

# SIMATIC

## **S7-SCL V 5.3 SP5 for S7-300/400**

### **Notes on installation and usage**

These notes should be considered more up-to-date than the information in other documents.

Read the notes carefully, because they contain important information on installing and using S7-SCL V5.3 SP5.

Version S7-SCL V5.3 SP5 is abbreviated as "S7-SCL" in the following.

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# 1 Corrections and Changes for S7-SCL V5.3

## 1.1 Changes from S7-SCL V5.3 SP5

### Corrections

Default values for structure parameters of functions are applied to the interface so that they can be taken into account by the appropriate configuration tools (e.g. CFC).

### User rights under MS Windows Vista

If you use S7-SCL V5.3 SP5 with STEP 7 as of V5.4 SP4 under MS Windows Vista, the user rights concept from MS Windows Vista is used in order to increase security. You can find additional information in the "readme.rtf" file in the STEP 7 V5.4 SP4 basic package.

## 1.2 Changes from S7-SCL V5.3 SP4

### Corrections

During compilation of SCL instructions with complex indices using the "Create debug info" option, you will no longer exit S7-SCL unintentionally.

## 1.3 Changes from S7-SCL V5.3 SP3

### Windows Vista operating system

S7-SCL can now also run under Windows Vista 32.

### Start menu

When operating under Windows Vista, you can find S7-SCL in the Start menu under **Start menu > All Programs > Siemens Automation > SIMATIC STEP 7 > S7-SCL**.

## 1.4 Changes from S7-SCL V5.3 SP2

### Project password

As of STEP 7 V5.4 it is possible to protect access to projects and libraries with a project password. This requires the installation of STEP 7 V5.4 and SIMATIC Logon V1.3 SP1, however.

If you have assigned a project password, S7-SCL requires it for certain actions, for example when creating and opening a source. Keep the SIMATIC Manager open in the background if you want to avoid frequent queries.

You can find more information in the help on STEP 7, in the chapter "What you should know about access protection".

### **Change log**

As of STEP 7 V5.4 it is possible to keep a change log which keeps track of online actions such as "Loading", "Operating mode changes" or "Clear/reset", provided you have set up access protection to projects and libraries. This requires the installation of STEP 7 V5.4 and SIMATIC Logon V1.3 SP1, however.

If you have activated the change log, S7-SCL will ask for a comment or reason for the execution of online actions and enter it in the log.

You can find more information in the help on STEP 7, in the chapter "What you should know about the change log".

### **Displaying the date and time**

- As of STEP 7 V5.4 there are two formats for the display of date and time of day available. You have the choice between the display in the language set in STEP 7 and the ISO 8601 standard. You can make the setting in the SIMATIC Manager, in the tab "Date and Time Of Day" of the "Customize" dialog. You can find more information in the help on STEP 7, in chapter "Display Formats for Date and Time".
- As of STEP 7 V5.4 you can display the module time in the local time of your PC/PG. You can make the setting in the SIMATIC Manager, in the tab "Date and Time of Day" of the "Customize" dialog. You can find more information in the help on STEP 7, in chapter "Displaying Module Times in the Local Time for Your PG/PC".

### **Corrections**

- Steps are no longer skipped and results are reliably displayed when using a CPU 319-3 PN/DP in the test mode "Single step".
- Sources which were compiled for the test mode are no longer read during subprogram calls to I/O output words (e.g. PAW224).
- The program is no longer aborted when new sources are created.
- Multidimensional fields are now correctly processed during AT construct.
- Partially selected lines are now completely taken into account for indenting and outdenting.
- It is possible to undo at any time when inserting text.

- There is now a check during test mode for the availability of data blocks in the AS in the call environment.
- The program is no longer aborted when breakpoints are activated in an H-CPU in redundant mode.
- The automatic indenting and outdenting following key words has been improved.
- When outdenting with constants of the type "... -- (-3 - x) + 2" no incorrect MC7 code is created.
- Incorrect MC7 code is not created in the language construction FOR when the final value is of the type DINT.

## 1.5 Changes from Hotfix 2 for Service Pack 1

1. S7-SCL no longer unintentionally closes when S7-SCL sources are compiled in large projects using the SIMATIC Manager or CFC.
2. A missing character string end (') no longer leads to a block from a source not being compiled.
3. The "normal text" now appears in the configured color when printing a source.

