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NEWS

# Integration of SIMATIC CFU in the TIA Portal

SIMATIC TIA Portal, SIMATIC CFU

https://support.industry.siemens.com/cs/ww/en/view/109766570

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# 1 Introduction

The SIMATIC Compact Field Unit (CFU) enables standardized device integration of PROFIBUS PA devices directly in the field. Along with the transmitters from the comprehensive Siemens Process Instrumentation product portfolio, this provides a standardized solution from a single source.

Figure 1-1



The SIMATIC CFU supports the PROFINET functionalities simple system connection S1, simple system redundancy S2, Media Redundancy Protocol (MRP) and Configure in RUN (CiR). This means that the CFU can be configured to the standard and readily available automation systems Changes to the configuration are supported during operation if the corresponding prerequisites are met.

The CFU is electrically or optically connected to the PROFINET fieldbus via the following Bus Adapters:

- BA 2xRJ45 BusAdapter for the Ethernet cable with a RJ45 outlet 6DL1193-6AR00-0AA0
- BA 2xFC BusAdapter for the direct connection of Fast Connect cables 6DL1193-6AF00-0AA0
- BA 2xLC BusAdapter for the light wave conducive fiberglass with a LC outlet 6DL1193-6AG00-0AA0

#### Decentralized configuration with SIMATIC CFU

With the SIMATIC CFU, you can also implement decentralized approaches in field device integration in the future as an alternative to classic centralized approaches. This means that the devices of the subsystem are not routed to the control cabinet via distributors or connection boxes, but connected directly to the SIMATIC CFU in the field. It is applicable for up to eight PROFIBUS PA devices and eight freely configurable digital inputs/outputs.

The SIMATIC CFU offers the following advantages:

- Automatic addressing of the PA field devices.
- Reduction of efforts for device integration and device replacement.
- Reduced cabling and wiring errors compared to multilevel connections (distributed peripherals, MTAs, etc.).
- Less planning and documentation required.
- Standardization of plant sections.

#### Comprehensive portfolio for process instrumentation

With the SIMATIC family, Siemens offers a robust and integrated product portfolio for process automation. A comprehensive product portfolio of transmitters, pneumatic valve position controllers, process controllers and process recorders is also available for a wide variety of applications in the field of process instrumentation.

You will find an overview of the products under the following link:

https://new.siemens.com/global/en/products/automation/process-instrumentationsolutions.html

# 1.1 Content of the application example

Using the TIA Portal as an example, the application example describes how you can integrate the SIMATIC CFU into automation systems using the manufacturerneutral GSDML (General Station Description Markup Language). Figure 1-2



# 1.2 Components used

The following hardware and software components were used to create this application example:

Table 1-1

Components	Quan- tity	Article number	Note
SIMATIC Field PG	1		Or PC with TIA Portal
SIMATIC CPU 1511-1 PN	1	6ES7511-1AK02-0AB0	Or another SIMATIC CPU
SIMATIC Compact Field Unit	1	6ES7655-5PX11-0XX0	Firmware V1.1.0
BA 2xRJ45 – Bus Adapter	1	6DL1193-6AR00-0AA0	-
SIMATIC STEP 7 Professional V15.1	1	6ES7822-105	Download or DVD
SIMATIC PDM stand alone V9.1 Update 3	1	6ES7658-368	Download or DVD

This application example consists of the following components:

Table 1-2

Components	File name	Note
Documentation	109766570_CFU_in_TIA_Portal_DOC_v10_en.pdf	

# 2 Integration in the hardware catalog TIA Portal

## 2.1 Introduction

In order to integrate PROFINET IO devices from various manufacturers into automation systems, the manufacturers supply a device-specific GSDML file in accordance with the GSDML specification. The GSDML file is comparable to the GSD file for PROFIBUS.

Each GSDML file is certified by PI (PROFIBUS & PROFINET International, also PNO) after a certification test.

