



INGENIEURBÜRO FÜR
TECHNOLOGIETRANSFER
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Getting Started

with

S7 for Windows[®]

Version 6.x

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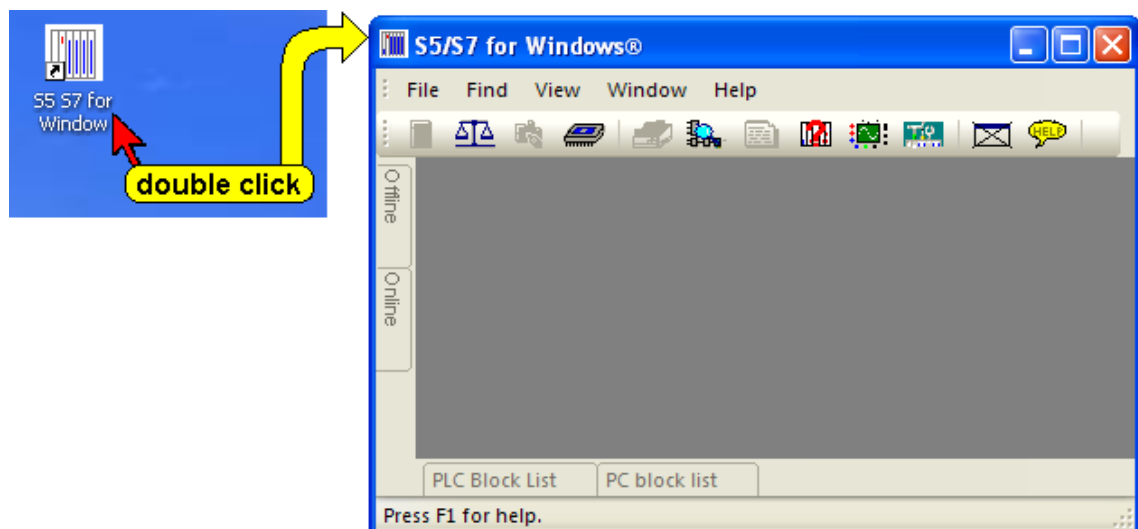
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1 S7 for Windows® Basics

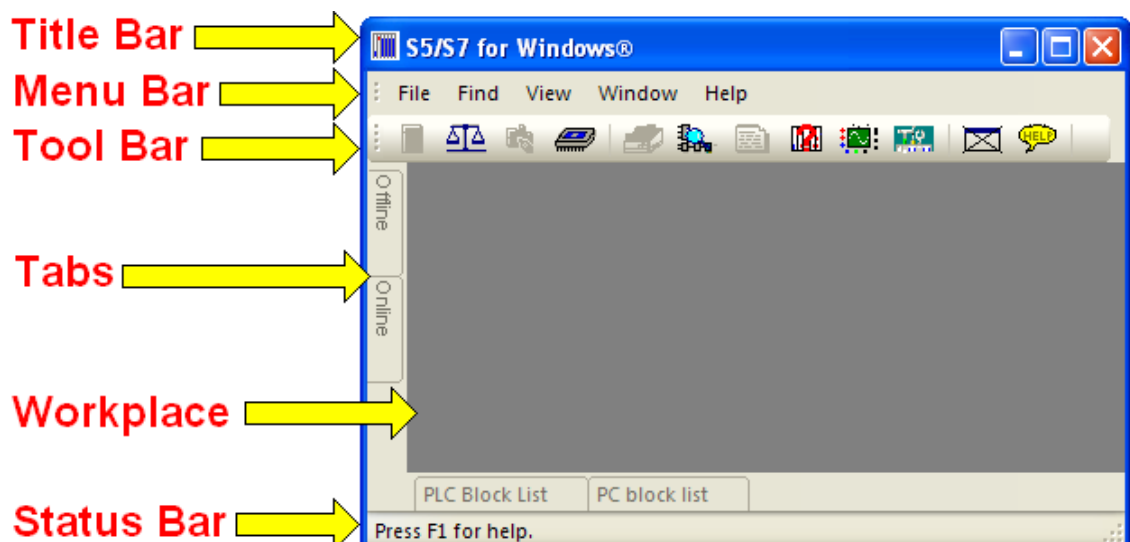
To work with S7 for Windows® basic skills are necessary.

1.1 Opening the S7 for Windows® Software

During the installation of S7 for Windows® an icon has been inserted. Double click the icon “S7 for Windows®” to start the programming system.



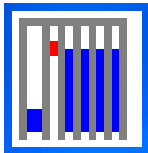
1.2 S7 for Windows® Basic Window



Title Bar



The title bar displays *S7 for Windows®*, and, if an additional Window is open in the workplace, the name of the open window is also displayed. The Icons are “Windows” specific.



Open Control menu

This icon opens the Control menu that contains the commands to Restore, Move, Size, Minimize, Maximize, or Close the open Window. The Keyboard shortcut is Alt + Spacebar.



Minimizing the open window to an icon

Clicking the button at the right side of the *S7 for Windows®* title reduces the open window to the size of an icon (same function as the **Minimize** command from the Control menu).



Maximizing the open window

Clicking the Maximize button in the upper right corner of *S7 for Windows®* will enlarge the window to its maximum size (same function as the **Maximize** command from the Control menu).



Restoring an enlarged window to its previous size

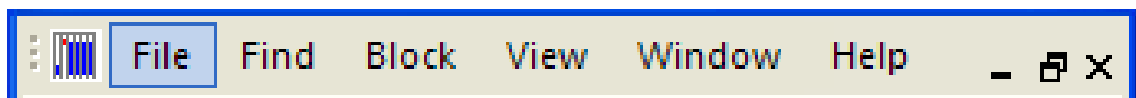
Clicking the Restore button in the upper right corner of *S7 for Windows®* will restore an enlarged window to its previous size (same function as the **Restore** command from the Control menu).



Closing S7 for Windows

Clicking the Close button in the upper right corner of *S7 for Windows®* will terminate S5 for Windows (same function as the **Close** command from the Control menu).

Menu Bar



The menu bar lists the available menus. The menus contain the available commands of *S7 for Windows®*. The menus in the menu bar change depending on the *S7 for Windows®* application windows opened. You can open a menu by clicking the name of the menu or by pressing the **ALT** key and then the first Letter of the menu name.

Tool Bar I

The tool bar provides instant access to frequently used *S7 for Windows®* commands. Click an icon with the mouse and the command is executed. You can reach these functions with the keyboard via the window menu and/or the function keys. The number of the icons to open windows depends on the selection “Classic Operator Interface” ON/OFF.

This tool bar is the same for all *S7 for Windows®* application windows.

Tool Bar I – Standard Operator Interface (Classic operator interface OFF)

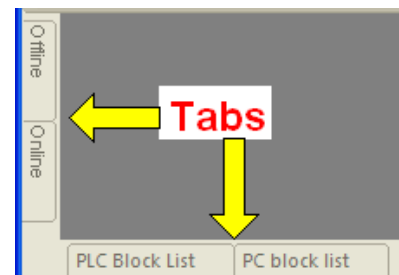


Tool Bar I – Classic Operator Interface (Classic operator interface ON)



Tabs

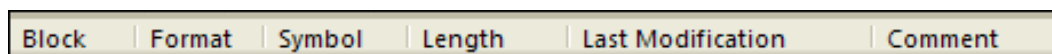
Several “tabs” may be displayed at the left as well as at the bottom of the *S7 for Windows®* window. The “Tabs” displayed depend on the selected windows in the “**View**” menu.



Workplace

All the blocks of an open PLC program file are listed in the PC block List. Additional application windows fill out the workplace.

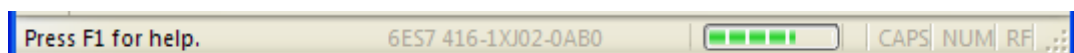
Workplace Column Title Bar



Clicking the title of a column will sort the PC Block List information in an ascending order. Clicking the title again will sort the information in a descending order.

The column width can be adjusted by dragging the column border with the mouse.

Status Bar



The status bar may displays additional information on the open window and executed tasks.

Note:

The **right mouse button** may be used within the Workplace.

If the **right mouse button** is clicked, a menu with the most important commands is opened.

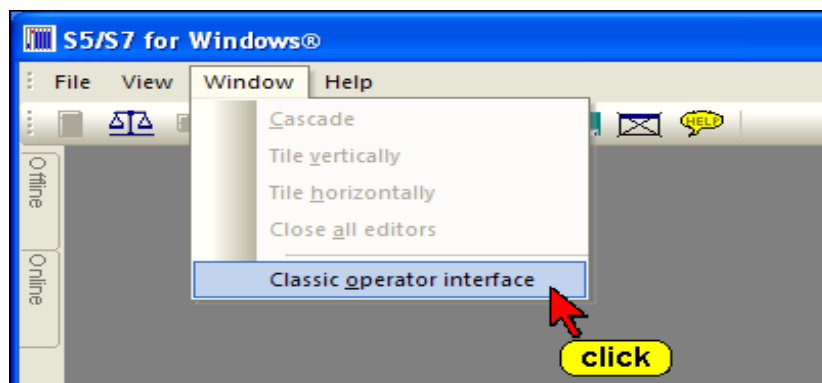
1.3 Operator Interface mode.

Version 6.x of *S7 for Windows®* has a new concept for opening and closing windows in the workplace.

Classic Operator Interface

If the “Classic operator interface” mode is selected, the “Tool Bar I” is extended and the open windows will stay open until they are closed.

To select the previously described mode, click “Classic operator interface” in the “Window” menu.

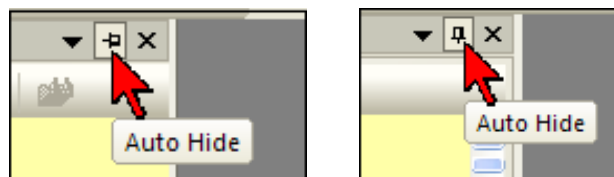


In “Classic operator interface” mode the “PC Block List” window is open and fills the whole workplace.

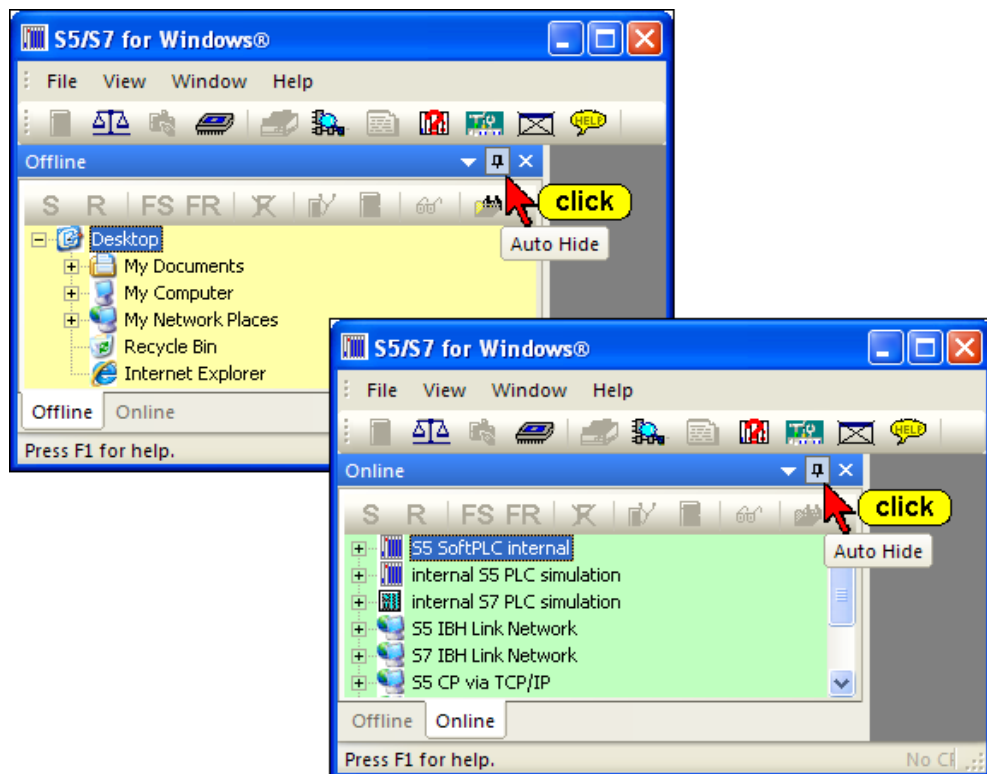
Using the “Auto Hide” functions.

It is recommended that you use the “Auto Hide” icon to lock the tab at the outside border of *S7 for Windows®*. By bringing the mouse pointer to the tab, the window will open automatically.

Use the “Auto Hide” icon to close a window.



“Auto Hide” function to close the “Offline tree” and the “Online tree”



Operator Interface mode.

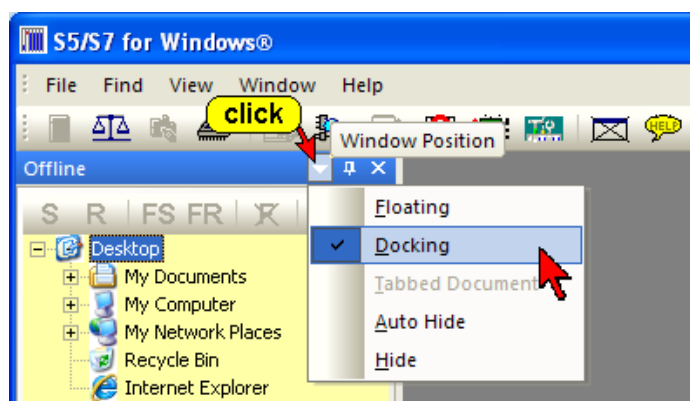
You can use the “Auto Hide” icon to lock the tab at the outside border of the workplace. By moving the mouse pointer to the tab, the window will open automatically. As soon as the mouse pointer leaves the automatically opened window, the window is closed.

