

SIMATIC

Process control system PCS 7 Licenses and configuration limits (V9.1)

Installation Manual

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Valid for PCS 7 as of V9.1

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Warning notice system

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

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

WARNING

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

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines, and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions form one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. These systems, machines and components should only be connected to the enterprise network or the Internet if and only to the extent necessary and with appropriate security measures (firewalls and/or network segmentation) in place.

You can find more information on protective measures in the area of industrial security by visiting:

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

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

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

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

Preface

Purpose of this documentation

This documentation describes the licensing for the process control system PCS 7.

The following topics are described:

- Selecting the correct licenses, referred to as license keys, for different PCS 7 software products.
- PCS 7 software packages and the required license keys.

Options for accessing PCS 7 documentation

The documentation required for PCS 7 includes the following types:

- **PCS 7 Readme**

The readme file is available in two versions:

- **PCS 7 Readme (offline)**

This version is installed by PCS 7 Setup. The file only contains general information and links to documents on the Internet.

- **PCS 7 Readme (online)**

This version contains all information on the installation and use of PCS 7 in the format which is already familiar to you. The file is only available on the Internet to keep it always up-to-date.

Note

The information provided in the *PCS 7 Readme* (online) on the Internet takes precedence over **all** other *PCS 7* documentation. Refer PCS 7 Online Readme (<https://support.industry.siemens.com/cs/cn/en/view/109780270>)

Read this *PCS 7 Readme* carefully, because it contains important information and amendments on *PCS 7*.

- **PUD Manager**

The "PUD Manager" an innovative tool to access documentation, comes with PCS 7 USB flash drive. Some of the highlights:

- Create your own Manual Collection.
- Customize the documentation set according to your needs.
- Efficient search engine to access your information.

For more information on PUD Manager, refer *Process Control System PCS 7; PUD Manager V2.1 Online Help*.

- **PCS 7 System Documentation**

System documentation contains information about several products such as configuration manuals and Getting Started manuals. This documentation serves as a guideline for the overall system and explains the interaction between the individual hardware and software components.

- **PCS 7 Product Documentation**

Product documentation contains information about special hardware and software components. The individual documents provide detailed information on the specific component.

Full versions of the documentation are available from the "Technical Documentation SIMATIC PCS 7" website: PCS 7 Technical documentation (<http://www.siemens.com/pcs7-documentation>)

You can find additional information in the product overview *Process Control System PCS 7; PCS 7 - Documentation*; Section "Options for accessing the documentation".

Required basic knowledge

General knowledge in the area of automation engineering and basic knowledge of PCS 7 is required to understand this documentation. It is also assumed that the reader knows how to use computers or other equipment similar to PCs (such as programming devices) with the Windows operating system.

See also

Siemens Industry support (<https://support.industry.siemens.com/cs/de/en/view/109748882>)

SIMATIC PCS 7 Overview (<https://support.industry.siemens.com/cs/ww/en/view/63481413>)

www.siemens.com/pcs7-documentation (www.siemens.com/pcs7-documentation)

PCS 7 licenses and quantity structures

Important terms

The following table lists terminology that is important for licensing:

Term	Description
License	A license provides the right to use products. This right is in the form of: <ul style="list-style-type: none"> • CoL (Certificate of License) • License key
CoL (Certificate of License)	The CoL certifies the license. The product may only be used by the license owner or authorized persons.
License key	The license key is the "technical representative" of the license (also called an "electronic license stamp").

License properties

Each license consists of a standard license type and a license type.

The standard license type defines how many PC stations the associated software may be installed and used on. The license type defines any applicable restrictions on how the associated software may be used.

- The following standard license types are available to you:

Standard license type	Description
Single license	With this license, the software may be used on any single computer. The type of permissible usage is defined in the Certificate of License.
Floating license	With this license, the software may be used on any computer within a network. The software may be installed on several computers for this purpose.

- The following license types are available to you:

License types	Description
Unlimited license	With this license, the software may be used without restriction.
Count relevant license	With this license, software usage is restricted to: <ul style="list-style-type: none"> • The number of process objects, archive tags, process tags ("tags") defined in the contract, depending on the licensed software. Display: The licensed number is displayed in the Automation License Manager under "Validity."

License types	Description
Countable Objects License	<p>With this license, software usage is restricted to:</p> <ul style="list-style-type: none"> The number of process objects defined in the contract. <p>Display: The values are displayed in the Automation License Manager under "Validity" in the format: "X(Y)" Value "X" = number of licenses still available for process objects. Value "Y" = maximum licensed number of process objects.</p> <p>Calculation: The number of process objects loaded into the AS is calculated by the executing application and is subtracted from the available process objects in the value "X". The value "X" is always updated by the executing application. The value for reducing configured process objects can therefore increase again. The value "Y" always indicates the maximum licensed number of process objects and is therefore not changed.</p>
Upgrade license	<p>Specific system status requirements may have to be met for an upgrade to be performed:</p> <ul style="list-style-type: none"> With an upgrade license, a license of an "old" version x can be converted to a version >x+.... An upgrade may become necessary due to an increased configuration limits.
Rental license	<p>With this license, software usage is restricted to:</p> <ul style="list-style-type: none"> The number of operating hours defined in the contract The number of days after first use defined in the contract <p>Note: The information area of the task bar will display tooltips telling you how long the rental license has left to run.</p>
Pay per use license	With this license, software usage is restricted by the terms of use defined in the contract.
Contract license	With this license, the software may be used without restriction.
Trial license	<p>With this license, software usage is restricted to:</p> <ul style="list-style-type: none"> A maximum of 14 days, for example A certain number of days after first use Test and validation purposes (disclaimer of liability)
Rental and Demo license	<p>With this license, software usage is restricted to:</p> <ul style="list-style-type: none"> The number of operating hours defined in the contract The number of days after first use defined in the contract <p>Note: The information area of the task bar will display tooltips telling you how long the demo license has left to run.</p>

Note

Not all products support all license types. In the *Automation License Manager* you can see which license form is valid for a specific product.

PCS 7 without a license key

You can use the *SIMATIC PCS 7* software package for up to 14 days as a trial version.

Note

You can activate the trial (demo) mode the first time the software is used

Process Historian support max 30 days trail License.

Missing license key

When a software program requests a license key, but it cannot be located on the network in a "valid" format, it is described as a "missing license key".

Automation License Manager

You can manage license keys centrally with the software *Automation License Manager*. When you use the package installation for PCS 7, the *Automation License Manager* is automatically included in the installation.

Virus-free

Note

Check that your PC is virus-free prior to each installation/uninstallation of a license key.

Viruses may pass between the hard disk and storage medium (license key USB stick, license key diskette) when using this method.

Write protection must not be activated when transferring license keys.

Additional information

- Documentation *SIMATIC; Automation License Manager*
- Installation manual *Process Control System PCS 7; Licenses and Configuration Limits*

Selecting the correct license keys

4.1 Selecting the correct license keys

Introduction

The **configurable** size of a PCS 7 plant is scalable. The software products for engineering station, operator station, SIMATIC BATCH station, Route Control station and SIMATIC PDM are licensed as follows:

- Version-dependent license
This license enables the associated functionality, e.g. OS server redundancy.
- License type "Count Relevant License" (licenses with scalable size)
These licenses determine the configuration limits of this functionality, for example, OS Runtime 1,000 PO. With licenses of the type "Count Relevant License", you can install several license keys whose licensed values are then added up.

Process object

The following applies to licensing of the "PO" process objects in SIMATIC PCS 7:

The following are counted as PCS 7 process object:

- All SFC
- All block instances that meet the following criteria:
 - Instance can be controlled and monitored.
 - Instance generates alarms.
 - Instance is not part of the driver library.

These objects are transferred to the OS and must be licensed.

A block with operator control and monitoring has the attribute `"S7_m_c = true"` in the CFC block properties.

A process object can include the following blocks and objects:

- Blocks for operating and monitoring a system
- Objects for automation
- Objects for signal recording and signal processing

You can find additional information on process objects in the manual *Process Control System PCS 7; Engineering System*, for example in the section "Counting and booking of process object licenses".

Licenses with scalable size (levels per component of the process control system)

The following table shows the levels in which the system size can be changed.