**Note** The integration of the SIMATIC CFU with the GSDML file in TIA Portal is possible as of firmware version V1.0.1.

The GSDML file is available under the following link: https://support.industry.siemens.com/cs/ww/en/view/109762284

The SIMATIC CFU Firmware is available under the following link: <u>https://support.industry.siemens.com/cs/ww/en/view/109754628</u>

A description of how to perform a firmware update with the TIA Portal can be found under the following link: https://support.industry.siemens.com/cs/ww/en/view/88778936

# 2.2 Installing the GSDML file

To be able to configure the SIMATIC CFU in the TIA Portal, you must first install the GSDML file.

Follow the steps below:

 Click on the "Tools > Manage Device Description Files (GSD)" menu ("Options > Manage general station description files (GSD)").

Fig	Figure 2-1											
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	CFU_Integration → Devices & ne	Support packages										
		Manage general station description files (GSD) Start Automation License Manager										
2	≝⊞шш≪≚	🐮 Show reference text										
N0		🛄 Global libraries 🔹 🕨										

The "Manage general station description files" dialog opens.

- 2. Click on the "Browse" button and select the directory in which the GSDML file is stored.
- 3. Select the GSDML file from the list.
- 4. Click the Install button to install the GSDML file.
  - Figure 2-2

١	/lanage general sta	tion descriptior	ı files				×
	Installed GSDs	GSDs in the p	project				
	Source path: D:\\F	Projects\CFU_Integ	ration\GSDML				2
	Content of importe	ed path					
	🛃 File		Version	Language	Status	Info	
	GSDML-V2.35-Sier	mens-CFU-PA-20	V2.35	English, Ge	Not yet installed	Compact Field Unit	
	<		1	11	Delete	Anstall Cancel	

After successful installation you will receive a confirmation and the hardware catalog with the SIMATIC CFU will be updated.

Figure 2-3	
Manage general station description files	×
Installation result	
! Message	
Installation was completed successfully.	
Save log Install additional files	Close

# **3 Project planning in the TIA Portal.**

The following network parameters are used in this example. Figure 3-1



## 3.1 Project engineering of the SIMATIC CFU

The SIMATIC CFU can be found in the hardware catalog under "Other field devices  $\rightarrow$  PROFINET IO  $\rightarrow$  I/O  $\rightarrow$  SIEMENS AG  $\rightarrow$  Compact Field Unit".

1. Drag and drop the Device "CFU PA V1.1" into the network view and place it next to the CPU 1511-1 PN.



#### Figure 3-2

 Assign the SIMATIC CFU to the PROFINET Controller "PLC\_1" (CPU 1511-1 PN). Click on the interface of the SIMATIC CFU and pull a connection to the interface of the controller "PLC\_1" while holding down the mouse button.



The result is a configured PROFINET controller-device relationship. Figure 3-4



- 3. Double-click on the SIMATIC CFU to open the properties of the SIMATIC CFU in the inspector window.
- Configure the PROFINET interface of the SIMATIC CFU. Assign the IP address and the PROFINET device name. You can also configure media redundancy, update time, and response monitoring time here.

Figure 3-5

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	Portal view 🔀 Overview 🍰 Devices &		<b></b>	Project CFU_Integration o	pened.	ļ

**Note** When configuring the SIMATIC CFU V1.1, the following additional functions and settings are possible.

- Service Interface
- Manual field device integration

When configuring the SIMATIC CFU V1.1, the SIMATIC CFU must have at least firmware version V1.1.1.

The current firmware of the SIMATIC CFU can be found under the following link: <u>https://support.industry.siemens.com/cs/ww/en/view/109754628</u>

Further information about the SIMATIC CFU can be found in the manual "SIMATIC Decentral Periphery SIMATIC CFU" under the following link: https://support.industry.siemens.com/cs/ww/en/view/109759420

# 3.2 Replacing the bus adapter

When inserting the SIMATIC CFU, the bus adapter BA 2xRJ45 (6DL1193-6AR00-0AA0) is configured by default. This can be replaced by the following bus adapters:

- BA 2xFC (6DL1193-6AF00-0AA0)
- BA 2xLC (6DL1193-6AG00-0AA0)

Proceed as follows to replace the bus adapter:

- 1. Open the device view of the SIMATIC CFU.
- 2. Table area of network view
- 3. Select the ports of the bus adapter and delete them.

