Advanced Process Functions V2.0

Engineering tool, function blocks and HMI library for material, parameter, storage location, job and archive management for the Process Control System SIMATIC PCS 7, enhanced job- and batch-creation via SIMATIC BATCH

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.

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.

Note: Binding document
All the information in this document supersedes statements in other documents. This readme file contains important information on the installation and use of Advanced Process Functions. You should therefore print out this information and read it carefully prior to installing and using the software.

Security information
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For the safe operation of a plant/machine, however, it is also necessary to integrate the automation components into an overall IT security concept for the entire plant/machine, which corresponds to the state-of-the-art IT technology. You can find information on this at [http://www.siemens.com/industrialsecurity](http://www.siemens.com/industrialsecurity). Products used from other manufacturers should also be taken into account here.

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1 Scope of supply
You have obtained the following components with this product package of Advanced Process Functions V2.0:
- APF Engineering Basic Package
- APF Runtime Package

The APF (Advanced Process Functions) are a collection of software modules which supports the automation of production processes from ‘raw material intake’ to ‘release for filling and packaging’. APF provide an engineering tool, predefined and generated function blocks as well as predefined HMI elements to implement the following functions:
- Material management
- Parameter management
- Storage location management
- Job management
- Archive management (for above mentioned functions)
- enhanced job- and batch-creation via SIMATIC BATCH

An option of Advanced Process Functions V2.0 is the support of integration with SIMATIC BATCH (integration of material management, automatic creation of batches, dialog for enhanced job- and batch-creation).

The Advanced Process Functions V2.0 are positioned as a PCS 7 based entry-level solution for small and medium plants. Because of that ISA-88 compliance is not demanded and will not be supported.

APF are not positioned as replacement for an MES system. Because of that ISA-95 compliance is not demanded and will not be supported.

APF are not ready for use in FDA regulated industries.

2 Hardware requirements
To be able to use Advanced Process Functions V2.0, the same hardware requirements apply as for SIMATIC PCS 7 V8.1. These can be found in the document "pcs7-readme.mht" on the product DVD.

The following hardware configurations are not supported with V2.0:
- OS Web Client
- Redundant single station with ES on one OS
- Multiple OS Servers in one PCS 7 multi-project with multiple APF servers
- Separate physical Server for SIMATIC BATCH and OS

In addition a migration of existing APF projects from V1.4.* to V2.0 is supported.

3 Software requirements
Advanced Process Functions V2.0 has been released with SIMATIC PCS 7 V8.1.

The Advanced Process Functions V2.0 require
- Windows-7 Ultimate (64 Bit) (incl. MUI), Windows Server 2008 R2 (64 Bit) incl. MUI
The Advanced Process Functions V2.0 have been tested for compatibility with the following antivirus software:

- Trend Micro OfficeScan Client

The compatibility between Advanced Process Functions V2.0 and other versions of the mentioned SW-Packages is not tested and cannot be guaranteed. Installing programs not approved by Siemens and operating them at the same time can have negative effects on the system response of Advanced Process Functions. You, as the user, are solely responsible for such effects. No additional software should be installed on runtime servers.

### 4 Authorizations

To be able to use the APF-software on your PC, several authorizations, i.e. rights of use, are required. The authorizations are on the supplied USB data medium as ordered. You will find further information on authorizations in the documentation of Automation License Manager (ALM).

The following licenses are required for APF:

- APF Engineering Basic Package (Floating License)
- APF Runtime Package (Floating License)
- WinCC User Archives

For upgrade from Advanced Process Functions V1.4* to V2.0 are Upgrade-licenses available.

The license according to the General License Conditions for Software Products for Automation and Drives for Customers with a Seat or Registered Office in Germany/outside Germany (hereinafter each "License Conditions") allows the use of the User Archives only within the use of the Add On Advanced Process Functions according to license. Siemens is not liable for any use over and beyond this limitation. Transfer of license to a third party is not permitted as independent transaction but only within transfer of rights according to the License Conditions of the Add On Advanced Process Functions.

For option "Integration with SIMATIC BATCH" are additional SIMATIC BATCH licenses necessary. These licenses are not included on memory stick with APF license keys.

### 5 Installation

Advanced Process Functions can only be installed with administrator rights in the operating system.

Before starting the installation please close all applications.

Insert the CD and start the setup program. The setup program must be executed on each computer on which APF is to be used.