Component of process control system	Levels of licenses		Comment
Engineering system (ES)	Loading of SIMATIC stations	PO: <ul style="list-style-type: none"> • 100 • 1,000 • 10,000 	"AS RT PO" license key <ul style="list-style-type: none"> • Required for download to the AS, but not for test or S7 PLC Simulation. • Only required once in the case of redundant systems.
Engineering system (ES)	Loading of SIMATIC stations	PO: <ul style="list-style-type: none"> • 100 • 500 	"CPU 410 Expansion Pack" <ul style="list-style-type: none"> • Upgrade only possible for SE card. • SMART SE Card PO 800: Upgrade not possible.
Operator station (OS)	PO: <ul style="list-style-type: none"> • 100 • 1,000 • 5,000 		"OS RT PO" license key
Archiving with operator station	Archive values: <ul style="list-style-type: none"> • 1,500 • 5,000 • 10,000 • 30,000 		The archive values are system dependent and varies with the system selected.
Process Historian	Note for use of the Process Historian: Only operator stations license keys for archive values.		Archive values from redundant data sources are counted as only one tag each.
Information Server	Clients: <ul style="list-style-type: none"> • 1 • 3 • 5 • 10 		A license is required for each active client connection. A client is any installed plug-in for Microsoft Excel or Word as well as the client of the web application. Client licenses are counted per PC, not per client application. This means only one license is required even if more than one report client of a PC is connected with the information server.
Information Server	Data source access: <ul style="list-style-type: none"> • 1 • 3 		<ul style="list-style-type: none"> • Number of OS servers per Information Server. A redundant OS server is counted as one OS server. • The licenses are required if the Information Server directly accesses the OS server (without Process Historian).
Maintenance Station (MS)	Asset tags (hardware components): <ul style="list-style-type: none"> • 100 • 1,000 		Number of monitored hardware components within a PCS 7 project.

Component of process control system	Levels of licenses	Comment
PCS 7 OS Web Option	Web clients: <ul style="list-style-type: none"> • 1 • 5 • 10 	Number of Web clients per Web server.
BATCH stations (batch processes)	Units: <ul style="list-style-type: none"> • 1 • 10 • 50 	Number of units within a PCS 7 project.
BATCH server (Web clients)	Web clients: <ul style="list-style-type: none"> • 1 • 5 	<ul style="list-style-type: none"> • Number of Web clients per BATCH server. • One license key per server computer for redundant servers.
BATCH server (Work memory)	Loading of work memory is needed for batch processing: <ul style="list-style-type: none"> • 500 MB 	<p>"BATCH Expansion (500 MB)" license key</p> <ul style="list-style-type: none"> • If more than 1,500 MB of work memory is needed for batch processing, this license key is necessary on a BATCH server PC. • Each license key expands the work memory by 500 MB. When batch processing, this enables the available SIMATIC BATCH Server's work memory to be used almost to its complete capacity. • One license key per server computer for redundant servers • Necessary for the expansion of the usable working memory for batch processing. <p>Information on the required working memory can be found in the manual <i>Process Control System PCS 7; SIMATIC BATCH</i>.</p>
Route Control Station (SIMATIC Route Control)	Routes: <ul style="list-style-type: none"> • 10 • 50 	Number of activated routes in process mode (material transports).
PDM	Number of devices: <ul style="list-style-type: none"> • 10 • 100 • 1,000 	Number of configurable devices.
SIMATIC Management Console	Assigned PC stations <ul style="list-style-type: none"> • 10 • 50 • 100 	Number of managed computers.

See also

Software and license keys for configuration with PCS 7 (Page 35)

Software and license keys for a single-station system with configuration (Page 37)

4.1 Selecting the correct license keys

Software and license keys for Operator Stations (Page 39)

Software and license keys for BATCH Stations (Page 42)

Software and license keys for Route Control Stations (Page 44)

Software and license keys for the SIMATIC Management Console (Page 45)

4.2 Determining the process objects for the SIMATIC station

Information on license key levels is available in the catalog ST PCS 7.

License key for the AS

The required license key for all SIMATIC stations depends on the total number of process objects loaded and configured in a project (Multiproject).

When an AS is loaded, the loaded process objects are evaluated. The following procedure shows you how to calculate the number of process objects configured in a Project or Multiproject.

PCS 7 V7.0 or higher:

The number of process objects loaded into the AS is calculated by the executing application and is subtracted from the available process objects of the license. The value for the number of available process objects is always updated by the executing application. The license key "AS RT PO" of the type "Countable Objects" is used.

For further information, refer to the section titled "Determining the process objects for the automation systems (Page 18)".

Requirement

SIMATIC Manager is open.

Procedure

1. Select the multiproject or project in the component view.
2. Select the **Options > PCS 7 license information** menu command.
The "PCS 7 license information" dialog box opens.
3. Select the entry "Process objects (AS RT PO)" and then select the desired license

Result

The corresponding number of process objects is displayed in the right-hand window "Configured license objects."

Note

The display of the license objects is based on the multiproject or project selected in the SIMATIC Manager.

The following information is also displayed below the window:

- The existing license.
- The number of licenses currently still available and of process objects that can still be configured with them.

4.3 Determining the process objects for the automation systems

Overview

The following applies to licensing of process objects for the automation system:

Licensing of process objects as of V7.0:

Process objects (PO) requiring licenses include objects that are subject to operator control and monitoring **and** can generate messages. These objects have the block attribute "S7_m_c" and require the "PCS 7 - Runtime License AS" license with the "AS RT PO" license key.

The display in the "PCS 7 license information" dialog window can be used to determine the objects subject to licensing. For a description of the procedure see the section "Determining the process objects for the SIMATIC station (Page 17)".

Additional information

You can find additional information on process objects:

- In the section "Insufficient license key – license key is not installed (Page 31) ".
- In the manual *Process Control System PCS 7; Engineering System* for example, in the section "Counting and booking process object licenses".

Installation of the AS RT PO licenses

Select the appropriate AS RT PO license installation for your engineering environment:

1. AS RT PO license installed on the local engineering PC

Install the AS RT PO license(s) in sufficient numbers on the engineering PC. The favorites list in the Automation License Manager (see menu "File > Settings") must not contain entries or the PCs listed do not have AS RT PO licenses.

2. AS RT PO license installed on a license server

Install the AS RT PO license(s) in sufficient number on the license server PC. The favorites list in the Automation License Manager (see menu "File > Settings") must contain the name of the license server PC. The local engineering PC must not have an AS RT PO license.

Display of objects in the "PCS 7 license information" dialog windows and the statistics function

The displays in the two dialog boxes differ as follows:

- "PCS 7 license information" dialog box
When the "Process objects (AS RT PO)" option is selected, the objects that can be operated and monitored **and** generate messages are displayed in this dialog box. Only these require a license for process operation and the license key "AS RT PO".
- Statistic function in the "Chart Reference Data" dialog box
Statistical values are displayed with the menu command **View > Statistics**. The "Block instances" folder displays all the objects that can be operated and monitored under the entry "of which are OCM capable", **regardless** of whether or not they can generate messages. You have the following options for opening the "Chart Reference Data" dialog box:
 - In the CFC Editor or SFC Editor with the menu command **Options > Chart Reference Data**.
 - When the chart folder of an AS is selected in the component view of the chart folder in SIMATIC Manager, with the menu command **Options > Charts > Chart Reference Data**.

PO volume of the CPU 410-5H

In PCS 7 V8.1 or later and CPU 410-5H with firmware version $\geq$ V8.1, you can use the Automation License Manager to increase the PO volume of a CPU 410-5H via an online upgrade of the System Expansion Card.

You can find information about this in the documentation *Process Control System PCS 7; Service Support and Diagnostics* and in the *Automation License Manager*.

4.4 Calculating the process objects for the operator station

Information on license key levels is available in the catalog ST PCS 7.

License keys authorize users to use a specified number of process objects (PO) or archive values on the operator station. This number is listed in the "Validity" column in Automation License Manager.

License key for OS process objects (OS RT PO)

A defined number of process objects can be operated and monitored with this license key. The number of process objects that can be processed depends on the load on the operator station.

Visualization is possible for up to 2 hours on an engineering station without these license keys.

You must transfer the license keys to the OS servers or OS single station systems (also engineering station).

An OS RT PO license key is not required for an OS client.

You can only use the editors for a limited period of time in demo mode.

Example: OS RT PO (Validity: 2,000)

Use this license key to increase the number of process objects permitted in process mode by 2,000.

Requirements

- SIMATIC Manager is open.
- The "Compile OS" function is executed in the SIMATIC Manager. The number of configured process objects can then be determined.

Procedure

Proceed as follows to determine the configured and licensed process objects and archive tags of the OS:

1. Select the multiproject or project in the component view.
2. Select the **Tools > PCS 7 License Information** menu command.
The "PCS 7 license information" dialog box opens.
3. Depending on the required information, select the entry in the table on the left:
 - **"OS process objects"** entry
The corresponding number of OS process objects is displayed in the right-hand window "Configured license objects".
 - **"Archive tags"** entry
The corresponding number of OS archive tags is displayed in the right-hand window "Configured archive tags".