F	igure 3-6	5											
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	Portal view	22 Overview	📩 cfu-pa			Subjettes	1.5				Project	CFU_Integration oper	ned.

- 4. Navigate to the ports of the new bus adapter in the hardware catalog.
- 5. Drag and drop the new port 1 to the corresponding position in the tabular area of the device view.
- 6. Drag and drop the new port 2 to the corresponding position in the tabular area of the device view.



#### Note

te The exchange of objects (modules, submodules) is not possible at this point.

It is not possible to use other bus adapters, e.g. BA 2xRJ45 (6ES7193-6AR00-0AA0) or BA 2xFC (6ES7193-6AF00-0AA0).

# 3.3 Configuration of the I/O

The digital inputs/outputs can be parameterized in the device view of the SIMATIC CFU. Follow the steps below:

- 1. Select the field "DIQ8 DC24V/0.5A" so that the module parameterization appears in the properties dialog.
- Activate the channels you want to use and select the type "Digital input" or "Digital output" for each channel. Additionally you can activate channel granular diagnostic options and parameterize the behavior at CPU STOP.

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**Note** Each channel must be configured individually. Using the GSDML file does not allow simultaneous editing of all channels.

The following parameters are ignored for channels that are parameterized as "Digital input":

- "Channel diagnostics: (DO) Short-circuit to L+" ("Channel diagnostics: (DO) Short-circuit to L+")
- "Channel: (DO) Reaction to CPU STOP" ("Channel: (DO) Reaction to CPU STOP")

# 3.4 Configuration of PROFIBUS PA field devices

The PROFIBUS PA field devices can be parameterized in the device view of the SIMATIC CFU. Configuration is possible via the manufacturer-neutral, universal PROFIBUS PA profiles. Each PROFIBUS PA field device supports at least one PROFIBUS PA profile.

Follow the steps below:

- 1. Select the desired PROFIBUS PA profile from the hardware catalog, e.g. "Transmitter 2 AI (Phy MBP)".
  - Two process values are transmitted via this PROFIBUS PA profile.
- 2. Add the selected PROFIBUS PA profile to the project engineering by dragging it to the desired slot.

Figure 3-9

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3. Assign a name to the PROFIBUS PA field device, e.g. "SITRANS\_TH400". Figure 3-10

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You can also adapt the submodules of the PROFIBUS PA profiles. For example, to adapt the submodule of an actuator, proceed as follows:

4. Delete the already configured submodule, e.g. "SP (short)".



5. The new submodule is then selected in the hardware catalog and dragged to the free space in the configuration table.

Figure	3-1	2
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#### Note

The function "Read back I/Os" is not available via the GSDML file.

You can connect field devices by using PROFIBUS PA profiles (16 PA profiles). It is not possible to use manufacturer-specific GSDs.

Automatic addressing of the PROFIBUS PA field devices eliminates the need for manual assignment of the PROFIBUS PA address (e.g. via the SIMATIC PDM Lifelist). The PROFIBUS PA field devices connected to the fieldbus connections FB0 to FB7 are assigned a fixed PROFIBUS PA address from 20 to 27.

# 3.5 Observing process values

After the SIMATIC CFU has been configured and the project loaded, you can observe the process values in the TIA Portal with an observation table or record them with a trace.

Figure 3-13 Observation table

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#### Figure 3-14 Trace



### 3.6 Service Interface

You can parameterize a fieldbus connection of the SIMATIC CFU PA as a service port for the field devices of this CFU (e.g. for calibrating the field devices in a defined environment).

Figure 3-15



If the service port is enabled, you can calibrate field devices connected to the service port. The field device behaves at the service port in the same way as at the original fieldbus connection.

