DCS Application Services
Modernization of the PCS 7 configuration
Version 3.0

Service manual

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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.

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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, can identifying risks and avoiding potential hazards when working with these products/systems.

Commissioning after service delivery

After completion of the service, the client must ensure that sufficient qualified and experienced personnel are available for restarting the plant and plant operation in order to avoid unforeseen incidents during plant start-up. A backup strategy is recommended when a risk is identified.

Change in block behavior and user interface

After a library exchange, the block behavior and the user interface may change.

The block icons and faceplates of the new block library result in a change of the user interface within the process visualization of the operator stations. Appropriate training of the plant operators is necessary to avoid operating errors.

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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1 Preface

In order to be able to continue to operate existing process plants safely, to maintain their competitiveness for the future and to ensure easy maintainability, it is indispensable to keep them up to date with the latest technology. Different project engineering methods and the use of a wide variety of block libraries make this considerably more difficult.

In many existing PCS 7 plants, in addition to the PCS 7 standard library, a diverse range of block libraries is used to realize the individual control level. Before a modernization the availability and upgradability of those blocks and libraries need to be checked extensively. Furthermore, a lot of those libraries will not be supported in the future anymore or can only be used with functional restrictions.

The PCS 7 Advanced Process Library (APL) provides enhanced functionality for increased process control productivity with more flexible blocks and higher-level control algorithms. It also features a more visually appealing user interface based on the latest ergonomics and makes even more effective process control by the operator in comparison with the standard library and many other libraries possible.

Within the "DCS Application Services" portfolio element, we offer

- a standardized approach for an automated library exchanges to APL
- a standardization of your automation system.
- Preparations with regard to an evolution of the SIMATIC PCS 7 multi-project to SIMATIC PCS neo

For this purpose, various service packages are summarized as "DCS Library Services", "DCS Standardization Services" and "SIMATIC PCS neo Readiness Services".

This results in the following advantages for the customer:

- Future-proof for upcoming Process Control Systems through the use of APL and Control Module Types (CMT)
- Other products adapted for APL are therefore also available, e.g. Industry Library (IL), Advanced Process Graphics (APG), PAA or Comos
- No additional software update costs for libraries -> Reduction of lifecycle costs
- Different project engineering of similar technological functions will be standardized → Better overview of the automation system → Reduction of maintenance costs
- Securing of investment (existing application)
- Long-term plant availability
- Plant becomes more efficient and productive
- Reduction of risks during upgrades → short downtimes
- Higher quality by using tools during the library exchange
- Reduction of risks during an evolution to SIMATIC PCS neo

Within the Library & Standardization and SIMATIC PCS neo Readiness Services various service packages are offered and will be subject to the following chapters.

The development of these services is based on experiences that were gained during the implementation of different modernization projects by RC-DE DI Cologne and DI CS PA Karlsruhe. The aim of these services is an efficient implementation of a modernization within the application.

Therefore, the service is available through two service providers with separate article numbers. Services and prices are the same.

Order Recipient	DI CS PA SPA 3	RC-DE DI PA SO 2 2
Service Provider	A4050987 (Karlsruhe)	A4025808 (Cologne)

2 Basics

In the following chapters, the basics for carrying out an AS library exchange, for standardization, for CM/CMT conversion as well as the standardization measures for a migration to SIMATIC PCS neo are explained.

2.1 Overview of procedures

Depending on the requirements, the initial situation and the objective, there are different procedures for modernizing a PCS 7 project.

A PCS 7 project to be modernized is classified in 3 initial states:

- Without APL modules and not yet standardized
- With APL modules, but without CMT and not standardized either
- With APL modules, standardized but without CMT
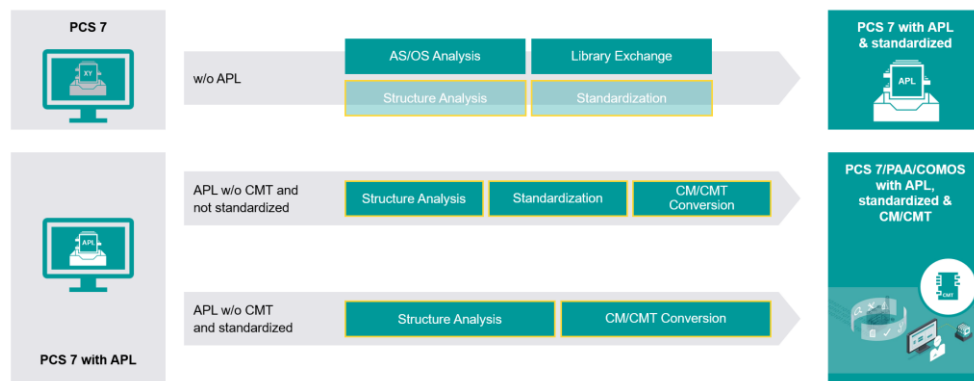
AS/OS analysis

In the AS/OS analysis, the project data of the desired AS and OS are read out and presented in a tabular overview. This provides a deeper insight into the project and can be used, for example, previous to a library exchange to better estimate the possible modernization effort and to make profound statements which are relevant for further technical clarification and project implementation.

Structure Analysis

For a successful standardization or CMT conversion, it is essential to identify and define existing and recurring block structures in the project to be able to make a statement about the feasibility of a CM/CMT conversion. The structure analysis evaluates the read-in data of the AS regarding potential standardizable block structures and presents the findings quantitatively in a tabular overview. In addition, specific and possibly problematic features of the project design will be identified, and possible countermeasures evaluated. A structure analysis can only be conducted in combination with an AS analysis.

SIMATIC PCS neo Readiness Services – AS Software Analysis

Before migrating from SIMATIC PCS 7 to SIMATIC PCS neo, certain criteria relating to the degree of standardization of the engineering of the SIMATIC PCS 7 multi-project must be met.

In the PCS neo readiness AS software analysis, criteria that relate exclusively to the engineering of the AS software are considered in detail and the plan folder of the S7 program is analyzed and presented.

A check for SIMATIC PCS neo criteria of the complete SIMATIC PCS 7 engineering data including the hardware components used is offered as part of "PCS 7 System Audit /PCS neo Readiness":

https://www.siemens.com/global/en/products/services/digital-enterprise-services/consulting-services/simatic-system-audit.html

NOTE	The content of the analysis is a recommendation. Non-compliance with the listed suggestions for standardizing the SIMATIC PCS 7 multi project only leads to increased effort when converting to SIMATIC PCS neo. An evolution from SIMATIC PCS 7 to SIMATIC PCS neo will be possible in all cases. Also without a planned conversion to SIMATIC PCS neo, it makes sense to consider the analysis results in any case.

Library Exchange

The library exchange has the task of replacing blocks of a block type with functionalities of one or more APL block types that are as identical as possible. This procedure is also referred to in the following as block exchange (see also chapter 3.1).

In general, blocks of all libraries can be exchanged for which it is possible to create conversion rules for a functionally identical transformation.

Standardization

Standardization generally means the unification of the AS and OS application data of a PCS 7 project. Standardization improves both the overview and the maintainability of the application data and paves the way for future DCS innovations.

As shown in the above overview diagram, structure analysis, standardization and CM/CMT conversion go hand in hand. The structure analysis identifies and defines standardizable block structures in the PCS 7 application data. It identifies engineering differences within similar technological functionalities and optimization potentials in the charts that are important for standardization. Corresponding measures can then be implemented manually or also tool-supported in the project to achieve the desired standardization.

Library Exchange + Standardization

Standardization can also be performed in advance of a library exchange in combination with the structure analysis. In contrast to a simple library exchange, a standardization is achieved with the help of a so-called typical exchange. In this case, recurring block structures are mapped by source typicals and their instances are identified in the PCS 7 project. These are then replaced by new target typicals with APL blocks in the actual library exchange.

Structure Analysis + Standardization + Library Exchange

A PCS 7 project already equipped with APL blocks can additionally be standardized and converted to CM/CMT. The existing application data is extended by the technological interfaces during a CM/CMT conversion. For this purpose, a structure analysis can be carried out in advance to identify standardizable block structures in the project, which are then converted to CMT and stored in the master data library. The instantiation of the CMTs or the creation of the CMs then takes place in the respective AS programs. It is also possible to use CMTs that have already been created independently and to integrate and instantiate them in the project.

Structure Analysis + CM/CMT Conversion

If APL blocks and a standardized PCS 7 project are already available, a structure analysis can be performed before the actual CM/CMT conversion in order to still identify the existing block structures that will be used as the basis for the CMTs. If CMTs have already been created, these can be used as well.

The existing application data is then extended by the technological interfaces during the CM/CMT conversion. This does not involve any change to the functional implementation.

2.2 Conversion using a DAS Toolset

The exchange of a library using a DAS Toolset is shown exemplary in the following diagram, containing 2 block types of the old PCS 7 standard library:
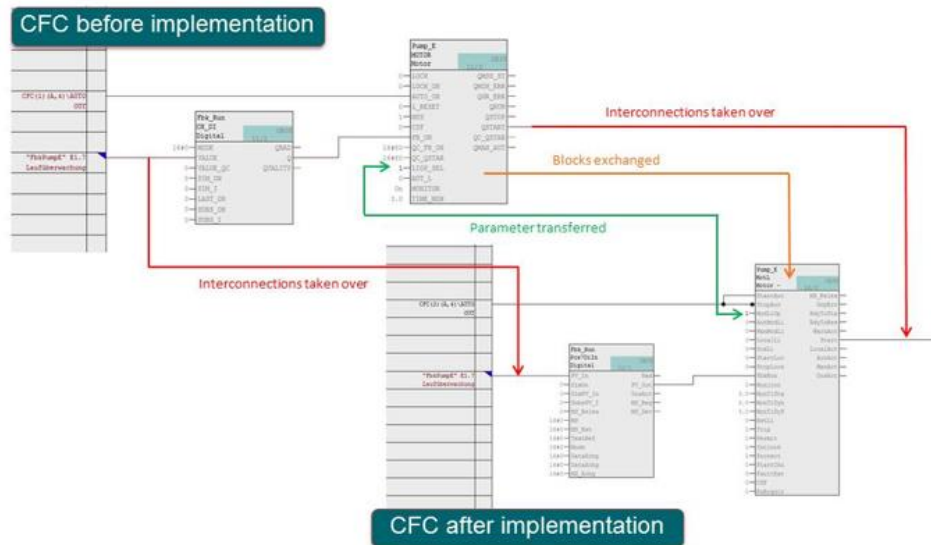
Original block		Exchanged block (APL)
CH_DI	**>**	Pcs7DiIn
MOTOR	**>**	MotL

2.3   Conversion rules

For the exchange of blocks of two different libraries conversion rules are required, in which the assignment of the source and target block is defined. They contain information, conditions and calculations that are important for the transfer of the connections, parameter values, block comment, block name, block position, operating texts, and messages.

Source typical

A source typical either consists of one single block or is a combination of interconnected blocks on a CFC. It has one master block and can include several other bocks that are connected to the master blocks. Options and conditions at the I/Os and the blocks itself can also be implemented.

Destination typical

In the destination typicals blocks or block combinations of the new library can be found. It is a functional identical representation of the source typical that will be replaced during the library exchange.

Exchange of source and destination typical

With the help of the DAS Toolset, the instances of a source typical are searched over the complete AS program and assigned to the corresponding destination typical by means of conversion rules. All blocks from the identified instances are replaced by blocks of the destination typical. In the process, the blocks of the destination typical are installed in the runtime group of the master block of the source typical.

2.4   Project-specific conversion rules

Project-specific conversion rules (e.g. for customized blocks) can be defined and used during the conversion. For project-specific conversion rules, as for the conversion rules of the "Block Exchange AS Basic Package", source typicals, destination typicals and a data assignment must be defined and later checked in a test conversion.

When converting with "Block Exchange AS Basic Package", these project-specific conversion rules can be used in parallel with the existing ones.

Project-specific conversion rules can be used again in further conversions.

2.5 Distinction between block exchange and typical exchange

When converting the blocks within a PCS 7 project, a distinction is made between block exchange and typical exchange:

Block exchange

- Only one block in the source typical
- No interconnections in the source typical
- Additional detection by block parameters
- Exchange of source block for one or more target blocks

Typical exchange

- At least two blocks in the source typical
- Source typical may contain interconnections
- Standardizations in CFC possible

The distinguishing feature between block exchange and typical exchange is the number of blocks in the source typical.

The distinction is part of the conversion rules. It is possible to combine block exchange and typical exchange.

When is a typical exchange used instead of a block exchange?

A typical exchange is recommended if, for example, unification or standardization is the desired aim. However, this requires system knowledge. The structures (block combinations) normally differ between the various PCS 7 systems. Thus, new project-specific conversion rules must be created, or existing ones modified.

Note	If a typical exchange is done, the number of conversion rules will increase.

2.6 What blocks can be exchanged?

The blocks that are exchanged in a conversion can be specifically defined for each project.