Result

Note

The display of the license objects is based on the multiproject or project selected in the SIMATIC Manager.

Insufficient license key

see section "Insufficient license key – license key is not installed (Page 31)"

Extending the number of licensed process objects and archive tags

- You extend the number of licensed processed objects by installing additional OS RT PO license keys on the operator station (OS server or OS single station system).
- The number of licensed archive tags can be increased by installing more "WinCC Archive" license keys on the PC.
- The number of licensed archive tags for each license key is added up. "WinCC Archive" license keys can be combined as required.
- "WinCC Archive" license keys to expand the number of licensed archive tags are available starting with 1,500 tags.
- With redundant systems, two archives with the corresponding number of archive tags must be configured.

Note

"WinCC Archive" license keys

Product name for separate order: **"SIMATIC PCS 7, SOFTWARE OS ARCHIVE"**

Example

If you need to archive approximately 11,000 archive tags, install the following license keys:

- "WinCC Archive" license key for up to 1,500 archive tags
(Basic license type; Single; License type: Count relevant; Validity: 1,500)
- "WinCC Archive" license key for up to 10,000 archive tags
(Basic license type; Single; License type: Count relevant; Validity: 10,000)

This licenses 11,500 archive tags.

Additional information

- *WinCC Information System*
- Section "Selecting the correct license keys (Page 13)"
- Section "Determining the archive values for the operator station (Page 22)"

4.5 Determining the archive values for the operator station

Introduction

Note the following conventions:

- The values of process tags of operator stations are referred to as archive tags below.
- The archive values of a process tag are assigned to archive tags.

The total number of archive tags in a project, multiproject, or on an operator station can be determined. You can find information on how to expand the number of licensed archive values in the section "Calculating the process objects for the operator station (Page 20)".

License key for archive tags (WinCC Archive)

The values for a specific number of archive tags can be archived with operator stations using this license key.

- **Example 2: WinCC Archive (Validity: 1,500)**
This license key enables you to increase the number of archive tags which can be configured for the archive server by **1,500**.
- Archive tags require licensing if any of the following properties is set with respect to the archiving:

Setting related to archiving	Archive tag available in the following archive
Archiving	<ul style="list-style-type: none">• Circular archive
Long-term archiving	<ul style="list-style-type: none">• Circular archive• Long-term archive

- You can configure a maximum of 80,000 archive tags for each operator station.
- You must transfer the license keys to the OS servers or OS single station systems.
- Product name for separate order: "SIMATIC PCS 7, SOFTWARE OS ARCHIVE"

Note

"WinCC Archive" license keys

Product name for separate order: "SIMATIC PCS 7, SOFTWARE OS ARCHIVE"

Using the Process Historian in the PCS 7 plant

The operator stations in a PCS 7 plant can send the archive values to a Process Historian.

The Process Historian can archive the archive tags of all OS servers of a PCS 7 plant.

Note

The Process Historian does not need separate license keys for archive tags of operator stations.

The number of licensed archive tags is derived from the total number of archive tags of all OS servers.

The following license keys are required in the plant to use the Process Historian:

- On operator stations: **WinCC Archive**
- On the Process Historian: **Process Historian**

Additional information

- *WinCC Information System*
- You can find information on how to expand the number of licensed archive values in the section "Calculating the process objects for the operator station (Page 20)".

4.6 Calculating the asset tags (hardware components) for the Maintenance Station

License key for Maintenance Station

The license type of these license keys is "Count relevant license". The licensed scope is added together when several license keys are installed.

This license key allows you to monitor a defined number of diagnostics objects (asset tags).

Example: Existing "Maintenance RT (100)" license key

This license key is sufficient for diagnosing up to 100 hardware components with a Maintenance Station. If you have three Maintenance RT (100) license keys on a Maintenance Station, you will be able to diagnose up to 300 hardware components.

Diagnostics objects

The following diagnostics objects are classed as an asset tag within a PCS 7 project:

- PC station
- Network component with diagnostics capability (for example, switch)
- Automation system (CPU)
- Distributed I/O (ET 200 station)
- Field device with diagnostics capability
- Object in the user diagnostics area (ASSETMON, AssetM)

Note

Diagnostics objects are counted as asset tags.

Diagnostics objects are not counted as process objects (PO) of the operator station. The diagnostics object ASSETMON is an exception.

Requirement

SIMATIC Manager is open.

Procedure

1. Select the multiproject or project in the component view.
2. Select the **Options > PCS 7 license information** menu command.
The "PCS 7 license information" dialog box opens.
3. Select the entry "Diagnostic objects (Maintenance RT)" in the left-hand table.

Result

The corresponding number of diagnostics objects is displayed in the right-hand window "Configured license objects".

Note

The display of the license objects is based on the multiproject or project selected in the SIMATIC Manager.

Insufficient license key

see section "Insufficient license key – license key is not installed (Page 31)".

4.7 Determining the units for the BATCH station

License key for BATCH station

A defined number of units can be operated and monitored with this license key. The number of units that can be processed depends on the utilization of the BATCH server.

Example: BATCH UNITS (Validity: 20)

The license key for BATCH servers is sufficient to configure up to 20 units.

Requirement

SIMATIC Manager is open.

Procedure

1. Select the multiproject or project in the component view.
2. Select the **Options > PCS 7 license information** menu command.
The "PCS 7 license information" dialog box opens.
3. Select the entry "SIMATIC BATCH units" in the left-hand table.

Result

The corresponding number of SIMATIC BATCH units is displayed in the right-hand window "Configured license objects".

Note

The display of the license objects is based on the multiproject or project selected in the SIMATIC Manager.

4.8 Determining the routes for the Route Control station

License key for Route Control station

For the process mode of SIMATIC Route Control, the number of active routes (material transports) is relevant and not the number of configured routes. The number of routes active in process mode is based on the process.

Example: Route Control Routes (Validity: 50)

This license key for Route Control servers can be used to simultaneously activate up to 50 routes in process mode.

Determination of routes

The following options are available for determining the number of routes:

- The status bar in the Route Control center shows how many routes were active at the same time after restarting the Route Control server.
- The number of routes can be determined in the "PCS 7 license information" dialog box in the SIMATIC Manager. More information is available in the following text.

Determining the number of routes in the SIMATIC Manager

1. Select the multiproject or project in the component view.
2. Select the **Tools > PCS 7 License Information** menu command.
The "PCS 7 license information" dialog box opens.
3. Select the entry "Route objects (Route Control Server)" in the left-hand table.
The corresponding number of routes is displayed in the right-hand window "Configured license objects".

Note

The display of the license objects is based on the multiproject or project selected in the SIMATIC Manager.

Insufficient license key

see section "Insufficient license key – license key is not installed (Page 31)"

New license

If you have installed the license, restart the Route Control server.

4.9 Determining the PDM objects for PC stations with SIMATIC PDM

Overview

SIMATIC PDM must be installed before it can be started. The software package contains all SIMATIC PDM software. Depending on the usage scenario, you only need to install certain applications.

The license type of these license keys is "Count relevant license". The licensed scope is added together when several license keys are installed.

This license key allows you to monitor a defined number of diagnostics objects (asset tags).

Example: Existing "Maintenance RT (100)" license key

(This license key is sufficient for diagnosing up to 100 hardware components with a Maintenance Station. If you have three Maintenance RT (100) license keys on a Maintenance Station, you will be able to diagnose up to 300 hardware components (Calculating the asset tags (hardware components) for the Maintenance Station (Page 24)).

License for S7 DSGW (data record gateway)

The "SIMATIC PDM Routing" option is not included in the SIMATIC PDM standalone product package.

Licensing for use of the S7 DSGW (data record gateway) for gateways from the plant bus (Ethernet) to field buses (PROFIBUS) takes place via TAG licenses.

TAG licenses are booked depending on the quantity according to the following rules:

- 10 TAG: per S7 DSGW with a PROFIBUS subnet
- 20 TAG: per S7 DSGW with more than one PROFIBUS subnet
- 10 TAG: per IE/PB link
- 0 TAG: for Ethernet or PROFINET networks

Additional information

You can find additional information on PDM objects:

- In the section "Insufficient license key – license key is not installed (Page 31) ".
- In the manual *Process Control System PCS 7; Engineering System* for example, in the section "Counting and booking process object licenses".

