

SIEMENS

SIMATIC

PCS 7 Process Control System CFC Readme V9.0 SP2 Upd2 (Online)

Readme

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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.

| |
|--|
| ⚠ DANGER |
| indicates that death or severe personal injury will result if proper precautions are not taken. |

| |
|---|
| ⚠ WARNING |
| indicates that death or severe personal injury may result if proper precautions are not taken. |

| |
|--|
| ⚠ CAUTION |
| indicates that minor personal injury can result if proper precautions are not taken. |

| |
|--|
| NOTICE |
| indicates that property damage can result if proper precautions are not taken. |

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. |

Trademarks

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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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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
<https://www.siemens.com/industrialsecurity>.

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 under
<https://www.siemens.com/industrialsecurity>.

Overview

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 CFC.

You can find important information in the "Notes on use" section.

Notes on Installation

The installation notes include important information that you need to install the "CFC for SIMATIC S7" software. Please read these notes prior to installation.

This version runs on the following operating systems:

- MS Windows 7 Professional with SP1 (64-bit) (English version of Windows only)
- MS Windows 7 Ultimate with SP1 (64-bit)
- MS Windows 7 Enterprise with SP1 (64-bit)
- MS Windows 10 Pro (64-bit)
- MS Windows 10 Enterprise 2015 LTSC (64-bit)
- MS Windows Server 2008 R2 Standard Edition with SP1 (64-bit)
- MS Windows Server 2012 R2 Standard Edition (64-bit) (as "Windows Server 2012 R2 Standard with Update" or including KB 2919355 "Windows Server 2012 R2 Update")
- MS Windows Server 2016 Standard Edition (64-bit)
- Only under PCS 7:
 - MS Windows 7 Ultimate / Enterprise with SP1 (32-bit)

3.1 Scope of Delivery

You can download CFC V9.0 SP2 Upd2 from the Industry Online Support:

Internet link (<https://support.industry.siemens.com>)

Engineering System Collection

In addition to the above-mentioned single download, you can also download the relevant files for the Engineering System (ES) as "Engineering System Collection".

The "Engineering System Collection" provides the ES products of the current ES Service Pack. This collection provides a package of quality improvement measures for the included ES products for installation.

You can find the "Engineering System Collection" of ES V9.0 Service Pack 2 in the section "PCS 7 Software Updates" > "PCS 7 V9.0 SP1" on the following website:

Internet link (<https://support.industry.siemens.com/cs/en/en/view/63481413>)

3.2 Hardware Requirements

The CFC software can be used under SIMATIC PCS 7 or SIMATIC STEP 7.

It can therefore only be operated on devices which meet the hardware requirements for the respective software.

3.3 Software Requirements

Runtime environment

CFC is a 32-bit application that requires one of the operating systems listed above.

CFC is add-on software. In order to operate CFC, you also need the following software on your programming device or PC:

- Basic software STEP 7 V5.6 or higher
- IEA-PO V9.0 SP2 or higher

Note

The SCL Compiler product is no longer needed as of CFC V6.1 including SP1.

The setup for CFC installs the required SCL Compiler functionality in the appropriate version (no SCL license key is required for this).

If a version of SCL Compiler earlier than V5.3 including SP1 was installed on the PC and SCL has been removed, CFC must be reinstalled. Otherwise, you cannot compile in CFC, because the SCL function cannot be found.

If you have installed an SCL Compiler with version V5.1.x on the PC, you must install the SCL Compiler again after removing CFC, because otherwise the SCL sources will no longer be displayed in the SIMATIC Manager.

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

Memory requirements

CFC requires approximately 90 MB of space on your hard disk.

Certificates for the SIMATIC applications

Siemens digitally signs SIMATIC applications in order to ensure the trustworthiness and authenticity of their applications.

When executing these applications, the validity of the relevant certificates will also be checked.

In industrial facilities without Internet access, errors or time delays may occur when checking the validity of certificates.

Observe the notes and recommendations included in the FAQ in Internet (<https://support.industry.siemens.com/cs/ww/en/view/87057037>).

3.4 Installation and removal

Installation of CFC

You can install CFC V9.0 SP2 Upd2 over an existing installation of CFC.

CFC can only be installed after complete installation of STEP 7. The setup program automatically installs CFC on the drive containing the STEP 7 software.