A PCS 7 project contains the following block types:

- Technological blocks
- Channel drivers
- OCM capable blocks
- Logic blocks
- Other blocks
- System blocks
- User-specific blocks

Technological blocks	Channel drivers	OCM capable blocks
Logic blocks	Other blocks	System blocks
	User-specific blocks	
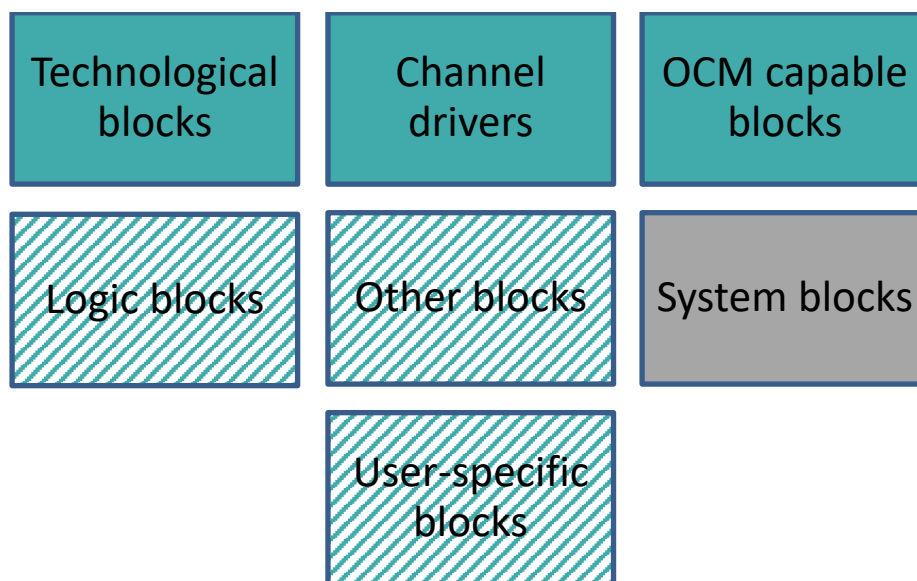
For a future-proof plant it is necessary to change the technological blocks, channel drivers and operating and monitoring blocks (blue). It is recommended to change logic blocks, user-specific blocks and other blocks as well, if the conversion is possible with Advanced Process Library (APL) respectively Industry Library (IL).

2.7 Control Module (CM) Technology

The Control Module technology is based on the type-instance method, where a CM (Control Module) represents the instance of the CMT (Control Module Type). It can be seen as an approach to standardization and not only optimizes engineering efforts, but also enables a unified structure of the automation program and fast adaptations to future requirements.

By means of the Control Modules, recurring combinations of individual blocks are grouped and provided with a technological interface.
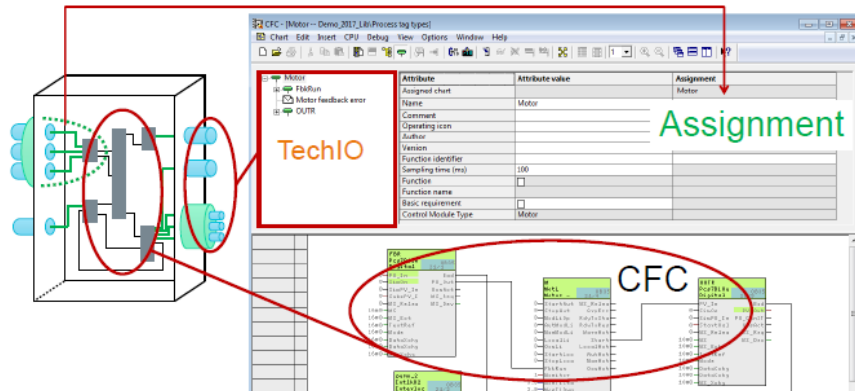
This enables:

- Central introduction of changes to the CMT and synchronization in the CM instances. Instance-specific extensions are managed as such and are not lost during type and instance synchronization. Changes can thus be downloaded to the AS bumplessly.

- The use of optional blocks within a CMT. These optional blocks can be used to create different variants of a CMT.

- Extended data exchange with Advanced ES, Plant Automation Accelerator (PAA) and COMOS Integrated Engineering.

3　DCS Library Services

3.1　Library Exchange AS

A conversion can be performed with the AS Standard Packages and additional customer-specific services. This standardized service package can be used for various use cases.

Project-specific conversion AS

This procedure is recommended if customized blocks or other special libraries are used in the application data. For those blocks and libraries no standardized work packages exist and individual ones need to be defined specifically for each use case.

Library exchange steps

The following picture shows the individual steps of the conversion:
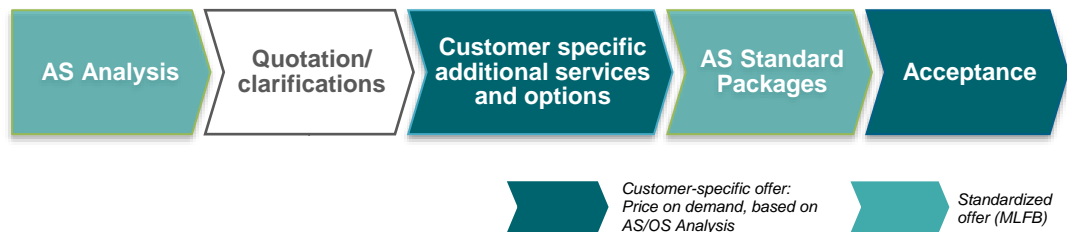
AS Analysis

The AS analysis enables the work packages required for a conversion to be identified, evaluated, and offered in a scalable manner. A detailed list of all service options that can be ordered can be found in the following chapter 3.1.1.

Quotation/clarifications

In the offer phase, a quotation is created based on the results of the AS analysis and it defines the scope of work or the work packages in consultation with the customer.

Customer-specific additional services and options

This step includes all the work packages that are not covered by the standard packages, such as the adaptation/extension of project-specific conversion rules or the creation of conversion rules for the typical exchange. In the case of an extension of the conversion rules, a test conversion must also be carried out prior to the actual conversion in order to ensure the quality of the rules.

Library Exchange (Block Exchange AS Basic Package)

The Block Exchange AS Basic Package contains the conversion of the blocks of an automation system according to the prespecified conversion rules.

This work step is also necessary for project-specific conversion.

Project-specific acceptance

After the conversion, a mutual acceptance test of the result of the library exchange is recommended. The scope of the acceptance must be specifically defined for each project.

3.1.1 AS Analysis

The cost of the "Block Exchange AS Analysis" service depends on the number of automation systems. The following packages are available:

Designation	Article Number
Block Exchange AS Analysis 5 AS AS analysis for max. 5 AS per multi-project as a basis for the technical clarification of the library exchange	Service Provider Karlsruhe 9LA1110-8DA00-1AA0 Service Provider Cologne 9LA1276-8DA00-1AA0
Block Exchange AS Analysis 10 AS AS analysis for max. 10 AS per multi-project as a basis for the technical clarification of the library exchange	Service Provider Karlsruhe 9LA1110-8DA00-1AB0 Service Provider Cologne 9LA1276-8DA00-1AB0
Block Exchange AS Analysis 20 AS AS analysis for max. 20 AS per multi-project as a basis for the technical clarification of the library exchange	Service Provider Karlsruhe 9LA1110-8DA00-1AC0 Service Provider Cologne 9LA1276-8DA00-1AC0
Block Exchange AS Analysis 30 AS AS analysis for max. 30 AS per multi-project as a basis for the technical clarification of the library exchange	Service Provider Karlsruhe 9LA1110-8DA00-1AD0 Service Provider Cologne 9LA1276-8DA00-1AD0
Block Exchange AS Analysis 50 AS AS analysis for max. 50 AS per multi-project as a basis for the technical clarification of the library exchange	Service Provider Karlsruhe 9LA1110-8DA00-1AE0 Service Provider Cologne 9LA1276-8DA00-1AE0

Note   The AS analysis is required for a customized quotation.

For the preparation of CM/CMT conversions or further standardizations (typical exchange) a structure analysis is offered, which is based on the AS analysis.

3.1.1.1 Task

The objective is to analyse a PCS 7 project that will later be migrated to APL. The PCS 7 project will be read-out and analyzed with the DAS Toolset. The results of the analysis are delivered in an Excel spreadsheet.

3.1.1.2 Implementation

Implementation takes place in the following order:

1. Providing the required project data
2. Analysis
3. Presenting and discussing the results (MS Teams meeting if required: ~1h)
4. Delivery of the data as Excel-file

3.1.1.3 Required data

Required data from the customer at project start:
- Latest PCS 7 project backup
- List of installed SIMATIC software of the PCS 7 ES incl. version numbers
- Additional software packages
- List of PCS 7 automation systems to be analyzed
- Passwords
- Designation of a technical contact person with system and project knowledge

3.1.1.4 Evaluation

The following analyses are documented and delivered in the Excel file:
- Block list
  - Total number of identified quantities
  - Number of SFC and CFC per CPU
  - Number of DB, FC, and FB per CPU
  - Block exchange possibilities as part of "Block Exchange AS Basic Package"
- Quantities of blocks used
  - List of total number of block types per AS
  - List of any other blocks to be converted
    (e.g. from other libraries or customized blocks)
  - Blocks with no existing APL equivalent
- Further AS evaluations
  - SFCs
  - SFC accesses (actions and transitions)
  - SFC types
  - SFC type block contacts
  - Suggestions for deleting blocks which are no longer required
    (Blocks without: OCM function, no SFC access, and no output connections)
- Evaluation of restrictions that require special processing during conversion.
  - Duplicate block names in the same CFC that differ only by uppercase or lowercase
  - Chart-in-chart
  - AS-wide interconnections
  - Direct address interconnections to the hardware periphery, merkers, and data blocks which were not connected through driver channel blocks and therefore need to be decoupled.

3.1.1.5 Boundary conditions

- Results, documents, or conversations are in German or English
- Editing of PCS 7 projects only containing Latin characters, other languages on request (e.g. Chinese)
- The project must be opened and read using standard PCS 7 resources. If an opening is only possible by additional installation, this may result in an additional charge.
- If the project cannot be read for technical reasons or the configuration deviates too much from the PCS 7 compendia, we reserve the right to cancel the work. In this case, an explanation will be provided and only the costs incurred will be charged.
- Before the analysis begins, the project is archived by the customer. Afterwards, the AS projects are read out by the contractor with a designated DAS Toolset. If errors occur in the data structures of the PCS 7 projects, the correction of these errors is not included in the quotation and is billed based on time and effort.
- An AS analysis is available from PCS 7 Version 6 and above.

3.1.1.6 Block Exchange AS Analysis results

In the following section the results of the "Block Exchange AS Analysis" and the structure of the Excel file is described.

Summary

The Summary provides an initial overview of the quantity structure of the analyzed project, e.g. total number of controllers, number of block types, block instances or CFCs and SFCs.

Name	Count
Controller	1
BlockTypes-All	155
BlockTypes-WithConvertionRules	71
BlockTypes-WithRulesToBeAdapted	2
BlockTypes-NoConversion	21
BlockTypes-WithOutConvertionRules	1
BlockTypes-APL	60
BlockInstances-All	5360
BlockInstances-WithConversionRules	3819
BlockInstances-WithRulesToBeAdapted	4
BlockInstances-NoConversion	347
BlockInstances-WithoutConversionRules	1
BlockInstances-APL	1189
CFCs	143
ChartInChart	7
SFC-Chart	11
SFC-Chart-StepAktions	175
SFC-Chart-Transitions	82
SFC-Nummeric_StepName	0
SFCTypes	0
SFCTypes-BlockContact	0
SFCInstances	0
OperandWithoutDriver	7
NotAllowedSymbols	32
IdenticalBlockNames	2
ToBeDeleted	4638
STD_Deviation	111

Controller

List of automation systems of the PCS 7 project with station names, number of CFCs, SFCs, DBs. FBs and FCs.

Blocktype_Matrix

This table shows, in cross table format, the number of block instances per AS, sorted by block type.

BT-WithConversionRules

This table lists all those block types with instances for which system-tested conversion rules already exist and that can be exchanged according to APL.

For a list of exchangeable blocks, see "Block Exchange AS Basic Package block list". The notes in the "STD_Deviation_Summary" spreadsheet must also be considered.

BT-WithRulesToBeAdapted

This table contains all block types with instances for which conversion rules already exist, but that cannot be used generically. Project-specific adaptation is necessary depending on the parameterization and use case. That adaptation effort must be ordered separately.

BT-NoConversion

Block types that cannot be exchanged due to the lack of a corresponding APL block (e.g. conversion functions). These blocks remain unchanged in the project.

BT-WithOutConversionRules

This list contains all remaining block types which are not contained in the previous lists. In addition to user blocks, this also includes block types from various third-party libraries for which no conversion rules exist. This list serves as a basis for any clarification discussions with technical contacts of the customer. If the block types in the list are to be exchanged, special conversion rules must be created separately. This work is offered on a project-specific basis.