Display of objects in the "PCS 7 license information" dialog windows and the statistics function

Product variants for stand-alone use

SIMATIC PDM is available as a stand-alone variant with the "Basic" and "Single Point" licenses and can thus be used independently of SIMATIC S7 or SIMATIC PCS 7.

- The "Single Point" product variant can be used for exactly one field device with a point-to-point connection. A project is permitted to contain a maximum of one object subject to licensing. This product variant cannot be extended with respect to functions or capacity using SIMATIC PDM options. No functional extensions (upgrades) are provided for this variant.
- The "Basic" product variant can be extended with respect to functions and capacity using SIMATIC PDM options. Functional extensions (upgrades) are provided for this variant.

4.10 Determining the number of computers for the SIMATIC Management Station

Information on license key levels is available in the catalog ST PCS 7.

License key for the SIMATIC Management Agent (x)

A defined number of computers can be connected with the Management Console with this license key. The connection is only possible if the SIMATIC Management Agent service is installed on the computers in the system. You can apply the functions of the Management Console to the connected computers.

You need one license key object for each managed computer in the Management Console network.

Example: SIMATIC Management Agent (50)

- You need one license key object for the Management Console computer. You can connect an additional 49 computers to the Management Console.

Requirement

The SIMATIC Management Console is open.

Procedure

Select the menu command **View > SMAgent license view**.

The dialog box displays the following information:

- Number of occupied licenses
The number of used SMA license keys shows how many computers are connected to the Management Console.
- Number of free licenses
The number of free SMA license keys shows how many additional computers can be connected to the Management Console.

4.11 Insufficient license key – license key is not installed

Reactions

Below you find the reactions of the PCS 7 components in the following situations:

- Insufficient license key
- Missing license keys
Example for missing license keys are:
 - License key is not installed
 - Access to license key is not possible, for example, license server is not available

License key for the AS

- If the current program contains fewer process objects than the previously downloaded project, the download operation automatically increases the number of available process object licenses. If enough licenses are not available, the license violation generates a corresponding message that must be confirmed. Now you may either terminate the download or continue just the same. The number of the required but unavailable licenses is recorded as a shortage. If you have purchased additional licenses, these missing licenses are included and registered in the ALM at the next download.

License key for OS process objects (OS RT PO)

- Missing license keys
The OS program automatically switches to demo mode.
- Insufficient license key
If you open a project with an insufficient number of configurable process objects, the OS program switches to demo mode automatically.

License key for Maintenance Station

Objects with diagnostic capability are

License key for PC stations with SIMATIC PDM

- Missing license keys for PDM tags
The SIMATIC PDM automatically switches to demo mode.
Without license keys, you can configure a maximum of 4 devices.
- Insufficient license keys for PDM tags
The SIMATIC PDM automatically switches to demo mode.
- Only the license key for options requiring a license (for example, SIMATIC PDM Extended) is missing.
The license-specific functions are not available (for example, routing via S7 DSGW).

Reaction

4.11 Insufficient license key – license key is not installed

If after starting SIMATIC PDM you receive a message stating that demo mode is activated, note the following:

- The SIMATIC PDM status line displays the information "Demo".
- The following function limitations are in effect:
 - The processing of the project with other editors is unrestricted.
 - Objects that are not affected by the infringement of the license conditions can be created.
 - The communication functions to PDM objects are locked.
 - Online dialog boxes of field devices can only be opened "offline".

License key for BATCH station

- Missing license keys
The OS program automatically switches to demo mode.
- Insufficient license key
If you open a project with an insufficient number of configurable process objects, the OS program switches to demo mode automatically.

License key on a BATCH Server PC

- **Behavior in the case of missing "BATCH Web Client" license keys on a BATCH Server PC**
 - If there is no "BATCH Web Client" license key for the BATCH Web Client on a BATCH Server PC, an error message is displayed on the BATCH Web Client when a connection is to be established.
A connection is not possible without a license.
 - If a server is redundant, you will require the license key on each of that server's PCs.

- **Behavior in the case of insufficient "BATCH Expansion (500 MB)" license keys on a BATCH Server PC**

BatchCC and OS Controls

From SIMATIC BATCH V9.0 onwards the performance capacity of the BATCH Server will be increased. BATCH Server can process larger quantities (depending upon the work memory and the performance capacity of the PC).

Therefore, the available working memory can be almost completely used by the SIMATIC BATCH system.

When the licensed working memory limit has been exceeded, no batch can be released, and no released batch can be started. Furthermore, chained batches, or batches that are programmed for an automatic start, are no longer able to be started.

A message in the PCS 7 OS message system will be generated. Batches that are already running will not be affected.

When enough licensed working memory is again available, you may once more start and release batches.

- As soon as more than 1,500 MB of work memory is needed for batch processing, this license key is necessary on a BATCH server PC.
- Each license key expands the work memory by 500 MB. When batch processing, this enables the available SIMATIC BATCH Server's work memory to be used almost to its complete capacity.
- If a server is redundant, you will require the license key on each of that server's PCs.

SIMATIC BATCH API

When the licensed working memory limit has been exceeded, the commands "Start" and "Release" will no longer function and will be rejected in SIMATIC BATCH API.

License key for Route Control station

- **Insufficient license key – server license key is installed**
 - If the Route Control server detects a license key for 30, 100 or 300 routes when powering up, the maximum number of material transports that can occur at any one time is limited to this value.
 - This means when the server receives its route request number 31, 101 or 301, the Route Control center shows that there is no license key or that it has been exceeded. The Route Control server runs on.
- **Insufficient license key – server license key is not installed**

If there is no license key installed on the Route Control server, the server is limited to a maximum of 300 routes (maximum limit). Since the Route Control server has no information on the actual system size, it adopts a safe stance - you can still run the system without a license. The fact that there is no license is indicated on the Route Control center.

4.11 Insufficient license key – license key is not installed

Licensing of PC stations

5.1 Software and license keys for configuration with PCS 7

Overview

The following tables show the software packages and the required license keys for the engineering station of PCS 7:

You can find information on license key levels in the section "Selecting the correct license keys (Page 13)".

Note

You can learn about the versions for the current program package on the *Process Control System SIMATIC PCS 7; PCS 7 Readme* file (see "Preface (Page 7)").

Engineering station

Designation	License key	Optional	Comment
AS/OS engineering	AS Engineering OS Engineering		
Runtime license AS	AS RT PO		Only required for download Count relevant license
BATCH Engineering	-	X	
Route Control Engineering	Route Control Engineering	X	
Maintenance Station Engineering	Maintenance ES	X	
PDM	PDM Basic PDM Integration in STEP 7 PDM Routing PDM Extended	X	
PDM Tags	PDM TAG	X	Count relevant license
S7 PLC Simulation	S7-PLCSIM	X	
Version Trail	Version Trail	X	
Version Cross Manager	Version Cross Manager	X	
Import/Export Assistant	IEA	X	

5.1 Software and license keys for configuration with PCS 7

Designation	License key	Optional	Comment
Advanced Engineering System	AdvancedES	X	
SIMATIC NET	<ol style="list-style-type: none"> 1. BCE 2. Industrial Ethernet 3. S7-REDCONNECT 	(1 st + 2 nd) alternative (3 rd) X	<ol style="list-style-type: none"> 1. Only for standard Ethernet network adapters (not required for SIMATIC NET CP). 2. When using SIMATIC NET CP, e.g. CP1623. 3. When using high availability connections.

5.2 Software and license keys for a single-station system with configuration

Overview

The following tables show the software packages and the required license keys for a single-station system in PCS 7 with configuration.

- The single-station system includes the engineering station and the operator station (single-station system) as basic functions.
- The following can be installed as optional functions, for example:
 - BATCH station (single-station system)
 - Route Control (single-station system)
 - Maintenance Station (single-station system)
 - PDM

You can find information on license key levels in the section "Selecting the correct license keys (Page 13)".

Note

You can learn about the versions for the current program package on the *Process Control System SIMATIC PCS 7; PCS 7 Readme* file (see "Preface (Page 7)").