For use of option “Integration with SIMATIC BATCH”, the APF-OS-Setup must be installed on all APF clients. (It’s the same setup like for OS Server. No additional licenses are necessary for APF clients.)
6 Upgrade
For an upgrade from V1.2.* to V2.0 please note:
- An upgrade of the Windows operating system as well as an upgrade of the PCS 7 system is required.
- Function blocks installed and generated prior to version V1.4 cannot be used. Generating new blocks as well as an update of the PCS 7 project is required.
- A detailed migration guide is available (see below).
- A migration must be supported by trained Siemens personnel.

For an upgrade from V1.4 incl. Upd1 or Upd2 to V2.0 please note:
- In case of changes of the user specific functions in the directory FB_UA_USER_SPECIFIC: backup the modified functions.
- Delete all FB_*.fcts in the APF folder in all OS projects. (Do not delete any other files, especially no *.ini files).
- Run the APF Integrator in all OS projects.
- In case of changes of the user specific functions in the directory FB_UA_USER_SPECIFIC: restore the modified functions. If necessary, adjust the settings for PCS 7 V8.0 SP2. Open, compile and save the functions.
- Exchange the OS symbols in the OS projects (@Template_APF.pdl)
- Run the OS project editor.
- Update the shipped APF blocks in the master data library as well as in all AS projects by means of the ‘Update block types’ function in the SIMATIC Manager.
- After all changes have been completed, you have to compile and download AS and OS. For the OS a full download is required. For the AS a delta download is sufficient.

For an upgrade from V1.4 SP2 to V2.0 please note:
- An upgrade of the PCS 7 system and the project is required.
- A detailed migration guide is available (see below).
- The blocks out of STEP 7 standard library / IEC-family are now replaced by the originals. Therefore the FC-numbers must be rearranged in the project-library and the project.
- Because of possible collision of numbers now the UDT-numbers are moved into another range. Therefore the UDT-numbers must be rearranged in the project-library.
- Update the shipped APF blocks in the master data library.
- Run the APF Integrator in all OS projects.
- Run the OS project editor.
- Function blocks installed and generated prior to version V2.0 cannot be used. Generate new blocks via Engineering Tool.
- Update the APF blocks in the master data library by means of the ‘Update block types’ function in the SIMATIC Manager.
- After all changes have been completed, you have to compile and download AS and OS. For the OS and AS a full download is required.

7 New features and changes compared to previous versions

7.1 What’s new in V1.4?
- The APF is installed via a PCS 7 compliant setup frame.
- The APF provides a new HMI and workflow for the engineering.
- Configuration settings are now fully covered by the new Engineering Tool; no manual editing with an editor like notepad is required.
- WinCC Textlibrary IDs for APF texts edited via the engineering tool are created automatically.
- Compatible interface changes (for example parameter name changes without type changes) require full compile but delta download only. (Without CPU stop!)
- The APF Engineering Tool provides enhanced logging mechanisms for fault diagnostics during engineering.
- The APF function blocks generated via the Engineering Tool contain a unique version information created during engineering and block generation. This version information is available for consistency check in the ES (CFC, Process Object View) and on the OS (FB_Numbers.ini).
- To ensure data consistency simultaneous start of multiple instances of the Engineering Tool is prevented.
- Manually edited User Archive names are no longer supported; usage of existing (migrated) User Archives with names differing from the standard is possible.
- In APF V1.2 materials had to be created within a material type. In APF1.4 materials can be created without creating or using any types. There is only one User Archive for all material types. However, due to backward compatibility, at least one type still has to be created.
- The number of selectable materials in the HMI has been increased.
- The I/Os of the APF function blocks are available in the Process Object View.
- The APF support an upgrade of existing projects from V1.2.* to V1.4 Update 2.

