Readme
Legal information

Warning notice system

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

<table>
<thead>
<tr>
<th><strong>DANGER</strong></th>
<th>indicates that death or severe personal injury will result if proper precautions are not taken.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WARNING</strong></td>
<td>indicates that death or severe personal injury may result if proper precautions are not taken.</td>
</tr>
<tr>
<td><strong>CAUTION</strong></td>
<td>indicates that minor personal injury can result if proper precautions are not taken.</td>
</tr>
<tr>
<td><strong>NOTICE</strong></td>
<td>indicates that property damage can result if proper precautions are not taken.</td>
</tr>
</tbody>
</table>

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

| **WARNING** | Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed. |

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.
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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 only form one element of such a concept. Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens’ guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit:


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

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

Overview

SFC V9.0 - Creating sequential control systems for SIMATIC PCS 7

This information has priority over statements made in other documentation.

Please read these notes carefully, as they contain important information about the installation and use of SFC.
3.1 Scope of Delivery

You have received one of the following components with the product package "PCS 7 - Engineering V9.0":

SFC V9.0

An SFC license is included on the license key flash drive for "PCS 7 - Engineering V9.0".

Content of the SIMATIC PCS 7 V9.0 DVD for SFC
- SFC V9.0
- Electronic manual "SFC for SIMATIC S7"

3.2 Hardware Requirements

The SFC software is part of the PCS 7 software and can therefore only be operated on devices which meet the hardware requirements for the PCS 7 software.

These requirements are described in the readme file for the PCS 7 software.

3.3 Software Requirements

Runtime environment

The SFC software is part of the PCS 7 software. To operate SFC, the software requirements of the PCS 7 software must be met.

You need at least the following software on your programming device or PC:

- Operating system (see software requirements in the readme file on the SIMATIC PCS 7 V9.0 DVD)
- STEP 7 basic software from the SIMATIC PCS 7 V9.0 DVD or higher
- CFC programming software from the SIMATIC PCS 7 V9.0 DVD or higher

To read the provided PDF files, you need a PDF reader that is compatible with PDF 1.x.

Memory requirements

SFC V9.0 requires approximately 30 MB of space on your hard disk.
3.4 Installation and removal

Installation of SFC
You can install SFC V9.0 over an existing installation of SFC.
SFC is installed via the SIMATIC PCS 7 V9.0 DVD setup.

SFC license key
Before you can work with CFC, you need to transfer the license key (usage right) from the license key memory stick to the computer.

- If the license key cannot be installed during setup, continue setup without installing the license key. Afterwards, restart the computer and install the license key using the Start menu command "Simatic > License Management > Automation License Manager".

The notes from the STEP 7 readme also apply to the license key.

Uninstalling SFC

Note
You have to remove software products in accordance with the MS Windows guidelines.

To do this, uninstall your software package in the Windows Control Panel. For example, in Windows 7, open Programs > Programs and Features in the Control Panel and select your software package to be uninstalled. This is the only way to uninstall the software under MS Windows.

Dynamically created files could remain when you uninstall SFC. This is detected by the Uninstall tool, and the message "Some elements could not be removed. You should manually remove items related to the application." is displayed. You can, but do not have to, delete these dynamically created files.
Notes on usage

These notes take precedence over statements made in the manuals and online help.

4.1 New features and changes as compared to previous versions

What's new in SFC?

V9.0

Version V9.0 contains the following enhancements or changes compared with version V8.2:

- Configuration of technological actions and conditions in SFC types
  Technological actions in steps and technological conditions in transitions/start conditions can be configured in the SFC editor.
  The current values of technological actions and conditions are displayed in the test mode of the SFC editor.

- Classifications for SIMATIC BATCH
  The classifications in the properties of an SFC type have been extended for the connection to SIMATIC BATCH via the equipment phase (EPH).

- Global commands and status in the "SFC Library"
  Pre-defined global commands and states are provided in the "SFC Library". To use the commands, they have to be copied from the SFC library to the project library in the PH view. They can then be used in the "Sequential control" of equipment phases or equipment modules as well as in SFC types.

