



SIMATIC

Process Control System PCS 7 PCS 7 Advanced Process Library Readme V9.0 SP1 (online)

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Version: 2017-12-02 (online)

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.

 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.

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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 only form one element of such a concept.

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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

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

Overview

Note

Read these notes carefully; they contain information that will be important to you and upgrades to PCS 7 Advanced Process Library.

The information given in this Readme file takes precedence over all the PCS 7 manuals.

Notes on installation

3.1 Scope of delivery

The scope of delivery includes the following library:

- PCS 7 Advanced Process Library V9.0 SP1

3.2 Hardware requirements

The installation is subject to the conditions of SIMATIC PCS 7 V9.0.

3.3 Software requirements

PCS 7 Advanced Process Library V9.0 SP1 requires PCS 7 Basis Library V9.0 SP1.

3.4 Installing the PCS 7 Advanced Process Library

Exit all applications before you start setup.

Install the library via the PCS 7 master setup or start the program Setup.exe of the PCS 7 Advanced Process Library. You will receive all further information during the installation process.

The library is copied to the same drive on which the PCS 7 basic software is installed. Installation requires about 1.6 MB of free memory on the hard disk.

Following the installation, you can find the blocks of the PCS 7 Advanced Process Library and templates under "PCS 7 AP Library V9.0".

Practical examples are located in the "APL_Example_EU" example project.

In order to receive the delta compilation and delta load capability in your project, use the blocks from the previous version of the PCS 7 Advanced Process Library.

To update your AS project, copy the blocks to your project. Then perform a block type import.

Please note that in this case you can not use the new features and improvements described in the section "New features and changes compared to earlier versions".

3.4 Installing the PCS 7 Advanced Process Library

New features and changes as compared to previous versions

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Note

For possible behavior changes in earlier versions, please refer to the readme of the previous version.

4.1 Version 9.0 SP1

4.1.1 What's new in Version 9.0 SP1?

- At the **PIDConR** block, the controller parameters TI and TD can now also be entered in minutes and seconds via the inputs TI_Unit and TD_Unit .
- With the **Integral** block, the calculation of the output status can be influenced for each feature bit. If Feature bit =1, the output status corresponds to the input status Out.ST = In.ST.
- With the **DoseL** block, the start-up behavior of scale dosing can be influenced for each feature bit. If feature bit =1, scale dosing can only be started if the input parameter StandStill is set, i.e. the scale is at a standstill.
- The parameters for gradient and ramp operation at the **MotSpdCL**, **OpAnL**, **PIDConL**, **PIDConR**, **PIDStepL**, **VivAnL** blocks can now be defined via the interconnectable parameters SP/MV_LiUpRaLim, SP/MV_LiDnRaLim and SP/MV_LiRmpTime .
- The **KalFilt** block now also features local operator authorization.
- On the **MonAnL** block, the 9th associated value for the message instances MsgEvld1, MsgEvld2 is assigned the input process value PV.
- At the channel blocks **PCS7AnIn**, **PCS7AnOu**, **PCS7Cnt1**, **PCS7DiIn**, **PCS7DiOu**, the default setting of the attributes S7_m_c = false and S7_xm_x = "Value.false" has been inserted at the process values PV_Out, PV_in, PV1_Li, PV2_Li . This simplifies the later activation of these attributes via AWL. This does not cause the code to be changed.
- The bypass functionality has been extended. If input signals of the interlock blocks **Intlk02**, **Intlk04**, **Intlk08**, **Intlk16** with limit switch points are interconnected with bypass information, the input signal can be bridged using this bypass information if bypass enable bits is set. The bypass function can be reset at all interlock inputs via the interconnectable input RstBypli. Process outputs and the limit switch points of the **MonAnL**, **MonDiL**, **TotalL**, **PIDConL**, **PIDConR** and **PIDStepL** blocks were provided with a bypass information bit. If the bypass function is activated at the blocks, then the bypass information bits of these outputs are also set.