A field device connected to the service port is automatically detected if it was last in operation at this CFU at one of the other fieldbus connections, i.e. if it was already configured via one of these fieldbus connections. It is automatically routed (mapped) to the original fieldbus connection of the CFU. The original fieldbus connection is deactivated by the detection of the field device at the service port until you disconnect the field device from the service port or deactivate the service port.

**Note** If the field device is connected to the service port, the process values for the field device are still transferred to the process.

Make sure that the field device is not involved in process operation at the time of calibration.

The current and voltage of the field devices connected to the service port are not monitored.



To parameterize a fieldbus connection as a service port, proceed as follows:

- 1. Open the device view of the SIMATIC CFU.
- 2. Table area of network view
- 3. Select "Parameters + Diagnosis" and open the properties of the SIMATIC CFU.

4. In the "Service interface" area, activate a fieldbus connection as a service port. Figure 3-17



# 3.7 Diagnostic options in the TIA Portal

#### Diagnostics in the device view

The integrated system diagnostics report any pending errors to the PROFINET controller.

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#### Activate display of DPV0 alarms on the SIMATIC CFU LEDs

DPV0 Alarms can be displayed on the LEDs of the SIMATIC CFU.

To display the DPV0 alarms, proceed as follows:

- 1. Open the device view of the SIMATIC CFU.
- 2. Table area of network view
- 3. Select "Parameters + Diagnosis" and open the properties of the SIMATIC CFU.
- Activate the option "Show DPV0 alarms on CFU LEDs" ("Show DPV0 alarms on CFU LEDs") in the area "PROFIBUS PA Parameters" ("PROFIBUS PA parameters").

#### Figure 3-19



# 4

# Device parameterization with SIMATIC PDM

SIMATIC PDM is an established universal, multi-vendor tool for configuration, parameterization, commissioning, diagnostics and maintenance of intelligent field devices (sensors and actuators) and field components (remote I/Os, multiplexers, control room devices, compact controllers). The library supplied with SIMATIC PDM with its more than 3,500 device descriptions for devices from more than 200 manufacturers worldwide, is most likely the most comprehensive library on the market.

If you work with TIA Portal, parameterize the PROFIBUS PA field devices with SIMATIC PDM stand alone.



**Note** The parameterization of the field devices and the SIMATIC CFU is only possible with SIMATIC PDM.

Further information about SIMATIC PDM can be found in the manual "SIMATIC Process Control System PCS 7 Help for SIMATIC PDM" under the following link: https://support.industry.siemens.com/cs/ww/en/view/109755005

# 4.1 Creation of a SIMATIC PDM stand alone project

To create a SIMATIC PDM stand alone project, proceed as follows:

1. Create a new project.



- 2. Right-click on "networks" to open the context menu.
- Click on "Insert New Object > Communication network". Figure 4-3



- 4. Click on the button "Assign device type...". ("Assign Device Type...").
- 5. Choose "PROFINET network" and confirm with "Ok".

Figure 4-4	
SIMATIC PDM stand alone - [CFU_PDM D:\Projects\CFU_Integration\CFU_PDM]	
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6. Name the PROFINET network, e.g. "PROFINET network CFU" and confirm with "OK".

Figure 4-5		
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/NET/PROFINET/profinet/edd_net_profinet_component License information: 0 of a maximum of 4 TAGs used.		
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Result: The PROFINET network has been added to the configuration. Figure 4-6

SIMATIC PDM stand alone - [CFU_PDM D:\Projects\CFU_Integration\CFU_PDM]							
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**Note** The field devices must be created directly in SIMATIC PDM. Only open SIMATIC PDM manually. Only in this way is access to the project engineering or to the field devices possible. The automatic opening of SIMATIC PDM from the engineering system is not possible (e.g. by double-clicking on the field device).

No "Expected TAG" is displayed in the EDD Wizard.