CFC is installed with a user-guided setup that you launch with the MS Windows Explorer by double-clicking on the SETUP program on the CD.

CFC 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 CFC

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 CFC. This is detected by the Uninstall tool, and shown with the message "Some elements could not be removed. You should manually remove items related to the application.. You can, but do not have to, delete these dynamically created files.

3.4 Installation and removal

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 CFC?

V9.0 SP2

Compared with the previous version V9.0 SP1, version V9.0 SP2 includes the following enhancements or changes:

- Menu command and button "Avoid implicit dead times"
If a feedback path is detected in the interconnection on a new interconnection in the CFC, then automatic correction is performed in the run sequence of the blocks in order to prevent this feedback path and resulting dead times.
This automatic correction can be enabled or disabled using a new button or menu command for avoiding implicit dead times. The function is disabled by default.
A warning is no longer output to the log during compiling.
You can find additional information on this in the section "Display of feedback in the signal processing (dead time)" of the "CFC for SIMATIC S7" manual or online help.
- New option "Ignore for type update"
A new option that ignores the parameter value for the type update on synchronization of the corresponding template has been added.
You can find additional information on this in the section ""Properties" dialog box, "I/Os" tab" of the "CFC for SIMATIC S7" manual or online help.
- The simultaneous use of an add-on library in addition to the Basic Library is supported via a XML switch.

4.1 New features and changes as compared to previous versions

V9.0 SP1

Compared with the previous version V9.0, version V9.0 SP1 includes the following enhancements or changes:

- Reporting
The logging function for downloading has been enhanced.
In the "Reports" dialog box, you can use the "Archive" button to open a dialog for selecting and displaying log files with detailed information about the download.
Information on the download can now also be stored in XML format in addition to the existing log files. These XML files with the information on the downloaded changes can be compared in the VXM if needed.
- New attributes on technological objects
With technological objects, such as control modules, the "Low scale value" and "High scale value" have been added. The attributes can be edited at the type of technological object and are only relevant for analog signals (input and output signals).

Note

You can find additional information on these enhancements or changes in the "CFC for SIMATIC S7" manual or online help in the following sections:

- "Change log and ES log"
 - "Attributes and attribute values of a control module"
-

V9.0

Compared with the previous version V9.0, version V8.2 SP1 includes the following enhancements or changes:

- Technological configuration
For technological configuration, the equipment phase "EPH" is provided to enable control of multiple lower-level equipment modules. The lower-level equipment modules (EM) are no longer permanently assigned in this case, but instead requested at runtime, allocated and then released again. The equipment phase of the assignment partner is at the process control end when interfacing to SIMATIC BATCH.

V8.2 SP1

Compared with the previous version V8.2, version V8.2 SP1 includes the following enhancements or changes:

- New attributes
 - For the "Message" object of control modules, the attributes "Single acknowledgment", "With acknowledgment", "Trigger action", "OS area" and "Batch ID" have been added.
 - The attribute "Version" has been added for control modules and equipment modules.

The new attributes participate in the data exchange between PCS 7 and COMOS.
- Delay time in the signal processing of an interconnection
A delay time in the signal processing of an interconnection is detected and displayed at the interconnection in the CFC. A warning is output in the log during compiling.
- Data exchange with COMOS via XML format
On export to an XML file, selected technological objects can now be exported using the new menu command "Export selected objects to XML".

Note

You can find additional information on these enhancements or changes in the "CFC for SIMATIC S7" manual or online help in the following sections:

- "Attributes and attribute values of a control module"
 - "Display of an interconnection"
 - "Data exchange with COMOS via XML format"
-

V8.2

Compared with the previous version V8.1.1, version V8.2 includes the following enhancements or changes:

- Chart-based runtime group management for blocks of CFCs
With a CFC that is integrated in chart-based runtime group management is integrated, the blocks are automatically managed in separate runtime groups based on the chart, i.e. the blocks of the CFC are organized in runtime units that are permanently assigned to this CFC. When F-blocks are also used in this CFC, not only is a runtime group for blocks automatically created in the "standard program", but a runtime group for the included F-blocks as well.
- "Type update in RUN" for default value changes in the interface of blocks/block types
In the case of default value changes at the interface of a block/block type, this block can be downloaded with the type update in RUN. It is no longer necessary to put the CPU in STOP mode for this.
Type update for control module types (CMT) with F components, i.e. programs with safety-related blocks from the F library, is supported.

