies.	Partner dispessive out/or     P       V To Station 110032     P <ul> <li>Status</li> <li>Querating state</li> <li>Rack</li> <li>Querating state</li> <li>Rack</li> <li>Status</li> <li>Status</li> <li>Status</li> <li>Querating state</li> <li>Rack</li> <li>Status</li> <li>Status</li> <li>Status</li> <li>Status</li> <li>Querating state</li> <li>Rack</li> <li>Status</li>         &lt;</ul>			
3.	Alternatively, an error is also displayed in the diagnostic display of the template. Clicking on its button opens the "Diagnostics" screen with the system diagnostics display. (see chapter <u>4.5</u> )	C			

# 4.7 Diagnostics with alarm view in the HMI

For the diagnostics of the missing supply voltage L+ in the module DQ32 in the system diagnostics view, please proceed as follows:

Table 4-23

No.	Action	Remark
1.	Open the "Messages" screen by clicking the corresponding button in the slide-in menu.	
2.	The alarm about the faulty module "DQ32" is displayed with the source, date and time.	No.         Time         Status         Text           24         8:45:07 AM         I         Error: Scopply voltage missing PLC_1/ DQ 322:24/050.5A ST_1.

# 4.8 Diagnostics with alarm indicator and alarm window in the HMI

For the diagnostics of the missing supply voltage L+ in the module DQ32 with the alarm indicator and the alarm window in the operating device, please proceed as follows:

No.	Action	Remark
1.	In case of a fault, the alarm indicator is displayed. The alarm indicator flashes, since the alarm must still be acknowledged. The number indicates the number of pending alarms. Click on the button of the alarm indicator. The alarm window opens up.	
2.	The alarm about the faulty module "DQ32" is displayed with the source, date and time.	Xime window         X           No.         Time         Date         Status Text         Acknowledge gr           A 24         9-30:51         7/20/20/201A         Error: Supply voltage missing         0           PLC_1 / DQ 32x24VDC/0.5A ST_1.         PLC_1 / DQ 32x24VDC/0.5A ST_1.         0
3.	Acknowledge the alarm by clicking on the "Acknowledge" button. The status of the alarm changes from "I" (incoming) to "IA" (incoming and acknowledged). The alarm indicator stops flashing.	
		লে ম

# 4.9 System diagnostics with the user program

The system diagnostics with the user program is only described as to the principle. The individual evaluation of the system diagnostic information of the diagnostic blocks has to be programmed by the user.

The meaning of the system diagnostic information of the respective diagnostics blocks are described with the example of a missing supply voltage L+ in the module DI32 of the IO device "et200mp". Please refer to the data block "DiagDB" in the online overview for system diagnostics information ´.

#### 4.9.1 Diagnostic information "LED"

The parameter "Ret\_Val" of the instruction "LED" puts out the status "4" of the CPU ERROR LED. Please find the description of the parameter "Ret\_Val" in the TIA Portal online help. "LED Status 4 = color 1 flashes with 2Hz"

This means that the ERROR LED flashes red and that an error has occurred.

-00	•	•	led	Struct		
-		•	laddr	HW_IO	50	50
-		•	led	UInt	2	2
-			retVal	Int	0	4

Figure 4-1: Diagnostic information LED

#### 4.9.2 Diagnostic information "DeviceStates"

With the parameter STATE, the status of the module selected by means of the parameter MODE is put out. The status information is put in form of a bit character string. The bit "0" of the bit character string contains the status information for all modules of an I/O system.

- Bit 0 = 0: No error encountered for any module.
- Bit 0 = 1: An error occurred for at least one module.

Bits "1" to "127" (PROFIBUS DP) or "1023" (PROFINET IO) indicate the status of the respective modules selected by the mode. In this example, the status was set to Bit 1. For MODE = 2 (error in the module), this means that an error occurred in the module with the "Device number" "1".

Figure 4-2: Diagnostic information DeviceStates

 •	deviceStates	Struct		
 •	laddr	HW_IOSYSTEM	260	260
 •	mode	UInt	2	2
 •	retVal	Int	0	0
 •	▼ state	Array[01023] of Bool		
	state[0]	Bool	false	TRUE
	state[1]	Bool	false	TRUE
	state[2]	Bool	false	FALSE

## 4.9.3 Diagnostic information "GET\_NAME"

The device number of the module with the device number "1" (see <u>Figure 3-5</u>) is "et200mp".

 •	getName	Struct		
 •	laddr	HW_IOSYSTEM	260	260
 •	stationNr	UInt	1	1
 •	done	Bool	false	TRUE
 •	busy	Bool	false	FALSE
 •	error	Bool	false	FALSE
 •	len	Dint	0	7
 •	status	Word	16#0	16#0000
 •	data	String	11	'et200mp'

Figure 4-3: Diagnostic information GET\_NAME

# 4.9.4 Diagnostic information "ModuleStates"

With the parameter STATE, the status of the module selected by means of the parameter MODE is put out. The status information is put in form of a bit character string. The bit "0" of the bit character string contains the status information for all modules.

- Bit 0 = 0 No error encountered for any module.
- Bit 0 = 1 An error occurred for at least one module.