If you click at tab, the open window will stay open until it is closed.

You can use the “Auto Hide” icon to lock the tab at the outside border of the workplace. By moving the mouse pointer to the tab, the window will open automatically. As soon as the mouse pointer leaves the automatically opened window, the window is closed.

If you click the tab the opened window will stay open until it is closed.

You may select the “Window Position.



1.4 Recommend Settings

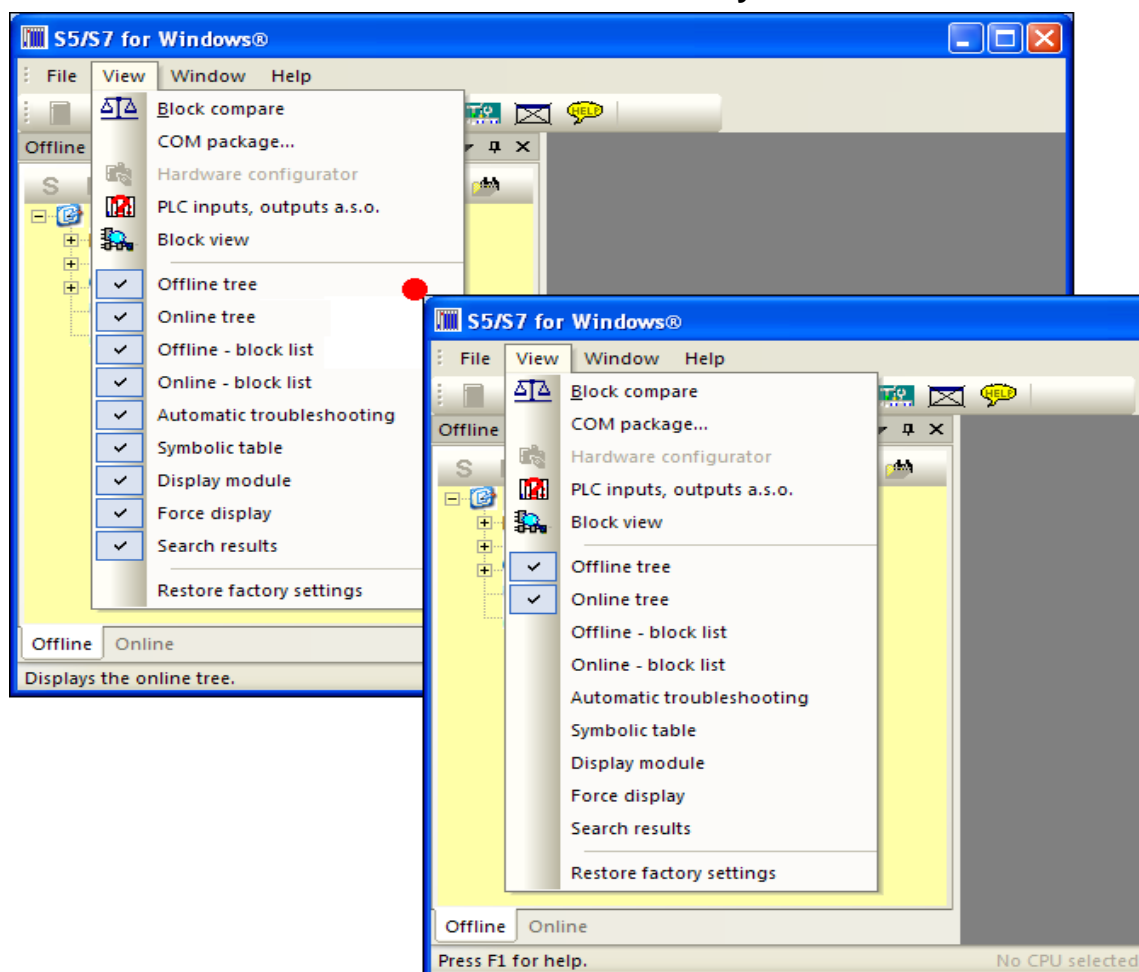
Note:

We recommend that you use *S7 for Windows®* with the “Standard operator interface” (Classic Operator Interface” OFF – see chapter 1.3).

Close all unnecessary windows.

Open the “**View**” menu and select the “Offline tree” and “Online tree”. Deselect all other views.

The “**View**” menu is used to select the necessary windows.



The “**Offline tree**” is used to select the “**S7 Project**” that you want to work with. The S7 Project contains the files necessary for an S7 PLC program. Later, we will show you how to generate a n S7 Project will be explained. An S7 Project is always required to work with a S7 PLC program executed on a PLC.

The “**Online tree**” is used to select the PLC to be connected with.

Tool Bar I

Depending on the selection, ON/OFF, the “Classic Operator Interface” or the Standard Operator Interface will be used.

Classic Operator Interface



The tool bar provides instant access to frequently used *S7 for Windows®* commands. Click an icon with the mouse and the command is executed. You can reach these functions with the keyboard via the window menu and/or the function keys.

This tool bar is the same for all *S7 for Windows®* application windows (Classic operator interface mode).

Tool Bar I – Standard Operator Interface (Classic Operator Interface OFF)



PLC Error Display (I-Stack, B-Stack, Diagnostic Buffer)



PLC state (Interrupt stack).

This icon enables you to view the program interrupt information stored in the PLC (I-Stack, B-Stack, Diagnostic Buffer). The information is displayed in real language with the faulty portion of the program.



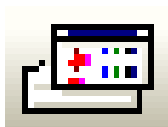
Go to previous Window

(Classic Operator Interface – ON only)



Go to previous Window.

This icon allows you to switch rapidly between open windows with a mouse click. The keyboard shortcut **Ctrl+F6** provides the same function.



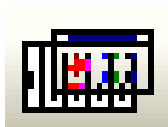
Display the Offline Block List

(Classic Operator Interface – ON only)



Displays the offline block list.

This index lists all the blocks with the date and time it was created or changed and a comment. One or more blocks may be selected for further manipulation.



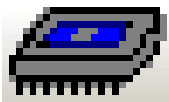
Display the Online Block List

(Classic Operator Interface – ON only)



Displays the online block list.

This index lists all the blocks stored in the PLC. One or more blocks may be selected for further manipulation in the same way it is handled in the windows file manager.



EPROM / EEPROM / Flash EPROM Burner

This icon opens a menu to control EPROM / EEPROM / Flash EPROM burning. It is only active when the EPROM burner option has been purchased.



EPROM Programming Device.



Cross Reference Display

A click on this icon lists the appearance of operands, as a symbol or absolute, throughout the whole program. This function may be called from any window.



Display cross reference.



Block Edit

The block selected in the block listing will be displayed in the block editor and is ready for any changes. The keyboard shortcut **F10** provides the same function.



(Strg+Alt+O)

Edit Block, open Block Editor.

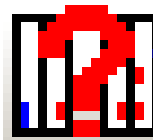


Symbolic Table Editor

With this easy to use integrated editor you can write, cut, copy and paste text to create and modify the symbol table. The symbol table may be tested for multiple uses of addresses or symbols. The symbol table can also be sorted by addresses or symbols.



Edit symbolic table.

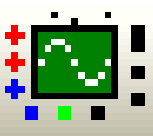


On-line PLC Status

The status of flags, inputs, outputs, timers, counters, comparators, data words, and peripheral words are displayed and can be modified.



Display PLC inputs and outputs.

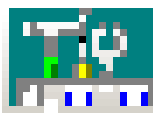


Oscilloscope

The Oscilloscope allows the observation of several operands (signals) inside the PLC changing their value over the time.



Oscilloscope.

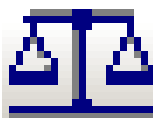


Preferences

This icon opens dialog boxes to customize the appearance of *S7 for Windows®*. The settings for the serial port, the editors, the indexes, the display font and other (miscellaneous) settings are saved and are reloaded whenever a new PLC project is opened.



Preferences, Fonts, etc.



PLC Block (Program) Compare

S7 for Windows® offers a powerful PLC Program (Block Compare). The command **Compare** opens dialog boxes to



Compare PLC programs and blocks.

select PLC Program files to compare (online and offline).



S7 Hardware configuration

This icon opens a window to setup and change the Hardware configuration of the S7 PLC.



Dynamic PLC Block Display

Enables fast switching between open PLC status windows.



Closing Open Windows

The *S7 for Windows®* active window is closed by clicking this icon. The keyboard shortcut **Ctrl+F4** provides the same function.



Help Function

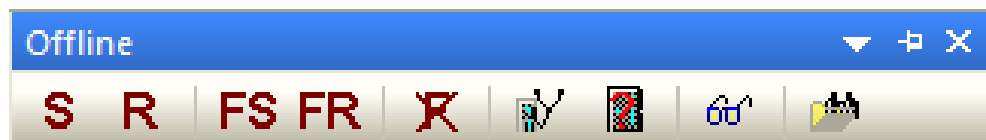
An integrated subject related help file with an index and a list of keyboard shortcuts for easy operation is available. The keyboard shortcut **F1** provides the same function.

1.5 Windows displayed in the S7 Workplace.

As soon as a window is opened in the workplace (see chapter 1.4 – “View” menu) an additional Toolbar is opened. The icons displayed depend on the window opened.

The tool bar II provides instant access to frequently used commands. Click an icon with the mouse and the command is executed. With the keyboard you can reach these functions via the File menu and the Block menu. The icons of currently usable commands are displayed in full colors. Inactive ones are in light grey.

Tool bar II (Offline)



Tool bar II (Online)



Tool bar II**(Module, Automatic Troubleshooting, Symbolic Table, Force Values)****SET**

A marked Operand will be “Set”. A logical one (1) is introduced to the marked bit. The next PLC cycle overwrites the set bit with the actual RLO. The user program may also modify the Operand.

S Set.(Alt+F8)
Set.

**RESET**

A marked Operand will be “Reset”. A logical zero (0) is introduced to the marked bit. The next PLC cycle overwrites the set bit with the actual RLO. The user program may also modify the Operand.

R Reset.(Alt+F7)
Reset.

**Change Value**

The change value dialog box will be opened to display and modify process variables. The next PLC cycle overwrites the change value with the actual RLO. The user program may also modify the Operand.

V (Alt+F6)
Dialog box to change values in the PLC.

**Force to 1 – SET**

A marked Operand will be “Forced to 1”. A logical one (1) is introduced to the marked bit. A forced value of “1” cannot be overwritten by the actual stage of the RLO or the user program.

FS Force to 1.
Force to 1.

**Force to 0 – RESET**

A marked Operand will be “Forced to 0”. A logical zero (0) is introduced to the marked bit. A forced value of “0” cannot be overwritten by the actual stage of the RLO or the user program.

FR Force to 0.
Force to 0.

**Force Value**

The change value dialog box will be opened to display and modify process variables. A forced value cannot be overwritten by the actual stage of the RLO or the user program.

FV
Force value.

**Switch of Forcing**

The forcing of the marked Operand will be switched off. The RLO and / or the user program takes control over the marked Operand.

X Switch off forcing.
Switch off forcing.



Find the most likely reasons for this Signal State

S7 for Windows® provides an Option to trace back an Output Signal (Q, PQ) or a Memory Signal (M) to the source Signals.



Find most likely reasons for this signal state.
Find most likely reasons for this signal state.



Show the Module State of the Connected PLC

This icon enables you to view the program interrupt information stored in the PLC (I-Stack, B-Stack, Diagnostic Buffer). The information is displayed in real language with the faulty portion of the program.



Show the module state of the connected PLC.
Show the module state of the connected PLC.



Show Current Values

This icon is provided to activate the status display. Clicking the icon again will deactivate the status again.



Show current values
Show current values



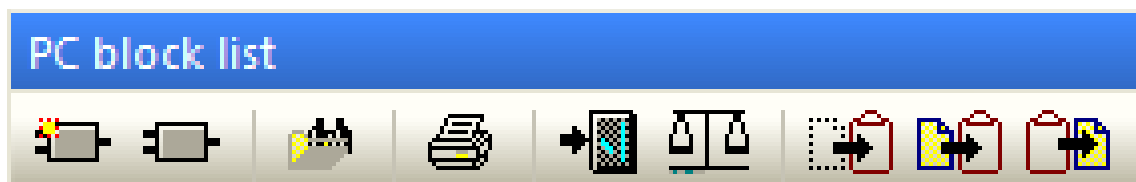
Show Cross Reference List for this Operand

The Cross Reference is opened and displays a list where the marked operand is used in the PLC program.