Note

You can find additional information on these enhancements or changes in the "CFC for SIMATIC S7" manual or online help in the following sections:

- "Chart-based runtime group management for blocks of CFCs"
 - "Type update of a CPU 410-5H PA"
-

4.2 Information on Configuration and Operation

4.2.1 Migrating to Other CFC Versions

Migrating to other CFC versions

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

- The data of older CFC versions can be read and displayed with CFC V9.x.
- Processing the data results in the conversion of this data at first write access (following a system prompt) for each chart folder in order to ensure compatibility.

General notes on compatibility:

- You cannot convert V9 data "back" to older versions.
- Data that was created with newer CFC versions cannot be processed with older CFC versions.
- After upgrading from an older CFC version, various function blocks are replaced by newer versions in the program. The old blocks remain in the block folder and can be removed using the command Options > Block Types > Clean Up.

Use of Equipment Modules (EM) and Equipment Phases (EPH) as of Version 9.0 and migration

If PCS 7 V9.0 is used, an upgrade to PCS 7 V9.0 SP2 is generally recommended.

The following limitations have to be observed:

PCS 7-ES V9.0:

In a migrated multiproject with SFC types in the program and in the project library, a functioning control system of equipment modules (EM) by equipment phases (EPH) CANNOT be set up!

To remedy this please generate the project library again and also generate an SFC type in it. The functionality can subsequently be used as described in the documentation.

PCS 7-ES V9.0 SP1:

Equipment Modules (EM) and Equipment Phases (EPH) created in Version 9.0 can be used an extended in the Version 9.0 SP1.

If existing SFC types from projects **before** Version 9.0 are to be used in Equipment Modules (EM) and Equipment Phases (EPH) as of Version 9.0, these SFC types can currently only be migrated to the new runtime system of the SFC library (V9.0) by copying the SFC types from the program into the library and back again.

4.2.2 General Information on CFC

Insertion position in runtime groups after copying blocks

When the "Chart-based runtime group management" option is selected, the blocks of a CFC are automatically managed in separate runtime groups based on the chart.

When blocks are copied, the copied blocks are inserted at the end of the associated runtime group.

After copying, check whether the insertion position of the copied blocks in the runtime group corresponds to the desired order.

Insertion position in cyclic interrupt OB after copying CFCs

When CFCs are copied, the copied CFCs are inserted at the end of the associated cyclic interrupt OB.

After copying, check whether the insertion position of the copied CFCs in the associated cyclic interrupt OB corresponds to the desired order.

Maintaining the capability for type updating in RUN

Supplement to the topic "Type update with a CPU 410-5H PA" in the "CFC for SIMATIC S7" documentation:

Type update in RUN is no longer possible if the following change has been made at a block:

- The name of an input with configured message was changed ("Message Event ID").

After this change, loading can only take place in STOP mode.

Handling of upper/lower case text for CFC objects

CFC as of V8.1 is still case-sensitive when dealing with blocks and instances within the charts. I.e. a block can be created with a name that differs from another name only in its 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.

Note on the SCL compiler message during generation of an FC block

If equipment modules (EM) are controlled by equipment phases (EPH) in the program, the SCL compiler may output a message during generation of an FC block that a function is not defined.

One possible cause may be that the block FC249 (@SFC_DT2UT) is missing in the program block folder.

Remedy:

Copy the block FC249 (@SFC_DT2UT) from the SFC library folder and paste it into the program block folder. If this was the cause of the SCL message, the program is now compiled without any errors.

"Key already exists" message during conversion of older projects to CFC as of version V8.1.

If this message appears, your project contains block types with names that differ only in their case. You must correct this in the previous version. You can perform the conversion only after you have done this.

Differences in CPU protection

- In CFC 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.

Notes on AS-wide interconnections

- Changes were made to the code of the IK_SEND system block in version 7.1.1. If you upgrade your project directly from version V7.1: You can accept this newer version of IK_SEND in your program by doing the following:
 - Open the CFC library in the SIMATIC Manager and select "IK" in the S7 program in the block folder of FC155 (IK_SEND).
 - Run the "Options > Charts > Update Block Types" function, selecting all projects using AS-wide interconnections in the following dialog.