### 7.2 Optimization and changes in V1.4
- Best-Before-Date: Optimization in FB_BBD (change of daylight saving time).
- Material Management: Optimization when deleting a material, which is used in APF TP.
- Job Management: Prior to APF V1.4 the value assignment of the parameters OPEXINT and QEXTINT at the block FB_JOB was swapped compared to PCS 7:
  - FB_JOB: 0 = extern, 1 = intern
  - PCS 7 Standard: 0 = intern, 1 = extern
  The value assignment has been aligned with the PCS 7 standard.
  In case of existing interconnections in the CFC, the application has to be aligned accordingly.
- The predefined trigger tag “test” have been removed from all trigger actions "0.pas. to prevent triggering all actions when creating a tag "test".
- From V8.0 on PCS 7 allows the configuration of a standard server for User Archives (before V8.0 only for alarms and Split Screen Manager). Please note that for APF a standard server for User Archives must not be configured!
- FB_GetFilterAndSortValues.fct: Optimization in the standard case of user-specific function.
  Attention: For update, overwriting of user-specific function has to be activated in the Integrator.
- FB_ST_AC: New alarm added to signal the erroneous deletion of a material.
- FB_009PA: Optimization of display of parameter sets in the faceplate for parameter group 9.
- FB_ConvertUOM.fct: Optimization in the user-specific function for conversion of hl to l.
  Attention: For update, overwriting of user-specific function has to be activated in the Integrator.
- FB_STOR.pdl: display for browsing of storage locations improved.
- FB_STOR_ED.pdl: display of material class and process releases improved.
- FB_ST_AC: the output QFORMERR for format errors is now set correctly.
- The internal variable „Redundancy_active“ is created automatically.
- The “ua” directory is created automatically in the OS project.
- If there are several libraries included in the multi project, the master data library will be recognized by the Engineering Tool correctly.
7.3 What’s new in V1.4 SP1?

- Since V1.4 the function blocks generated by the Engineering Tool contain a unique version information. With V2.0 a comparison of the version information on OS and AS is executed; in case of version mismatch an error output is set.
- In previous versions of APF changes of classes / groups / types in the Engineering Tool have been updated only when the OS server has been loaded for the first time. For all further changes these changes had to be exported manually on the Engineering System and had to be updated manually on the OS Server. With V2.0, APF supports an automatical transfer of these changes from ES to OS in the context of the OS download; the manual alignment is obsolete.
- In all previous versions of the APF the names of the enumerations had to be edited manually as text in the Engineering Tool. With V2.0 a combobox is available, from which the enumerations available in the SIMATIC Manager can be selected.
- The APF can be operated with multiple OS Servers within one PCS 7 mutiproject; the change of the OS Server projects is recognized by the APF Integrator. The restriction that only one OS Server can be used for the APF functions applies, which means that both the communication as well as the mapping of blocks of the APF has to be done in this server. When changing the OS Server project no cleanup takes place, scripts and User Archive remain in the old server project.
- In order to optimize performance of the APF Engineering Tool start sequence, the User Archive editor will no longer be started.
- With the installation of the APF the manuals and the online help for the function blocks are available.

7.4 Optimization and changes in V1.4 SP1

- Comboboxes and multi-line text boxes have been replaced by WinCC standard objects. The STEP controls (S7actdx.dll) are no longer installed. 
  Start the APF Integrator and download the OS; thus the APF screens and scripts on the OS Servers will be updated.
  In case you have used these objects in own screens, please replace them according to the APF system. Contact the customer support if necessary.
- The monitoring time is edited and interpreted consistently in seconds now.

7.5 What’s new in V1.4 SP2?

APF supports as an option the integration with SIMATIC BATCH. This allows a more comfortable recipe-system than the APF parameter- and job-management. APF still supports the Material- and Storage-management.

- APF provide common use of materials in APF and SIMATIC BATCH with an automatic synchronization.
- APF provide with a user-defined WinCC-Scripting-Interface the automatic creation, release and start of batches in SIMATIC BATCH. All necessary header-data and parameters can be given.
7.6 What’s new in V1.4 SP2 Upd1?
- APF supports more entries in the comboboxes. Up from 250 entries the combobox will become temporarily invisible for better performance.

7.7 What’s new in V2.0?
- The APF licenses were switched from “single” to “floating”
- The APF provides a new dialog, which allows the creation of production orders and a comfortable split into batches. The orders and batches are sent to SIMATIC BATCH for further processing. The pre-selections of dialog (e.g. mode for computing number of batches and batch-size, batch-status) are set for dialog-control via WinCC-graphics-designer. The dialog-functions can also be controlled via properties and events by user-specific scripts.

7.8 Optimization and changes in V2.0
- The automatic version-check of function blocks was optimized.
- Optimization of changes in engineering
- The integration of client-projects was optimized.
- The blocks out of STEP 7 standard library / IEC-family are now replaced by the originals (see upgrade hints).
- Because of possible collision of numbers now the UDT-numbers are moved into another range (see upgrade hints).
- During synchronization, APF materialclasses and –types are automatically mapped to neutral folders in SIMATIC BATCH.