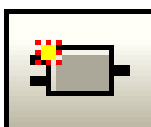
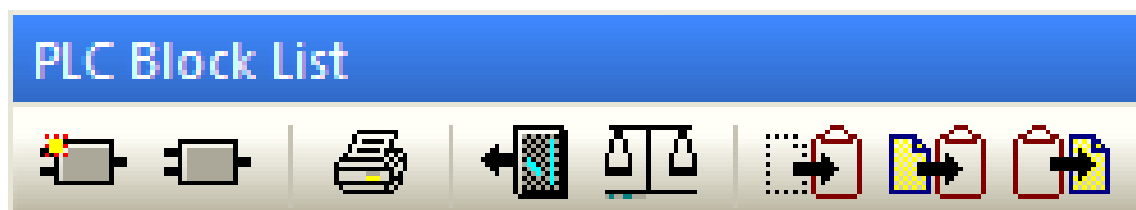


Show cross reference list for this operand
Show cross reference list for this operand

Tool bar II (PC Block List)



Tool bar II (PLC Block List)

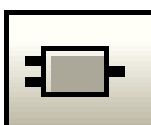


Create new PLC Block

A dialog box to establish the name of the new block is opened. After entering the new Block, the Block Editor window is opened and ready for creating a new Block.



Create new PLC block.
Create new PLC block.



Edit Block

The block selected in the block listing will be displayed in the block editor and is ready for any changes.



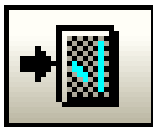
Edit Block, open Block Editor.
Edit(Strg+Alt+O)
Edit Block, open Block Editor.



Print Block

The marked block is printed.

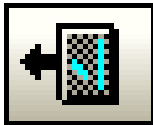
Print block.
Print block(Strg+Alt+P)
Print block.



Transfer Block to PLC

The marked blocks are transferred to the PLC.

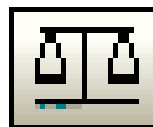
Transfer Block to the PLC.
Transfer Block to the PLC(Strg+F5)
Transfer Block to the PLC.



Transfer Block to PC

The marked blocks are transferred to the PC.

Transfer Block to the PC.
transfer to PC
Transfer Block to the PC.



PLC Block Compare

The marked Block from the PC Block List is compared with the Block in the PLC (online and offline compare).

Compare PC block with PLC block.



Cut Block

The marked blocks are transferred to a temporary buffer and are removed from the Block List. The keyboard shortcut **Ctrl+X** provides the same function.

Cut Block.
Cut Block
Cut Block.



Copy Block

The marked blocks are transferred to a temporary buffer and remain in the Block List. The keyboard shortcut **Ctrl+C** provides the same function.

Copy selected Block into the clipboard.
Copy selected Block into the clipboard
Copy selected Block into the clipboard.



Paste Block

The blocks currently in the temporary buffer are transferred to the PC block list. The blocks remain in the temporary buffer. The keyboard shortcut **Ctrl+V** provides the same function.

Paste Block.
Paste block
Paste Block.

1.6 Generating an S7 Project

A new S7 Project can only be generated in an existing Folder.

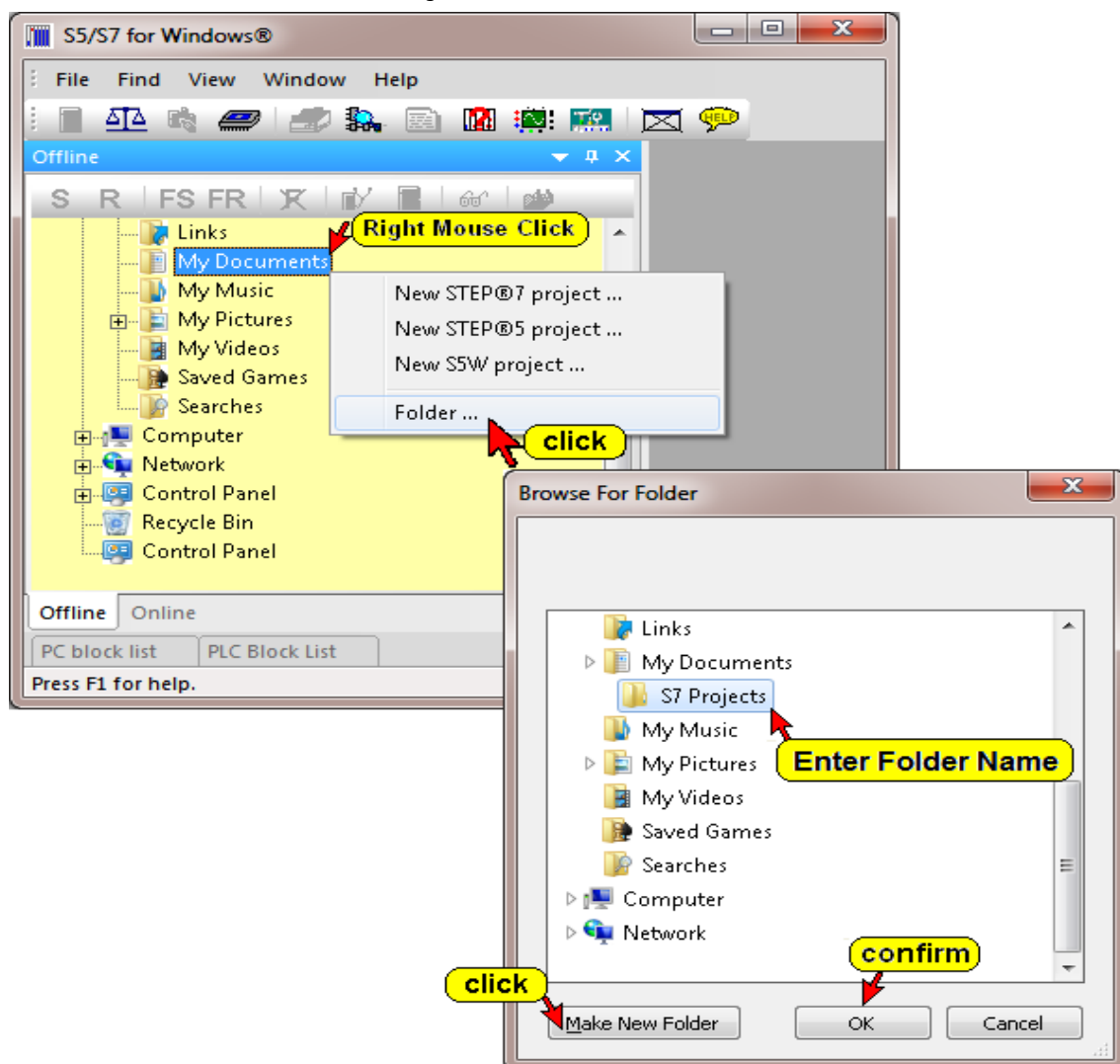
S7 for Windows® provides a command to generate a “New Folder”.

It is not recommended that you generate a new project directly in the “My Documents” folder. You can name a new folder and put it in the “My Documents” folder, for instance “S7 Projects”.

Note:

To “debug” a PLC program located in the PLC, you have to have the PLC program located in a S7 Project. This could be the original project with comments and symbols (preferable).

If the original project is not available you must download the PLC program into a newly generated S7 Project.

Generate a new “S7 Projects” folder**Note:**

Windows with “Offline – information” have a light yellow background.

Note:

Windows with “Online – information” have a light green background.

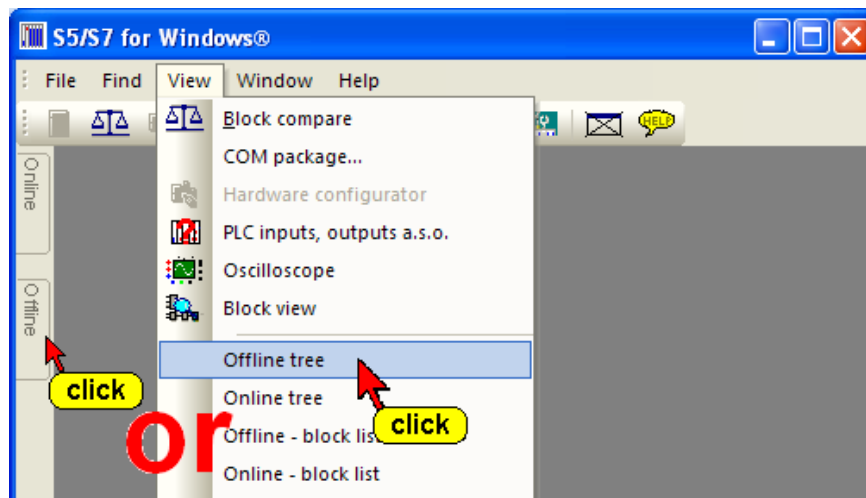
Commands to open a new project

S7 for Windows® provides the possibility to generate S7 projects in the same format than the SIEMENS® STEP® 7 projects.

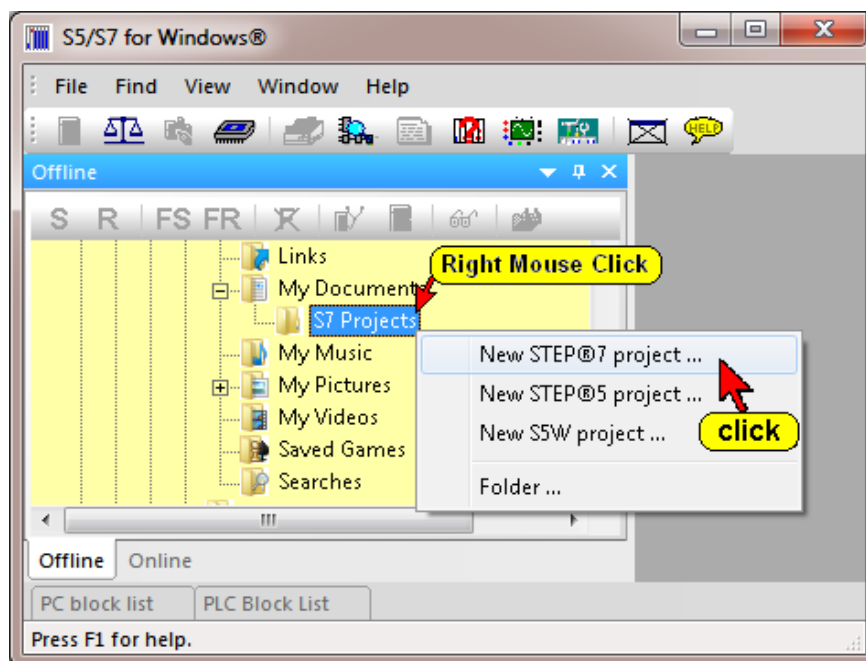
This way import and export functions are not required with S7 for Windows®.

The following explains the steps to generate of a “**New STEP® 7 project**”.

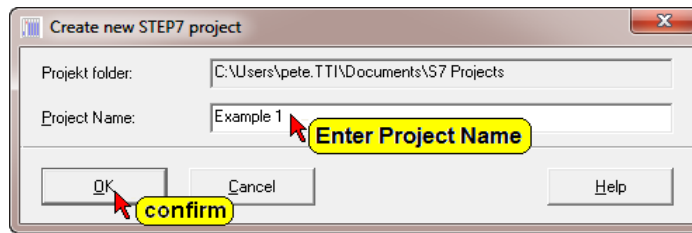
- Open the “Offline” window.



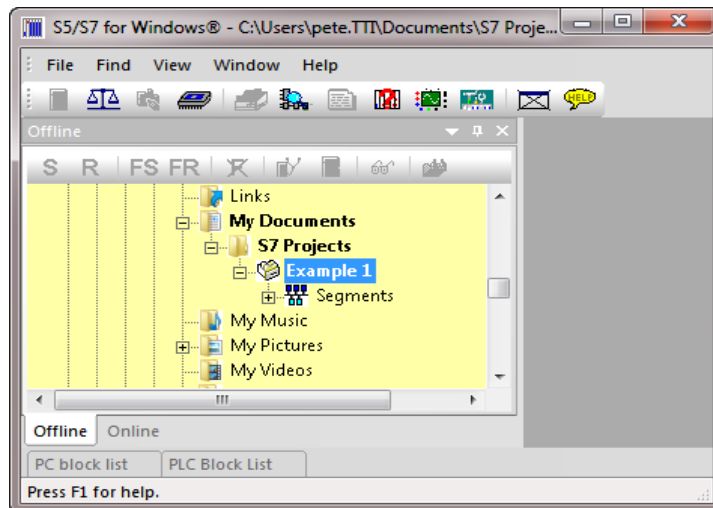
- Click the folder with the right mouse button to open the context menu to select the “New STEP® 7 project” command.



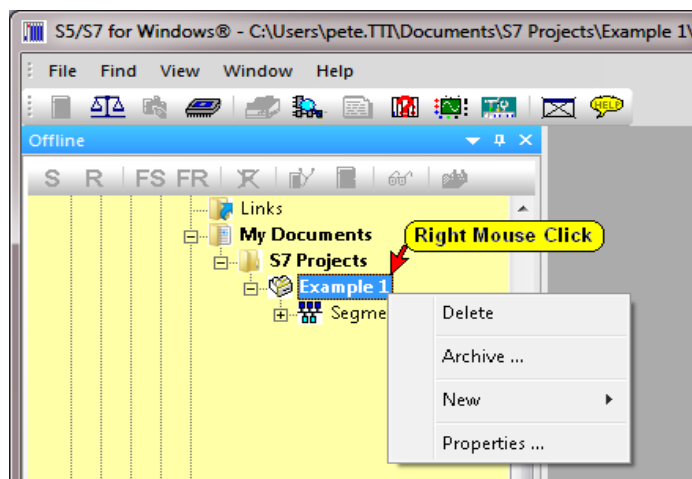
- Type the Project Name “Example 1” in the “Create new STEP®7 project” dialog box and confirm with “OK”..