BT-APL

List of all APL block types that are already implemented in the project.

Chart-In-Chart

List of existing chart-in-chart elements in the project. The notes in the chapter "Execution of automated block exchange" Blocks (chart-in-chart)" must be considered.

SFC

List of SFCs inside the project.

SFC StepActions/ SFC Transitions

List of all SFC actions with block parameters used.

Further information see also:
"AS Option - SFC Plan Parameter Exchange "

SFC-Nummeric_StepName

The steps and transitions listed here must be renamed before tool-supported editing. Individual numbers are not permitted. Unique step and transition names are recommended. Otherwise, a combination of a letter and a two-digit number can be used. (e.g. S01...)

SFC-Types

List of SFC-types inside the project.

SFCTyp-Blockcontacts

List of all function block contacts used in the project within an SFC type. If block types are used in these block contacts that were exchanged during a library exchange, it is recommended to adapt these block contacts and their SFC accesses in the sequencers to the new block types accordingly.

For this, a project-specific assignment as well as a creation of control and process values is mandatory and must be ordered separately

AddressWithoutDriver

List of direct address interconnections without using channel driver blocks. In contrast to APL blocks, old block types have no connections of the data type STRUCT. A direct interconnection of addresses to these connections was therefore possible. Direct address interconnections to the new structure inputs & outputs of the APL blocks, however, are no longer possible (status PCS 7 V9.1 SP1 UC1). If the old blocks are replaced with APL, these direct interconnections can only be adopted with means of additional structure converter blocks. This process is included in the scope of services of the "AS Block Exchange Basic Package".

IdenticalBlockNames

List of all blocks with name conflicts in a CFC, which differ only by upper/lower case. This can lead to considerable problems in the assignment in the case of a block exchange. The names are to be adapted accordingly before the library exchange. It is recommended to change those blocks that do not have OS access.

ToBeDeleted

This table is used to identify block types that are technically obsolete.

The blocks are selected according to the following criteria:

- Blocks that cannot be operated and monitored
- Blocks that have no output connections
- Blocks that are not part of SFC sequencers

If these conditions apply to a block, the upstream block is also checked for these criteria. If all criteria are met, this block will also be included in this table.

STD_Deviation_Summary

Not all old standard blocks can be migrated 100% functionally identical to APL. This spreadsheet therefore lists existing deviations and functional differences between old standard and new APL blocks that occur when the "AS Block Exchange Basic Package" is used and the blocks are exchanged. Information about the affected block type, block parameter names, the number of deviations and a description of the type of the respective deviation are given.

STD_Deviation

The individual points of use of the relevant deviations are listed with ResourceName, CFCName, BlockName, BlockTypeName, BlockParameterName and ParameterValue or ParameterConnection, depending on their purpose.

Note	The results of the SIMATIC PCS neo Readiness AS analysis are included in the AS analysis. For details see chapter SIMATIC PCS neo Readiness Results

3.1.2   Structure analysis (optional)

If standardization is to be carried out as part of the library exchange, a structure analysis must be performed in advance to identify recurring block structures that are necessary for standardizing the application data. See also chapter 4.1

3.1.3   AS Standard Packages

Basic requirement for a PCS 7 multi-project

The following basic package is required for a PCS 7 multi-project:

Designation	Article Number
Block Exchange AS Basic Package/MP Library exchange to APL Basic effort for a PCS 7 multi-project (MP) **Note** min. 1 AS required (AS414 / 416 / 417 / 410)	Service Provider Karlsruhe 9LA1110-8DA00-3AA0 Service Provider Cologne 9LA1276-8DA00-3AA0

Requirements for each automation system

One of the following packages is required for each automation system:

Designation	Article Number
Block Exchange per AS large Library exchange to APL for a large PCS 7 AS (AS417 or from 800 to 1800 process objects) **Note** Can only be ordered in combination with Block Exchange AS Basic Package/MP	Service Provider Karlsruhe 9LA1110-8DA00-3AD0 Service Provider Cologne 9LA1276-8DA00-3AD0
Block Exchange per AS medium Library exchange to APL for a medium PCS 7 AS (AS416 or up to 800 process objects) **Note** Can only be ordered in combination with Block Exchange AS Basic Package/MP	Service Provider Karlsruhe 9LA1110-8DA00-3AC0 Service Provider Cologne 9LA1276-8DA00-3AC0
Block Exchange per AS small Library exchange to APL for a small PCS 7 AS (AS414 or up to 200 process objects) **Note** Can only be ordered in combination with Block Exchange AS Basic Package/MP	Service Provider Karlsruhe 9LA1110-8DA00-3AB0 Service Provider Cologne 9LA1276-8DA00-3AB0

Optional packages

The following packages are available in addition to the Basic Package:

Designation	Article Number
AS Option - Reposition CFC Blocks New placement of CFC blocks for a PCS 7 AS **Note** Can only be ordered in combination with Block Exchange per AS	Service Provider Karlsruhe 9LA1110-8DA00-8AA0 Service provider Cologne 9LA1276-8DA00-8AA0
AS Option - SFC Parameter Exchange Exchange of parameters in steps and transitions for a PCS 7 AS **Note** Can only be ordered in combination with Block Exchange per AS	Service Provider Karlsruhe 9LA1110-8DA00-8AB0 Service Provider Cologne 9LA1276-8DA00-8AB0
AS Option - Dissolve chart-in-chart Ungroup chart-in-chart elements for a PCS 7 AS **Note** Can only be ordered in combination with Block Exchange per AS	Service Provider Karlsruhe 9LA1110-8DA00-8AC0 Service Provider Cologne 9LA1276-8DA00-8AC0

3.1.3.1   Block Exchange AS Basis

3.1.3.1.1   Task

The Block Exchange AS Basic Package includes the conversion of the blocks of an automation system according to prescribed conversion rules.

The block Exchange AS Basis Package contains the conversion of the block types listed in chapter 5.1. The library exchange takes place in a defined order (see also chapter 2 "Basics".

3.1.3.1.2   Applications

The standardized service package can be used for various use cases.

- Conversion of an automation system using the included or project-specific conversion rules:
- Checking the results of the "AS Block Exchange Basic Package" in a preliminary project
- Checking project-specific conversion rules on a test automation system

3.1.3.1.3   Implementation

Implementation takes place in the following order:
1. Providing the required project data
2. Execution of automated block exchange
3. Delivery of the exchanged project data

3.1.3.1.4   Required data

The following information and data must be available before the start and should preferably be submitted through SecureFileExchange:

- Latest PCS 7 project backup
- List of installed SIMATIC software from the PCS 7 Engineering Station
- List of block types to be converted
- Software packages used
- List of PCS 7 automation systems to be converted
- Required passwords
- Designation of a technical contact person with system and project knowledge over the entire project duration

3.1.3.1.5   Conducting the automated block exchange

A pass of the conversion using the conversion rules takes place and the changes are written to PCS 7.

Scope of delivery

The following information and data will be delivered after conversion:

- Converted automation system
- If required: Information about warnings and errors during the block exchange

Project-specific conversion rules

Project-specific conversion rules can be created instead of or in addition to the existing conversion rules. The conversion rules are not checked before the actual conversion within the "Block Exchange AS Basic Package".

Address interconnections

All address interconnections are checked for structure interconnections and, if necessary, decoupled with additional blocks. For example, AND, OR, StruAnOu or StruAnIn.

Message texts

Message texts from the APL library will be used as standard. Block comments will also be added before the actual message texts.

The message properties, such as message priorities and message classes, are re-evaluated and adjusted if needed by the customer.

Blocks (chart-in-chart)

It is not possible to exchange block instances within a chart-in-chart element. If chart-in-chart elements are identified during AS analysis, further proceeding must be clarified.

There are the following options:

- Chart-in-chart elements must be dissolved by the customer before the migration.
- Chart-in-chart elements are dissolved tool-supported into different CFCs or into their original charts

After a migration there is no more chart-in-chart element left in the automation program.

AS-wide interconnections

The exchange of blocks with AS-wide interconnections is not possible.

The interconnections to the blocks to be exchanged must first be decoupled with temporary blocks and then removed again after the conversion.

This is not included in the standard scope of services.

Qualification

> The basis of the "Block Exchange AS Basic Package" are certified conversion rules and tools. There is no separate qualification or creation/delivery of qualification protocols.

PCS 7 versions

> A conversion is available for the following PCS 7 versions:
>
> - PCS 7 V9.0
>
> - PCS 7 V8.2
>
> Other PCS 7 versions will not be supported but can be analyzed in a "Block Exchange AS Analysis". Modifications to the conversion rules may be required for PCS 7 versions other than those mentioned above. No upgrade is included in this service package.
>
> The "Block Exchange AS Analysis" is available from PCS 7 V6.

Service packs and updates

> Service packs and updates may contain fixes that are necessary for conversion. For this reason, a conversion can only be carried out with up-to-date service packs and updates. In particular this applies to the sub-packages CFC and SFC.
>
> The customer must ensure that all required upgrades are carried before sending the project data to the contractor.

3.1.3.1.6 Acceptance

> With the delivery of the converted automation systems, acceptance is declared automatically. If a separate acceptance is desired, this can be ordered separately.

3.1.3.1.7 Division of labour

AS Work Library Exchange	Customer	Contractor
Preparing the PCS 7 project and providing the required project data	x	
Creating the assignment (Parameter, messages, etc.) of project-specific blocks for the conversion	(x)	CaS
Creating a typical test project and conducting a functional typical test	(x)	CaS
Creating and syntax testing the conversion rules as per specification		CaS
Conducting the automated block exchange. (Block Exchange AS Basic Packages incl. project-specific conversion rules)		x
Checking the log-outputs of the DAS Toolset		x
SFC Parameter Exchange – Adapting accesses in the SFC		optional
Reposition CFC Blocks – Repositioning of blocks within a CFC		optional
Dissolve chart-in-chart – Dissolve of chart-in-chart elements		optional
Delivering the conversion		x
Checking the conversion	x	
Acceptance of the conversion	x	CaS

CaS: *Customer-specific additional services*

3.1.3.1.8 Boundary conditions

- Results, documents or conversations are in German or English

- Editing of PCS 7 projects with Latin characters, other languages on request (e.g. Chinese)

- The project must be opened and read using standard PCS 7 resources. If opening is only possible by additional installation, this may result in an additional charge.

- If the project cannot be read in for technical reasons or the configuration deviates too much from the PCS 7 compendia, we reserve the right to cancel the work. In this case, a justification will be provided and only the costs incurred will be charged.

- By exchanging the library, the functions, the user interface and the operating philosophy of APL are used, deviations from the existing library may occur. No functional enhancements of the APL functionality are considered in the creation of new function blocks or modifying the operation.

- Before the migration begins, the project is compiled entirely by the customer. Afterwards, the AS projects are imported by the contractor with the DAS Toolset. If errors occur in the data structures of the PCS 7 projects, the correction of these errors is not included in the quotation and is billed based on time and effort.

- The converted blocks are usually installed at the original position. The new blocks have a larger range of functions so that block overlapping can take place in the CFC after the conversion. The repositioning of the blocks can be ordered as an option.

- It is not possible to convert AS-wide interconnections. The interconnections to the blocks to be exchanged must first be decoupled with temporary blocks and then removed again after the conversion. This work is not included.

- No duplicate block names may be contained in a CFC chart, regardless of uppercase/lowercase letters.

- Conversion takes place according to the conversion rules contained in the "Block Exchange AS Basic Package" or the conversion rules delivered by the customer. Comments and units are carried over for input−/output parameters where it makes sense to use them.

- The library exchange requires a download of the target systems and a possible STOP of the PCS 7 system.

- Experience has shown that APL blocks require more memory, data storage, cycle time, and communication resources than the original library. The contractor does not check whether the existing hardware is enough for the new quantity structure.

- Only the specified source blocks/functions are replaced, all other blocks, particularly user blocks, are retained.

- The supplied automation system must be compilable without errors before conversion in the PCS 7 version used. Any warnings present must be documented.

3.1.3.1.9   Scope of the quotation

The following services are not included in the quotation:

- All changes in the PCS 7 project that are not expressly described in this document
- Bug fixes/upgrades of the PCS 7 project
- Conversions for block types not contained in the existing or delivered conversion rules
- Changes in the F-part of the project
- Changes in the AS communication
- Troubleshooting errors in the data structures of the PCS 7 project
- Functional changes in the program compared to the source software.
- Qualification/qualification documents
- Creation and updating of measuring points/control module types
- Editing the project library

3.1.3.2   AS Option - Reposition CFC Blocks

Repositioning of blocks within a CFC

The converted blocks are usually installed onto the original position. The new blocks have a larger range of functions so that block overlapping may occur in the CFC after the conversion.

This option contains the automatic repositioning of all blocks based on the runtime group position in all CFC charts.

3.1.3.3   AS Option - SFC Plan Parameter Exchange

Adapting accesses in the SFC charts

If there are SFC accesses to parameters of exchanged block types in the sequencers, an adaptation of these SFC accesses is necessary.