8 Notes on configuration and operation

8.1 PCS 7 System
- Make sure that for separate PCS 7 ES and OS the setting “Permit activation on ES” in the WinCC project properties / “Options” tab is disabled. Having this setting enabled may result in corrupt APF user archive data (Refer also to Customer Support FAQ ID 24285161).
- Selective download (CFC editor): This SIMATIC PCS 7 function has been designed for “continuous systems” and cannot be used in conjunction with APF.

8.2 Configuration Settings in CFC / Assigning block numbers
The following FB/FC- block number ranges are reserved for the Advanced Process Functions V2.0 (and predecessor versions) and must be excluded for use by application block numbers as well as CFC/SFC compiler output (instance DBs, runtime group FC’s, SFC-Types etc.):
- FB 1775 – FB 1800
- FB 2080 – FB 2085
- FC 1775
The Engineering Tool will generate project specific FBs. The management of these block numbers can be configured via the Engineering Tool and is in the responsibility of the user. They must not overlap with the above mentioned ranges.
8.3 APF Tools

- On change of an FB number of a previously compiled material class (e.g. FB_001A FB-Nr. 201 to 1201), the SCL compile will fail because the symbolic name in PCS 7 symbol table cannot be created / changed.
  Workaround: Please open the symbol editor and delete the old symbol for the corresponding FB number.
- The APF Engineering Tool creates FB I/Os based on the names specified in the Engineering Tool; in some cases these names may be in conflict with SCL variables used internally, i.e. the name / identifier is already in use.
  Workaround: Please use a different name in the Engineering Tool.
  Hint: please use self-explanatory names.
- With APF it is possible to create material lots from the PLC application. These S7 strings can contain quotes, double quotes and other special characters, e.g. XLOT"1OS1, which are not allowed as characters in the PCS 7 OS and User Archives. These names are not accessible, i.e. they cannot be displayed or deleted in the OS.
  Please ensure that the PLC application respects conventions for invalid special characters in the PCS 7 OS as well.
- The APF dummy FBs required for FB generation remain in the master data library after compiling / creating FBs. Every time when generating an FB a message appears: “do you want to overwrite FB xxx?”. This message can be acknowledged with “yes” like the following message which asks for the permission to overwrite an existing block, which should always be answered with “yes”.
- After re-sorting the job list in the HMI the external deletion of jobs via FB_JOB still works correct, but in the message text a wrong job name may be displayed.
- Due to backward compatibility it is not possible to delete the following objects in the Engineering Tool:
  - Material classes
  - Material types
  - Parameter groups
  - Archive groups
- Storage management: APF provides typicals for the search of storage locations and materials in “@PCS7TypicalsAPF.pdl” with option “/2”. In manual mode they can open the faceplate automatically, if the selection of a storage location is required. However, after each compiling the trigger names must be completed accordingly via “Properties – Miscellaneous – OpenFaceplate” (e.g. from “.QMAN_OUT” to “FB_STLOC/FB_STLOC.QMAN_OUT”).
- PCS 7 enumerations used by the APF must not start with value 0.
- Windows local settings have to be set consistently prior to APF engineering on all PC stations within the PCS 7 multiproject incl. the ES and must not be changed during the engineering. It is also recommended not to make changes afterwards.
- The APF support OS Single Stations. It is generally recommended, not to install the PCS 7 ES on the PCS 7 OS Server (the actual OS Single Station), but to use a separate PC Station. In case ES and OS are installed on one PC Station, please pay attention that the OS runtime is not active during an APF engineering session. The APF Engineering Tool prevents saving data when OS Runtime is active.
- To avoid inconsistent master data in APF, do not modify them at the same time on different OS clients.

8.4 SIMATIC BATCH integration

- If during transmission of data from APF to SIMATIC BATCH a switch between redundant server or a reboot of the SIMATIC BATCH server occurs, rarely a reboot of WinCC graphics runtime could be necessary.
The mapping of APF material classes and types to neutral folders in SIMATIC BATCH works only up to 16 characters.

9 Notes for Documentation
The APF documentation consists of the following documents:
- Installation and configuration
- Engineering manual
- Function manual
- Operator manual
- SIMATIC BATCH Integration

The documentation is contained on the product CD V2.0 and is also available on our customer support page.

For the migration from APF V1.2.*/1.4.* to APF V2.0 a migration guide is available for download on our customer support pages.