4.1 Version 9.0 SP1

- The **AssetM** block has been extended so that it can also be used to display information without EDD.
- The following blocks have been given batch displays with corresponding input parameters: **CntOhSc**, **Intlk02**, **Intlk04**, **Intlk08**, **Intlk16**, **OpStations**, **OpDi01**, **OpDi03**, **OpTrig**, **Ratio** and **SelA16In**.
- A separate interlock is available for each direction at **VlvMotL** and **VlvPosL** by means of the new Feature2 Bit 16.
- By means of the new Feature, Feature2 Bit 11 at the **DoseL**, **FmCont**, **FmTemp**, **PIDConL**, **PIDConR**, **PIDStepL**, **MonDi08**, **MonAnL**, **MonDiL**, **MotL**, **MotSpdCL**, **MotRevL**, **MotSpdL**, **VlvL**, **VlvMotL**, **Vlv2WayL**, **VlvAnL**, **VlvPosL** blocks, the transmission of the MsgLock function and operating mode "Out of service" to the interconnected message block (EventTs, Event16Ts) can be suppressed. This only applies to the interconnection at the input EventTsIn.
- Via Feature Bit8 the variance and therefore the CPI value can be calculated in a more accurate yet more CPU-intensive manner at the **ConPerMon** block. If the calculation type is changed, the limit values CPI_AL_Lim and CPI_WL_Lim may have to be adapted.
- In preparation for future versions of PCS 7, the channel block **Pcs7AnIn** supports the scalable measuring range of the module ET 200SP AI 4xRTD/TC 2-/3-/4-wire HF (6ES7134-6JD00-0CA1) V2.0 for the measuring type thermocouple with measuring range type K [NiCr-NiAl]. On selection of the option scalable measuring range in HW Config, on compilation with module drivers, the values for Minimum and Maximum from HW Config are parameterized at the input parameters Scale of the channel block Pcs7AnIn . If the option Scalable measuring range is reset, then please assign parameters to the values for the input parameter Scale in accordance with your requirements (default values Low=0 and High=100).

4.1.2 Changes to Version 9.0 SP1

- At blocks **MotL**, **MotRevL**, **MotSpdCL**, **VlvMotL**, **VlvL**, **VlvAnL** and **VlvPosL** the static monitoring of feedback messages is now also active during processing of warning times for controls.
- The behavior of the **Smooth** block in the event of excessively large time constants has been improved. If time constants are too large, the `ErrorNum = 62` output is set.
- The status calculation in the **FbAnIn** block at the `PV_Li.ST` output has been improved.
- The activation of laboratory sampling at the **KalFilt** block has been improved.
- The attributes `S7_m_c`; `s7_alarm_ui` have been optimized internally at the **Polygon**, **FbDrive**, **FbSwtMMS**, **FbEnMe**, **ShrdResS**, **ShResL**, **STRep**, **CntOhSc**, **FbAnTot** blocks.
- At the **Lag** block, the update of the time response of the filter function after a shift to a different cyclic interrupt has been improved.
- The function "Two delay times for each limit value" with the system deviation ER has been improved at the **PIDConL** and **PIDConR** blocks.
- The parameter comments at the **Snd_DigVa**, **Snd_AnaVal**, **Rcv_DigVal** and **Rcv_AnaVal** blocks have been revised.

- The **Pcs7HaAI** and **Pcs7HaAO** blocks now respond to additional quality codes of the HART modules with HV_OutXBad.Value = 1 (see online help).
- At the **TimeTrig** block, the calculation of OSPermOut and OSPermLog in relation to the display of the operator control enable of the period operating mode (parameter view) has been improved.
- At the **TimeTrig** block, the start of the individual trigger via interconnection is only possible by an edge 0-1 at the input parameter SetPerLi.
- At the **VlvAnL** block without auxiliary valve, the gradient limit of the manipulated variable has been improved in the areas PosDiOpen..MV_HiLim and PosDiClose..MV_LoLim in automatic mode upon control via OpenAut, CloseAut.