## 1.6 Changes from Hotfix 1 to Service Pack 1

1. The compilation speed has been significantly improved.
2. The highlighting in the message window remains during a change between the message window of a compilation control file and the associated source.
3. The possible address area for absolute access to data blocks (also for inputs and outputs) has been extended from 0..32737 to 0..65535 .. In order to cover the larger range, a variable index can now also be of the type DINT.
4. Loops with a complex final value, e.g. `. FOR i:= start TO End.x[j].y DO`, can now also be used for loops.
5. S7-SCL does not abort if you compile a source in which a line comment contains the key words FUNCTION, PROGRAM, FUNCTION\_BLOCK, etc.

## 1.7 Changes from S7-SCL V5.3 SP1

You can find information on this topic in the "What's new?" section of the online help. You can open this section from the contents of the help for S7-SCL (menu command **Help > Topics**).

## **Notes on Installation**

The installation notes contain important information that you will require to install the S7-SCL software. Read these notes before installing the software.

## 2 Contents of the Consignment

This CD contains the complete package for S7-SCL-Version V5.3 including SP5,

This version comes in 5 languages and can be run on the following operating system:

- **MS Windows 2000 Professional SP4** (hereafter referred to as MS Windows 2000)
- **MS Windows XP Professional SP1/SP1a/SP2/SP3** (hereafter referred to as MS Windows XP)
- **MS Windows Server 2003 or MS Windows Server 2003 SP1/SP2**  
German/English, Standard Edition and MUI. Only in workstation mode (no client-server installations)
- **MS Windows Vista 32:** Business and Ultimate.

S7-SCL Version V5.3 SP5 is supplied on the CD "S7-SCL V5.3 SP5" with a floating or upgrade license in the consignments described below:

### **S7-SCL, V5.3 including SP5 (Floating License)**

Order number: 6ES7811-1CC05-0YA5

The package includes:

- 1 CD S7-SCL V5.3 SP5
- 1 License stick
- 1 Certificate of license

### **S7-SCL V5.3 including SP5 Upgrade (Floating License) (V3/V4/V5/V5.1-> V5.3)**

Order number: 6ES7811-0CC05-0YE5

The package includes:

- 1 CD S7-SCL V5.3 incl. SP5
- 1 License stick (upgrade license)
- 1 Certificate of license
- 1 Product information

**Contents of the CD S7-SCL V5.3 including SP5**

- S7-SCL V5.3 including SP5
- Information about the product "What's New"
- Electronic manual "S7-SCL - Getting Started"
- Electronic manual "S7-SCL for S7-300 and S7-400"
- Automation License Manager

The manuals are available on your computer following installation.



### 3 Hardware Requirements

To work with the S7-SCL software, your system must meet the same requirements as for operating STEP 7 (see the Readme for STEP 7). You specifically require:

Operating system	Minimum requirements		
	Processor	RAM	Graphics
MS Windows 2000 Professional	600Mhz	256 MB *)	XGA 1024x768 16-bit color depth
MS Windows XP Professional	600Mhz	256 MB *)	XGA 1024x768 16-bit color depth
MS Windows Server 2003	2.4 GHz	1 GB *)	XGA 1024x768 16-bit color depth
MS Windows Vista 32 Business	1 GHz	1 GB **)	XGA 1024x768 16-bit color depth
MS Windows Vista 32 Ultimate	2 GHz	1 GB **)	XGA 1024x768 16-bit color depth
*) At least 1 GB of memory recommended			
**) At least 2 GB of memory recommended			

Note on Windows Vista:

The “Aero Glass Style” can only be used with a high-performance graphic adapter. It requires:

- DirectX9 capability
- 128 MB memory

## 4 Software Requirements

### 4.1 Operating Environment

#### Operating systems

S7-SCL V5.3 SP5 is a 32-bit application that runs under the following operating systems:

#### Operating Systems

S7-SCL is a 32-bit application, whose functionality has been tested and released for the following operating systems:

- MS Windows 2000 Professional with SP4
- MS Windows XP Professional with SP1 / SP1a / SP2 / SP3
- MS Windows Server 2003 with / without SP1/SP2
- MS Windows Vista 32 Business/Ultimate with / without SP1

S7-SCL V5.3 SP5 has not been tested or released for the following operating systems. Use these at your own risk.