In the Folder “S7 Project” the STEP® 7 Project “Example 1” is generated.

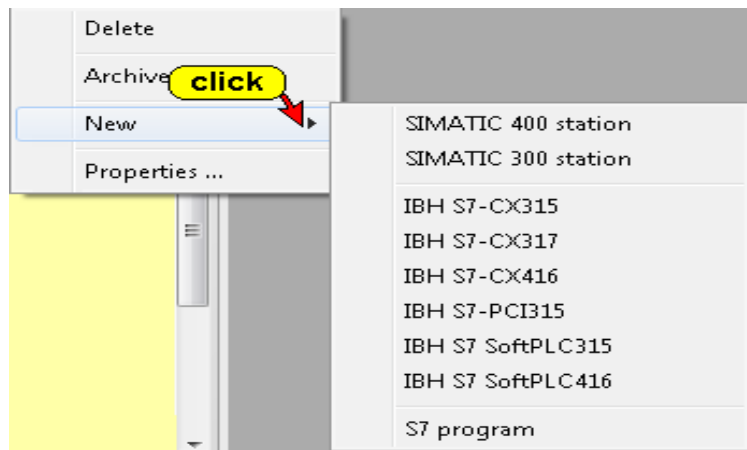


- Click the “S7 Project Example 1” with the right mouse button to open the context menu.



- **Delete** This command deletes the STEP® 7 Project.
- **Archive** With this command the STEP® 7 Project is archived. In the opened dialog box the archive name (file name) and the archive location (path, folder) is packed in the ZIP format.
- **Properties** In the opened dialog box the STEP® 7 Project name can be changed. An author name and comments can be added.

- The “**New**” command opens dialog box to select containers for the CPU and / or the S7 program logic.



- **SIMATIC 400 station** SIMATIC 400 station
The container will house the complete hardware configuration of a PLC with a Simatic 400 CPU.
- **SIMATIC 300 station** SIMATIC 300 station
The container will house the complete hardware configuration of a PLC with a Simatic 300 CPU.
- **IBH S7-xxx**
The container will house the complete hardware / software configuration of a Hardware / Software PLC compatible with a Simatic 300 or 400 CPU.
- **S7 Program** S7 program
The container will house the PLC-blocks of an S7 PLC Program.

A STEP® 7 Project can contain multiple containers. As soon as a SIMATIC station or an IBH S7-xxx station is selected a S7 Program container is automatically inserted.

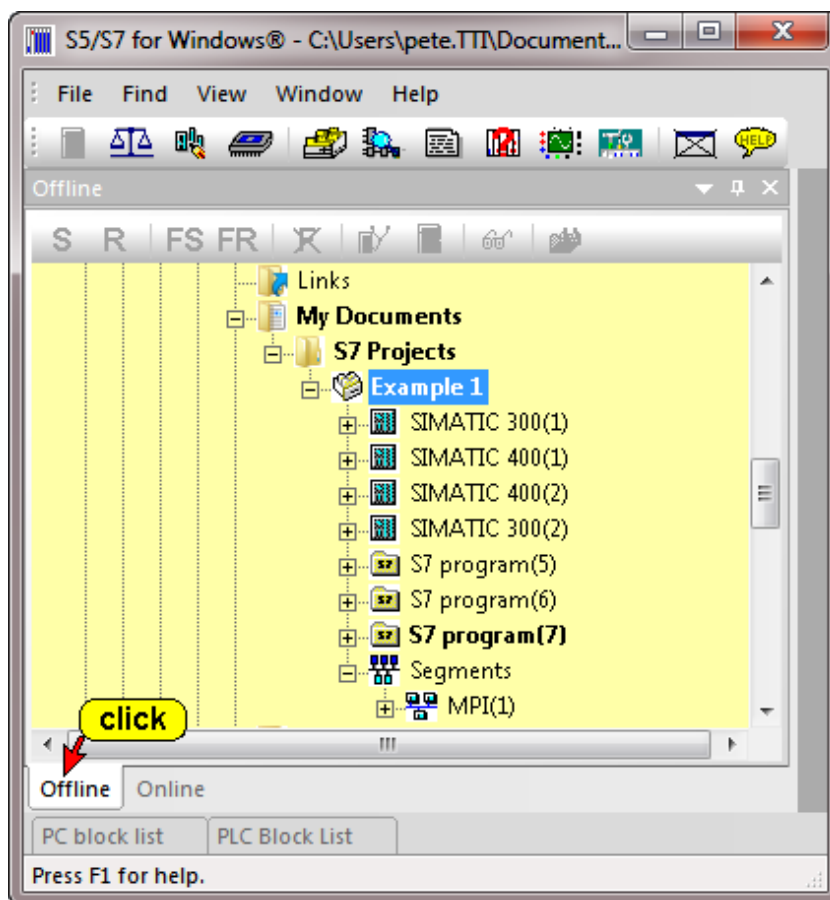
- If you want to transfer a PLC program from a S7 300 CPU click “**SIMATIC 300 station**”. If the PLC you want to work with has a S7 400 CPU click “**SIMATIC 400 station**”.

The S7 project with its name “Example 1” with the selected containers is listed in the “Offline – Tree”.

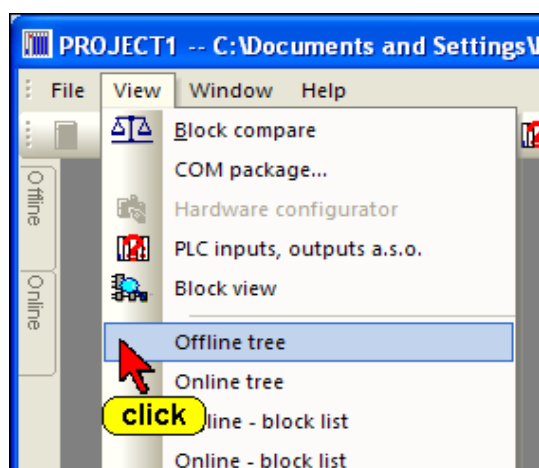
Note:

A STEP® 7 Project can hold multiple S7 programs and S7 stations.

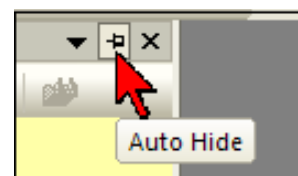
- Click the tab “Offline” to display the contents of the STEP® 7 Project. If multiple containers are entered into the STEP® 7 Project they are automatically numbered.



- If the “Offline” tab is not shown, use the command “Offline tree” from the “View” menu to open the Offline window.



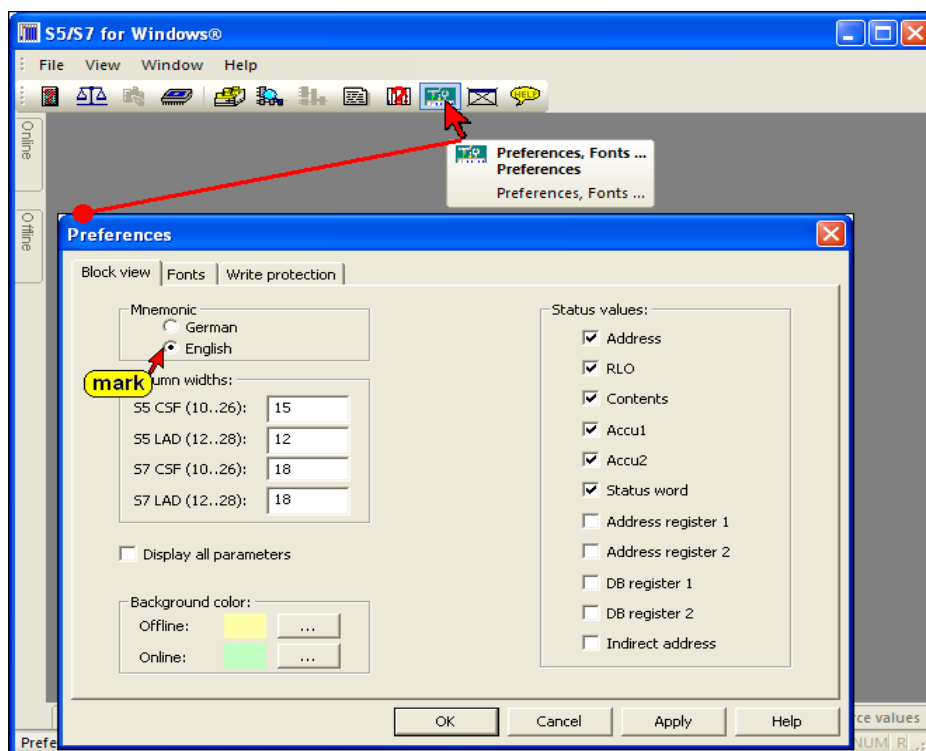
It is recommended that you use the “Auto Hide” icon to lock the tab at the outside border of S7 for Windows®. By moving the mouse pointer to the tab the window will open automatically.



Note:

A “Project” is required to make a PLC user program. You also must have an open project to transfer and save an existing program from a PLC for backup purposes.

1.7 Selecting the English Mnemonics



In the USA, PLC programs usually use English Mnemonics. The selection changes the mnemonics of the instructions (key words), of the operands in the logic and the symbolic table. The selection will not change the language of the program (menu commands, symbols, comments, etc.).

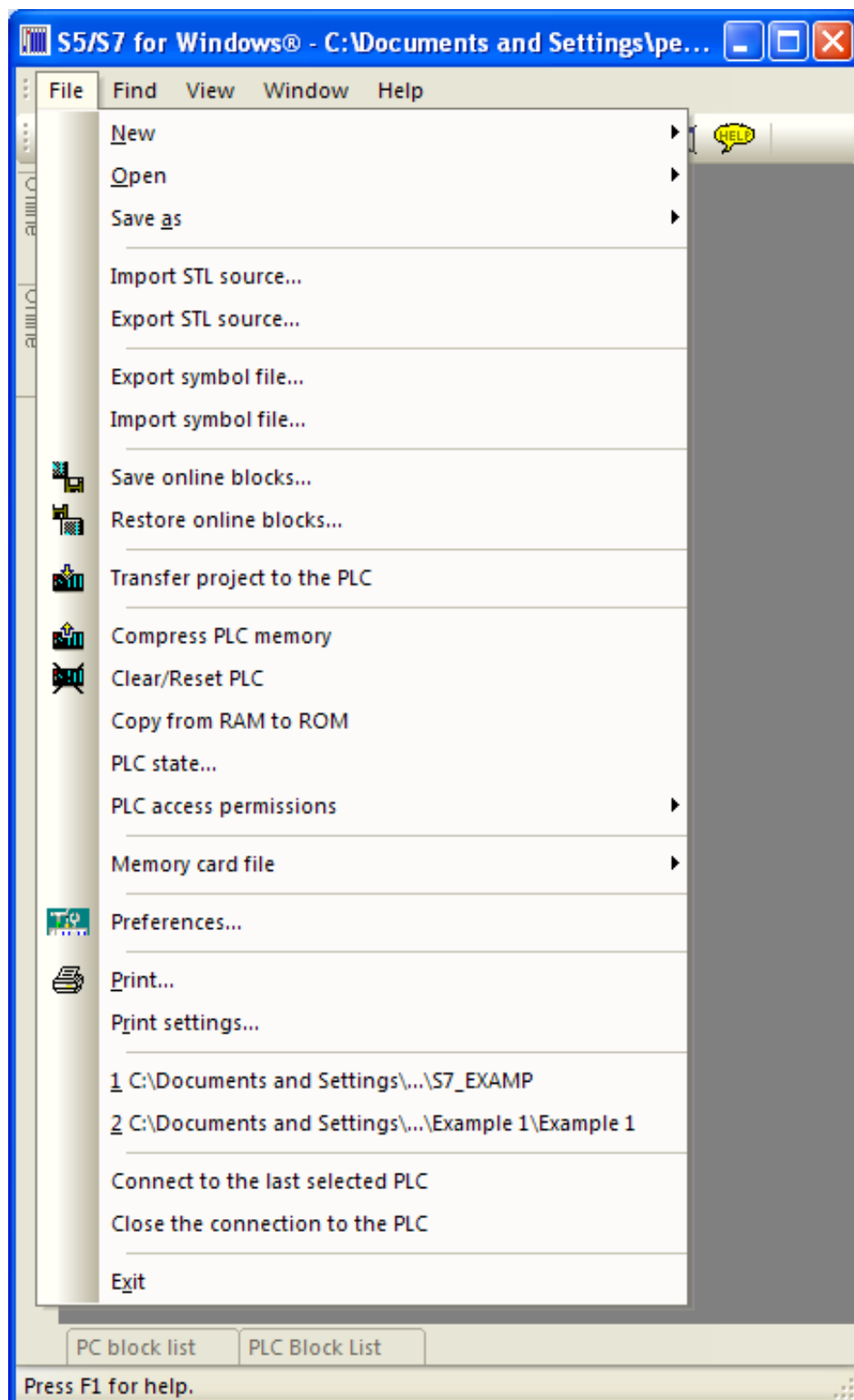
The mnemonics to identify Bit-Memory, Timers, Counters, Inputs, Outputs, and the instruction set used for Statement List (STL) programming are identified with their English (International mnemonics) syntax.