## 4.2 Configuration of the SIMATIC CFU and the PROFIBUS PA field devices

#### 4.2.1 Integrating the Device Description of the SIMATIC CFU into SIMATIC PDM

To integrate the latest device description (EDD) of the SIMATIC CFU into SIMATIC PDM, proceed as follows:

- 1. Start the Device Integration Manager of SIMATIC PDM.
- 2. Click on the icon "Read device descriptions from compressed source..." in the function bar. ("Read device description from compressed source...") and select the ZIP file with the device description in the selection dialog.
- 3. Click the "Integration" icon in the toolbar. The device description of the SIMATIC CFU is integrated in SIMATIC PDM.

Figure 4-7

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Note The current device description (EDD) of the SIMATIC CFU can be found under the following link: https://support.industry.siemens.com/cs/ww/en/view/109749714

#### 4.2.2 Adding a SIMATIC CFU

To insert the SIMATIC CFU with SIMATIC PDM stand alone, proceed as follows:

- 1. Right-click on the "PROFINET network CFU" network to open the context menu.
- 2. Click Insert New Object > Object.



- 3. Click on the button "Assign device type...". ("Assign Device Type...").
- 4. Select "CFU PA V1.1" and confirm with "OK".

Figure 4-10

Figure 4-9	
SIMATIC PDM stand alone - [CFU_PDM D:\Projects\CFU_Integration\CFU_PDM]	)
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5. Enter the PROFINET device name and the configured IP address and confirm with "OK".

•		
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/DEVICE/PROFINET/REMOTEIO/SIEMENS/CFU_PA/CFU_PA_V2		
License information: 0 of a maximum of 4 TAGs used.		
OK	Cance	el

#### 4.2.3 Adding PROFIBUS PA field devices

To insert PROFIBUS PA field devices with SIMATIC PDM stand alone, proceed as follows:

- 1. Right-click on the SIMATIC CFU "cfu-pa" to open the context menu.
- 2. Click "Insert New Object > Object".

Figure 4-11				
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	SIMATIC PDM	>		
	Rename	F2		
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- 3. Click on the button "Assign device type...". ("Assign Device Type...").
- 4. Select a field device and confirm with "OK". Figure 4-12

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5. Enter the PROFIBUS PA object name and the PROFIBUS PA address and confirm with "OK".

Figure 4-13

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License information: 1 of a maximum of 4 TAGs used.	OK Cancel

6. Repeat steps 1 to 5 for additional PROFIBUS PA field devices.

#### 4.2.4 Parameterization of the PROFIBUS PA field devices

Via the context menu you open the PDM parameterization view of the PROFIBUS PA field devices. You can open this view either via the SIMATIC CFU "cfu-pa" in the so-called Multiview (with all configured PROFIBUS PA field devices) or via a single PROFIBUS PA field device in the so-called PDM Singleview (single view).

To open the PDM parameterization view of the PROFIBUS PA field devices, click on "Open Object" in the context menu of a component.

In the PDM parameterization view, you can now parameterize the PROFIBUS PA field devices.





# 4.3 Further parameterization options of the SIMATIC CFU

With the SIMATIC PDM Assistant "CFU PA V1.1 Configuration" ("CFU PA V1.1 Configuration") you can parameterize additional settings online at the SIMATIC CFU.

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		Software Revision					
		Bootloader Revision					
		Set I&M data of CFU PA Bus Adapter:					
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		Commissioning status	Not completed				
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		CFU Power Supply Parameters					
		Configure 24V Power Supply:					
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		Power Supply Disturbance Diagnostics	Disabled				

# The "Commissioning Wizard: Complete" is recommended here. Figure 4-16



The "Commissioning Wizard: Complete" guides you in 6 steps through the parameterization options of the SIMATIC CFU. At the end you load this parameterization with SIMATIC PDM into the SIMATIC CFU.

In addition to the Identification & Maintenance data (I&M), the redundant power supply and the electronics temperature can be monitored. In addition, current and voltage levels on the PROFIBUS PA lines can be monitored with the so-called extended fieldbus diagnostics. The messages and alarms of this monitoring can be displayed via SIMATIC PDM.