- MS Windows 2000 Professional with SP3
- MS Windows XP Professional without SP
- MS Windows XP Home
- MS Windows Vista Home Basic/Premium

S7-SCL V5.3 SP5 cannot be installed and cannot run under:

- MS Windows 3.1
- MS Windows for Workgroups 3.11
- MS Windows 95
- MS Windows 98
- MS Windows Millennium
- MS Windows Vista 64 Bit versions
- MS Windows 2000 with / without SP1 / SP2

The same basic conditions for running STEP 7 continue to apply here.

## 4.2 Hard Disk Space

S7-SCL V5.3 SP5 requires approx. 50 MB on your hard disk.

The disk space required by STEP 7 must also be taken into account here (see the STEP 7 Readme file).

## 4.3 Compatibility to STEP 7

To work with the S7-SCL software, you require at least STEP 7 V5.3.

In order to be able to use the following functions introduced with S7-SCL V5.3 including SP3, you need to have at least STEP 7 V5.4:

- Password protection
- Change log
- Selection of the date and time of day format

S7-SCL V5.3 SP4 and STEP 7 V5.4 SP3 can run under MS Vista. With S7-SCL V5.3 SP5 in connection with STEP 7 as of V5.4 SP4, the user concept of MS Vista is used in order to improve security.

## 4.4 Upgrading an Older Version of S7-SCL with the S7-SCL V5.3 SP5 Upgrade

Installation of the upgrade package requires a valid license for S7-SCL V3.x, V4.x, V5.

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**Note:**

Be aware that an upgrade may require you to change your operating system because S7-SCL V5.3 SP5 can only run under Windows 2000 Professional SP4, Windows XP Professional SP1/SP2/SP3, Windows 2003 Server or Windows Vista. The product information contains additional information about upgrading.

The existing authorization/license must be save to floppy with the AuthorsW/Automation License Manager program before a new operating system is installed.

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# 5 Software Installation

## 5.1 Installing S7-SCL V5.3 SP5

When installing S7-SCL V5.3 SP5 you can overwrite existing installations of S7-SCL. Older versions do not need to be uninstalled.

Before starting the Setup program, close all applications (such as MS Word, etc.) and the "Control Panel" window.

Insert the S7-SCL-CD in the drive. The Setup program guides you through the installation. The installation program starts automatically when you insert the S7-SCL CD. If you have disabled the automatic start function for your computer, find the program using the Windows Explorer and start it manually by double-clicking on it in the root directory of the CD.

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### Note

STEP 7 and S7-SCL register themselves in MS Windows 2000/XP/Server 2003/Vista system files. You cannot move or rename STEP 7 or S7-SCL files or folders using Microsoft Windows utilities such as the Explorer or modify STEP 7 or S7-SCL data in the Microsoft Windows registry. After such modifications, it is possible that the program will no longer run properly.

The security settings of your system are modified during installation so that you can use STEP 7: Port 4410 for TCP is entered as an exception in the Windows Firewall.

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## 5.2 License Key for S7-SCL V5.3 SP5

Before you can start working with S7-SCL, you must transfer the license key from the license stick to the computer. There are two ways of doing this:

- While you are installing STEP 7, the Setup program displays a message if there is no suitable license key installed on your computer. You can then decide whether you want the license key to be installed by the Setup program or whether you want to install the license key manually at a later time using the Automation License Manager program.
- If the license key cannot be installed during setup, continue the Setup program without installing the license key. Then restart your computer and install the license key using start menu command Simatic\License Management\Automation License Manager.

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### Note

The license key can be installed on all local drives.

The Automation License Manager prevents installation of license keys on impermissible drives such as RAM drives, floppies or compressed drives (e.g. DBLSPACE). If a hard drive of a device is registered as "removable media" and not as a normal "hard disk", it will be treated as a CD drive on which license keys cannot be installed.

Select the respective host drive for compressed drives.

Read the notes in the README.WRI file about the Automation License Manager on the STEP 7 Installation CD under "Automation License Manager\disk1\".

Hidden files are stored in the folder "<Drive where license key is installed>:\AX NF ZZ". These files and the folder must not be deleted, moved, or copied. They contain data required for the licensing of your software!

If you do not adhere to these guidelines, the license key may be irretrievably lost.

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### Note about using license keys correctly

- The license stick must not be read-only. Since the license stick must be used without write protection, there is a danger that a virus could be transferred from the hard disk to the diskette. You should therefore run a virus check on your PC or programming device every time you install or remove a license key.
- If you use a defragmentation program, which enables you to move fixed blocks of memory, only use this option once you have moved the license key from the hard disk back to the license stick.
- When you install a license key, a cluster appears on the target drive marked with a special character. Some testing programs may show this cluster as "defective." Do not attempt to "repair" the cluster.