V8.2

Version V8.2 contains the following enhancements or changes compared with version V8.1:

- Calculations in SFC
  Calculations can be configured in steps, transitions or sequencers in the SFC Editor ("Starting Condition", "Preprocessing" or "Postprocessing" tabs).
  The values of the calculation results and the output variables are displayed in test mode of the SFC Editor.
  You can find additional information in the section "Overview of SFC calculations" of the "SFC for SIMATIC S7" manual or online help.

V8.1
Version V8.1 includes the following enhancements or changes compared with the previous version V8.0.4:

- **Block icons for process pictures in APL-based style**
  The templates for the block icons can be available in different variants. Variants "1" and "2" are already present as standard.
  - Variant "1" contains icons in the PCS 7 standard.
  - Variant "2" contains icons in an APL-based style.
  You can find additional information on this:
  - In the "Operator control and monitoring" section in the "CFC for SIMATIC S7" manual or online help.
  - In the "Configuring SFC block icons" section of the "SFC Visualization" manual or online help.

- **"Selective download" function**
  The new "Selective download" function can be used to download individual or multiple modified CFCs or SFCs to a target system. You can use selective downloading as a user to specifically select which configured changes should be transferred to the target system, enabled and tested.
  You can find additional information in the section "Selective download of individual charts" of the "CFC for SIMATIC S7" manual or online help.

- **Type update in RUN mode**
  CPU 410-5H PA supports type update in RUN mode. This makes it possible to update the instances and download them to the target system in RUN mode after changing an interface at the block types. This is only possible in STOP mode in other automation systems.
  You can find additional information in the section "How to Download Programs" of the "SFC for SIMATIC S7" manual or online help.

### 4.2 Information on Configuration and Operation

#### 4.2.1 Migrating to Other SFC Versions

**Processing SFC data of earlier versions**

Data created with older versions of SFC can be further processed with SFC V9.x as follows:

- The data of older SFC versions can be read and displayed with SFC V9.x.
- For older SFC versions, processing results in the conversion of data at first write access (following a system prompt) for each chart folder in order to ensure compatibility. All CFCs of the chart folder are included in the conversion.
Note

General notes on compatibility

- You cannot convert V9.x data "back" to older versions.
- Earlier SFC versions cannot be used to process data created with SFC V9.x.

Preparing data of older SFC versions for editing with SFC V9.x

Upgrading versions prior to V6

When versions V6 or earlier are upgraded to V9.x, you must perform a complete compilation and a complete download while the CPU is in STOP.

Upgrading version V6.x

When versions V6.x are upgraded to V9.x, it is possible to compile changes and download changes while SFCs/instances are disabled.

In principle, download of changes without stopping the AS is only possible when new functions – in particular, the update of library blocks – are not used simultaneously.

To ensure that SFCs can be downloaded with a download of changes when switching to SFC V9.x, the data must be adapted beforehand in the previously used SFC V6.x version as follows.

The applicable hotfixes for CFC and SFC must first be installed:

- CFC 6.1 SP1 Hotfix 6 and SFC 6.1 SP1 Hotfix 1, or
- CFC 6.1 Hotfix 3 and SFC 6.1 Hotfix 2, or
- CFC 6.0 SP2 Hotfix 8 and SFC 6.0 SP1 Hotfix 5, or
- CFC 6.0 Hotfix 7 and SFC 6.0 Hotfix 4 or higher hotfixes for the respective versions.

The applicable hotfixes for CFC and SFC must first be installed:

Then, the @SFC_RTS (FB 300) block, as well as the @SFC_ESM (FB 246) block for SFC 6.0 Hotfix 4, must be copied from the "SFC Library" to all programs in which SFCs are used. Afterwards, a complete compilation and a download of changes must be performed for each chart folder containing SFCs (charts or types, instances). Simultaneous configuration changes are not allowed during this process, since they could prevent a download of changes. After the data has been prepared in this way, it can now be transferred to SFC V9.x.