4.1.3 Update Information for Version 9.0 SP1

The following applies to the software update from V9.0.x to version 9.0 SP1:

1.	Make Textual Inter-connections	No
2.	Compile AS	Compile changes
3.	Download AS program	Download changes
4.	AS STOP necessary	No
5.	Compile OS	Complete compilation

List of changed blocks

Name	Number	Block version	Interface change	Code change
CntOhSc	FB1803	5.1	No	No
DoseL	FB1809	5.1	No	Yes
FbAnIn	FB1813	9.1	No	Yes
FbAnTot	FB1817	9.1	No	No
FbDrive	FB1905	9.1	No	No
FbEnMe	FB1908	9.1	No	No
FbSwtMMS	FB1907	9.1	No	No
Lag	FB1828	5.1	No	Yes
MotL	FB1850	5.1	No	Yes
MotRevL	FB1851	5.1	No	Yes
MotSpdCL	FB1854	5.1	No	Yes
MotSpdL	FB1856	5.1	No	Yes
Pcs7AnIn	FB1869	9.1	No	Yes
Pcs7AnOu	FB1870	9.1	No	Yes
Pcs7HaAI	FB1931	9.1	No	Yes
Pcs7HaAO	FB1932	9.1	No	Yes

4.1 Version 9.0 SP1

PIDConR	FB1875	5.1	No	Yes
Polygon	FB1881	5.1	No	No
ShrdResS	FB1914	5.1	No	No
ShrdResL	FB1917	5.1	No	No
Smooth	FB1890	5.1	No	Yes
STRep	FB1801	5.1	No	No
Vlv2WayL	FB1897	5.1	No	Yes
VlvAnL	FB1896	5.1	No	Yes
VlvL	FB1899	5.1	No	Yes
VlvMotL	FB1900	5.1	No	Yes
VlvPosL	FB1918	5.1	No	Yes

Note

- If "No" is listed in the column "Code change", only attributes, message texts and/or version number have been changed.
-

Information on configuration and operation

- The **blocks in the library** have been designed exclusively for **S7-400** automation systems and are not suitable for the configuration of failsafe applications.
- For **AS blocks** that include ALARM_8P blocks:
Only the data types BOOL are permitted (not permitted: Bit array), BYTE, CHAR, WORD, INT, DWORD, DINT, REAL, DATE, TOD, TIME, S5TIME, DATE_AND_TIME, COUNTER, TIMER. Copy a STRING data type into an ARRAY OF BYTE . Structures must be interconnected with the message auxiliary values via a converter block. Otherwise, these message auxiliary values are always displayed with "0".
The initial interconnection of an auxiliary value or the data type (in case of a value change) takes effect only after restarting the CPU.
- The **templates** contain CFC charts with ready-made technological functions. These charts include the blocks and interconnections that are required as default for each of the functions. You can continue to use these charts as a template for individual automation solutions in the future. The templates are described in detail in the Online Help.
- You are not permitted to set the minimum cycle time of OB1 to a value other than 0.
- With the CPU 410 PA SMART, the minimum scan cycle time of OB1 is permanently set to 200ms.
- Please note that the signal status of the individual block I/Os is not evaluated by the SFC type because the SFC type does not offer any characteristics of the type Struct.
- Interconnecting inputs and outputs with APL structures to inputs and outputs of blocks without structures. This new CFC function (as of PCS 7 V7.1 SP1) allows APL blocks to be interconnected to blocks from other libraries without a converter block. This simplifies the engineering. However, this function may result in an interruption of the Flow signal status.
Example:
Interconnection of BOOL output with structure to BOOL input without structure and further interconnection. BOOL output without structure to BOOL input with structure. If the Flow signal status is to be maintained, the signal status must be redirected around the non-APL logic using converter blocks.
- The **FbAnIn**, **FbAnOu**, **FbDiIn** and **FbDiOu** channel blocks support FF field devices with analog or digital input and output values. The first implementation stage of the use of FF devices behind Profibus Slave AB7000 (introduced for PCS 7 V7.0) is no longer supported.
- If the **EventTS/Event16TS** block is interconnected with the `EventTsIn` input in a technological block, the **EventTs** and the technological block must be installed in the same cyclic interrupt OB of the same CPU.
- **I/O ManModLi**
The attribute `S7_contact` is missing on the `ManModLi` and must be set manually if needed at the block interface. You can reach the interface by double-clicking the appropriate block in the block folder. To retain backward compatibility with existing projects, the attribute can no longer be set because otherwise the existing connections between the SFC and the block would be changed.