- Do not forget to transfer the license key to the license stick before formatting, compressing, or restoring your hard disk or before installing a new operating system.
- If a backup copy of your hard disk contains copies of license keys, there is a danger that these copies may overwrite the valid installed license keys when you restore your backup data to the hard disk, thereby destroying the valid license keys. To prevent a valid license key from being overwritten by a backup copy, you must remove all license keys before you make a backup copy or exclude the license keys from the backup.

### Using the trial license

If there is no valid License Key installed for S7-SCL V5.3, SP5 a trial license key , which is supplied and installed with S7-SCL is used. This license key allows you to run S7-SCL for only fourteen days. The trial license is activated, following acknowledgment, at the first start of S7-SCL without a valid license key.

## 5.3 Removing S7-SCL V5.3 SP5

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### Note

Software products must be removed according to Microsoft Windows conventions, otherwise they cannot be uninstalled.

Use the removal function of the Windows operating system (in the taskbar under **Start > Settings > Control Panel > Add/Remove Programs**) to remove your software package (for example, " SIMATIC S7-SCL V5.3 including SP2").

You can also run the S7-SCL setup program to remove the program.

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## **Release Notes**

These notes should be considered more up-to-date than the information in manuals and online helps.

## 6 Note on Compatibility with DIN EN 61131

S7-SCL has complied with the PLCopen Basis Level of the structured text DIN EN 61131-3 (formerly IEC 1131-3) standard since version 5.0.

If an ST program exists, you can now either import it into the STEP 7 database with SIMATIC Manager as an ASCII file or in the S7-SCL editor using copy and paste.

### Important settings and requirements

The following settings are important in order to create programs that conform to standards:

- Select the English mnemonic for the project in SIMATIC Manager under **Options > Customize > Language**.
- Deactivate the option "Permit nested comments" in S7-SCL under **Options > Customize > Compiler**.
- Deactivate the option "Create block numbers automatically" under **Options > Customize > Create Block**.
- The lines END\_VAR, END\_CONST, END\_LABEL, FUNCTION\_BLOCK name, FUNCTION name etc. are not allowed to be separated with a semi-colon. A semi-colon is interpreted as an "empty" statement so that all following structures will be evaluated as statements.



# 7 Using Texts in Foreign Languages

As of S7-SCL V5.3 SP1, you can enter texts in foreign languages that do not correspond to the STEP 7 language specified.

In this way, it is possible enter Chinese source texts in STEP 7 with S7-SCL with English as the specified language on a Chinese Windows STEP 7 with S7-SCL. Please see the STEP 7 online help for notes about changing languages.

## Rules:

- S7-SCL 5.3 SP1 allows foreign characters in the following areas of the sources:
- In global symbols, which are contained in the STEP 7 symbol table.
- In STRING constants, e.g. for `TITLE = ' ... '`, `AUTHOR : ' ... '`, `FAMILY : ' ... '`.
- The length of the STRING constants is generally limited to 254 bytes. The length is 8 bytes for the AUTHOR and FAMILY attributes.
- In user-defined attributes.
- In comments.

The following elements can only contain English characters (ASCII characters 0x2a - 0x7f):

- IEC string functions
- Block parameter and local symbols
- Structures that define the S7-SCL language

**Applicable character sets:**

The following foreign language character sets under the MUI version of the released Windows operating system have been tested:

- Japanese
- Chinese (Simplified)
- Korean
- Russian
- Greek

Additional languages are possible; universal application cannot be guaranteed, however.

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**Note:**

The option "Upper/Lower case" is offered in Find/Replace dialogs, even if the foreign language used does not know the difference (e.g. ideographic languages such as Japanese, Chinese).

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# 8 Notes on Programming and Operation

## General notes

The general notes on the STEP 7 Standard package V5.3 also fully apply to S7-SCL. This section only contains additional information that is either not in the documentation or that is only valid for this particular release of the software.

## Copying S7-SCL programs containing S7-SCL sources

If the S7-SCL add-on package is not installed on a PG/PC and use STEP 7 (e.g. SIMATIC Manager) to copy, cut or paste programs, the S7 SCL source files contained within them are lost.

## User rights

To be able to work with S7-SCL under MS Windows 2000/2003/XP/Vista, you must have at least logged on as the user (no guest log in). You need administrator rights to be able to install the S7-SCL Software.