Necessary further changes in the sequencers that cannot be resolved by adapting the SFC accesses are not part of the service package. This concerns for instance additional accesses for auto/manual switching.

3.1.3.4   AS Option - Dissolve chart-in-chart

Dissolve of chart-in-chart objects

The existing chart-in-chart elements can be dissolved tool-supported. The following conversions are possible:

Dissolving of chart-in-chart elements:

- To the original position in the CFC
- To a new tab within the CFC
- To a new, separate CFC

3.1.3.5   AS Option - Flexible Use

This option can be used for required additional services. It can be order via MLFB. The scope of services and amounts are specified separately.

3.1.4   Customer-specific AS additional services

In cases where the AS standard packages do not cover all requirements, customer-specific additional services are offered. These are not included in the standard scope.

The further procedure is defined within the scope of a quotation clarification according to AS and OS analysis or a structure analysis.

Possible additional services:

- Customer-specific conversion rules
- Functional Typical Test
- Project cleaning & standardization with CM/CMT conversion
- Project editing (detailed clarification, project management, acceptance)
- Options (PCS 7 upgrade...)

3.2 Library Exchange OS

A conversion can be performed with the OS Standard Packages and additional customer-specific services. These standardized service packages can be used for various use cases.

Conversion with OS Standard Packages

The exchange of the block library makes adaptions of the block icons, tag connections, dynamic dialogs, scripts, etc, necessary in the OS as well.

Steps in the library exchange OS

Customer-specific offer: Price on demand, based on AS/OS data analysis

Standardized offer (MLFB)

OS Analysis

By means of an OS analysis, all relevant process pictures, including all objects and their properties, of the desired OS servers are read in. Thus, necessary work packages can be identified, evaluated and offered in advance.

Quotation/clarifications OS modifications

In the quotation phase, a quotation is created based on the results of the OS analysis and the scope of work defined in consultation with the customer. The "Block Exchange OS Analysis" can also be ordered without the "Block Exchange AS Analysis".

Customer-specific additional services

See chapter 3.2.3 "Customer-specific OS additional services"

OS Standard Packages

These are described in chapter 3.2.2 "OS Standard Packages".

Acceptance

It is recommended to discuss the result of the OS library exchange after the conversion mutually so they can be verified later. The scope of the acceptance must be defined specifically for each project.

3.2.1 OS Analysis

The effort of the OS analysis service (Block Exchange OS Analysis) depends on the number of OS servers. The following packages are available:

Designation	Article Number
Block Exchange OS Analysis Required per PCS 7 server OS picture analysis to identify OS activities Analysis data is transferred in Excel format	Service Provider Karlsruhe 9LA1110-8DA00-1BA0 Service Provider Cologne 9LA1276-8DA00-1BA0
OS Option Analysis Detail Required per PCS 7 server In addition, extensive detailed analysis data as MS Access database for own evaluations **Note** Can only be ordered in combination Block Exchange OS Analysis	Service Provider Karlsruhe 9LA1110-8DA00-6BA0 Service Provider Cologne 9LA1276-8DA00-6BA0

3.2.1.1 Task

The objective is to analyze the PCS 7 OS projects that serve as the basis for OS adaptations that occur in connection with a library exchange to APL. For this purpose, the relevant process pictures (PDL) contained in the PCS 7 OS project, including all their objects and their properties, are read out and analyzed.

The results of the OS analysis are transferred in the form of an Excel spreadsheet or Access database. However, the OS analysis can also be used as a basis for further bulk data handling on the OS, e.g. exchange of WinCC OnlineTrendControls (Classic) with current WinCC OnlineTrendControls.

3.2.1.2 Implementation

The implementation takes place in the following order:

1. Delivery of the required data
2. Execution of "Block Exchange OS Analysis"
3. Handing over the results as Excel spreadsheet / Access database

   Discussion of results (MS Teams meeting if required: ~1h)

3.2.1.3 Required data

The following information and data must be available before the start. They should preferably be submitted by SecureFileExchange:

- PCS 7 project backup (PCS 7 V6 or higher)
- Desired project language for carrying out the analysis ("standard language in runtime")
- List of installed SIMATIC software of the PCS 7 Engineering Station
- Provision of the software packages used (e.g. OCX)
- List of PCS 7 OS stations to be analyzed
- Required passwords
- Current screen resolution (definition of full screens)
- Designation of a technical contact person with system and project knowledge

3.2.1.4   Boundary conditions

- Results, documents, or conversations are in German or English

- Working on PCS 7 projects with Latin characters, other languages on request (e.g. Chinese)

- The project must be opened and read using standard PCS 7 tools. If opening is only possible via additional installation, then additional charges are possible.

- If the project cannot be read out for technical reasons or the configuration deviates too much from the PCS 7 compendia, we reserve the right to cancel the work. In this case, a justification will be provided and only the costs incurred will be charged.

- Evaluation is possible with PCS 7 Version 6 and above

- Properties of OCX objects can only be read out after providing and installing the corresponding software packages. The analysis is then carried out in the WinCC version in which the OCX can be installed.

- Analyses based on old WinCC versions may cause problems due to errors in discontinued WinCC versions. Corresponding problems are documented. for example, individual pictures or objects cannot be analyzed.

- The evaluations contain all process pictures that do not begin with @. Optionally, an analysis of the "@pictures" can be performed.

3.2.1.5   Block Exchange OS Analysis results

The spreadsheets of the Excel file Basic_OS_[project name].xls contains the following information:

OS_A_Summary

Overview of the data of the analyzed server, such as total number of pictures, number of WinCC OnlineTrendControls (trend pictures), dynamics and statistical values, such as the average number of block icons per picture, etc.

Nr	Beschreibung	Description	Count	Reference
1	Bilder Gesamt	Pictures in total	18	OS_A_Picture_Overview
2	Vollbilder	Full-size pictures	17	OS_A_Full_Size
3	Bilder mit unzulässiger Namenslänge	Pictures with invalid name length	1	PDL_24_Check_PictureTree
4	Bildauflösung Höhe (Häufigste)	Resolution Height (most common)	967	
5	Bildauflösung Breite (Häufigste)	Resolution Width (most common)	1920	
6	Bausteinsymboltypen	Block icon types	49	OS_A_Type_Assignment
7	Bausteinsymbole	Block icons	107	OS_A_XREF_CustObj_Type_X
8	Bausteinsymbole mit mehreren Tagnames	Block icons with multiple tag names	3	OS_A_XREF_CustObj_MultiTagnames
9	Anwenderobjekte ohne Typ-Attribut	Customized objects without type attribute	3	OS_A_XREF_CustObj_NoType
10	Bilder mit Bausteinsymbolen	Pictures with block icons	9	OS_A_XREF_CustObj_Type_X
11	Durschnittliche Anzahl an Bausteinsymbolen je Bild	Average number of block icons per picture	12	
12	Dynamik Dialoge ohne Bausteinsymbole	Dynamic dialogue without block icons	9	OS_A_Prop_DynamicDialog
13	Variablenanbindungen ohne Bausteinsymbole	TagConnections without block icons	6	OS_A_Prop_TagConnection
14	Prozessvariablen in Skripten an Eigenschaften	Tags in scripts at properties	3	OS_A_ScriptTags_Properties
15	Prozessvariablen in Skripten an Ereignissen	Tags in scripts at events	6	OS_A_ScriptTags_Events
16	Prozessvariablen in Direktverbindungen	Tags in direct connections	1	OS_A_Tags_DirectConnections
17	Prozessvariablen in TrendControls	Tags in Trend Controls	18	OS_A_TrendTags
18	Verwendete Bausteinparameter	Used block parameters	19	OS_A_Parameter_Assignment
19	Durchschnittliche Anzahl an Dynamisierungen je Bild	Average number of dynamics per picture	2	
20	Kurvenbilder	Pictures with trends controls only	3	
21	Anzahl Kurvencontrols	Trend controls in total	5	
22	Trend Control Classics	Classic trend controls	2	OS_A_Classic_TrendControl
23	Aktuelle Trend Controls	Latest trend controls	3	OS_A_TrendControl
24	Nicht-Standard Faceplateaufrufe	Non-standard Faceplate jumps	2	OS_A_Customized_FaceplateJumps
25	Anzahl zu bearbeitender Bilder	Number of pictures to be edited	14	
26	Bildsprünge über Direktverbindungen	Picture jumps via direct connections	5	OS_A_PictureJumps_DirectCon
27	Objekte mit defekten Dynamisierungen	Objects with corrupt dynamisations	4	OS_A_DeadDynamics

OS_A_Picture_Overview

Overview of all WinCC process pictures used in the server. An evaluation is carried out about the picture size and character lengths of the picture names.

No.	Picture name	Height	Width	Length name
1	Picture_Name_example1.pdl	2620	1280	21
2	Picture_Name_example12.pdl	825	1280	22

OS_A_Full_Size

In this table, the pictures with full screen resolution are listed after the evaluation of the picture size was conducted. The definition of the full screen resolution is done in the table "Definition_Full_Size".

PDL_24_Check_PictureTree

List of all pictures with more than 24 characters. This information is important if these process pictures shall be integrated in the Picture Tree via the SIMATIC Manager Plant Hierarchy. Here, a maximum of 24 characters is permitted.

Definition_Full_Size

Specification of the full screen resolutions.

Nr	Height (PCS 7 Arbeitsbereich)	Width (PCS 7 Arbeitsbereich)	Height (Monitorauflösung)	Width (Monitorauflösung)
1	825	1280	1024	1280
2	967	1600	1200	1600
3	839	1680	1050	1680
4	847	1920	1080	1920
5	967	1920	1200	1920

OS_A_Type_Assignment

Overview of the existing block icons with the number of uses. This gives an overview of all the block icons that were used in the pictures. If blocks are exchanged, the corresponding block icons must be exchanged, too.

OS_A_XREF_CustObj_Type_X

Cross reference of all customized objects which have a type attribute like type, Type, tagtype, StructureType or Servername including information about picture, object name, position, tag, tagname, CFC name, block name and block type of the corresponding block.

OS_A_XREF_Custobj_MultiTagnames

Customized objects of the OS_A_XREF_Custobj_Type_X that have dynamics of multiple blocks or dynamics at usually not dynamized object properties (e.g., Visible, Operation).

OS_A_XREF_CustObj_NoType

Cross reference of all customized objects that have no type attribute like type, Type, tagtype, StructureType or Servername including information about picture, object name, position, tag, tagname, CFC name, block name and block type of the corresponding block.

OS_A_Prop_DynamicDialog

Overview of existing dynamic dialogs with formulas and used parameter names. The table includes all WinCC-objects without customized objects.

This information is important because the parameter names must be adapted in the formulas accordingly to the exchange of the blocks (this applies, for example, to static texts, I/O field, bars, lines).

Depending on the type of configuration, considerable engineering effort is to be expected when evaluating status words (e.g. bit-by-bit) that are no longer available after the blocks have been replaced.

OS_A_Prop_TagConnection

Overview of existing tag connections with used parameter names. This spreadsheet includes all WinCC-objects without customized objects.

This information is important because the parameter names must be adapted accordingly to the exchanged blocks (this applies, for example, to static texts, I/O fields, bars, lines).

OS_A_TrendTags

Table with all trend tags in WinCC OnlineTrendControls or WinCC OnlineTrendControls (Classic). After the exchange of AS blocks the parameter names in the tags must be adapted according to the exchanged blocks.

OS_A_Parameter_Assignment

This table includes all block parameters, which are used in dynamizations with additional information about the block type of the block parameter and the count of use in dynamizations.

OS_A_ClassicTrendControl

Table with all WinCC OnlineTrendControls (Classic) including information about object name, position, height and width. This can be used whether and optional exchange of the WinCC OnlineTrendControls (Classic) with the current WinCC OnlineTrendControls makes sense.

OS_A_TrendControl

Table with all current WinCC OnlineTrendControls including information about object name, position, height, and width.

OS_A_DeadDynamics

Table with all dynamics whose CFC or block name referenced in the process variable is no longer present in the AS and therefore does not function.

3.2.1.6 Block Exchange OS Option Analysis Detail results

In addition to object properties, the "Detail" service package also analyses object events and C and VB actions on object properties and object events.

Additional information and data are delivered as MS Access database "Detail_OS_*.mdb" with the following tables: (All C and VB scripts are also delivered as a separate .txt file).)

OS_A_GetEventsC_all

This table shows all events that contain C-scripts

OS_A_GetEventsDC_all

This table shows all events that contain direct connections

OS_A_GetEventsVBS_all

This table shows all events that contain VB-scripts

OS_A_GetProperties_all

This table contains all WinCC objects and their properties of the analyzed process pictures.

OS_A_PictureJumps_DirectCon

This table is included in the Basic_OS_*.xls file as well as in the Detail_OS_*.mdb and contains all picture jumps that were configured via direct connections. This configuration method will make a return to the previous picture in the OS runtime with the designated return button impossible.