Examples:

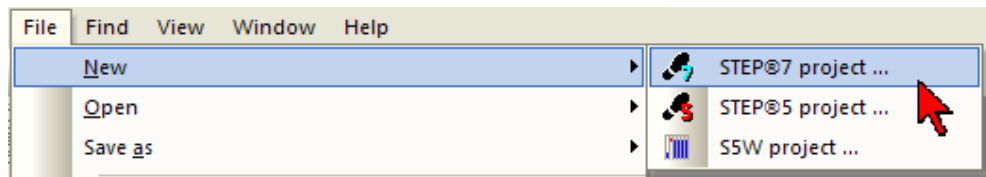
Input	I	Timer	T	OR	O
Output	Q	Counter	C	Count Down	CD
Memory	M	AND	A	Count Up	CU

1.8 File Menu

The commands in the File Menu control the opening and saving of projects (files). Your personnel preference settings as well as the printing and documentation layouts are also controlled by the commands from this menu. Basic online debug functions are also available.



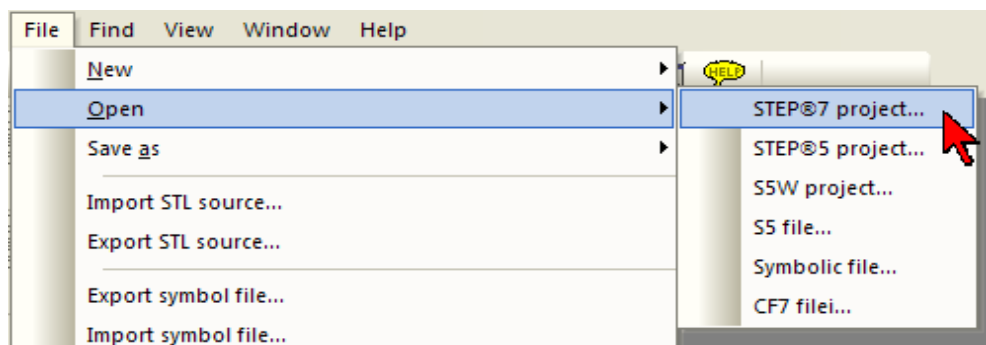
New (New Project)



The **New** command is used to create a new project. An additional menu is opened to select the type of project (see Chapter 1.6 Generating a S7 Project).

A dialog box will be opened to enter the name of the new project and to select the path (folder) to store the project.

Open

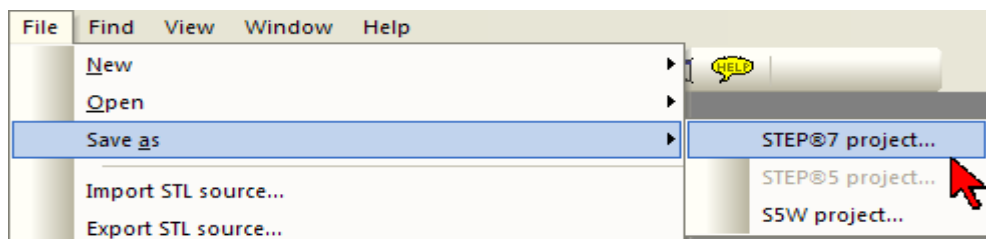


The **Open** command is used to open a PLC program in a project or a file containing a S5 program, a symbolic table (S5 or S7), or a hardware configuration (s7) direct. An additional menu is opened to select the type of project or a file to open.

A dialog box will be opened to select the path (folder) the name of the project and the PLC Program to be opened.

If you selected to open a file a dialog box will be opened to select the path (folder) the name of the file. Only files with the corresponding the file name extension (**.S5**; **.SEQ**; **.CF7**) will be listed.

Save as



The **Save as** command is used to save the in the “Offline Tree” marked Project (the PLC Blocks of the Project are listed in the “PC Block List”). An additional menu is opened to select the type of project to be saved. A dialog box will open to define the name and path to save the project.

Export STL source

Export STL source...

The structure of the STL Source (Source Text) is based on the IEC 1131 standard. The S7 Program to export must be selected in the “Offline Tree”. The PLC Blocks of the S7 Project (the “PC Block List”) are converted in the STL Source format and are saved in a file with the file extension ***.awl**.

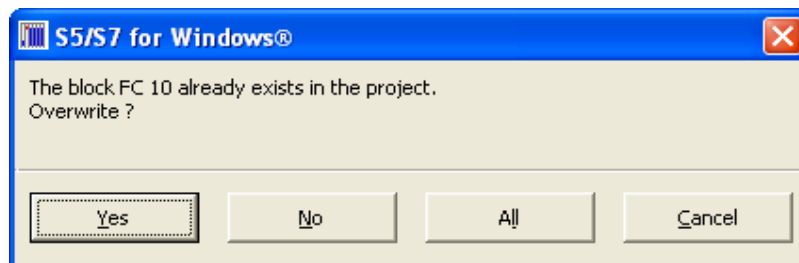
STL Source Code (Text) can be modified with any text editor (Notepad etc.). This might be necessary to add “Know-How Protection” to a S7 Block.

Import STL source

Import STL source...

The S7 Blocks located in a file in the STL Source format with the file extension ***.awl** can be imported to an S7 Program. The S7 Program to import to must be selected in the “Offline Tree”. The S7 Blocks are added to the S7 Blocks in the PC Block List. During the import the Block is automatically compiled into Statement List (STL).

A dialog box opens if the Block to be imported is already present in the S7 program listed in the PC Block List.



Click the **Yes** button to overwrite the PLC block listed in the dialog box only. If another block is imported the dialog box will be opened again.

Yes

Click the **No** button to not be overwrite the block listed in the dialog box. The original block remains untouched.

No

If another block is imported, the dialog box will be opened again.

Click the **All** button to overwrite the PLC block listed in the dialog box. Any further block to be imported will also be overwritten. The dialog box will not be opened again.

All

Click the **Cancel** button will abort the block import. The PLC block listed in the dialog box and any further block to be imported will not be imported. The dialog box will not be opened again.

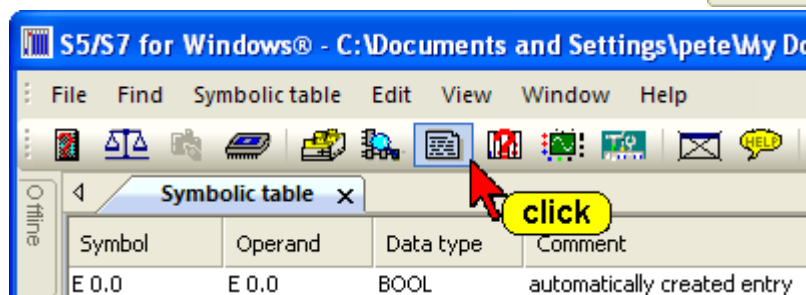
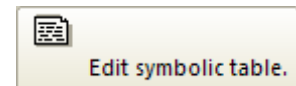
Cancel

Export Symbolic File

Export symbol file...

The symbolic table of the PLC program can be exported in plain text format (ASCII Text). The S7 Program must be selected in the “Offline Tree”. In the opened dialog box you have to select the path (folder) and to enter the name of the symbolic file to be exported. The symbolic table file is saved with the file name extension **.seq**.

To display the Symbolic File to be exported click the “Edit Symbolic Table” icon.



Import Symbolic File

Import symbol file...

A symbolic table located in a file in plain text format (ASCII Text) with the file name extension **.seq** can be imported. The symbolic table is added to the program. The S7 Program must be selected in the “Offline Tree”.

Note:

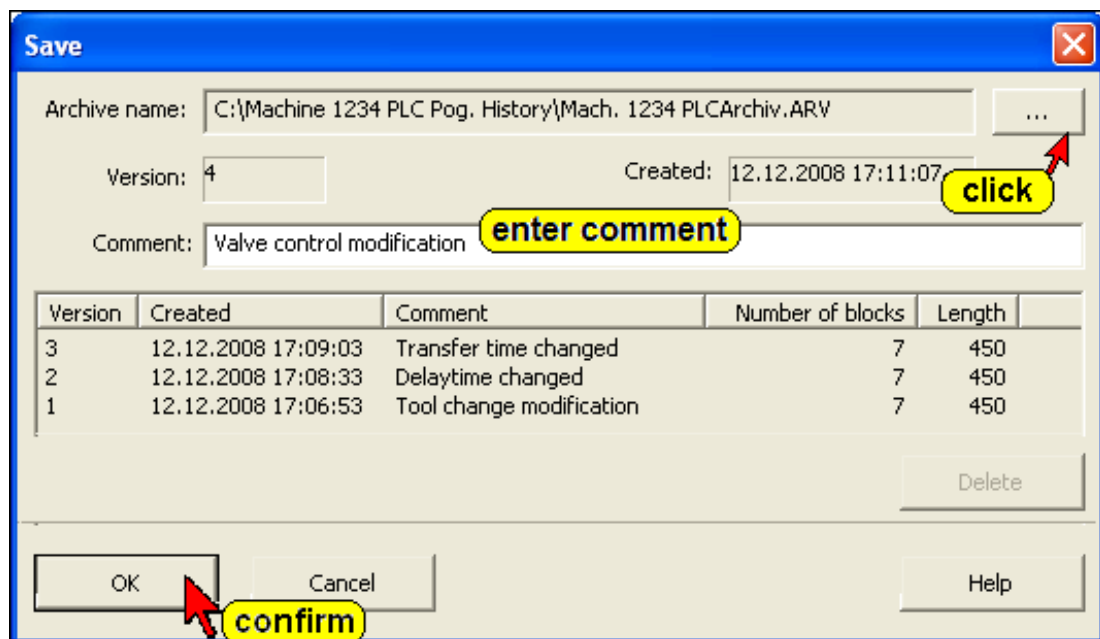
Any in the PLC existing symbolic table is overwritten. After the import only the imported symbolic table is available in the PLC program.

With this command you may only open files in the symbolic table file format (*.seq).

Save Online Blocks

Save online blocks...

The PLC Block in the connected online PLC can be saved in an archive file (compressed format). A dialog box is opened where you can select the **Archive Name** and the path to save the archived PLC program. This command is used to backup PLC programs and save the different versions (Backup History).



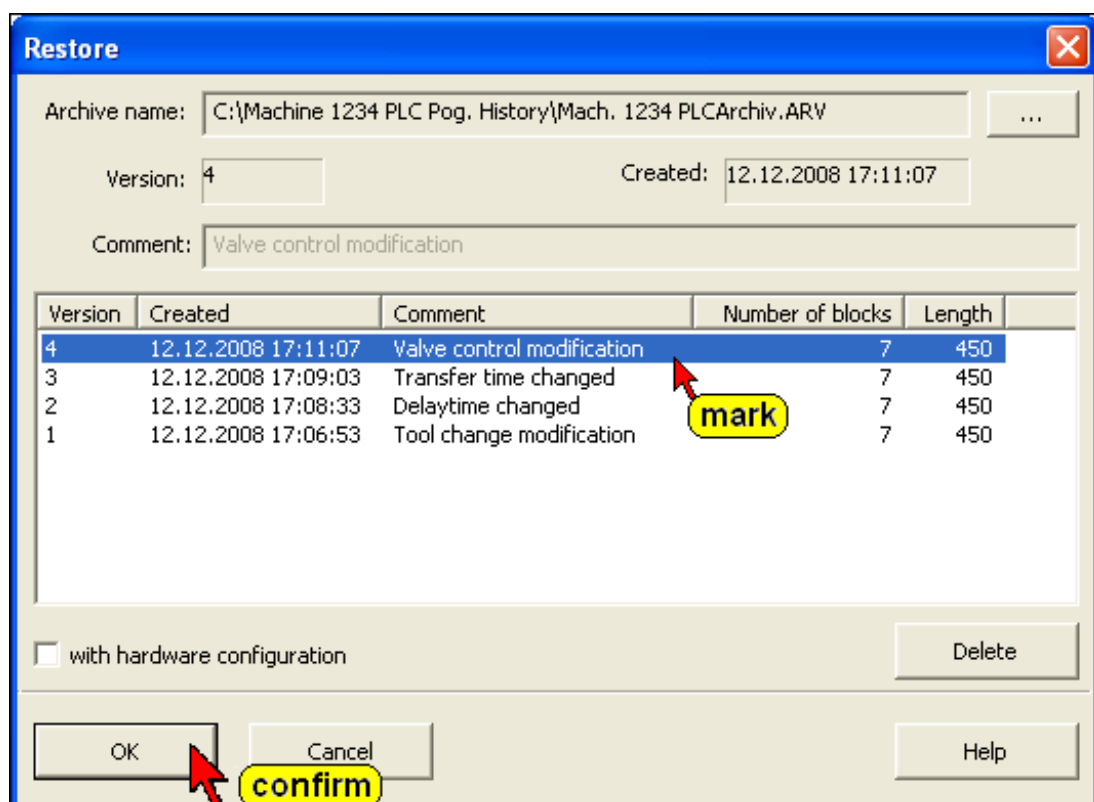
Restore Online Blocks



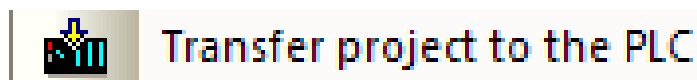
Restore online blocks...

The archived PLC Programs saved in the PC (different versions – backup History) are listed. The marked archived PLC Program can be transferred to the connected online PLC. This program will replace PLC program inside the PLC.