- The use of different channel block types for the same drive device type or frequency converter is not permitted.
- **Ab APL 8.0 SP2: Feature "Separate evaluation of excluded and simulated interlock signals"**
If the `Feature`, `Feature2 Bit2` is enabled, the signal may not be inverted per CFC for interconnections to the inputs, otherwise the bypass display cannot be refreshed for system related reasons.
This affects the following interlock inputs:
Intlk02, Intlk04, Intlk08, Intlk16: `In01, In02, ...`
DoseL, MotL, MotRevL, MotSpdL, MotSpdCL, VlvL, Vlv2WayL, VlvAnL, VlvMotL, VlvPosL: `Permit, Interlock, Protect`
MotRevL: `Permit, Interlock, Protect, PermRev, IntlRev, ProtRev`
MotS, VlvS, OpDi01, OpDi03, PIDConL, PIDConR: `Interlock`
For the inversion of the interlock signals, the inputs `InvIn01, InvIn02...` can be used at the interlock blocks.
- **LAG Block**
A change to the `SampleTime` first takes effect after a change to the delay time `LagTime` or after resetting the block (`Reset = 1`).
- Before using the **PCS 7 example project Advanced Process Control** (APL_Example_xx, xx refers to the language version), it is recommended to update the function blocks of the PCS 7 Advanced Process Library and the basic data contained within it using the OS Project Editor.
- Quality information is only supported for ET 200SP HA modules.
- **DoseL block**
Acknowledgement following an overdosage (`Feature2 bit 24 = 1`) is only requested for a dribbling quantity (`DribbIn > 0`). If the dosing system operates without a dribbling quantity and an overdosage requires acknowledgement, this can be achieved by parameterizing a very small dribbling quantity.

Notes on the documentation

- The terms or message classes Alarm, Warning, Tolerance or the corresponding acronyms in icons and colors used in the documentation are not valid when using user-configured message classes.
These terms and colors depend on the project-specific setting.
The **user-configured alarm classes** are only supported by block icons from the template pictures "@PCS7TypicalsAPLV8.PDL" or template "@TemplateAPLV8.PDL" .
- In the section "Local operation" of the documentation, subsection „LocalSetting = 2 and LocalSetting = 4" state that the runtime monitoring of the block is disabled. The following should be stated here: "The runtime monitoring only works with rapid stop, external errors, motor protection and when both feedback signals are set (discrepancy)."
- The following has to be replaced in the chapter "**MotSpdCL functions**" in section "**Controlling a device infeed or inverter enable**"
 - OLD:
When the function is activated, the motor can also be started directly. When starting forwards or backwards the device infeed or inverter enable is also activated. The frequency converter automatically determines the correct sequence. The motor can now be stopped and restarted without having to switch off the device infeed or inverter enable. The activation of the device infeed or inverter enable for starting the motor can be performed in the automatic, manual and local operating modes with local setting 1 or 3, or by forcing.
 - NEW:
When the "device infeed" function is activated, the motor can also be started directly: The device infeed is also activated when starting in forward or reverse. The frequency converter automatically determines the correct sequence. The activation of the device infeed for starting the motor can be performed in the automatic, manual and local operating modes with local setting 1 or 3, or by forcing.

- The following must be replaced in the "**Redundancy**" section of the "**Description of Pcs7AnIn**" chapter.
 - OLD:
If both signals deliver a "bad" quality code, the substitute value is passed on to the process with a "bad" quality code.
 - NEW:
If both signals deliver a "bad" quality code, the `Bad = 1` output is set and the last valid value, a substitute value or the invalid value is effective depending on the configuration of the `Feature` parameter.
- The following must be replaced in the "**Redundancy**" section of the "**Description of Pcs7AnOu**" chapter.
 - OLD:
If both signals deliver a "bad" quality code and an "E/E redundancy warning" (`Mode = 16#x5xxxxxx`) is issued, 50% of the value of the application program is passed on to the process.
If both signals deliver a "bad" quality code, the last process value is retained.
 - OLD:
If both signals deliver a "good" quality code and an "E/E redundancy warning" (`Mode = 16#x5xxxxxx`) is issued, 50% of the `PV_In` value at each of the outputs `PV_Out` and `PV_OutSlv` is effective.
If both signals deliver a "bad" quality code, 100% of the `PV_In` value at each of the outputs `PV_Out` and `PV_OutSlv` is effective.

Change history of PCS 7 Advanced Process Library

Changes since delivery release PCS 7 Advanced Process Library Readme (online)

Version	Edition	Change
2017-12-02 (ONLINE)	12/2017	Delivery status PCS 7 Advanced Process Library V9.0 SP1