OS_A_Customized_FaceplateJumps

This table is included in the Basic_OS_*.xls file as well as in the Detail_OS_*.mdb.

This table includes faceplate jumps which are executed not with block icons. This kind of engineering is not PCS 7 conform and should be replaced with block icons.

OS_A_ScriptTags_Properties

This table is included in the Basic_OS_*.xls file as well as in the Detail_OS_*.mdb.

Overview of all tags with the used parameter name in C- and VB-actions on object properties. The list includes all WinCC-objects without customized objects.

After the exchange of AS blocks the parameter names in the tags must be adapted according to the exchanged blocks.

OS_A_ScriptTags_Events

This table is included in the Basic_OS_*.xls file as well as in the Detail_OS_*.mdb.

Overview of all tags with the used parameter name in C- and VB-actions on object events. The list includes all WinCC-objects without customized objects.

After the exchange of AS blocks the parameter names in the tags must be adapted according to the exchanged blocks.

OS_A_Tags_DirectConnections

This table is included in the Basic_OS_*.xls file as well as in the Detail_OS_*.mdb.

Overview of all tags with the used parameter name in direct connections. The list includes all WinCC-objects without customized objects.

After the exchange of AS blocks the parameter names in the tags must be adapted according to the exchanged blocks.

3.2.2 OS Standard Packages

The following tasks are always required in the OS after a library exchange.

- Exchange of block icons
- Adaption of tag connections and dynamic dialogs
- Adaption of the process value archives (Tag Logging)

These tasks were combined into service packages for various quantity structures. The standard packages can be ordered if the PCS 7 Library (old standard library) is used and if the OS engineering was done PCS 7 compliant.

Designation	Article Number
Block Exchange OS Standard Basic 80 Library exchange to APL Basic effort required per PCS 7 OS Server up to 80 pictures. - Exchange of block icons - Exchange of tag connections and dynamic dialogs - Handling of process value archives	Service Provider Karlsruhe 9LA1110- 8DA00-3BA0 Service Provider Cologne 9LA1276- 8DA00-3BA0
Expansion OS Standard 10 pictures Additional handling of 10 process pictures - Exchange of the block icons - Exchange of tag connections /dynamic dialogs **Note** Can only be ordered in combination with Block Exchange OS Standard Basic 80.	Service Provider Karlsruhe 9LA1110- 8DA00-3BB0 Service Provider Cologne 9LA1276- 8DA00-3BB0

An OS analysis is required in order to ensure the service packages to cover the complete required scope of work and to determine required project-specific additional services respectively.

All non-standard changes to block icons, scripts, properties, events, tag connections, etc, which are not adapted and covered in the course of the regular OS library exchange, must be ordered on a project-specific basis.

Any adjustments in other editors (e.g. Report Designer) are also not included in the standard packages and can be ordered on a project-specific basis.

Optional packages

The following packages are available in addition to the basic package:

Designation	Article Number
Conversion to System Archive Basic 400 Basic effort for setting up the archiving at the block parameter within the CFC based on existing process archives and conversion to system archive for up to 400 archive tags. Connecting the OnlineTrendControls to the new tags of the system archives. **Note** Can only be ordered in combination with Block Exchange AS/OS.	Service Provider Karlsruhe 9LA1110- 8DA00-8BA0 Service Provider Cologne 9LA1276- 8DA00-8BA0
Expansion System Archive 100 Setting up the archiving at the block parameter in the CFC based on existing process archives and conversion to system archive for additional 100 archive tags. **Note** Can only be ordered in combination with Conversion to System Archive Basic 400.	Service Provider Karlsruhe 9LA1110- 8DA00-8BB0 Service Provider Cologne 9LA1276- 8DA00-8BB0

Designation	Article Number
OS OnlineTrendControl Exchange Basic 50 Basic effort required per PCS 7 OS Server for the exchange of up to 50 classic OnlineTrendControls with current OnlineTrendControls.	Service Provider Karlsruhe 9LA1110- 8DA00-5BA0 Service Provider Cologne 9LA1276- 8DA00-5BA0
Expansion OnlineTrendControl Exchange 10 Exchange of 10 additional classic OnlineTrendControls in the process pictures with current OnlineTrendControls. **Note** Can only be ordered in combination with OS OnlineTrend Control Exchange Basic 50.	Service Provider Karlsruhe 9LA1110- 8DA00-5BB0 Service Provider Cologne 9LA1276- 8DA00-5BB0

Designation	Article Number
Conversion OS Picture Resolution Basic 80 Basic effort for changing the picture resolution for up to 80 pictures including manual rework.	Service Provider Karlsruhe 9LA1110-8DA00-5BC0 Service Provider Cologne 9LA1276- 8DA00-5BC0
Conversion OS Picture Resolution Basic 20 Basic effort for changing the picture resolution for up to 20 pictures including manual rework.	Service Provider Karlsruhe 9LA1110-8DA00-5BE0 Service Provider Cologne 9LA1276- 8DA00-5BE0

Designation	Article Number
Expansion OS Picture Resolution 20 Changing the picture resolution for every 20 additional pictures including manual rework. **Note** Can only be ordered in combination with "Conversion OS Picture Resolution Basic 80" or "Conversion OS Picture Resolution 20"	Service Provider Karlsruhe 9LA1110- 8DA00-5BD0 Service Provider Cologne 9LA1276- 8DA00-5BD0

3.2.2.1 Block Exchange OS Standard Basic

3.2.2.1.1 Exchange of block icons (customized objects)

It is generally recommended to use the unmodified default block icons of the APL. Customizing the objects will lead to additional effort in future upgrades.

Services

All block icons of the old library will be exchanged to the new APL library target version while retaining their tag and location in the process pictures. In addition to the APL standard template, the customer can decide whether customized block icons are to be used. In such a case, these must be provided by the customer. The corresponding assignment list for the exchange of the block icons (old→new) is prepared by the contractor and completed by the customer.

After the block icons have been exchanged, the process pictures may need to be corrected, as the new block icons have different dimensions and may therefore overlap with existing objects.

Boundary conditions

- Using the PCS 7 APL standard template is part of the service scope.
- The TemplateAPL.cfg is used to update the block icons.
- The size of the block icons to be exchanged must not differ significantly from the old block icons. (Maximum width +10%, Maximum height +10%)
- It is assumed that the conversion takes place in one project step.
- The plant engineering must have been carried out in conformity with PCS 7 (according to PCS 7 Compendium).
- The assignment of block icons is carried out by the customer.

3.2.2.1.2 Adaption of tag connections and dynamic dialogs

When the block library is exchanged, the parameter names of the blocks and thus the tags change. As a result, tag connections, dynamic dialogs and other accesses to tags must be adapted at the used places in the process pictures.

Services

Tags in process pictures are adapted to the parameter name of the new blocks
This includes.

- Tag connections
- Tags in dynamic dialogs
- Tags within WinCC OnlineTrendControls
- Tags in Direct Connections

Boundary conditions

- There are no substitute configurations in the Standard Packages for those cases in which, for example, the required information is no longer available in a OCM possible parameter or status word. (see chapter "Substitute configuration dynamics")
- Some states in APL are no longer provided as single tags in the OS, but as bits in a status word. This dynamic usually must be changed with a dynamic dialog with access to the desired bit. The number of occurrences depends on the PCS 7 version and attributes of the project library. (e.g. FB_CLOSE > .Status1.Bit17). The conversion to dynamic dialogs must be adjusted manually for each property and is not included in the "Block Exchange OS Standard Basis" standard package.

3.2.2.1.3   Adaption of tags in scripts

When the block library is exchanged, the parameter names of the blocks and thus the tags change. As a result, tags in C- and VB-actions must be adapted at the used places in the process pictures accordingly.

Services

Tags in scripts in process pictures are adapted to the parameter names of the new blocks. This includes:

- Adaption of the parameter names in C- and VB-actions in object properties
- Adaption of the parameter names in C- and VB-actions in object events
- Adaption of faceplate-calls at WinCC objects (e.g. buttons), which are using standard functions

Boundary conditions

- There are no substitute configurations in the Standard Packages for those cases in which, for example, the required information is no longer available in a OCM possible parameter or status word.
- The adaption of tags, which are created in scripts for different use cases (e.g. customer specific product selection system) or further adaptions can be ordered as customer specific OS additional services (see Chapter: "additional adaptions of scripts")

3.2.2.1.4   Handling of process value archives

After a library exchange, the parameter names of the exchanged block types have changed so that the old archive tags in the existing process value archives no longer work. After adapting the parameter names in the archive tags in the process value archives, the process value archives and the WinCC OnlineTrendControls will work again.

If system archives are already used, the new system archives are generated with new archive tags during an OS compile.

Services

- Adaptation of the parameters in tags within the Tag Logging while retaining the old archive names

- Adaption of the parameters of archive tags within WinCC OnlineTrendControls

Boundary conditions

- The trend view of APL faceplates and the APL Operator Trend Control (AOTC) only show archive values from system archives, not from manually created process value archives

3.2.2.2   Conversion to system archives (optional)

After a library exchange, the use of system archives is recommended.
System archives are created automatically via OS compilation, so that the process value archives do not have to be maintained manually. The selection of which values are archived is made in the CFC.
The trend view and the APL Operator Trend Control (AOTC) only display archive values from system archives, which is why a changeover is necessary for the use of these functions.

Services

- Enabling archiving within the CFC block parameter and conversion to system archive

- Archive tags within WinCC OnlineTrendControls are adapted to the parameter of the new block type

Boundary conditions

- The existing process value archives are used as a basis for archiving the APL blocks.

- After converting the archives, the old archive values are no longer available on the servers.

3.2.2.3   OnlineTrendControl exchange (optional)

Basically, when using this option, it is necessary to always check whether the OnlineTrendControl operating concept will be retained.

The OnlineTrendControls can also be exchanged independently of the library exchange.

Services

The existing WinCC OnlineTrendControls (Classic) are replaced by the current WinCC OnlineTrendControls.

The following procedure is used to implement the WinCC OnlineTrendControls:

- Read-out of the WinCC OnlineTrendControls (Classic) and listing in an Excel table.

- Exchange of the OnlineTrendControls (Classic) in the process pictures based on a template

- (optional) If necessary, the customer will adapt and accept the template.

3.2.2.4   Conversion OS picture resolution (optional)

When switching to new monitor formats (16:9/16:10), the old resolution must be adapted to the new target resolution independently of the AS work packages.

Overview of common picture resolutions

x		y	Aspect Ratio DAR
1024	×	768	4:3
1152	×	864	4:3
1280	×	1024	5:4
1680	×	1050	16:10
1920	×	1080	16:9
1600	×	1200	4:3
1920	×	1200	16:10
2560	×	1600	16:10

Services

- Conversion of the picture resolution to a given target resolution.

- Standard objects such as buttons and text fields are adapted to the new resolution as well.

- Optionally, the font size of static texts or I/O fields can be adjusted. For this purpose the flexible use option can be ordered.

- Manual check and rework of pictures. This is necessary because stretching with the calculated factors can lead to smaller deviations of the object positions in some cases.

Boundary conditions

- Properties and dynamic dialogs remain unchanged.

- Dynamic changes of the object sizes as well as object positions are not examined and not converted either.

- Object size of customized objects remains unchanged.

- When changing the "Active Design" from "WinCC Classic" to "WinCC 3D", the appearance of objects may also change (colors, styles, e.g. for line ends with arrows). The contractor does not make any adjustments.

- If the project configuration in the source project deviates from the PCS 7 standard too much (PCS 7 Compendium), the pictures might need to be reworked again by the customer. The main reason for this is that the contractor lacks plant specific knowledge, and the result would only become visible on the live OS runtime with process coupling.

3.2.2.5 Required data

The following information and data must be available before the start and should preferably be provided by SecureFileExchange:

- Latest PCS 7 project backup

- List of installed SIMATIC software of the PCS 7 Engineering Station

- Information regarding the OS Server to be processed

- Desired project language for carrying out the work ("standard language at runtime")

- Provision of the software packages used (e.g. OCX)

- Designation of a technical contact person with system and project knowledge over the entire project duration

3.2.2.6 Acceptance

With the delivery of the edited OS projects the acceptance is automatically declared. If desired, a separate acceptance can be ordered.

3.2.2.7 Division of labour

OS Work Library Exchange	Customer	Contractor
Conducting an OS software analysis		x
Creation of the OS template picture with APL block icons in target version for OS block icon exchange incl. type assignment	x	optional
Exchange of block icons (customized objects) incl. "Picture washing "		x
Rework due to deviating icon size (> maximum width +15%, maximum height +10%)	(x)	CaS
Exchange of tag connections and dynamic dialogs		x
Adaptions of faceplate calls form WinCC objects (e.g. buttons) using standard functions		x
If necessary, adaption of scripts (e.g. operating pictures)	(x)	CaS
If necessary, substitute configuration for dynamic modification for which parameter exchange is not possible. (e.g. complex logic, evaluation of status words that no longer exist...)	(x)	CaS
Handling of process value archives (retaining the process value archives)		x
Conversion to system archives		optional
Updating parameter names in OnlineTrendControls to APL (system archive)		optional
OnlineTrendControl exchange		optional
Conversion OS picture resolution		optional
Delivery of the results		x
Checking OS work	x	x
Acceptance OS work Library Exchange	x	

CaS: *Customer-specific additional services*

3.2.2.8 Scope of service

The following services are not included:

- All changes in the PCS 7 project that are not explicitly described in this document.
- Troubleshooting/Upgrading the PCS 7 Project
- Qualification/ Qualification documents

3.2.3 Customer-specific OS additional services

In cases where the OS standard packages do not cover all requirements, customer-specific additional services are offered. These are not included in the standard scope.