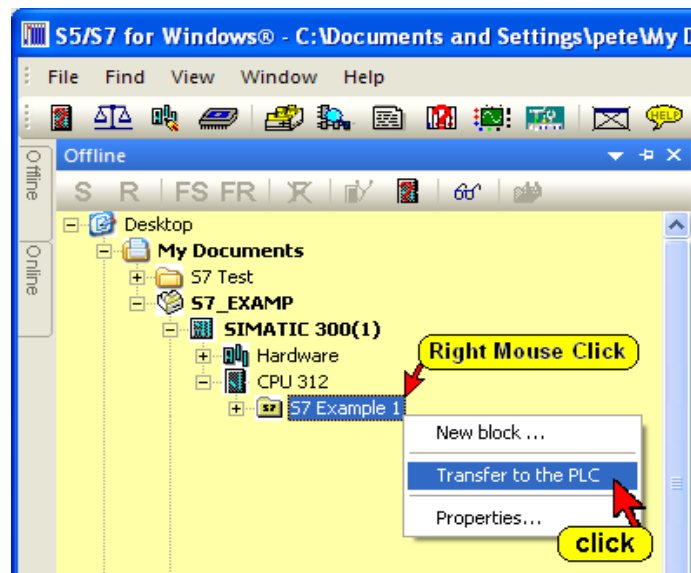
Restore Online Blocks



Transfer Project to the PLC

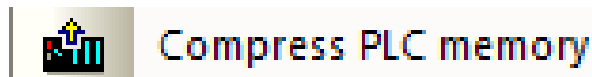


The PLC Program marked in the “Offline Tree” is transferred to the connected online PLC.



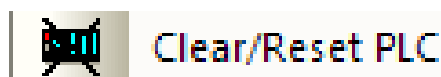
Prior to overwriting a Block a warning is displayed to allow or cancel the overwriting.

Compress PLC Memory



Deleting blocks in the PLC does not remove these blocks from the PLC memory. The deleted blocks still occupy space in the memory. If blocks with the same name are transferred to the PLC, the old block remains in the PLC and occupies space in the PLC memory. The command **Compress**, from the File menu, reorganizes the PLC memory. All the unused blocks are deleted. After executing this command, only usable blocks remain in the PLC memory.

Clear / Reset PLC



Click the command “**Clear / Reset PLC**” in the File menu.

Overall Reset; Erasing the Program Memory and Resetting the CPU

Before downloading a new program to the S7 programmable controller (PLC) a memory reset on the CPU should be performed to ensure that no "old" blocks and information are still in the CPU.

Overall Reset deletes the following:

A memory reset clears the following data from the selected module:

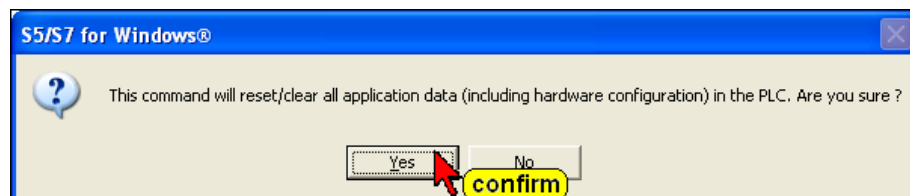
- Work memory
- Read/write area of the load memory

If a memory card is inserted, the module copies the contents of the memory card to the internal load memory following the memory reset.

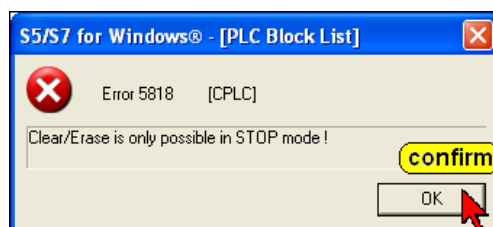
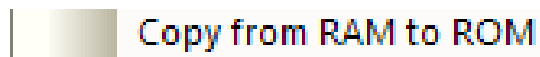
- System memory
- Backup memory

The S7 MPI parameters and the diagnostic buffer are not changed.

To ensure that the command “**Clear / Reset PLC**” is not accidentally executed a warning is displayed. Confirm the warning.



If the CPU is not in the Stop mode a message is displayed and the command “**Clear / Reset PLC**” will not be executed.

**Copy from RAM to ROM**

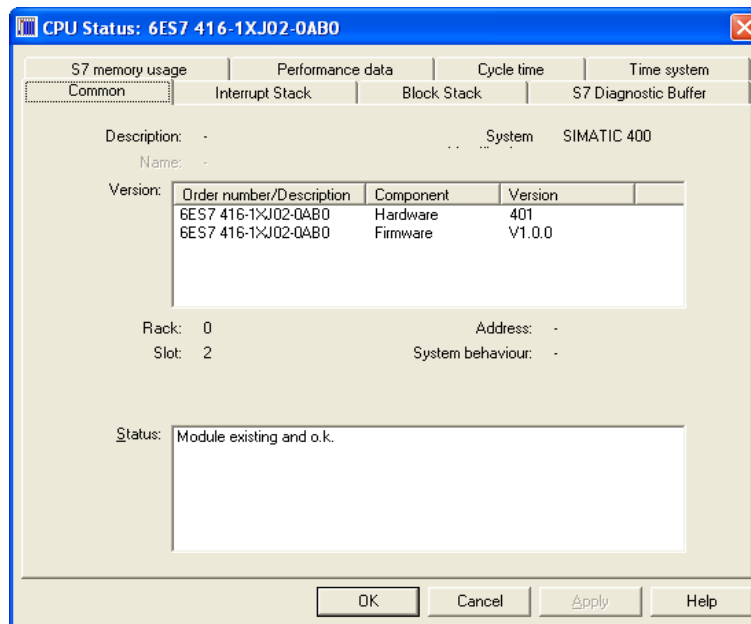
Click this command to copy the contents of the RAM of the active module to the ROM area (only modules which support this function).

PLC State

Several displays are provided to display the status of the online PLC. If the PLC is running only the common information the S7 Diagnostic Buffer and the S7 memory usage display are available.

If the PLC is in a stop due to a fault condition, the Interrupt Stack (I-Stack) and the Block Stack (B-Stack) will display the reasons for the stop condition.

Common Information

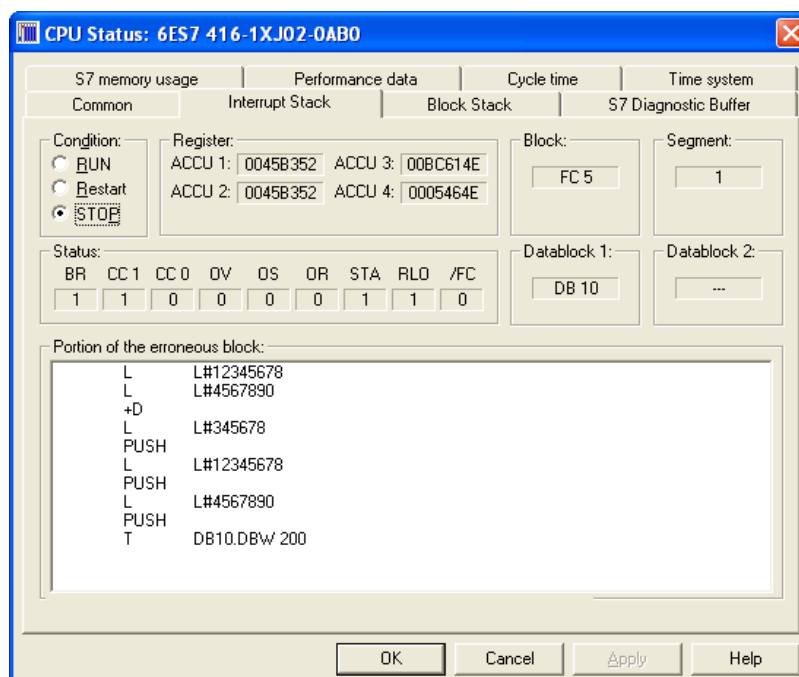


The "Module Information" property sheet contains detailed diagnostic and maintenance information on the module. Depending on the diagnostics capability of the module, different information is available.

Interrupt Stack (I Stack)

Clicking the "Interrupt Stack" tab opens the interrupt stack (I stack). The interrupt stack always refers to a priority class. First the respective organization block must be marked (selected) in the B stack.

The data displayed is valid for the interrupted priority class assigned to the organization block (OB) selected in the block stack.



RUN

If the PLC is in a STOP condition. Click RUN to put the PLC into the RUN condition. Start with the execution of OB100.

Restart

If the PLC is in a STOP condition. Click Restart to put the PLC into the RUN condition. Start with the execution of OB101 / OB102 (CPU 400 only).

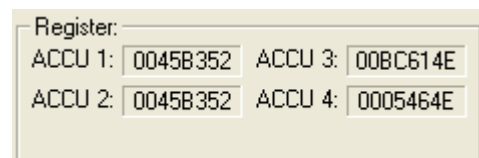


STOP

The PLC is in a RUN condition. Clicking STOP to put the PLC into a STOP condition.

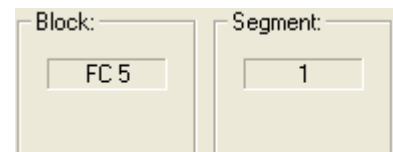
Register (ACCU's)

The contents of accumulators 1, 2, 3, and 4 are displayed in hexadecimal form.



Block and Segment

The block and the Segment where the PLC program was interrupted (stop condition) is displayed.



Data Blocks

The active data blocks (DB) are listed when the PLC program was interrupted, the data block numbers will be displayed.

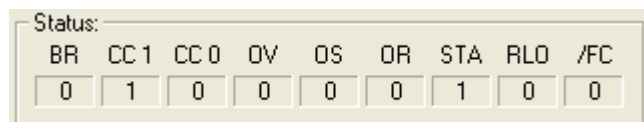


Status

Status Word Bits:

The bits zero to eight of the status word are

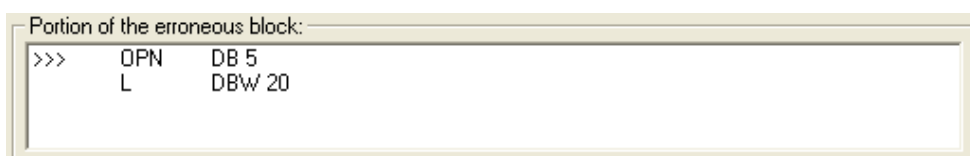
also displayed and given an abbreviation for their meaning (bit 9 ... 15 unassigned).



Assignment	Bit	Description
BR	8	Binary Result The BR bit is used to indicate whether or not an error occurred during the execution of an SFB or SFC. ● If an error occurred the BR bit is 0 ● If no error occurred the BR bit is 1

Status Word Bits (continued)

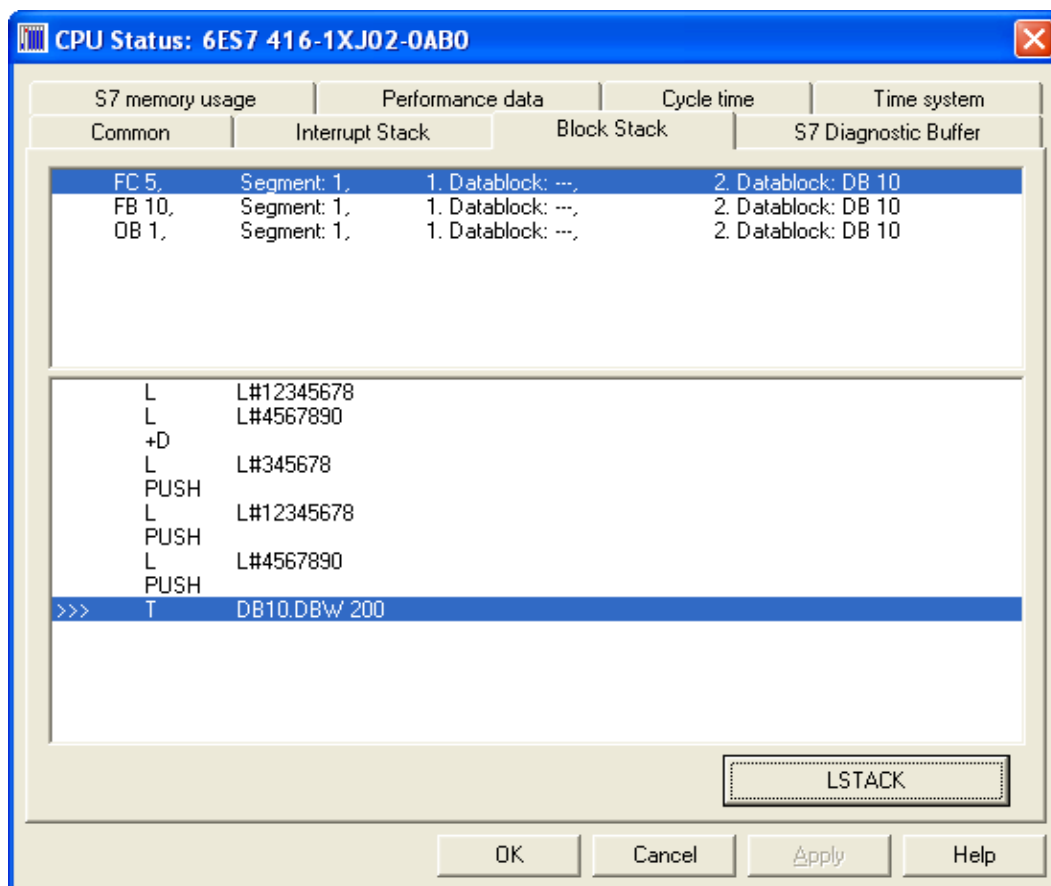
Assignment	Bit	Description	
CC 1, CC 0	7, 6	Condition Code 1 Condition Code 0	The CC1 and the CC0 bits provides information about the results of various operations: <ul style="list-style-type: none"> ● Results of a math instruction ● Results of a shift or rotate instruction ● Results of a comparison instruction ● Results of a word logic instruction
OV	5	Overflow	The OV bit is set if an error occurred during an arithmetic function, math function or compare function. The OV bit is reset if the fault is cleared.
OS	4	Stored Overflow	The OS bit is set together with the OV bit but is not reset if the fault is eliminated. The bit can be reset with the Jump if OS=1 (JOS), the block call, or the block end commands.
OR	3	Or (AND before OR)	The OR bit is used during the execution of a logical AND instruction (A, AN, A(, AN(,)and NOT) prior the OR operation. If the RLO of the logical AND instruction a "1", the OR bit is set. Any other logical bit instruction resets the OR bit.
STA	2	Status	The STA bit stores the value of the addressed (referenced) bit.
RLO	1	Result of Logic Operation (previous)	The RLO bit stores the result of a logical operation triggered by a bit logic instruction or math comparing instructions.
/FC	0	First Check Bit (negated)	The value of the FC bit is used to control chained logical and compare instruction.