Note on textual interconnections in F-programs

When the "Make textual interconnections" function is executed, any open textual interconnections to F-blocks are closed without querying the F-password.

Notes on control modules/control module types

If a project or a library is removed from the multiproject, the associated control modules and control module types cannot be processed further.

When a control module is created by copying a control module type, it is possible that the sampling time of the control module will be changed. This always happens when the default assignment of cyclic interrupt and sampling time has been changed in the library and/or the target project (e.g. when organization block OB36 instead of OB35 has the sampling time of 100 ms). In this version, the assignment to the organization block is set instead of the sampling time during copying. If this happens, check whether the copied control module has the desired sampling time and correct it if necessary.

The sampling time of a control module type that was generated from a process tag type is always 100 ms in this version, regardless of the cyclic interrupt in which the blocks of the process tag type are installed. Please check whether the generated control module type has the desired sampling time and correct it if necessary.

Control module types that do not contain blocks cannot be used as templates in projects.

When configuring control modules and control module types, avoid using nested control tags if you want to exchange data with COMOS and Advanced ES. Nested control tags are not supported in COMOS and Advanced ES and can lead to problems in these products.

Number of the selected objects for the type-instance comparison

With the type-instance comparison of technological objects, it can occur in rare cases that the reading in of the selected objects is interrupted and the comparison not carried out after the selection of the objects and the start of the comparison.

In this case it is recommended to distribute the objects for which a comparison is desired among multiple comparisons.

Cross-project interconnections from CM parameter to CM parameter

Cross-project interconnections from CM parameter to CM parameter in a multi-project are refused at the plant level. Only cross-CPU interconnections between CM parameters are permitted within a project at plant levels.

The principle with which you can achieve an alternative configuration of a cross-project interconnection between CM parameters is described below.

1. Create an interconnection of a plant output from "AS01" to the "Reference block variable" of the plant input of "AS02".
2. Select "AS02" and then the menu command "Options=> Plant types => Close references to block variables"

Note on the use of memory cards when loading an S7 program

Note that after loading an S7 program to a memory card (via SIMATIC Manager, "CPU > Save to Memory Card ..." menu), the blocks cannot be monitored in the test mode of the CFC. When the connections log on, an error message appears stating that the connection cannot be monitored. To remedy this, download the program via the CFC to an S7-PLCSIM or to a test CPU in addition. You can then use test mode as usual.

4.2.3 CFC for S7

Creating Block Types

If blocks are created for later use as FCs in CFCs (for example, with STL/SCL), you can only write to block outputs (VAR_OUTPUT) in these FCs. If block outputs are read, this will lead to working with undefined values.

If old values should be retained beyond the cycle, the in/out parameter (VAR_INOUT) must be used or written to the block as an FB.

Block library "CFC Library" is overwritten by the new version

The existing "CFC Library" block library is overwritten by the new version during installation. If you want to retain the old library, it must be copied prior to the installation.

4.2.4 SFC instances in the CFC

For subsequent interconnection of freely programmable associated message values to the SFC instance (AUX_PR_04 to 10), a Stop/Run transition of the CPU must be executed after a delta compile and delta download for the change to take effect, and the associated message values to be displayed in WinCC. Alternatively, a complete download can be performed.

4.2.5 Copying by overwriting SFCs

When a SFC is copied from one project to another with Insert and Overwrite and you want the retain the runtime properties of the original SFC present in the target project, the SFC must be copied individually.

If the SFC is not copied individually, but together with other SFCs and/or CFCs, the insertion position of the copied SFCs in the target project must be checked and, if necessary, adapted manually.

4.2.6 Use of the "Selective Download" function after migration.

To use the "Selective Download" function, we recommend that you enable the "Chart-based insertion" option in the "Properties Chart Folder" dialog.

If the "Chart-based insertion" option is activated after migration to the current CFC version, then many dependencies are displayed the first time the "Selective Download" function is started, as the charts downloaded to the CPU have not yet been changed to "chart-based insertion".

For this reason, the following procedure is recommended:

1. Migration of the CFCs.
To change the existing CFC charts to "chart-based insertion", select the menu command "Charts > Chart-based runtime group management" in the shortcut menu of the chart folder.
2. Checking runtime groups
During migration it is possible that empty, unmanaged runtime groups are created in OB1 and OB100. You should remove them in the runtime editor via the menu item "Edit > Delete empty Runtime groups" because loadable code is created for these empty runtime groups as well.
3. Download changes of all CFCs.