## Limits of internal compiler lists

The internal compiler symbol table may contain up to approximately 65500 symbols. This limit is only reached when extensive interfaces are read in during the compilation of a block.

## Reaction of the compiler to errors in the declaration section

If the declaration section contains errors that could cause an "undefined response" from the compiler, the statement section is not compiled. The statement section can only be compiled when the declaration section is error-free.

## Printing

- When printing project documentation with DocPro, the layout "L11PC\_A" is not permitted for S7-SCL.
- You will get the best printing results with "CourierNew" font, font size 8 or higher.

### **Creating S7 reference data**

The following restrictions apply when working with S7 reference data:

When generating cross-reference list or similar lists in version 5.3, blocks must be recompiled and, if they already exist, must be overwritten. This procedure must not be aborted.

In the cross-reference list, the access type (read = R or write = W) for input and output parameters must be shown as unknown (unknown = ?).

Access to variables of a DB is always displayed in the cross-reference list in absolute form.

### **Compiler options**

Compiler options in a source or a compile control file have priority over settings which are entered into the S7-SCL editor in the "Compiler" tab, as well as jobs from outside (e.g. "Generate reference data" as a STEP 7 job).

### **System attributes for blocks**

System attributes are not checked for correctness. Please make sure that the notation is correct.

### **Structures**

Structures may be nested up to a depth of 6 steps.

Names of global addresses such as timer, counter, memory, inputs, etc. are not allowed to be used as names of structure elements.

### **Error message "The block could not be saved"**

An FC, FB or DB must be defined in the source prior to its use. This may otherwise lead to the error message as mentioned above.

### **SEL and MUX functions**

For the functions SEL and MUX whole structures, fields, parameter data types and S5Time are not allowed to be used as parameters.

### **Symbol table**

The connection with the symbol table is made when a source is opened. An additional symbol table is only taken into consideration after closing and reopening the source.

### **Copying sources and blocks**

When copying a source or a block, the connection between them gets lost. For testing / debugging you need to reload and compile the source or the block again.

### **MIN / MAX / MUX input parameters**

The input parameters of the MIN / MAX / MUX functions have to start with the lowest input parameter (IN0 for MUX, IN1 for MIN / MAX) and increase without gaps.

### **Functions INT / DINT\_TO\_BCD**

Contrary to the description in the manual, the INT / DINT\_TO\_BCD functions do not influence the OK flag.

### **Access to variables of the type S5TIME with BCD\_TO\_INT and INT\_TO\_BCD**

Variables of the type S5TIME can be read with the function BCD\_TO\_INT or written with INT\_TO\_BCD.

Use AT construct to assign a view of the type WORD to the variable of the type S5TIME.

Example:

```
VAR

    TimeS5T : S5time;

    TimeWord AT TimeS5T : WORD;

    TimeInt : INT;

END_VAR

....

....

TimeS5T := S_ODT(T_NO:= T10, S:=TRUE, ....);

TimeInt := BCD_TO_INT(TimeWord);

....
```

## 9 Notes on the S7-SCL Debugger

### **Points to note when debugging**

Make sure that the connection between the programming device and the CPU remains stable during debugging (status and breakpoint). Disturbances on the connection may mean that the application must be restarted.

You require a mouse for the SCL debugging functions. If your system does not have a mouse, you can install a keyboard mouse.

### **Maximum number of testable components/instances reached**

If you compile a source file with the option "Generate debug information" and the warning "Maximum number of testable components / instances reached" is displayed, this part of the source file cannot be monitored or executed in single step.

### **Fonts in the "Errors and Warnings" window**

The "Errors and Warnings" window takes on the settings for the font size and type from the working window. You can select colors as desired.

### **Source changes**

After changing a source you need to save, compile and load the block that needs to be tested, before the test function can be enabled.

# 10 Notes on the Documentation

## Online documentation

The HTML-based online documentation for S7-SCL contains all the information you require when working with S7-SCL. You can open the online documentation with the menu command **Help > Contents...**

## Using help

You will find detailed information on using help in the section of the online documentation entitled "Working with the Online Documentation".

## Electronic manual

You also have the documentation available as an electronic manual. The content of the electronic manual is identical to that of the online documentation.

This gives you the option of obtaining information using only the online help or of printing out some or all of the chapters of the electronic manual for reference.

The manual is entered in the Windows Start menu and you can display and print it with the Acrobat Reader.

You can open the electronic manuals with the Start menu command **START > SIMATIC > Documentation.**