Single-station system

Designation	License key	Optional	Comment
AS/OS engineering	AS Engineering OS Engineering		
Runtime license AS	AS RT PO		Only required for download Count relevant license
OS software single station	OS Single Station Basic		
Runtime License OS	OS RT PO		Count relevant license
OS archives ¹⁾	WinCC Archive ¹⁾	X	Count relevant license
BATCH single-station package	BATCH Single Station User BATCH Single Station System	X	
BATCH units	BATCH Units	X	Count relevant license
BATCH server (Web clients)	BATCH Web Client	X	Count relevant license
BATCH server (Work memory)	BATCH Expansion (500MB)	X	Count relevant license
Route Control Engineering	Route Control Engineering	X	
Route Control Server	Route Control Server	X	
Route Control Center	Route Control Center	X	Licensing for RC client
Route Control Routes	Route Control Routes	X	Count relevant license

5.2 Software and license keys for a single-station system with configuration

Designation	License key	Optional	Comment
Maintenance Station Engineering	Maintenance ES	X	
Maintenance Station Runtime Basic Package	Maintenance RT	X	Count relevant license
PDM	PDM Basic PDM Integration in STEP 7 PDM Routing PDM Extended	X	
PDM Tags	PDM TAG	X	Count relevant license
S7 PLC Simulation	S7-PLCSIM	X	
Version Trail	Version Trail	X	
Import/Export Assistant	IEA	X	
SIMATIC NET	1. BCE 2. Industrial Ethernet 3. S7-REDCONNECT	(1 st + 2 nd) alternative (3 rd) X	1. Only for standard Ethernet network adapters (not required for SIMATIC NET CP). 2. When using SIMATIC NET CP, e.g. CP1623. 3. When using high availability connections.

¹⁾ Product name for separate order: "SIMATIC PCS 7, SOFTWARE OS ARCHIVE"

5.3 Software and license keys for Operator Stations

Overview

The following tables show the software packages and the required license keys for the following PC stations of PCS 7:

- Operator station (single-station system / redundant single-station system)
- Operation Station server / redundant server
- Operator station client

You can find information on license key levels in the section "Selecting the correct license keys (Page 13)".

Note

You can learn about the versions for the current program package on the *Process Control System SIMATIC PCS 7; PCS 7 Readme* file (see "Preface (Page 7)").

OS single-station system / redundant single-station system

Designation	License key	Optional	Comment
OS software single station	OS Single Station Basic		Not required for non-redundant OS
OS software single station redundancy	OS Single Station Redundancy		In the case of a redundant OS: Alternative license key to "OS Single Station Basic" license key
Runtime License OS	OS RT PO		Count relevant license
OS archives ¹⁾	WinCC Archive ¹⁾	X	Count relevant license
OpenPCS 7 for connecting to the local OPC server	OpenPCS 7 Station / OS or OpenPCS 7 Station	X	License key only (without software installation) required.
Web server	1. OS Web Server Basic 2. OS Web Server	X	1. Web server and Web diagnostics server are used alternately. 2. License key for number of Web clients
Web diagnostics server Web diagnostics client	WebDiagnose Server WebDiagnose Client	X	Web server and Web diagnostics server are used alternately.
SIMATIC NET	1. BCE 2. Industrial Ethernet 3. S7-REDCONNECT	(1 st + 2 nd) alternative (3 rd) X	1. Only for standard Ethernet network adapters (not required for SIMATIC NET CP). 2. When using SIMATIC NET CP, e.g. CP1623. 3. When using high availability connections.

¹⁾ Product name for separate order: **"SIMATIC PCS 7, SOFTWARE OS ARCHIVE"**

OS server / redundant server

Designation	License key	Optional	Comment
OS software server	OS Server		Not required for non-redundant OS
OS software server redundancy	OS Server Redundancy		In the case of a redundant OS: Alternative license key to "OS Server" license key
Runtime License OS	OS RT PO		Count relevant license
OS archives ¹⁾	WinCC Archive ¹⁾	X	Count relevant license
Information Server	Information Server		Required for when using an Information Server
Information Server	Information Server - Client Access	X	Count relevant license
Information Server	Information Server - Data-source Access	X	Count relevant license
BATCH server	BATCH Server	X	
BATCH units	BATCH Units	X	Count relevant license
BATCH server (Web clients)	BATCH Web Client	X	Count relevant license
BATCH server (Work memory)	BATCH Expansion (500MB)	X	Count relevant license
Route Control Server	Route Control Server	X	
Route Control Routes	Route Control Routes	X	Count relevant license
OpenPCS 7 for connecting to the local OPC server	OpenPCS 7 Station / OS	X	License key only (without software installation) required. Software installation only necessary for connecting to all OS servers.
Maintenance Station Runtime Basic Package	Maintenance RT	X	Count relevant license
SIMATIC NET	1. BCE 2. Industrial Ethernet 3. S7-REDCONNECT	(1 st + 2 nd) alternative (3 rd) X	1. Only for standard Ethernet network adapters (not required for SIMATIC NET CP). 2. When using SIMATIC NET CP, e.g. CP1623. 3. When using high availability connections.

¹⁾ Product name for separate order: **"SIMATIC PCS 7, SOFTWARE OS ARCHIVE"**

OS client

Designation	License key	Optional	Comment
OS software client	OS Client		
Web server	1. OS Web Server Basic 2. OS Web Server	X	1. Web server and Web diagnostics server are used alternately. 2. License key for number of Web clients
Web diagnostics server Web diagnostics client	WebDiagnose Server WebDiagnose Client	X	Web server and Web diagnostics server are used alternately.
BATCH client	BATCH Client	X	
Route Control Center	Route Control Center	X	The license for RC client is either located directly on the client or, alternatively, on the ES.
SFC visualization	SFC Visualization	X	
OpenPCS 7 (OS client)	OpenPCS 7 Station / OS	X	

5.4 Software and license keys for BATCH Stations

Overview

The following tables show the software packages and the required license keys for the following PC stations of PCS 7:

- BATCH server/BATCH redundant server
- BATCH Client

Additional information on the single-station system for BATCH can be found in the section "Software and license keys for a single-station system with configuration (Page 37)".

You can find information on license key levels in the section "Selecting the correct license keys (Page 13)".

Note

You can learn about the versions for the current program package on the *Process Control System SIMATIC PCS 7; PCS 7 Readme* file (see "Preface (Page 7)").

BATCH server/BATCH redundant server

Designation	License key	Optional	Comment
BATCH server	BATCH Server		One license key per server computer for redundant servers.
BATCH Basic	BATCH Basic		<ul style="list-style-type: none"> • Alternative to "BATCH Server" license key, restricted functionality; • One license key per server computer for redundant servers
BATCH units	BATCH Units		Count relevant license
BATCH server (Web clients)	BATCH Web Client	X	Count relevant license In the case of redundant servers, the necessary licenses must be available on each server.
BATCH server (Work memory)	BATCH Expansion (500MB)	X	Count relevant license In the case of redundant servers, the necessary licenses must be available on each server.

Designation	License key	Optional	Comment
BATCH API	BATCH API	X	
SIMATIC NET	1. BCE 2. Industrial Ethernet 3. S7-REDCONNECT	(1 st + 2 nd) alternative (3 rd) X	1. Only for standard Ethernet network adapters (not required for SIMATIC NET CP). 2. When using SIMATIC NET CP, e.g. CP1623. 3. When using high availability connections.

BATCH Client

Designation	License key	Optional	Comment
BATCH client	BATCH Client		
BATCH recipe system	BATCH Recipe System	X	Only required if recipes will be created on the BATCH client.

5.5 Software and license keys for Route Control Stations

Overview

The following tables show the software packages and the required license keys for the PC stations of PCS 7 Route Control.

Additional information on the single-station system with Route Control can be found in the section "Software and license keys for a single-station system with configuration (Page 37)".

You can find information on license key levels in the section "Selecting the correct license keys (Page 13)".

Note

You can learn about the versions for the current program package on the *Process Control System SIMATIC PCS 7; PCS 7 Readme* file (see "Preface (Page 7)").

RC Server

Designation	License key	Optional	Comment
Route Control server	Route Control Server		
Route Control routes	Route Control Routes		Count relevant license
SIMATIC NET	1. BCE 2. Industrial Ethernet 3. S7-REDCONNECT	(1 st + 2 nd) alternative (3 rd) X	1. Only for standard Ethernet network adapters (not required for SIMATIC NET CP). 2. When using SIMATIC NET CP, e.g. CP1623. 3. When using high availability connections.

RC Client

Designation	License key	Optional	Comment
Route Control Center	Route Control Center		The license for RC client is either located directly on the client or, alternatively, on the ES.

5.6 Software and license keys for the SIMATIC Management Console

Overview

The following tables show the software packages and the required license keys for working with the SIMATIC Management Console.

You can find information on license key levels in the section "Selecting the correct license keys (Page 13)".

Note

You can learn about the versions for the current program package on the *Process Control System SIMATIC PCS 7; PCS 7 Readme* file (see "Preface (Page 7)").