If the "Selective Download" function is started for the first time after migration, the number of dependencies displayed is reduced.

You can find additional information on the "Selective Download" function and the "Chart-based insertion" option in the section "Selective download of individual charts" of the "CFC for SIMATIC S7" manual or online help.

4.3 Notes on the Documentation

The entire documentation on CFC 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.

The CFC is described in the manual "SIMATIC Process Control System PCS 7 CFC for SIMATIC S7".

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

4.4 Information on Update 1

Note

The changes from all previous updates are also included in the respective subsequent update.

Update 1 contains the following expansions or corrections:

1. If the download was rejected on a CPU 410-5 because the CPU was busy with an internal system function (e.g. compression in RUN), a download of changes was no longer possible afterwards. This is no longer the case.
2. The FbSwtMMS block for SIMOCODE pro V on PROFINET is now interconnected correctly.
3. The migration to chart-based runtime groups of the chart folder in the master data library is now faster.
4. When activating a variant in a control module instance, assignments between CM parameters and low/high scale values or the unit were sometimes lost. This is no longer the case.
5. Changed scale values or units are now applied when updating.
6. A technological configuration is now still possible even after overwriting an SFC type from V8.
7. Even customer-specific units at parameters of control modules (CM) are now displayed correctly.
8. The unit at signals/parameters (CV) can now also be configured without interconnected channel driver.
9. Copying and deleting of SFC types has been optimized.
10. AS-wide interconnections can now also be moved if the data type changes from a scalable data type into a structure data type or vice versa in the process.
11. When copying an F-block within a CFC with chart-based runtime group management, the copied block is now always integrated into the existing runtime group of the CFC.
12. The "Generate Module Drivers" function has been optimized.
13. Invalid configurations of the "Negation" attribute are now no longer possible.

14. After removing the type assignment, instances of control module types (CMT) can now be deleted.
15. A "Save as with reorganization" can now be performed even for projects with fail-safe parts.
16. The I/O names at block contacts are now limited to 10 characters.
17. Interconnections of the STRUCT data type to scalar data types are now possible again.

4.5 Notes on Update 2

Note

The changes from all previous updates are also included in the respective subsequent update.

Update 2 contains the following enhancements and corrections:

1. When copying and pasting blocks in charts without chart-based runtime group management, the blocks are now always inserted at the position of the local installation pointer for the chart.
2. The inadvertent moving of blocks between runtime groups with and without runtime group management is now no longer possible.
3. The compiling of F-programs is now possible in all cases, including when using charts with chart-based runtime group management.
4. The interconnecting of structured data types with addresses is now possible again without limitations.
5. When forcing AS-wide interconnections, compilation errors may occur. This problem has now been resolved.
6. When copying charts, the global installation pointer is now irrelevant.
7. When pasting clipboard content into a text box, the existing text in the text box remains.
8. After certain changes to SFC types, in rare instances the ability to download changes may be lost. This problem has now been resolved.
9. In rare instances, if a default value at the input of an FB block has been changed and a type change in RUN is carried out, the original value may not be configured at the input of existing instances of the type even though the value was entered by the user.
10. In rare instances, a download of changes may be rejected with internal error message "-117". This problem has been resolved.
11. When copying F-charts while using CFC charts with chart-based runtime group management, a system error may occur. This problem has been resolved.
12. When deleting F-charts, system errors may occur in some cases. This problem has now been resolved.

13. With use of certain modules, an abort may occur when generating module drivers. This problem has now been resolved.
14. With use of certain non-Siemens PROFINET modules, errors may occur when generating module drivers. This problem has now been resolved.
Note: Besides CFC V9.0.2 Update 2, you also need Update 4 of Basis Library V9.0.1.
15. In rare instances, a selective download or a download of changes may be rejected with internal error number 0xFFDF_D22F. This problem has been resolved.
16. Online values can now be changed via the object properties of a CFC block instance again.
17. Changed block positions could lead to a system error during synchronization between control module types (CMT) and their instances. This has now been corrected.
18. When copying blocks and an installation pointer which had not been set, a system error could occur. This has been corrected.