3.2.3.1 OS project clean-up

This includes

- Reduction of the variance of the used block icons
- Editing projects with block icons with unmaintained type attributes
- Substitute configurations

3.2.3.2 Substitute configuration dynamics

If necessary, substitute configuration for dynamic dialogs for which parameter exchange is not possible. (e.g. complex logic, evaluation of status words that no longer exist...)

3.2.3.3 Additional adaptions of scripts

Further adaptions of scripts, which are not included in the "Block Exchange OS Standard Basis"-Package, can be ordered project specifically with the option "DCS Modernization Flexible Use". This can include:

- Adaption of tags, which are created in scripts for different use cases (e.g. in customer specific product selection systems)
- Other scripts: Complex logic, which can not be recreated with a simple exchange of the tag, can be adapted with help of a technological contact of the customer and charged according to time and effort

3.2.3.4 Replacing graphical objects with block icons

If, for example, buttons are used to open faceplates, the use of block icons according to PCS 7 Compendium is recommended. The exchange of graphical objects for block icons is optional. If necessary, the block icons must be adapted if the standard view is not acceptable for the specific use case.

3.2.3.5 Block Icons - customer-specific exchange list

If it is not possible to assign the picture objects unambiguously using the property "type", an assignment of the picture objects by the customer is necessary in advance. The assignment will be done in an Excel table. Optionally, the assignment can be offered as a project-specific additional service.

3.2.3.6 Block Icons - customer-specific template

Optionally, the customer can provide a modified template picture with the customer specific standard as well as the configuration file for the new block icons. ("Template.PDL" & "TemplateControl.cfg").

3.2.3.7 Block Icons - changed properties

Deviations of the object properties, such as changed font sizes, colors, etc., of the used block icons or additional dynamizations compared to the default template picture are to be named and implemented in the TemplateControl.cfg.

Instance-specific adjustments of static properties or additional dynamisation are calculated additionally.

3.2.3.8 Block Icons - rework due to deviating icon size

If the new icon size differs significantly from the original icon size, further adaptions to the pictures may be necessary.

3.2.3.9 Adaptions in additional editors

e.g. Report Designer, Global Script

4 DCS Standardization Services

4.1 Structure analysis

Within the scope of a structure analysis, the following service package is offered in combination with the "Block Exchange AS Analysis":

Description	Article number
AS option structure analysis Detection of recurring structures in CFC charts for standardization and in preparation of a CM/ CMT conversion for up to 10 search structures with up to 3 options in a maximum of 10 AS. Presentation of the analysis results and mutual definition of the search structures in up to two meetings. **Note** Can only be ordered in combination with AS Block Exchange Analysis.	Service Provider Karlsruhe 9LA1110-8DA00-6AA0 Service Provider Cologne 9LA1276-8DA00-6AA0

Note

The AS analysis described in chapter 3.1.1 must be carried out in advance in order to be able to perform the structure analysis.

A structure analysis is also the basis for a customer-specific offer as part of a CM/CMT conversion.

Definition of additional search structures can be ordered project-specifically via "DCS Modernization Flexible Use".

4.1.1 Task

The structure analysis is used to detect recurring and typable block structures within an automation program. On the one hand, these recurring structures form the basis for a typical exchange (see Library Exchange+Standardization) and, on the other hand, they are the main component of later CM/CMTs.

- The customer can provide typicals to improve the quality of the structure analysis.

- For the presentation of the analysis results and joint definition of CMT search structures, plant knowledge is required from the customer.

- Following the structure analysis, an individual offer for the implementation of the CM/CMT conversion can be prepared.

4.1.2 Implementation

Implementation takes place in the following order:

1. Providing the required project data (customer)
2. Structure analysis, discussing the results and mutual definition of the search structures in up to 2 meetings
3. Delivering the data as Excel-file

4.1.3 Required Data

The customer provides the following data at the project start:

- Latest PCS 7 project backup
- Software packages used
- List of PCS 7 automation systems to be analyzed
- Passwords
- Designation of a technical contact person with system and project knowledge

4.1.4 Boundary conditions

- Results, documents, or conversations are in German or English
- Editing of PCS 7 projects only containing Latin characters, other languages on request (e.g. Chinese)
- The project must be opened and read using standard PCS 7 resources. If an opening is only possible by additional installation, this may result in an additional charge.
- If the project cannot be read for technical reasons or the configuration deviates too much from the PCS 7 compendia, we reserve the right to cancel the work. In this case, an explanation will be provided and only the costs incurred will be charged.
- Before the analysis begins, the project is archived by the customer. Afterwards, the AS projects are imported by the contractor with the DAS Toolset. If errors occur in the data structures of the PCS 7 projects, the correction of these errors is not included in the quotation and is billed based on time and effort.
- A structure analysis is available from PCS 7 Version 6 and above.

4.1.5 Structure analysis results

The individual lists of the Excel document handed out to the customer are described in more detail below.

Summary

The Summary tab in the Excel file gives an overall view of the quantity structure of the analyzed project, such as number of found block types which can be converted to CMT. CFCs with CMs, CFCs with multiple CMs or CFCs from which no CMT can be migrated.

BTFound

Listing of those block types and their instances that have been defined as master block within a search structure and were found during the analysis.

- CountFound: Number of instances of a block type that are covered by the search structure and can be converted to a CM/CMT.
- CountBT: Number of all instances of the respective block type present in the project.
- Found in %: Indicates the percentage of those block types that can be converted to CM/CMT in the entire project.

    (Found in % = CountFoundBT*100/CountBT)

STFound

This list is similar to the previous one. Here the different variants of the source typicals including their corresponding master block type are listed itemized.

FoundBI

In this list all block types with their respective instances are listed, which are present in the entire project.

- CountBI: Shows all existing block instances of each type within the project.
- CountFoundBI: Lists the number of found block instances that are part of a search structure and can be converted to CM/CMT.

CFCWithCCMTs

In this list all CFCs are listed, on which several technological blocks exist, which are assigned to different or also the same CMT. This will become a problem for the conversion, since only one CM/CMT can be created per chart.

Here a manual splitting of these plans must take place before a CM/CMT conversion.

CFCWithCMT

Charts listed in this table will contain a CM after the CMT conversion.

CFCWithoutCMT

Charts listed in this table will not contain a CM after the CMT conversion.

4.2　Standardization

In order to keep process plants competitive and to ensure easy maintainability of the plant, it is important to keep these plants at the current state of the art. The basic requirement is therefore the standardization and modernization of the engineering. By standardizing the existing PCS 7 process control system, the migration of the project to the future SIMATIC PCS neo process control system is prepared and ultimately simplified.

4.2.1　Control Module Types

A proven approach to standardization and modernization of existing plants is the use of so-called Control Module Types (CMT).

With the creation of CMTs and the conversion of existing CFCs into Control Modules (CM) as instances of the CMT, an important step towards standardization is taken, since recurring structures in the project are combined and mapped as CMTs.
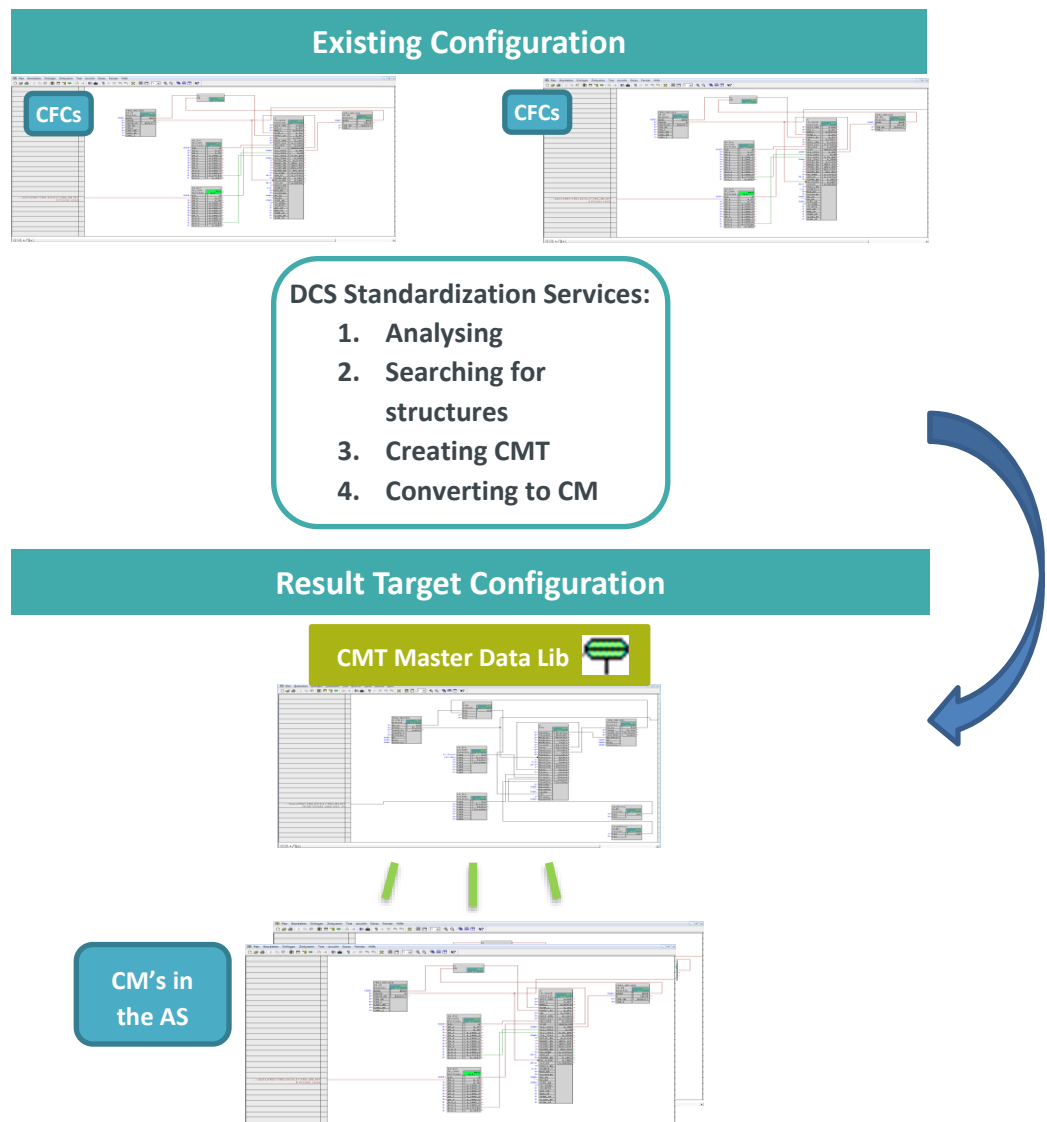
4.2.2 Unification of different realizations of the same technical functions

Often it can occur in the configuration of an automation system that similar technological functionalities (e.g. motor - or valve control) were realized in different ways. Different implementation methods, a long life cycle of the system, uncoordinated & not agreed engineering work of too many people or a lack of documentation/overview can contribute to this grievance.

A structure analysis can identify these functionally identical block combinations. A unification can be done manually or with the help of the DAS Toolset in the form of a typical exchange as part of the library exchange.