Computers with the Management Console

Designation	License key	Optional	Comment
SIMATIC Management Console	SIMATIC Management Console		We recommend only one computer per network with a Management Console
SIMATIC Management Agent (x;x;x)	SIMATIC Management Agent (x;x;x)		Per managed computer; number of managed computers in the PCS 7 system Count relevant license

Managed computers

Note

License keys for working with the SIMATIC Management Console

You must install the license keys locally so that they are available on the computer with the SIMATIC Management Console.

5.7 Software and license keys for SIMATIC PDM

Overview

SIMATIC PDM is an optional package in SIMATIC PCS 7.

The tables below show the software packages and the required license keys for PC stations with SIMATIC PDM.

You can find information on license key levels in the section "Selecting the correct license keys (Page 13)".

Information on the software packages and license keys for the different PC stations is available in the following sections:

- For the engineering station and PDM in the section "Software and license keys for a single-station system with configuration (Page 37)".
- For a separate PC with SIMATIC PDM in the section "Determining the PDM objects for PC stations with SIMATIC PDM (Page 28)".

SIMATIC PDM

Product name	License key	SIMATIC PCS 7 (ES AS OS BATCH Route Control)	Comment
Software on the SIMATIC PCS 7 USB flash drive (SIMATIC PDM)		(Z)	
Maintenance Station	Maintenance RT (Z)	(Z)	

Here (Z) denotes **Quantity and function dependency**.

Product variants for stand-alone use

SIMATIC PDM is available as a stand-alone variant with the "Basic" and "Single Point" licenses and can thus be used independently of SIMATIC S7 or SIMATIC PCS 7.

- The "Single Point" product variant can be used for exactly one field device with a point-to-point connection. A project is permitted to contain a maximum of one object subject to licensing.
This product variant cannot be extended with respect to functions or capacity using SIMATIC PDM options. No upgrades are provided for this variant.
- The "Basic" product variant can be extended with respect to functions and capacity using SIMATIC PDM options. Upgrades are provided for this variant.

5.8 Software and license keys for Process Historian and Information server

Overview

The tables below show the software packages and the required license keys for PC stations with Process Historian and Information Server.

You can find information on license key levels in the section "Selecting the correct license keys (Page 13)".

Computers with Process Historian

You need the following licenses for operation of a Process Historian system in connection with WinCC or PCS 7:

Product	Version	License type	Validity
Process Historian Server - Basic Package	2020	Single	Unlimited
Process Historian and Information Server (Only PCS 7)	2020	Single	Unlimited
Process Historian Archive-Batch (Only PCS 7)	2020	Single	Unlimited
Process Historian API inkl. 1 X API Client	2020	Single	Unlimited
Process Historian API Client	2020	Single	Counter-relevant (1)
Process Historian API Client	2020	Single	Counter-relevant (3)
Process Historian - Archive Tags	2020	Single	Counter-relevant (1500)
Process Historian - Archive Tags	2020	Single	Counter-relevant (5000)
Process Historian - Archive Tags	2020	Single	Counter-relevant (10000)
Process Historian - Archive Tags	2020	Single	Counter-relevant (30000)
Process Historian - Messages	2020	Single	Unlimited

Connectivity licenses

Additional licenses are required for the following Connectivity functions:

Product	Version	License type	Validity
Process Historian OPC UA Server	2020	Single	Unlimited

Computers with Information Server

The SIMATIC Information Server provides the following license types:

Product	License type	Number of licenses	MLFB	WiBu product code
Information Server	Single	Without restriction	6DL8906-0AC00-0AB5	60001
Information Server Client-Access	Single	1	6DL8906-0BC00-0AB5	60002

License count for client access

Each active client connection of the Information Server requires a license. The number of clients depends on the number of PCs, not on the number of applications that are open on a PC. Even when multiple report clients are connected to the Information Server from a PC, only one license is required.

Assignment of a client license:

- Connection with the Information Server via Internet browser/Web application
- Use of various URLs which the server cannot identify as one source

Release of a client license:

- Logout from the Web application
- Inactivity after 20 minutes

Trial license

The setup of the Information Server also installs a trial license. The trial license can be selected in the license query.

- 30 days validity
- Start of the 30 days on the day of the first use

The trial version becomes a full version when you install a full license. Reinstallation is not necessary.

Data volumes

6.1 Overview of the quantity structures of PCS 7

Introduction

The section describes the following PCS 7-specific quantity structures:

- Automation systems
- Operator station

Additional information

- Information on the quantity structure of SIMATIC BATCH can be found in the manual *SIMATIC BATCH* in the chapter "Product introduction and installation > Configuration limits".
- Information on the quantity structure of SIMATIC Route Control can be found in the manual *SIMATIC Route Control* in the chapter "Appendix > Quantity framework".

6.2 Quantity structures for automation systems of PCS 7

Configuration limits of AS with standard and high availability

The values in the following tables are not AS-specific maximum values for the corresponding position, but rather represent a typical distribution of the available AS total capacity in mixed operation of all positions of a related block.

The tables below show the typical mixed configuration limits for SIMATIC PCS 7 automation systems using the Advanced Process Library (APL)

Mixed configuration limits using the Advanced Process Library (APL)

Table 6-1 Mixed configuration limits for high availability automation systems (basis: Advanced Process Library)

	AS 412H	AS 414H	AS 416H	AS 417H
	V6.0	V6.0	V6.0	V6.0
Analog value measurements	10	100	400	600
Digital value measurements	20	250	800	1,000
PID controllers	5	50	150	200
Motors	7	75	200	400
Valves	7	75	200	400
SFC	0	15	100	200
Steps	0	150	1,000	2,000
Dosing	0	3	25	50
Digital inputs (DI)	30	300	1,200	1,800
Digital outputs (DO)	10	110	400	650
Analog inputs (AI)	15	150	600	900
Analog outputs (AO)	5	50	200	350
Process objects (PO)	30	350	1,200	2,000

Table 6-2 Mixed configuration limits for automation systems (basis: Advanced Process Library)

	AS 414-3	AS 414-PN/DP	AS 416-2	AS 416-3	AS 416-PN/DP	AS 417-4	PCS 7 ... RTX ¹⁾
	V7.0	V7.0	V7.0	V7.0	V7.0	V7.0	V4.6 (2010)
Analog value measurements	100	100	200	400	400	500	400
Digital value measurements	250	250	450	800	800	1,000	800
PID controllers	50	50	75	150	150	180	150
Motors	75	75	100	200	200	350	200
Valves	75	75	100	200	200	350	200

6.2 Quantity structures for automation systems of PCS 7

	AS 414-3	AS 414-PN/DP	AS 416-2	AS 416-3	AS 416-PN/DP	AS 417-4	PCS 7 ... RTX ¹⁾
	V7.0	V7.0	V7.0	V7.0	V7.0	V7.0	V4.6 (2010)
SFC	15	15	40	100	100	200	100
Steps	150	150	400	1,000	1,000	2,000	1,000
Dosing	3	3	15	25	25	50	25
Digital inputs (DI)	350	350	600	1,200	1,200	1,700	1,200
Digital outputs (DO)	100	100	200	400	400	550	400
Analog inputs (AI)	175	175	300	600	600	800	600
Analog outputs (AO)	75	75	100	200	200	250	200
Process objects (PO)	350	350	600	1,200	1,200	1,800	1,200

¹⁾ SIMATIC PCS 7 AS RTX with WinAC RTX.

Mixed configuration limits for AS with CPU 410

The CPU 410 can be used for standard automation systems as well as high availability automation systems. The configuration limits are scalable and depend on the licensing. You define the configuration limits of the CPU 410H with a System Expansion Card.

You can find additional information on this in the system manual *Process Control System PCS 7; PCS 410-5H Process Automation*.

Table 6-3 Mixed configuration limits for automation systems

	AS 410H	
Applied library	Advanced Process Library	
Scalable by means of license	from	to
Analog value measurements	10	600
Digital value measurements	20	1,000
PID controllers	5	200
Motors	7	400
Valves	7	400
SFC	0	200
Steps	0	2,000
Dosing	0	50
Digital inputs (DI)	30	1,800
Digital outputs (DO)	10	650
Analog inputs (AI)	15	900
Analog outputs (AO)	5	350

6.2 Quantity structures for automation systems of PCS 7

	AS 410H	
Applied library	Advanced Process Library	
Scalable by means of license	from	to
Process objects (PO)	30	2,600 ¹⁾

- ¹⁾ In PCS 7 V8.1 or later, you can use the Automation License Manager to increase the PO volume of a CPU 410-5H via an online upgrade of the System Expansion Card (as of firmware version 8.1). The PO volume of the System Expansion Card is limited to 2600 process objects. Starting from this PO volume, the limitation of the PO volume is canceled.