Portion of Erroneous Block

A list field is provided to display the portion of the PLC where the fault occurred.

Block Stack (B-Stack)

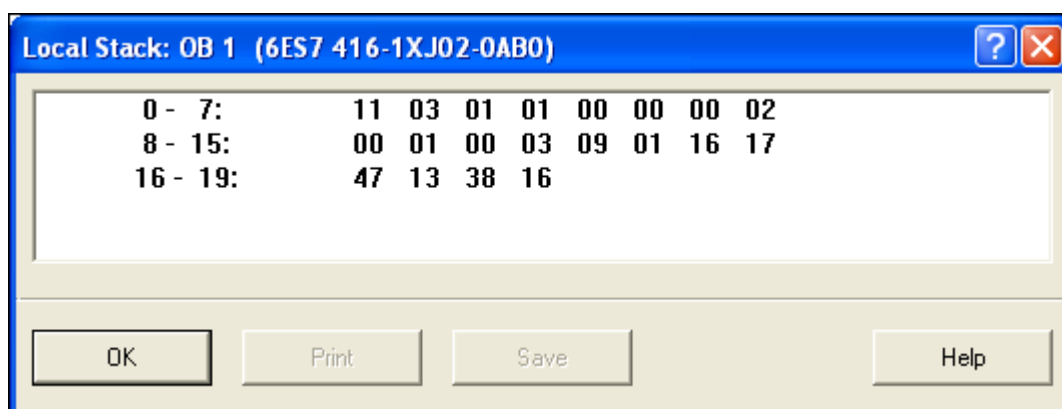
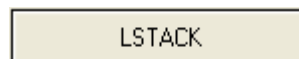
During the program execution the jump instructions enter data in the block stack. The block where the jump (block call) originated and the following locations are listed. The block stack lists all the blocks that that were called but had not been completely processed prior to the CPU going into its STOP mode.



Details are displayed about the selected block (segment). Mark the Block that you want details on.

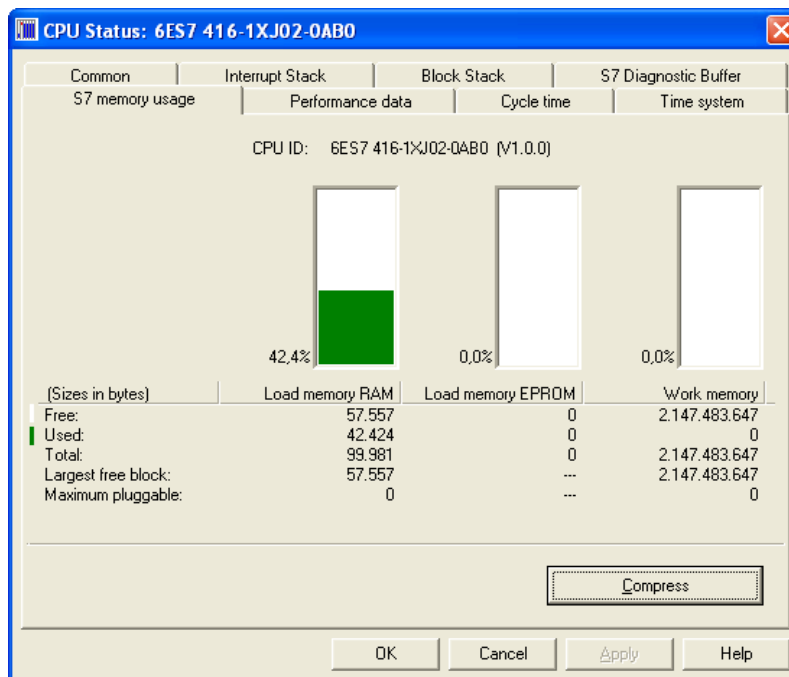
L-STACK

The data in the L-Stack (local Temp data) can be displayed. Select the Block and click the "LSTACK" button.



S7 Memory usage

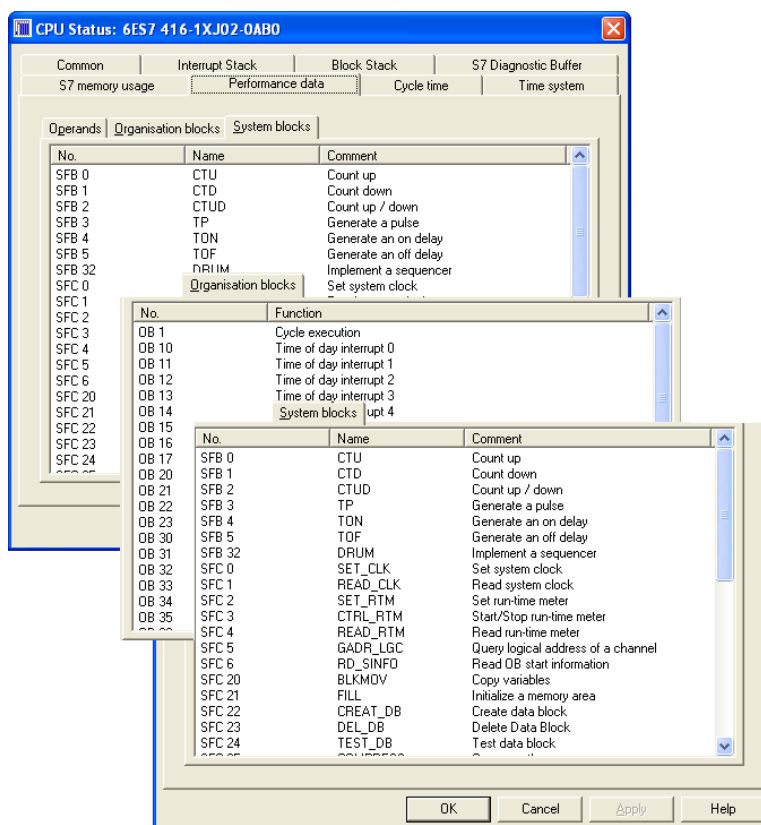
The used memory with its absolute addressing is displayed.



A button is provided to compress the memory.

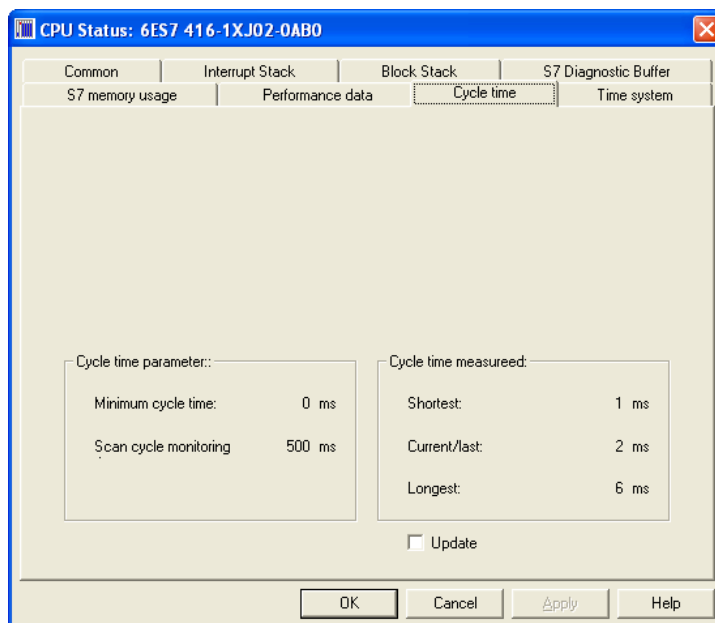
Performance Data

The types and amounts of operands, the types Organization Blocks and their numbers, and the System Blocks (SFC, SFB) the CPU can perform are listed.



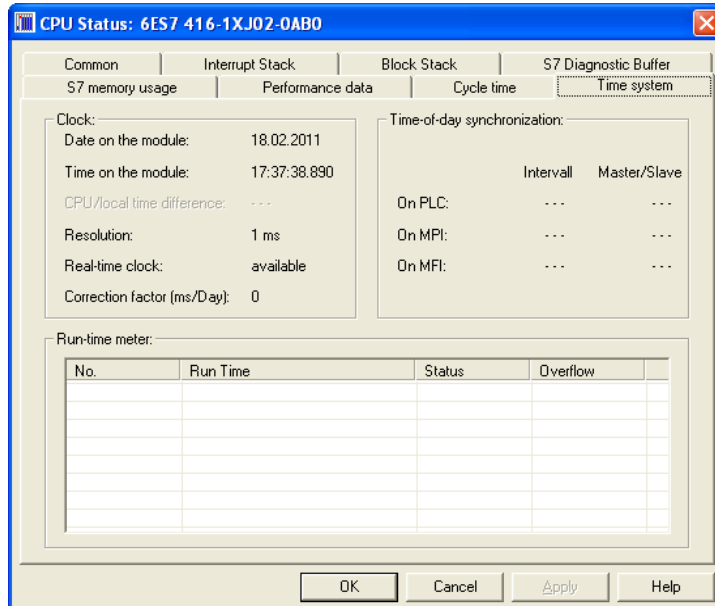
Cycle Time

The preset maximum Cycle Time (Hardware Configurator) and the actual cycle times (shortest, current / last, and the longest) are listed.

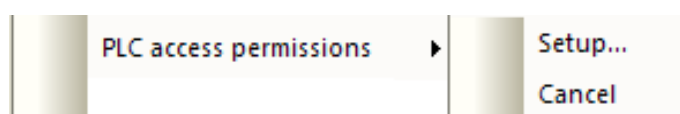


Time System

The parameters of the time settings of the CPU are displayed.

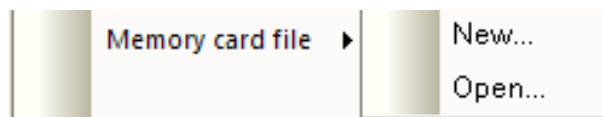


PLC Access Permission



The "SETUP" command opens a dialog box to assign a password to access an online connected PLC. With the "Cancel" command the access can be permitted. Not all CPUs support this function.

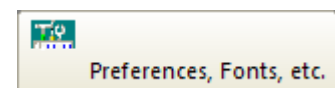
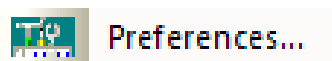
Memory Card File



The "Memory Card file New..." and "Memory Card file Open..." functions can be used to save a full set of data from a project to a memory card along with any other data desired.

This data can then be retrieved from the memory card for subsequent use. In addition, you have the option of saving the current user program (including the HW configuration) to the memory card. To save or retrieve data, the memory card can be located either in a CPU or in the slot of a programming device (PG) or PC. The "New.../Open... Data on Memory Card" functions are only available for newer CPUs.

Preferences

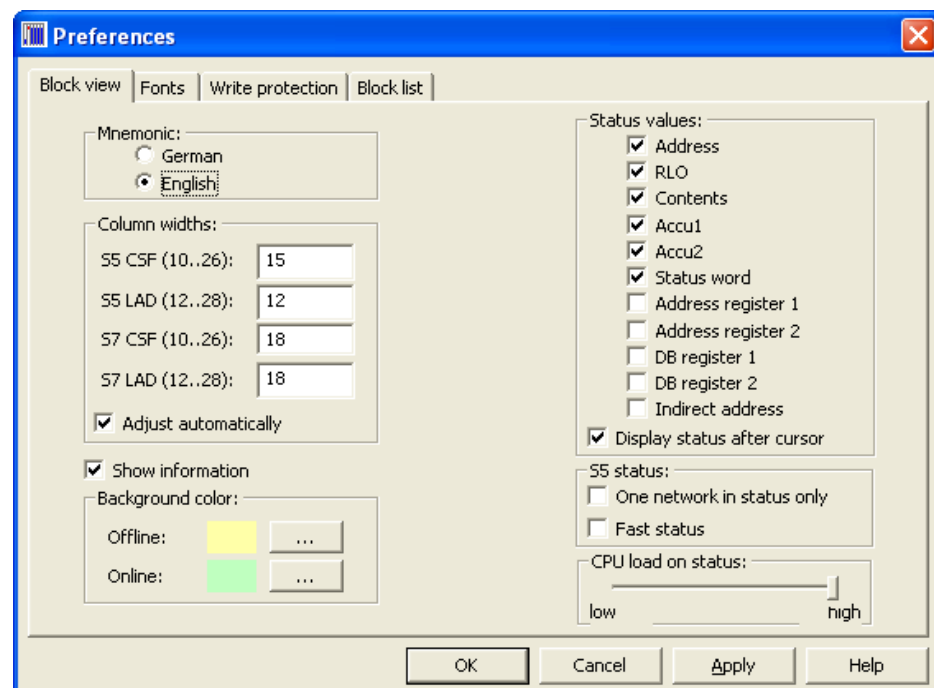


The **Preferences** command or clicking the icon opens the **Preferences** dialog box.