Existing & different configurations of similar functions
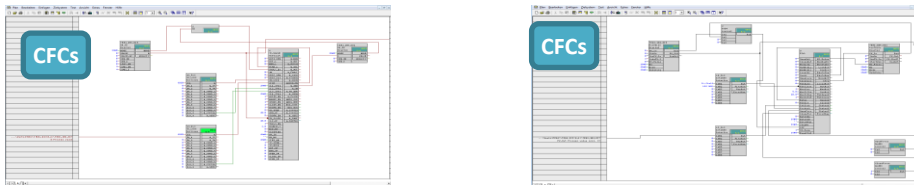
DCS Standardization Services:
1. Analysing
2. Searching for structures
3. Exchanging these structures via typical exchange
4. Additional manual standardizing work

Result with standardized configuration
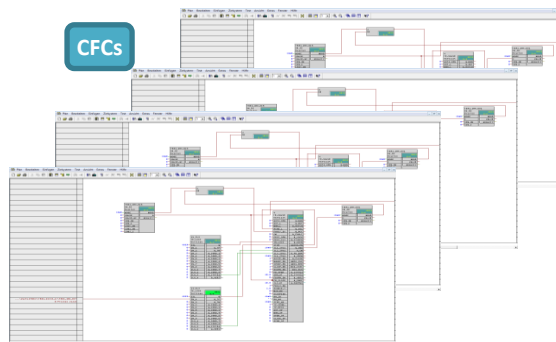
4.3 CM/CMT Conversion

As a part of the CM/CMT conversion, the following service packages are offered in combination with the "Structure Analysis":

Basic effort for one PCS 7 multiproject

The following basic package is required for each PCS 7 multiproject:

Description	Article number
Control Module conversion per AS small Conversion of recurring structures into CMs for a small PCS 7 AS (AS414 or up to 200 process objects) **Note** Can only be ordered in combination with AS option structure analysis and Control Module conversion per CMT	Service Provider Karlsruhe 9LA1110-8DA00-4AB0 Service Provider Cologne 9LA1276-8DA00-4AB0
Control Module conversion per AS medium Conversion of recurring structures into CMs for a medium PCS 7 AS (AS416 or up to 800 process objects) **Note** Can only be ordered in combination with AS option structure analysis and Control Module conversion per CMT	Service Provider Karlsruhe 9LA1110-8DA00-4AC0 Service Provider Cologne 9LA1276-8DA00-4AC0
Control Module conversion per AS large Conversion of recurring structures into CMs for a large PCS 7 AS (AS417 or from 800 up to 1800 process objects) **Note** Can only be ordered in combination with AS option structure analysis and Control Module conversion per CMT	Service Provider Karlsruhe 9LA1110-8DA00-4AD0 Service Provider Cologne 9LA1276-8DA00-4AD0
Control Module conversion per CMT Conversion of recurring structures into CMs per Control Module Type (CMT) **Note** Can only be ordered in combination with AS option structure analysis and Control Module conversion per AS	Service Provider Karlsruhe 9LA1110-8DA00-4AA0 Service Provider Cologne 9LA1276-8DA00-4AA0

4.3.1 Task

The package "Control Module Conversion per AS" and " Control Module Conversion per CMT" includes the creation of CMTs in the master data library of the respective PCS 7 project. In addition to the creation of CMTs, the respective CFCs, which can be converted based on the previously defined structure analysis, are created in CM instances from the CMTs. A CMT can also contain optional blocks. This allows the creation of different CMs which are all created on the same CMT.

4.3.2 Possible applications and advantages

Existing process plants can be standardized with the CM/CMT conversion. Thus, future engineering changes will become clearer, more structured and require significantly less time. Additional CM instances can be easily created and defined with the desired optional blocks.

If changes have to be made in the PCS 7 project afterwards, these can be implemented in the corresponding CMT and transferred to all instances of the CMT by synchronization.

In addition to saving time and standardizing the plant, the reduction of error-proneness in engineering plays an important role. The integration of the CMT technology prevents the blocks from being connected incorrectly, because optional blocks created in the CMT are automatically inserted and connected in the corresponding instance with just a few clicks.

As already mentioned at the beginning of the basics chapter, CMT technology also enables data exchange with Advanced ES, Plant Automation Accelerator (PAA) and COMOS Integrated Engineering which can come in handy if bulk engineering is to be done.

4.3.3 Implementation

The implementation takes place in the following order after the structure analysis has been carried out:

1. Providing the required project data
2. Creating CMTs and converting existing CFCs into CMs
3. Delivering the converted PCS 7 project archive with created CMT master data library

4.3.4 Required data

The customer provides the following data at the project start:

- Latest PCS 7 project backup
- Possible search typicals
- List of installed SIMATIC software of the PCS 7 ES incl. version numbers
- Software packages used
- List of PCS 7 automation systems to be converted
- Required passwords
- Designation of a technical contact person with system and project knowledge

4.3.5 Carrying out the CM/CMT conversion

The CMTs are created in the master data library on the basis of the previously performed structure analysis. After the CMTs have been created, the affected charts are converted into CMs in the respective AS programs.

Scope of delivery

> The following information and data will be delivered after the conversion:

- Converted automation system incl. project-specific CMT master data library

PCS 7 versions

> The conversion is possible for the following PCS7 versions:

- PCS 7 V9.0 and newer
- PCS 7 V8.2

Other PCS 7 versions are not supported. Upgrades are not included in this service package.

Service Packs and Updates

> Service packs and updates for PCS 7 may contain corrections that are necessary for the conversion. For this reason, a conversion can only be carried out with the latest service packs and updates.

> The client must ensure that any necessary upgrades have been carried out before delivery to the contractor.

4.3.6 Acceptance

> Automatic acceptance is declared with the delivery of the converted automation systems. If desired, a separate acceptance can be ordered.

4.3.7 Division of labour

Work packages for creating and converting CM/CMT	Customer	Contractor
Preparing the PCS 7 project and providing the required project data	x	
Providing pre-defined typicals for creating CMTs	optional	
Analysis of recurring structures via the package „structure analysis" as described in chapter 4.1		x
Presenting & discussing the identified structures together with the customer	x	x
Delivering the results of the structure analysis in tabular form (Excel)		x
Cleaning up improper structures such as several technological blocks on one CFC that later will belong to a CMT	optional	CaS
Creating Control Module Types and integrating them in the project (Master data library)		x
Converting the corresponding CFC charts into Control Modules		x
Delivering the results		x
Checking the conversion	x	x
Accepting the conversion	x	CaS

CaS: *Customer-specific additional services*

Part of the structure analysis

4.3.8 Boundary conditions

- Results, documents, or conversations are in German or English
- Only CFC charts that match the CMTs can be converted to CMs
- A combination of several CMTs in one CM is not possible
- No new/additional functions will be created
- The runtime groups of the blocks within the created CM correspond to those in the CMT and may differ from the original runtime group before the conversion.
- Acceptances/meetings/extensions/standardizations/commissioning/FAT are not included in this position and will be charged according to time and effort.
- Editing of PCS 7 projects only containing Latin characters, other languages on request (e.g. Chinese)
- The project must be opened and read using standard PCS 7 resources. If an opening is only possible by additional installation, this may result in an additional charge.
- If the project cannot be read for technical reasons or the configuration deviates too much from the PCS 7 compendia, we reserve the right to cancel the work. In this case, an explanation will be provided and only the costs incurred will be charged.
- Before the conversion begins, the project is archived by the customer. Afterwards, the AS projects are imported by the contractor with the DAS Toolset. If errors occur in the data structures of the PCS 7 projects, the correction of these errors is not included in the quotation and is billed based on time and effort.
- A CM/CMT conversion is available from PCS 7 Version 8.2, 9.0 and newer.

4.3.9 Scope of the quotation

The following services are not included in the offer:

- Any changes to the PCS 7 project not specifically described in this document.
- Bug fixes/upgrades of the PCS 7 project
- Changes in the F part of the project
- Changes in the AS communication
- Problem solutions for errors in the data structures of the PCS 7 project
- Functional changes in the program compared to the source software.
- Qualification/ Qualification documents
- Working on the project library

4.4 SFC documentation

4.4.1 Task

The goal is the documentation of SFC sequencers of SFC charts and SFC types. For this purpose, the PCS 7 project is read out with the DAS Toolset and then the SFC charts or types are exported and transferred as graphical representation in the form of Excel files.

Description	Article number
SFC documentation per sequencer Graphic representation of an SFC sequencer in an Excel file for one SFC sequencer	Service Provider Karlsruhe 9LA1110-8DA00-4GA0 Service Provider Cologne 9LA1276-8DA00-4GA0

4.4.2 Implementation

The implementation takes place in the following order:

1. Providing the required project data
2. Reading out and evaluating the project data with the DAS Toolset
3. Transferring the SFC documentation in the form of Excel files

4.4.3 Required data

- Latest PCS 7 project backup
- Passwords for access protection (SIMATIC Logon etc.)

4.4.4 Evaluation

Each SFC chart or SFC type is delivered as a separate .xls-file. Each SFC sequence is presented in its own spreadsheet.

The actions of steps and the conditions of transitions are directly assigned to the visualized step or condition.

The evaluation contains:

- Steps (turquoise) with all actions (I: Initial Action, P: Processing Action, T: Terminating Action)
- Transitions (yellow) with conditions and logic of the conditions (A: And, O: Or, NO: Nor, NA: Nand)
- Grey representation of start and end steps
- Visualization of different sequence branches (Parallel, alternative, loop, jump)

SFC_RMT1
Sequence: RUN
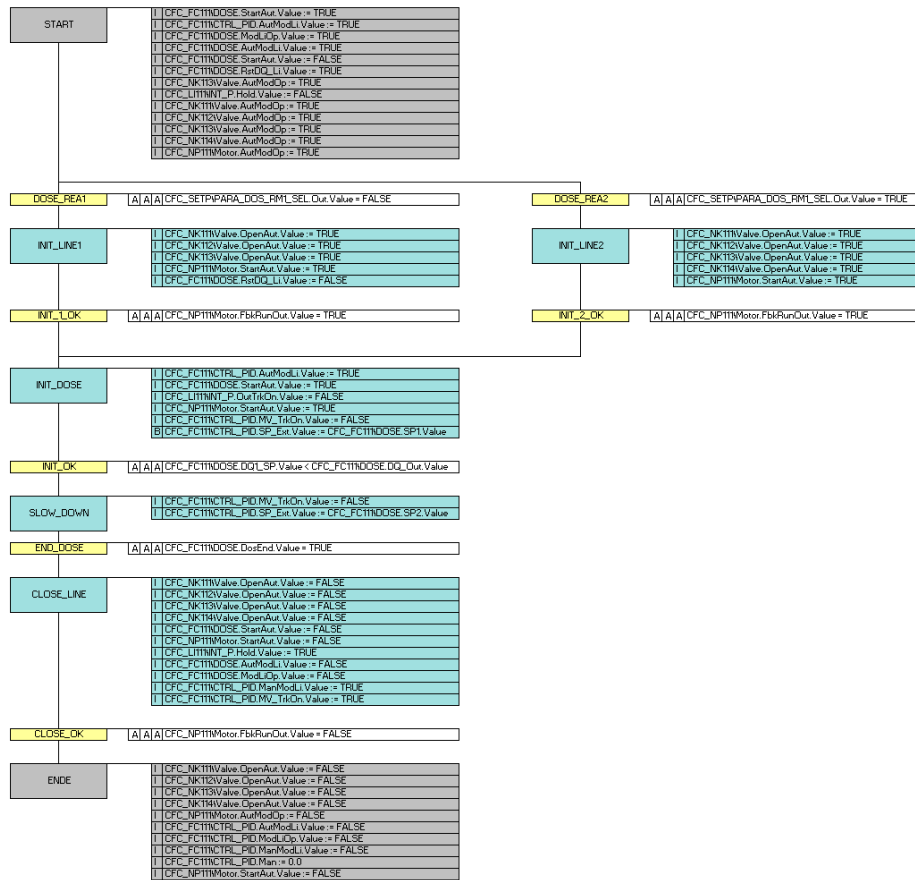
For SFC types the characteristics and messages are listed in a separate spreadsheet. Included are:

- General information (Author, Version, Operating Mode, Comment)
- Control strategies
- Setpoints
- Assignment control strategies to setpoints
- Process values
- Control values
- Parameters
- Bit memories
- Timers
- Note texts
- Block contacts
- Position texts
- Messages

4.4.5 Boundary Conditions

- Documentation is in German or English
- Documentation of SFC sequencers only with Latin characters. Other languages on request (e.g. Chinese)
- The project must be opened and read using standard PCS 7 tools. If opening is only possible via additional installation, then additional charges are possible.
- If the project cannot be read for technical reasons or the configuration deviates too much from the PCS 7 compendia, we reserve the right to cancel the work. In this case, an explanation will be provided and only the costs incurred will be charged.
- The evaluation is possible as of PCS 7 version 6

5 SIMATIC PCS neo Readiness Services

The "SIMATIC PCS neo Readiness Services" module includes services to check and prepare the PCS 7 project with respect to the evolution to SIMATIC PCS neo.

5.1 AS Software Analysis (SIMATIC PCS neo Readiness)

Table 5-1

Description	Article number
PCS neo Readiness AS Software (5AS) SIMATIC PCS neo Readiness AS Software Analysis for up to 5 PCS 7 AS. The analysis provides important information for converting the SIMATIC PCS 7 CFC engineering to PCS neo. Analysis data is transferred in Excel format. The results are discussed together.	Service Provider Karlsruhe 9LA1110-8DA00-7AA0 Service Provider Cologne 9LA1276-8DA00-7AA0
PCS neo Readiness AS Software Extension SIMATIC PCS neo Readiness AS Software Extension. Extension of the PCS neo Readiness AS Software Analysis by 5 additional AS. **Hinweis:** Only possible in combination with PCS neo Readiness AS Software (5 AS)	Service Provider Karlsruhe 9LA1110-8DA00-7AB0 Service Provider Cologne 9LA1276-8DA00-7AB0

5.1.1 Task

The objective is to analyse a PCS 7 project for deviations from the configuration specifications of the AS software engineering of the SIMATIC PCS neo readiness checklist for the migration to SIMATIC PCS neo. To do this, the PCS 7 project is read in and analyzed using the DAS toolset. The results of the analysis are handed over in the form of an Excel spreadsheet and are then discussed with the client.