6.3 Quantity structures for the operator station

OS configuration limits (per multiproject)

Information on licensing and process objects "PO" can be found in section "Selecting the correct license keys (Page 13)".

Parameter	Value
Max. number of servers / server pairs in the project (OS, BATCH, Route Control and archive servers)	18
Max. number of automation systems per OS server / server pairs	64
Max. number of OS clients in multi-client operation (per multi-station system)	40 Note: If each OS client has access to all OS servers/server pairs. The maximum number of monitors of these OS clients is limited to 60.
Max. number of monitors per operator station in multi-channel operation	4
Max. number of OS areas	64
Max. number of windows per monitor	1 up to 16 (adjustable)
Number of trends per trend window	10
Image selection time of OS process pictures (4 monitors) 100 process symbols of the APL	approximately 2 s ¹⁾
Max. number of process objects:	
• per OS single-station system	8,500 PO
• per OS server	12,000 PO
• per AS	2,600 PO
• per project	216,000 PO
Max. number of configurable alarms per server / single-station	200,000
Number of process tags:	
• per OS single-station system	approximately 4,500
• per OS server	approximately 7,000
• per multi-station system	approximately 128,000
Integrated high-performance archive system (cyclic buffer)	
Based on Microsoft SQL server for:	
• Process value archiving (per OS server/single-station system)	approximately 1,500/s Note: The values are system dependent and varies with the system selected.
• Message archiving (per OS server/single-station system)	Messages as continuous load: ca. 10/s Message burst ca. 3,000 with a duration of 4 s Note: If the time until the next message burst is less than five minutes, messages can be lost.

6.3 Quantity structures for the operator station

Parameter	Value
Long-term archiving	
Process value archiving with SIMATIC Process Historian	For additional information on the configuration limits, refer to the SIMATIC Process Historian documentation. The Process Historian does not need separate license keys for archive tags of operator stations.
Max. number of PCS 7 Web clients	100
Max. number of PCS 7 Web Diagnostics clients	3
Number of maintenance stations	1 maintenance station for monitoring diagnostic variables

- ¹⁾ The actual image selection time depends on the dynamics or graphic output load, which can be significantly influenced by flashing objects, trend controls, scripts and so on.
Please note that performance of the Microsoft Windows patch KB4091666 (which fix the Specter and Meltdown hardware-based vulnerabilities) may affect performance.

6.4 Quantity structures for SIMATIC Route Control

Introduction

The quantity framework is valid for the scope of **one** Route Control project, that is, an individual S7 project or an S7 multiproject, depending on the configuration.

Note

The specifications provided below are theoretical limits. Because many different program parts (in addition to Route Control) are implemented in an automation system, the elements of Route Control themselves are also distributed across multiple automation systems.

The number of message-block calls (AlarmS, SFC18) is restricted in PCS 7. This is related to the new message concept. The cause and the effects on Route Control are described in the chapter "Restriction of the quantity framework" in the *Process Control System PCS 7: Route Control* online help.

Quantity Framework Overview

Object	Min.	Max.	Note
Routes	1	N	You can insert as many instances of block type RC_IF_ROUTE as you wish in your S7 project/CFC charts. This applies equally if you are using the concept of dynamic ID assignment. Only the number of material transports that can be performed simultaneously during runtime (that is, the number of instances actively controlling a route and its elements).
Material transports	1	300	This is the number of simultaneously active (operating) routes during runtime, that is, instances of block type RC_IF_ROUTE.
Control elements (CE)	1	1,024	Per AS
Sensor elements (SE)	1	1,024	Per AS
Parameter elements (PE)	1	1,024	Per AS
Link elements (LE)	1	1,024	Per AS
Automation system	1	32	Number of automation systems that can be controlled by Route Control. An automation-system number ranges between 1 and 213.
Partial routes	1	64,000 *	Per Route Control project
Route control element (RCE)	1	64,000 *	Over all partial routes of the entire Route Control project

6.4 Quantity structures for SIMATIC Route Control

Object	Min.	Max.	Note
Interconnected elements per route per AS	0	450	One route can accommodate up to 450 interconnections per AS and control these elements. If a route runs via more than one AS, these values are added. Thus, one route can activate more than 1,000 interconnected elements via 3 automation systems. The route search can be influenced by specification of intermediate (via) locations. If one element is interconnected multiple times in different mode levels (for example, 3 times in the same partial route), this counts as three elements.
Elements per partial route	0	64,000 *	Theoretical limit, limited in practice by the number of elements per AS
Server	1	2	1 = Route Control application (server) 2 = Route Control application (server + standby)
Element subtypes	1	255	Number of permitted subtypes for the following elements: <ul style="list-style-type: none"> • Control elements (CE) • Sensor elements (SEs) • Parameter elements (PEs)
Modes/ Mode levels	1	32	Per mode table
Mode table/ Mode table	1	64,000 *	Limited by the Route Control database, even though the MODETABLE parameter in RC_IF_ROUTE is a DINT-type parameter.
Configuration chart (CFC)	1	1	Exactly one chart per AS; thus, up to 32 charts for 32 automation systems
Locations	0	64,000 *	SOURCE/DEST parameter in RC_IF_ROUTE
Plants (PCell)	0	64,000*	Limited by plant hierarchy in SIMATIC Manager
Unit (Unit)	0	64,000 *	Limited by plant hierarchy in SIMATIC Manager
Material	0	1,024	Limited by RC_IF_ROUTE
Material group	0	1,024	Limited by Route Control database
Successor Relationships	0	64,000 *	Limited by Route Control database

* These are theoretical limits, which are possibly further restricted by other system properties!

6.5 Quantity structure for SIMATIC BATCH

Definition of configuration limits

The quantity structure in SIMATIC BATCH describes the quantitative load on the process control system when executing batch processes.

Based on the quantity structure, you can calculate the number of automation systems for the planned process cell and select suitable dimensions for the SIMATIC BATCH server. This is intended to reduce the automation costs and to improve the quality, yield, safety, process cell utilization and productivity.

Quantity structure information can, however, only provide a rough guide for planning the components of a process cell. For example, batches with a short duration (minutes up to a few hours) with large numbers of setpoints can put significantly more load on a SIMATIC BATCH server or an automation system than batches with few setpoints and a duration of several days.

Basics for calculating the performance of both operating modes

The data shown provides you with guide values that indicate which load states related to typical data or basic data can be reached in your BATCH process cell both in PC-based and AS-based mode and how you can select suitable dimensions for your process cell. This allows you to estimate overload situations in advance and to include these in your planning.

The measured results are shown in the following section "Measured results for calculating the performance of both modes".

Hardware and software basics

The following hardware and software was used:

- Automation system used CPU 417-4XT05-0AB0.
- The PC used for the measurements is equipped with the hardware recommended by SIMATIC PCS 7.
- In PC-based mode, the blocks relevant to SIMATIC BATCH are installed in OB32 (1 second cycle).

Engineering data (equipment properties)

Number of units	50
Number of materials	100
Number of qualities per material	2

Recipe data

To calculate the performance data, a hierarchical recipe with the following characteristic data is used.

6.5 Quantity structure for SIMATIC BATCH

Configured recipe data in the BATCH Control Center:

Number of RUPs per RP	10
Number of ROPs per RUP	10
Number of RPHs per ROP	15
Number of RPHs in simultaneous branches	5
Number of transitions per ROP	15
Number of conditions per transition	5
Number of header parameters per recipe / formula	100 / 10
Number of parameters per RPH	15
Number of parameters per control strategy	10
Number of active RUPs per RP	3
Number of process tags per RUP	5
Number of process tags per ROP	3
Number of configured electronic signatures (ESIG) in an RP	3
Number of of active RPHs within a batch	3

Batch data

Number of planned batches	100
Number of batches per order	100
Number of batches to be created simultaneously	100
Number of released batches	100
Number of batches to be released simultaneously	100
Number of batches running simultaneously	100
Number of of active RPHs within a batch	3 PC-based 30 AS-based
Number of of active RPHs within a batch process cell	30 PC-based 350 AS-based
Number of opened batches (control recipes) on all BATCH clients	30
Number of batches to be completed simultaneously	50
Number of batches to be archived simultaneously	30
Number of batches to be deleted simultaneously	30
Number of active BATCH clients (BATCH Control Center)	5
Duration of the RPH	10 min
Duration of the transition	10 s
Acquisition cycle of the archive tags	10 s
Execution of step change	simultaneous

Measured results for calculating the performance of both operating modes

The measured values depend on the project, the equipment and load of the PC being used and can differ from the times shown here. The times were calculated with the hardware recommended by SIMATIC PCS 7.