## 4.4 Use of the SIMATIC PDM Maintenance Station

The SIMATIC PDM Maintenance Station works independently of the automation projects, the automation systems (controllers) used for them and supports other types of communication. The SIMATIC PDM Maintenance Station is not focused on specific automation solutions. In principle, it is suitable for all projects in which communication types supported by SIMATIC PDM and field devices from the SIMATIC PDM device description library are used.

This allows you to use the SIMATIC PDM Maintenance Station as an asset management system for intelligent field devices (HART, PROFIBUS PA) within TIA Portal projects.



The visualization is automatically generated from the PDM project and shown in the following figure. The Group Display can be used to visualize the subordinate level up to the field devices in the controller area.



Figure 4-19

You can open a faceplate for each field device. In addition to the electronic nameplate, this also indicates upcoming events such as messages, alarms and maintenance requirements. You can also create and edit maintenance orders.

SilviA IIC F Divi call be called via a buttoli ili tile illiage block.	SIMATIC PDM	can be called	d via a button	in the	image block.
--	-------------	---------------	----------------	--------	--------------

SITRANS_TH400			(
DM Maintenance State Block		🗖 🔄 🖉 🌧	2
		Z D D D D D D D D D D D D D D D D D D D	
	HID/TAG	SITRANS_TH400	
Good	LID	SITRANS_TH400	Q
	Address	-	G
	Description		0
	Message		0
Ormand	Device type	SITRANS TH400	0
Comment	Manufacturer	Siemens	0
	Order number	7NG3214-0*N00	0
	Serial number	PQAV0070568216	0
	Installation date	01.10.1998	0
	HW revision	53509004	0
	SW revision	V2.03 PA01	0
	Last update	2019-05-08 12:31:49	\$

#### Note The EDD (Electronic Device Description) for integrating the SIMATIC CFU into SIMATIC PDM can be found in the PDM device catalog or individually under the following link:

https://support.industry.siemens.com/cs/ww/en/view/109749714

Further information on the Maintenance Station can be found under the following link:

https://support.industry.siemens.com/cs/ww/en/view/109759590

#### 5 Appendix

#### 5.1 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

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- Plant data services
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- 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:

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#### **Industry Online Support app**

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for Apple iOS, Android and Windows Phone:

support.industry.siemens.com/cs/ww/en/sc/2067

# 5.2 Links and Literature

Table 5-1

No.	Торіс
\1\	Siemens Industry Online Support
	https://support.industry.siemens.com
\2\	Link to the entry page of the application example
	https://support.industry.siemens.com/cs/ww/en/view/109766570
\3\	Process instrumentation
	https://new.siemens.com/global/en/products/automation/process-
\4\	PROFINET GSD file (GSDML) - SIMATIC Compact Field Unit (CFU)
	https://support.industry.siemens.com/cs/ww/en/view/109762284
\5\	SIMATIC CFU Firmware
	https://support.industry.siemens.com/cs/ww/en/view/109754628
\6\	Electronic Device Description (EDD) - SIMATIC Compact Field Unit (CFU)
	https://support.industry.siemens.com/cs/ww/en/view/109749714
\7\	FAQ: How do you carry out a firmware update in the TIA Portal for the decentralized peripherals?
	https://support.industry.siemens.com/cs/ww/en/view/88778936
\8\	Manual: SIMATIC Decentralized periphery SIMATIC CFU
	https://support.industry.siemens.com/cs/ww/en/view/109759420
\9\	Manual "SIMATIC Process Control System PCS 7 Help for SIMATIC PDM"
	https://support.industry.siemens.com/cs/ww/en/view/109755005
\10\	Manual: SIMATIC Process Control System PCS 7 Maintenance Station
	https://support.industry.siemens.com/cs/ww/en/view/109759590

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# 5.3 Change documentation

Table 5-2

Version	Date	Change
V1.0	05/2019	First version