The status of the ET 200MP interface module occupies bits "1" and "2". Bits "3" to "127" indicate the status of the module of ET 200MP selected with Mode. In this example, the status was set to Bit 3. For MODE = 2 (error in the module), this means that an error occurred in the first module ("DI32x24VDC\_HF\_1").

0			0			
-	•	•	moduleStates	Struct		
-		•	laddr	HW_DEVICE	263	263
		•	mode	UInt	2	2
		•	retVal	Int	0	0
-		•	▼ state	Array[0127] of Bool		
-			state[0]	Bool	false	TRUE
-			state[1]	Bool	false	FALSE
			state[2]	Bool	false	FALSE
-			state[3]	Bool	false	TRUE
-			state[4]	Bool	false	FALSE

Figure 4-4: Diagnostic information ModuleStates

# 4.9.5 Diagnostic information "GET\_DIAG"

In the following example the diagnostic status of the DI module "DI32x24VDC\_HF\_1" is put out according to the structure "DIS" (Parameter MODE = 1) in the parameter "DIAG". For the meaning of the individual parameter values of the structure "DIS", please refer to the TIA Portal online help. You will receive the following diagnostic information:

Table 4-25

Parameters	Value	Meaning
MaintenanceState	7	Error
ComponentStateDetail	Bit 6 = 1	Error in at least one channel or one component
OwnState	4	Error
IOState	Bit 4 = 1	Error
	Bit 15 = 1	Hardware error
OperatingState	0	-

Figure 4-5: Diagnostic information GET\_DIAG

-00	•	•	ge	tDiag	Struct		
-00		•		laddr	HW_ANY	269	269
-00		•		mode	UInt	1	1
-00		•		retVal	Int	0	0
-00		•		cntDiag	UInt	0	0
-00		•	٠	diagDis	DIS		
-00			•	MaintainanceState	DWord	16#0	16#0000_0007
-00				ComponentStateDetail	DWord	16#0	16#0000_8040
-00				OwnState	UInt	0	4
-00				IOState	Word	16#0	16#8010
-00			•	OperatingState	UInt	0	0

Note

Further information on system diagnostics can be found in the application example "Diagnostics in the user program with S7-1500".

https://support.industry.siemens.com/cs/ww/en/view/98210758

# 5 Basics

#### Basics for the system diagnosis

In the SIMATIC environment the diagnostics of devices and modules are summarized in the expression system diagnostics. The monitoring functions are automatically derived from the hardware configuration.

All the SIMATIC products refer to integrated diagnostic functions with which you can detect and repair faults. The components automatically report operational faults and supply additional detailed information. Diagnostics over the whole system can minimize downtimes.

In the running system, the following states are monitored by the system:

- Failure of a device
- Pull out/push in fault
- Module fault
- Periphery access fault
- Channel fault
- Configuration fault
- No supply voltage L+
- Broken wire
- Short circuit to ground

#### System diagnostics are also possible in STOP

The system diagnostics are integrated in the firmware of the CPU S7-1500 and works independently from cyclic user programs. Therefore it is also available in the CPU operating mode STOP. Any faults are detected immediately and reported to the higher-level HMI devices, the web server, the display of the CPU S7-1500, the LED displays in the module concerned and in the TIA Portal even in the operating mode STOP. Therefore, the system diagnostics are always synchronous with the actual system status.

#### Uniform diagnostic and display concept

All the connected diagnostic display media are supplied with the same system diagnostic information by a uniform mechanism.

## **Diagnostics in different languages**

The display of the system diagnostics is available in several languages:

- German
- English
- French
- Spanish
- Italian
- Japanese
- Chinese (simplified)
- Korean
- Russian
- Turkish
- Portuguese (Brazil)

#### 6 Appendix

#### 6.1 Service and support

#### **Industry Online Support**

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos - all information is accessible with just a few mouse clicks: support.industry.siemens.com

#### **Technical Support**

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical gueries with numerous tailor-made offers ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form:

www.siemens.com/industry/supportrequest

## SITRAIN – Digital Industry Academy

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page: www.siemens.com/sitrain

#### Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services .
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

support.industry.siemens.com/cs/sc

#### Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for iOS and Android: support.industry.siemens.com/cs/ww/en/sc/2067

# 6.2 Links and literature

Table 6-1

No.	Торіс
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/68011497
\3\	SIMATIC S7-1500, ET 200MP, ET 200SP, ET 200AL, ET 200pro Diagnostics Function Manual https://support.industry.siemens.com/cs/ww/en/view/59192926
\4\	SIMATIC S7-1500, ET 200MP Automation system System Manual https://support.industry.siemens.com/cs/ww/en/view/59191792
\5\	SIMATIC S7-1500, SIMATIC Drive Controller, ET 200SP, ET 200pro Web server Function Manual https://support.industry.siemens.com/cs/ww/en/view/59193560
\6\	SIMATIC NET: Industrial Ethernet Switches SCALANCE X-200 Operating Instructions https://support.industry.siemens.com/cs/ww/en/view/102051962
\7\	Application example "Diagnostics in User Program with S7-1500" https://support.industry.siemens.com/cs/ww/en/view/98210758
/8/	HMI Templates for application examples https://support.industry.siemens.com/cs/ww/en/sc/2054

# 6.3 Change documentation

Table 6-2

Version	Date	Modifications
V1.0	05/2013	First version
V2.0	09/2020	Update to TIA Portal V16 Update 1