Result, measured value (offline)

For the measured times, it is assumed that the step changes execute simultaneously and are not processed with a time offset. Simultaneous step changes mean maximum load.

Acquired data:

Action	Runtime
Creating a recipe / library	< 2 s
Deleting a recipe / library	< 4 s
Creating a formula	< 2 s
Deleting a formula	< 2 s
Creating a material	< 2 s
Deleting a material	< 2 s
Releasing for testing / production	< 90 s
Opening a recipe / library	< 4 s
Checking a recipe for validity / releasing	< 75 s
Creating an order	< 2 s
Creating a batch	< 20 s
Release batch	< 75 s

Result, measured value (online)

When processing the basic recipe described, a PC equipped with a size of the SIMATIC BATCH online database has a 30% processor load.

Definition of step change: A step change means that a recipe phase was completed, a transition run through and the following recipe phase was started. This means that at least 3 recipe objects are involved in a step change. In practice, however, there are often more than 3 recipe objects involved, for example in simultaneous branches, alternative branches or when there is synchronization. As an average value, approximately 5-7 recipe objects are assumed per step change.

Action	Runtime
Start batch	< 3 s
HOLD command	< 2 s!
RESUME after HOLD command	< 2
PAUSE command	< 2 s
RESUME after PAUSE command	< 2 s
Close batch	5 to 10 min
Archive batch	< 50 s
Change parameter	< 3 s
Step change time	4 s PC-based < 1 ms AS-based

Result of the AS runtimes for AS-based mode

The measured results shown in the following table serve as the basis for the calculations made below.

Recipe structure	AS runtime
Completing recipe phase (average measured value)	1.8 ms
Updating setpoint (average measured value)	0.07 ms
Processing a transition (average measured value)	4 ms
Starting recipe phase (average measured value)	1.9 ms
Processing a recipe phase (average measured value)	2 ms

These measured values result in a step change time of 8.4 ms ($1.8 \text{ ms} + 5 \cdot 0.07 \text{ ms} + 4 \text{ ms} + 1.9 \text{ ms} + 5 \cdot 0.07 \text{ ms}$) for a recipe phase with 5 parameters. As a result, with, for example, 100 simultaneously active recipe phases and 32 simultaneous step changes, the recipe processing time can be calculated as follows:

Recipe processing time = $32 \cdot 8.4 \text{ ms} + 100 \cdot 2 \text{ ms} = 469 \text{ ms}$.

This calculation does not, however, apply to parallel branches, alternative branches or when there is synchronization since more than three recipe objects are then involved in a step change. 32 simultaneous step changes with such constructs would lead to a loss of performance.

A reduction in the number of simultaneous step changes increases the number of simultaneously active recipe phases and vice versa.

To guarantee optimum performance in the automation systems, remember the following:

- The calculated total cycle time (times for communication, firmware, recipe processing and user program) should always be shorter than the cycle time of the OB in which the UNIT_PLC and the user blocks are installed.
- Take into account all the CPU requirements relating to the cycle time (you should also refer to the documentation for the automation system S7-400 CPU Data).

Distributed over all the automation systems connected to the BCS, the BCS can:

- Have a brief peak load (max. 1 s) of up to 200 simultaneous step changes. In this case, a maximum of 200 recipe phases that do not execute a step change can also be active. To ensure that the BCS and AS continue to operate synchronized with each other following such peak loads, you must ensure a recovery time of that least 60 s.
- Be run in continuous operation with not significantly more than 350 simultaneous, active recipe phases. In this case, an average of 2 step changes may be active per second.

Result of the determination of memory requirements (data blocks) for AS-based mode

The following table shows the minimum memory requirements (data blocks) of the CPU for AS-based mode.

Memory allocations	Description	Memory requirements in KB
Static part. Occupied by system.	Communication (Event Send)	56
	Function blocks	60
	Function calls	41

Memory allocations	Description	Memory requirements in KB
Dynamic part. Occupied by settings in the BATCH configuration dialog.	per unit	57
	per recipe unit procedure (RUP)	128

Based on the recipe data from the section "Basics for calculating the performance of both modes", the actual memory requirements can be calculated as shown below.

Note

For this performance determination, the units must be configured within one automation system and the recipe unit procedures must all be active at the same time.

Sample calculation (AS-based mode only).

Memory allocations	Description	Memory requirements in KB
Static part. Occupied by system.	Communication (Event Send)	56
	Function blocks	60
	Function calls	41
Dynamic part. Occupied by settings in the BATCH configuration dialog.	10 units	570
	10 simultaneously running recipe unit procedures (RUP)	1280
Memory requirements	Total in KB:	2007

Based on this calculation, it can be seen that the AS requires at least 2007 KB of memory for the recipe logic. You set the memory required for the recipe logic as a percentage of the entire work memory in the BATCH configuration dialog for the CPU.

To determine the amount of required memory for a CPU, you need to add the standard BATCH blocks (SFC type, SFC, IEPH etc.) and the blocks for process control (drivers, actuators, sensors etc.).

Typical performance data for the two operating modes

The following quantity structure for AS-based mode represents a complex process cell.

Requirement for the AS: A recipe of the size shown below can be downloaded to and processed for the recipe logic assuming that the AS has a work memory capacity of 30 MB, 60% of which is being utilized.

Result: The following table specifies from a SIMATIC BATCH perspective how the automation system can be configured taking into account the conditions listed above.

Automation system (AS)	Number
Setpoints/parameters per RPH	48 setpoints/parameters per recipe phase with a maximum of 5 text string setpoints/parameters and a maximum of 32 characters per text string
RPHs per ROP	96 recipe phases and transitions (total quantity) per recipe operation (ROP)
ROPs per RUP	20 recipe operations (ROPs) per recipe unit procedure (RUP)
RUPs per AS	16 units per AS with 48 setpoints/parameters per recipe phase (RPH)

6.5 Quantity structure for SIMATIC BATCH

BATCH capacity limits	Number
Number of batches that can run simultaneously in a batch process cell	64
Number of recipe phases (RPH) that can run simultaneously in a batch	150
Number of recipe phases that can run simultaneously in a batch process cell	300

Regardless of the data listed in the table above, in each AS a maximum of 100 recipe objects, for example recipe operations, recipe phases and transitions, may change their status per second. In this case, the time taken for recipe processing accounts for approximately 60 to 70% of the maximum automation system cycle load.

We recommend that you do not process more than 300 active recipe phases on a BATCH server (nor a redundant server).

Note**Number of recipe phases running simultaneously**

Depending on the frequency and how often step changes occur, the SIMATIC BATCH server can process significantly more than 300 active equipment phases/operations.

Report creation and archiving

SIMATIC BATCH can process data (XML archive file) up a maximum of 200 MB in a report. This applies only when using the XML format with SIMATIC BATCH version V7.0 or earlier. With SIMATIC BATCH V7.0 SP1 or later, this restriction no longer applies to reports due to the use of a new XML format.

This quantity of data is made up as follows:

- Size of the batch process cell (PCell)
- Number of recipe phases/recipe operations run through Also include multiple processing in loops.
- Number of recipe parameters
- Number of trends and the number of measured values per trend. Also take into account the duration of the recording and cycle time.

The following average data quantities can be used for an estimate:

- approx. 1.1 MB for 100 recipe phases
- approx. 0.5 MB for 100 recipe parameters
- approx. 0.05 MB for 1 trend with 300 measured values
- approx. 0.1 MB for 1 trend with 600 measured values

The situation could be critical with the following recipe constellations:

- Recipe phases run through large numbers of loops.
- Incorrect cycle times are configured for trend archives in WinCC.

The number of measured values is calculated from the duration of the trend divided by the acquisition cycle time (for example 6000 s runtime for the trend / 10 sec. cycle time = 600 measured values). The number of measured values for trends can be limited to approximately

1000 measured values that are adequate for a good overview. A maximum of 50000 measured values are possible per trend.

Note

A cycle time of 1 second and 24 hours runtime mean 86400 measured values.

A recipe with 1500 recipe phases would result in an archive data size of approximately 30 MB for approximately 6 hours runtime.

Exceeding the specified recommendations means that batch reports and possibly also the archiving of batches are no longer possible.

Batches are automatically closed and archived with a automatic generated PDF report. In this report, the state "archived" is not displayed in the status history but only "completed" and "closed". However, when printing a preview of the archived batch in the Batch Control Center, the "completed", "closed and "archived" states are displayed.

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