NOTE

The content of the analysis is a recommendation. Non-compliance with the listed suggestions for standardizing the SIMATIC PCS 7 multi project only leads to increased effort when converting to SIMATIC PCS neo. An evolution from SIMATIC PCS 7 to SIMATIC PCS neo will be possible in all cases.

Also without a planned conversion to SIMATIC PCS neo, it makes sense to consider the analysis results in any case.

5.1.2 Implementation

Implementation takes place in the following order:

1. Providing the required project data (customer)
2. Analysis
3. Delivering the data as Excel-file
4. Presenting and discussing the results (MS Teams meeting if required: ~1h)

5.1.3 Required data

Required data from the customer at project start:

- Latest PCS 7 project backup
- List of installed SIMATIC software of the PCS 7 ES incl. version numbers
- Additional software packages
- List of PCS 7 automation systems to be analyzed
- Passwords
- Designation of a technical contact person with system and project knowledge

5.1.4 Boundary conditions

- Results, documents, or conversations are in German or English
- Editing of PCS 7 projects only containing Latin characters, other languages on request (e.g. Chinese)
- The project must be opened and read using standard PCS 7 resources. If an opening is only possible by additional installation, this may result in an additional charge.
- If the project cannot be read for technical reasons or the configuration deviates too much from the PCS 7 compendia, we reserve the right to cancel the work. In this case, an explanation will be provided and only the costs incurred will be charged.
- Before the analysis begins, the project in its entire structure is archived by the customer. Afterwards, the AS projects are read out by the contractor with a designated DAS Toolset. If errors occur in the data structures of the PCS 7 projects, the correction of these errors is not included in the quotation and is billed based on time and effort.
- An analysis is available from PCS 7 Version 6 and above.

5.1.5 Results

Summary

The Summary provides an initial overview of the quantity structure of the analyzed project, e.g. total number of controllers, count of chart in chart elements, count of used non cyclic OBs etc.

Name	Count
Controller	5
BlockTypes-NotAPL	24
ChartInChart	40
SFC-Types	1
NotAllowedSymbols	0
DuplicateCFCNames	31
DuplicateGlobalVars	28
NonCyclicOBs	4
SymbolTableS7DB	2
RuntimeGroupReduction	1
CFCSubChart6	2
TextLen	2
NoRuntimeGroups	2
MoreRTGCFC	158
CFCDriverOnly	2
CFCMoreDriver	56
CFCWithoutTH	9
MoreCPUsInProject	2
RTGNameNotLikeCFCName	100
MoreTechnBlocksCFC	36
CustomDBs	7

Controller

List of all automation systems contained in the PCS 7 project including resource names, station names, CPU names.

BlockTypes-NotAPL

List of all blocks which may cause problems during an evolution to SIMATIC PCS neo.

ChartInChart

List of all Chart-In-Chart elements. The in PCS 7 used Chart-In-Chart concept is not longer supported in SIMATIC PCS neo.

SFC-Types

> List of all SFC types. In SIMATIC PCS neo, EM types should be used instead of SFC types outside of Batch or Route Control.

DuplicateCFCNames

> In SIMATIC PCS 7 it is possible to assign CFC names twice within a multiproject. Since the name of the CFCs / CMs is included in the project-wide tag, it must be unique for the migration to SIMATIC PCS neo within the PCS 7 multi project in the future. The duplicate chart names are included in this list with the corresponding AS names.

Not Allowed Symbols

> List of all symbols not allowed in the PCS 7 project.

DuplicateGlobalVars

> Duplicate names in symbol table with AS name. In SIMATIC PCS 7, the names in the symbol table only have to be unique within an AS.
> In the future (SIMATIC PCS neo) the names within a multiproject must be unique.

NonCyclicOBs

> List of runtime groups used in non-cyclic OBs. According to the PCS 7 compendium, the use of non-cyclic OBs is not permitted and is not supported in SIMATIC PCS neo.

SymbolTableS7DB

> List of DB or marker entries from the symbol tables.

> The use of CPU resources such as S7 memory and the use of user-defined data blocks is not supported in SIMATIC PCS neo.

RuntimeGroupReduction

> List of all connections to runtime groups. The activation or deactivation of runtime groups with a binary signal is not allowed in SIMATIC PCS neo.

CFCSubChart6

> List of all CFCs with more than 6 sub charts. For a migration to SIMATIC PCS neo are only allowed 6 sub charts.

TextLen

> Text lengths greater than 1000 characters are no longer permitted in the future. The text boxes containing more than 500 characters are displayed here.

NoRuntimeGroups

> List of all blocks in CFCs that are not included in a runtime group o rare directly included in an OB. These blocks prevent the switch to chart oriented structure of runtime groups, which is a prerequisite for migrating to SIMATIC PCS neo.

MoreRTGCFC

> List of all CFCs which are assigned to multiple runtime groups. These blocks prevent the switch to chart oriented structure of runtime groups, which is a prerequisite for migrating to SIMATIC PCS neo.

CFCDriverOnly

> List of all CFCs which are only drivers. Such CFCs are a hint that the drivers are not next to the technological blocks of the tags which would be beneficial for a transition to CMTs. Drivers are not visible in the CFCs in SIMATIC PCS neo.

CFCMoreDriver

> List of all CFCs which are only drivers. Such CFCs are a hint that the drivers are not next to the technological blocks of the tags which would be beneficial for a transition to CMTs. Drivers are not visible in the CFCs in SIMATIC PCS neo.

CFCWithoutTH

> List of all CFCs which are not assigned to a plant hierarchy folder. For a later migration to SIMATIC PCS neo the CFCs must be assigned to the plant hierarchy.

MoreCPUsInProject

> Table with projects of the multi project which contain more than one CPU.

RTGNameNotLikeCFCName

> List of runtime groups which are not named like the affiliated CFC. For a migration to chart oriented runtime groups the name of the runtime group has to be like the CFC.

MoreTechnBlocksCFC

> List of all CFCs which contain multiple technological blocks (e.g. MotL and VlvL). For a migration to CMs a distribution of one CM per tag is beneficial.

CustomDBS

> Table with user defined data blocks. These are not supported in SIMATIC PCS neo.

6 Appendix

6.1 Block List Block Exchange AS Basic Package

Conversion rules for the following blocks are included in the Library Exchange (Block Exchange AS Basic Package) and will be used if instances of these block types exist within the PCS 7 project.

Type	Comment	Library
ABS_R	Absolute value of REAL values	BOP
ADD4_P	Adder with 4 inputs	PCS7LIB71
ADD_R	REAL-Addition	PCS7LIB71
ADD8_P	Adder with 8 inputs	PCS7LIB71
AND	AND logic operation	BOP
AVER_P	Time average value	PCS7LIB71
CH_AI	Analog Input	PCS7LIB71
CH_AO*	Analog Output	PCS7LIB71
CH_DI	Digital Input	PCS7LIB71
CH_DO	Digital Output	PCS7LIB71
CH_U_AI*	Analog Input (universal)	PCS7LIB71
CH_U_AO**	Analog Output (universal)	PCS7LIB71
CH_U_DI**	Digital Input (universal)	PCS7LIB71
CH_U_DO**	Digital Output (universal	PCS7LIB71
CMP_R	REAL Comparator	PCS7LIB71
COUNT_P*	Counter	PCS7LIB71
CTU	Upwards counter	CFC_ELEMENT_400
CTD	Downwards counter	CFC_ELEMENT_400
CTRL_PID*	PID Control	PCS7LIB71
CTRL_S*	S-Control	PCS7LIB71
DIG_MON	Monitor a binary measuring point	PCS7LIB71
DIV_R*	REAL-Divider	PCS7LIB71
ELAP_CNT	Measuring the period of aggregates	PCS7LIB71
F_TRIG	Recognition of falling edge	PCS7LIB71
GAIN_SHD	Source Chart for FB Gain Scheduling	PCS7LIB71
INT_P	Integrator extended	PCS7LIB71
INTERLOK*	INTERLOK-Block	PCS7LIB71
LIM_R	REAL-LIMITER	CFC_ELEMENTA
LIMITS_P	Limiter	PCS7LIB71
MAX2_R	Maximum of 2 REAL	PCS7LIB71
MAX4_R	Maximum of 2 REAL	CFC_ELEMENTA
MAX8_R	Maximum of 8 REAL	CFC_ELEMENTA
MEANTM_P	Sliding average forming	PCS7LIB71
MEAS_MON	Meas.value monitoring block	PCS7LIB71
MESSAGE	Producing of S7- ALARM_8P	PCS7LIB71
MIN2_R	Minimum of 2 REAL	CFC_ELEMENTA
MOT_REV	Control reversable motors	PCS7LIB71
MOT_SPED	Motor with 2 speeds	PCS7LIB71
MOTOR	Motor	PCS7LIB71
MUL4_P	Multiplier with 4 inputs	PCS7LIB71
MUL_R	REAL-Multiplier	PCS7LIB71
MUX2_R*	Multiplexer of 2 REAL	CFC_ELEMENTA

Type	Comment	Library
MUX4_R*	Multiplexer of 4 REAL	CFC_ELEMENTA
MUX8_R*	Multiplexer of 8 REAL	CFC_ELEMENTA
NAND	NAND logic operation	BOP
NOR	NOR logic operation	BOP
NOT	NOT logic operation	BOP
OP_A	Analog value operating	PCS7LIB71
OP_A_LIM	Analog value operating (limited)	PCS7LIB71
OP_A_RJC	Analog value operating (rejected)	PCS7LIB71
OP_D*	Binary operating	PCS7LIB71
OP_D3*	Switch 1 of 3	PCS7LIB71
OP_TRIG	Trigger	PCS7LIB71
OR	OR logic operation	BOP
POLYG_P	Polygon char. (non lin. char)	PCS7LIB71
PT1_P	Lag circuit	PCS7LIB71
R_TRIG	Recognition of positive edge	PCS7LIB71
RAMP_P	Ramp forming	PCS7LIB71
RS_FF	RS FlipFlop, resetting dominant	BOP
SAMP_AVE	Sliding average	CFC_ELEMENT_400
SEL_BO	Multiplexer 1-out-of-2 for BOOL values	BOP
SEL_R	Multiplexer 1-out-of-2 for REAL values	BOP
SPLITR_P	Split range	PCS7LIB71
SR_FF	SR FlipFlop, setting dominant	BOP
SUB_R	REAL-Subtraction	PCS7LIB71
TIMER_P	Impulse function and delayed on/off	CFC_ELEMENTA
TOF	Generate an Off Delay	StandardLibrary_SFB
TON	Generate an On Delay	StandardLibrary_SFB
TP	Generate a Pulse	StandardLibrary_SFB
VALVE	Single-Drive/Dual-Feedback Valve	PCS7LIB71
XOR	Anticoincidence logic operation	BOP

* Depending on the application, an 1:1 exchange of the blocks to APL may result in functional deviations. Depending on the use of these blocks, a separate clarification is required. This clarification is not included in the "AS Block Exchange Basic Package".

** Functionally identical mapping of the CH_U_*blocks is only possible in the current version if PA_ON = False

6.2 Modernization Consulting

Description	Article number
DCS Modernization Flexible Use Usage and quantity according to agreement, e.g. individual consulting or additional project services	Service Provider Karlsruhe 9LA1110-8DA00-0CA0 Service Provider Cologne 9LA1276-8DA00-0CA0
DCS Modernization Flexible Use S Usage and quantity according to agreement, e.g. individual consulting or additional project services	Service Provider Karlsruhe 9LA1110-8DA00-0CC0 Service Provider Cologne 9LA1276-8DA00-0CC0
DCS Modernization Travel Costs Travel expenses for services onsite. (Charging according to effort) **Note** Can only be ordered in combination with DCS Modernization Flexible Use	Service Provider Karlsruhe 9LA1110-8DAXX-0CB0 Service Provider Cologne 9LA1276-8DAXX-0CB0

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6.3 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:
https://support.industry.siemens.com

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

6.4 Links and literature

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	DCS Application Service https://support.industry.siemens.com/cs/ww/en/view/109759453
\3\	DCS Modernization and Application Services https://www.siemens.com/global/en/products/services/digital-enterprise-services/retrofit-modernization-services/dcs-application-and-modernization-services.html

6.5 Change log

Version	Date	Modifications
V1.1	09/2019	First version
V2.0	07/2022	Merging DCS Library and Standardization Services into Application Services Introduction of new DCS Standardization Services modules • CM/CMT conversion • Structure analysis • SFC-Docu Adaptation to OS Analysis V4.2.6.5 General adjustments to the overall document (wording, etc.)
V3.0	06/2023	New chapter: SIMATIC PCS neo Modernization