SIMATIC

S7-SCL V 5.6 for S7-300/400

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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 V5.6.

Version S7-SCL V5.6 is abbreviated as "S7-SCL" in the following.

To print the file, set the left and right margins to a width of 25 millimeters (1 inch) for A4 portrait size.

Contents

1 Corrections and Changes for S7-SCL

1.1 Changes from S7-SCL V5.6

The operating systems MS Windows 10 Pro and Enterprise, MS Windows Server 2012 and MS Windows Server 2016 are supported.

Note on error message: Internal error – no code generation

This error can be caused by complex formulas.

In this case the block can be compiled without error if the compiler option “Create debug info” is selected and the compiler option “Optimize object code” is cleared.

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 DVD contains the complete package for S7-SCL-Version V5.6.

This version is in 5 languages and can be run on the operating systems listed in chapter 4.1.

S7-SCL Version V5.6 is supplied on the DVD "S7-SCL V5.6" with a floating or upgrade license in the consignments described below:

S7-SCL, V5.6 (Floating License)

Order number: 6ES7811-1CC06-0YA5

The package includes:

- 1 DVD S7-SCL V5.6
- 1 License stick
- 1 Certificate of license

S7-SCL V5.6 Upgrade (Floating License) (V3/V4/V5/V5.1/V5.2/V5.3 -> V5.6)

Order number: 6ES7811-0CC06-0YE5

The package includes:

- 1 DVD S7-SCL V5.6
- 1 License stick (upgrade license)
- 1 Certificate of license

Contents of the DVD S7-SCL V5.6

- S7-SCL V5.6
- Information about the product "What's New"
- Electronic manual "S7-SCL - Getting Started"
- Electronic manual "S7-SCL for S7-300 and S7-400"

The manuals are available on your computer following installation.

3 Hardware Requirements

In order to be able to work with the S7-SCL software, the requirements for operating STEP 7 must be fulfilled (refer to STEP 7 readme file)

4 Software Requirements

4.1 Operating Environment

Operating Systems

S7-SCL V5.6 is released for the following operating systems :

- MS Windows 7 Ultimate, Professional and Enterprise (64-bit), with SP1
- MS Windows 10 Pro and Enterprise (64-bit)
- MS Windows Server 2008 R2 (64-bit) with SP1 (Standard Edition as work station computer)
- MS Windows Server 2012 R2 (64-bit) (Standard Edition as work station computer)
- MS Windows Server 2016 (64-bit) (Standard Edition as work station computer)

The capability of running S7-SCL on any other operating systems is not guaranteed. Use on other operating systems is at the user's own responsibility..

4.2 Hard Disk Space

S7-SCL V5.6 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

S7-SCL V5.6 requires at least one of the following versions of STEP 7:

- STEP 7 V5.5 SP1
- STEP 7 V5.6

4.4 Upgrading an Older Version of S7-SCL

Installation of the upgrade package requires a valid license for S7-SCL V3.x, V4.x, V5.0, V5.1, V5.2 or V5.3.

Note:

Please note that an upgrade may call for a change of operating systems, because older operating systems (for example, MS Windows XP) are no longer supported as of S7-SCL V5.6 (cf. chapter 4.1). Additional notes on installation are included in the product information.

Before changing operating systems, the existing authorization/license key with the program AuthorsW/Automation License Manager must be backed up on a floppy disk or USB stick.

5 Installation

5.1 Installing S7-SCL

When installing S7-SCL V5.6 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-DVD in the drive. The Setup program guides you through the installation. The installation program starts automatically when you insert the S7-SCL DVD. 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 DVD.

Note

STEP 7 and S7-SCL register themselves in MS Windows 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.

5.2 License Key for S7-SCL

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 Siemens Automation\Automation License Manager.

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 DVD drive on which license keys cannot be installed.
Select the respective host drive for compressed drives.

Read the notes in the almreadme.rtf file about the Automation License Manager on the STEP 7 Installation DVD under "InstData\Automation License Manager\ALM32\".

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.

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 V5.6 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

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 > Programs and Features**) to remove your software package.

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

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 as of version 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.

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).

8 Notes on Programming and Operation

General notes

The general notes on the STEP 7 Standard package V5.6 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.

Block properties for DBs and UDTs

Sources for DBs and UDTs correspond to the notation for an AWL source. Particular attention should be paid to the following in the case of DBs:

```
DATA_BLOCK DB<No> or DB symbol
TITLE =   <interner Baustein-Titel/ Internal block title>
//  <Baustein-Kommentar/ Block comment>
AUTHOR:   xxxx     //  max. 8 Zeichen / max. 8 characters
FAMILY:    yyyy     //  max. 8 Zeichen / max. 8 characters
NAME:     zzzz      //  max. 8 Zeichen / max. 8 characters
VERSION:  01.01     //  max. 15.15
KNOW_HOW_PROTECT
UNLINKED
READ_ONLY
NON_RETAIN
    FB<No> or FB symbol
or struct
         ….
     end_struct
or UDT<No> or UDT name
BEGIN
    Optional presetting of parameters
    or structure components
END_DATA_BLOCK
```

Indirect addressing of I/O

Indirect addressing of outputs of the I/O, such as

`FC100(o_word := %PQW[i]);` is not possible. Workaround with

```
FC100(o_word := tmp );
```

```
%PQW[i] := tmp;
```

Access width for I/O

Access to the I/O is only possible by BYTE, WORD or DWORD.

Conversion of WORD to DINT

The conversion function `WORD_TO_DINT(x)` works in the same way as `DWORD_TO_DINT(WORD_TO_DWORD(x))`

Notation of constants in DBs

In DBs, the notation of an AWL source applies to all constants.

Parameter G with the SEL function

Only variables or constants should be used as actual parameters.

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 7/10, 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.

Note for blocks with many value assignments

Blocks can have a maximum of 64 KB of code. Exceeding this limit does not always trigger a corresponding error message. In some cases this leads to an error message 'internal error'.

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 as of 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_BDVD

Contrary to the description in the manual, the INT / DINT_TO_BDVD functions do not influence the OK flag.

Access to variables of the type S5TIME with BDVD_TO_INT and INT_TO_BDVD

Variables of the type S5TIME can be read with the function BDVD_TO_INT or written with INT_TO_BDVD.

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 := BDVD_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 components / instances to be tested has been reached

If you compile a source file with the option " Create debug info " and the warning "Maximum number of components / instances to be tested has been 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 Adobe Reader.

You can open the electronic manuals with the Start menu command Start > Siemens Automation > ….