Upgrading version V7.x

Following an upgrade of PCS 7 V7.x, the SFC system blocks FB245, FB246, FB300, and FC240 to FC250 must be copied from the SFC library to all block folders. Afterwards, a complete compilation is absolutely mandatory (even though a compilation of changes is offered for selection), and a download of changes is permissible. The SFC system blocks FB245 to FB300 and FC240 to FC250 from "SFC Library\Blocks+Templates\Blocks" are reserved blocks for PCS 7 and must not be renamed. This means that any identically-named user blocks in projects must be renamed before the SFC component of PCS 7 is used.
Notes on the SFC runtime system

The SFC runtime system was optimized with SFC V9.x. Following a conversion, the associated blocks are partially copied automatically to the block folders whose assigned chart folders have been converted. Please ensure that the latest SFC system blocks are included in the block folder and, if necessary, copy the more recent blocks from the SFC library to the block folders of the project.

Additional resource requirements for SFC V9.x as compared to older SFC versions

The functional expansions for SFC require additional system resources (memory, tags, etc.) in the automation system and OS server when updating SFC. These additional requirements arise regardless of whether new functions are already being used. They are, however, a prerequisite for the use of the new functions (e.g., sequencers in SFC, expanded download of changes, etc.).

Determination of the additional requirements

The increased system resource requirements as compared to older SFC versions can be determined using the attached Excel worksheet, "SFC-AdditionalResources-V9.xls". This will enable you to determine whether the available system resources can accommodate your PCS 7 project and thus whether it can still be downloaded and run.

You can find the "SFC-AdditonalRessources-V9.xls" file on the SFC installation medium in the directory of the "SFC Readme" file.

Because the resource requirements are heavily dependent on the individual configuration, it cannot be guaranteed that you will be able to download your programs to the automation system after the update to PCS 7 V9.x. Therefore, you should always keep additional system resources in reserve.

4.2.2 General Information on SFC

Handling of upper/lower case text for SFC objects

SFC V8.1 and higher still distinguishes between upper and lower case in the names of steps and transitions within charts. In other words, it is possible to create steps and transitions with names that differ from other names only with respect to case.

However, we recommend that you keep names case-sensitive for cooperation with WinCC; otherwise, WinCC will not be able to distinguish between the blocks with the same names.

Differences in CPU protection

- In SFC test mode, write access is also allowed with the key in RUN position.
- When password protection is enabled, those who do not know the password cannot access the CPU, regardless of the protection level.
Scope of functions in SFC calculations

In SFC V9.0, the number of inputs of the functions/operations is limited to max. two inputs for SFC calculations.

This statement takes precedence over the information in the section "Scope of functions in SFC calculations" of the online help or documentation.

Limitations when configuring SFC types

During the configuration of SFC types, SFC instances of the type in question that are open simultaneously might not be updated. To avoid problems, you should close all SFC instances for the SFC type while you process this type.

Resource requirements for SFC V9.x

Determination of the requirements

The system resource requirements can be determined using the Excel worksheet, "SFC-Resources-V9.xls".

This will enable you to determine whether the available system resources can accommodate your PCS 7 project and thus whether it can be downloaded and run.

You can find the "SFC-Resources-V9.xls" file on the SFC installation medium in the directory of the "SFC Readme" file.

Because the resource requirements are heavily dependent on the individual configuration, it cannot be guaranteed that you will be able to download your programs to the automation system. Therefore, you should always keep additional system resources in reserve.

4.3 Notes on the Documentation

The entire documentation on SFC is available to you via the online help. This documentation contains both "basic knowledge" on cross-function contents as well as information on the direct operating and functional context.

SFC is described in the "SFC for SIMATIC S7" manual.

The manuals are available as electronic documents which you can read and print with the supplied Acrobat Reader (in Windows Start menu, submenu "Siemens Automation > SIMATIC > Documentation").