The dialog box is designed as a card file with tabs to separate the different subjects.

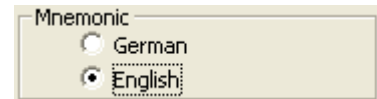
Each dialog box card offers buttons and command fields to setup the appearance of *S7 for Windows®*.

Block View Tab



Mnemonics

The language of the mnemonics you want to use can be set. The selection changes the mnemonics of the instructions (key words) and the operands in the logic and the symbolic table. The selection will not change the language of the program (menu commands, symbols, comments, etc.).



English Mnemonics (normally ON)

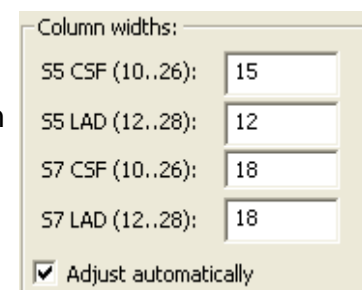
The mnemonics to identify Bit-Memory, Timers, Counters, Inputs, Outputs, and the instruction set used for Statement List (STL) programming is identified with their English (International mnemonics) syntax.

Mnemonics		
Name	English	German
Input	I	E
Output	Q	A
Memory (Flag)	M	M
Timer	T	T

Mnemonics		
Name	English	German
Counter	C	Z
AND	A	U
Count Down	CD	ZR
OR	O	O

Column Width (normally set as shown)

S7 for Windows® can display a symbolic operand with up to 24 characters (without a hyphen). To display symbolic operands with their full length name, the column width is adjustable. It is insured, that the operand is correctly identified even when the symbolic name is truncated in the display.

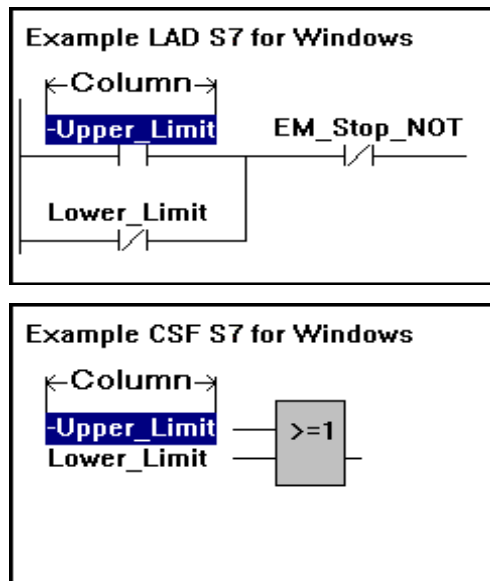


The column width can be adjusted automatically or set manually.

The column width is separately adjustable for the Control System Flowchart (**CSF**) and the Ladder Diagram (**LAD**) display. You can select a column width between 10 and 26 characters (including the leading hyphen) for the CSF display. LAD display allows a column width between 12 and 28 characters (including the leading hyphen).

The number entered as the column width is the number of characters spaces possible to display. The width of a character space varies with the font selected and does not always match the width of the other characters. Usually the number of space characters is slightly higher than the number of characters possible to be displayed in a given column width.

Column width example S7 for Windows®



Adjust automatically (normally ON)

The column width of each segment is adjusted automatically to the width of the used operands.

Status Values

Address (normally ON)

In this column the memory address of the S7 instruction is displayed. The address displayed in the STL Status window online, is the relative addresses within the PLC RAM area.

RLO (normally ON)

In this column the Result of a Logical Instruction (ROL) of the instruction, in that specific line, is displayed.

Contents (normally ON)

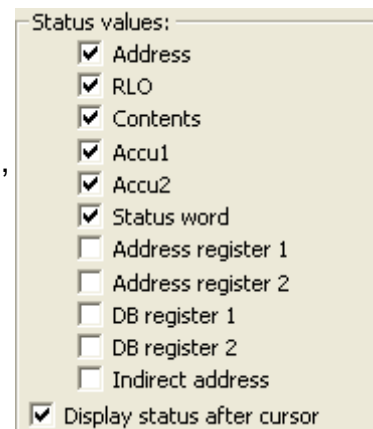
In this column the Status Bit or the Contents of counters and timers is displayed.

ACCU1, ACCU2 (normally ON)

In these columns the contents of the Accumulators is displayed. The accumulators are 16 or 32 bit general purpose registers and are used to process bytes, words, and double words.

Status Word (normally ON)

In this column, the contents of the Status Word is displayed. The eight (8) lower bits of the 16 bit Status Word Register are showing detailed information about the instruction.



Address Register 1, Address Register 2 (normally OFF)

The contents of the Address Registers are displayed in these columns.

DB Register 1, DB Register 2 (normally OFF)

The contents of the Data Block Registers are displayed in these columns.

Indirect Address (normally OFF)

In this column the information about the indirect addressing in use is displayed.

Display Status after Cursor (normally ON)

When selected, the status is only shown starting at the cursor position down to the end of the status window. This reduce the number of lines to be display with their status. This will give a faster status update.

Note:

The more information you want to display in the STL Status window the longer it takes to build up the STL Status window. All information being displayed has to be transferred from the PLC to the PC.

Show information (normally ON)

If selected additional information are shown.

Background Color (normally Offline light yellow, Online light green)

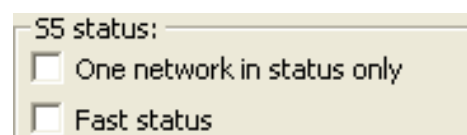
The default setting is that Windows with “**Offline – information**” has a light yellow background. Windows with “**Online – information**” has a light green background.



The color of the background can be changed. Clicking the button will open a dialog box to change the colors.

**S5 Status – One Network in Status Only** (normally OFF)

When selected, the status is only shown for one network (segment). This reduces the amount to be displayed with their status. This will allow a faster status update.

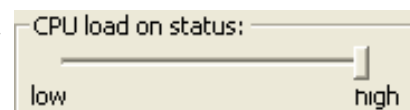


S5 Status – Fast Status (normally OFF)

S5 / S7 for Windows normally fetches at least one complete network (segment) of a PLC Block for the status display in STL presentation. This has the advantage that all parts of the segment being executed and the parts being jumped over (light gray) are displayed. There is the possibility when using conditional jumps in the PLC program, that the status display will require some time to build the display. When selected, the data from the PLC is manipulated to display logic that is called very seldom, so the system will run faster. This will reduce the amount of logic (lines) displayed with their status.

CPU Load on Status (normally set to High)

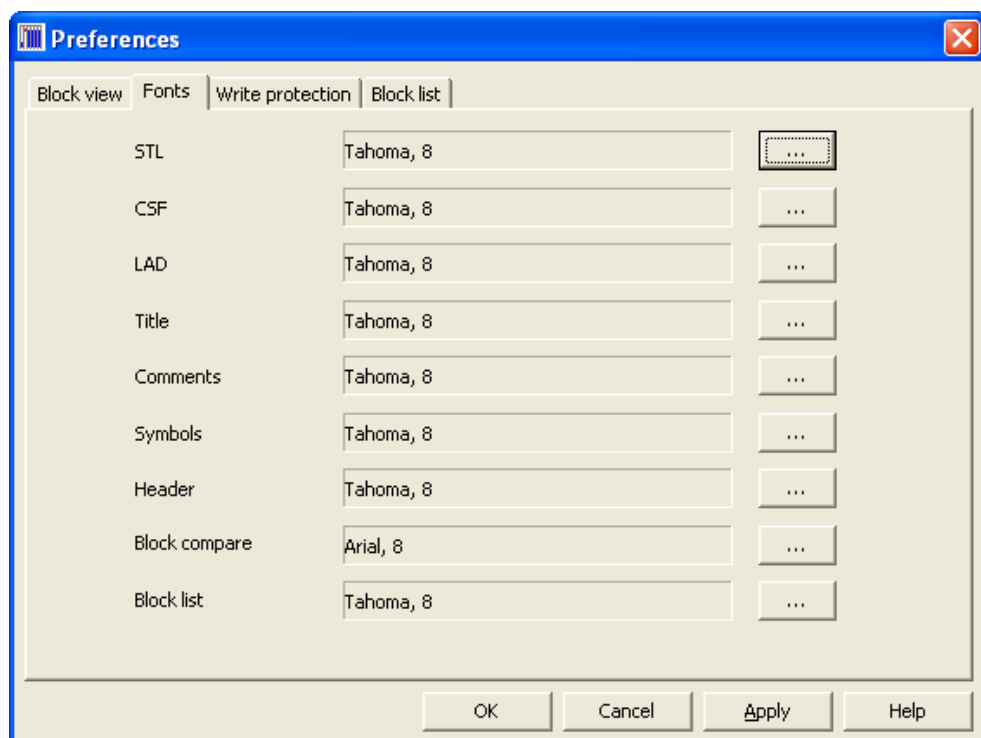
The Status Display requires a lot of data to be transferred between the PLC and the PC to update the segment (network)



displayed on the monitor. This data transfer puts a lot of load on the CPU of the PC. A slider is provided to adjust the allowable load due to the data transfer on the CPU.

If the keyboard or mouse handling feels slushy (slow PC, fast PLC action) reduce the CPU load.

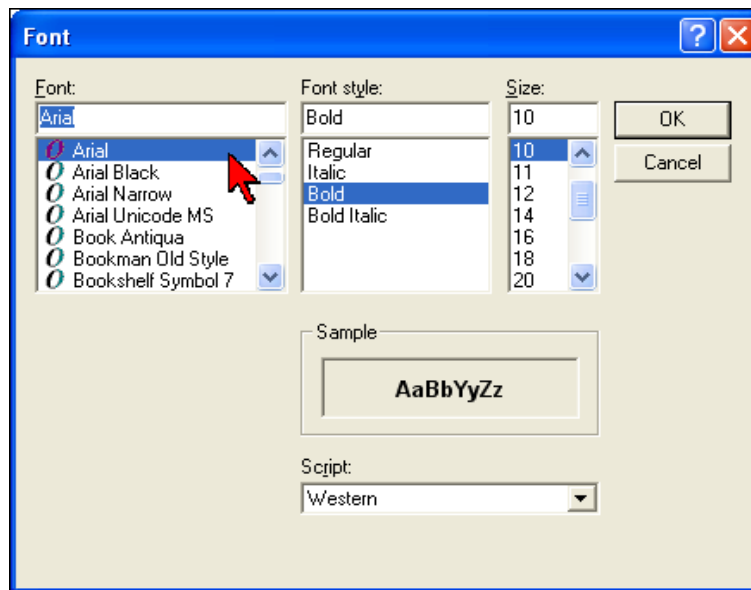
Fonts Tab



The font can be changed. Clicking the button will open a dialog box to change the fonts.



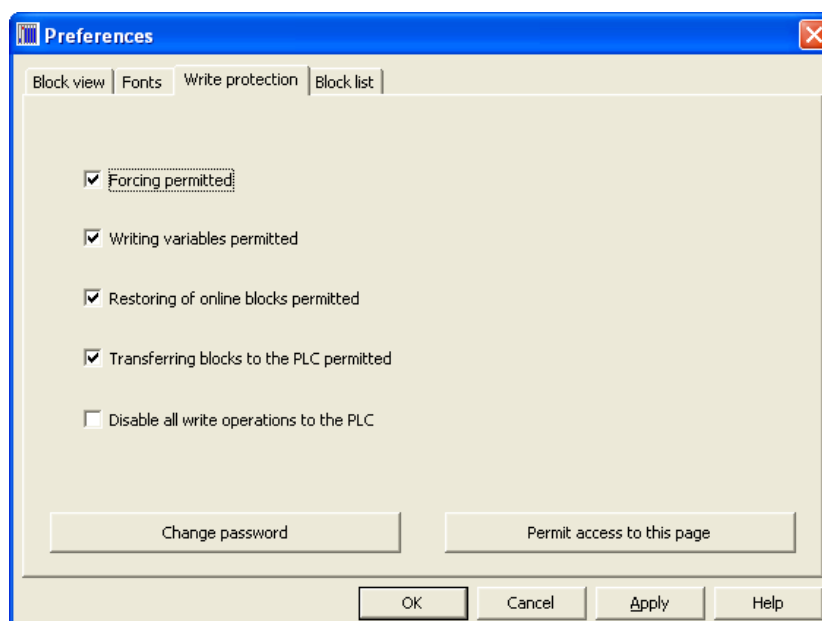
Different fonts may be assigned to various subjects for separation and a better reading. Also the font size and its style may be set.

**Note:**

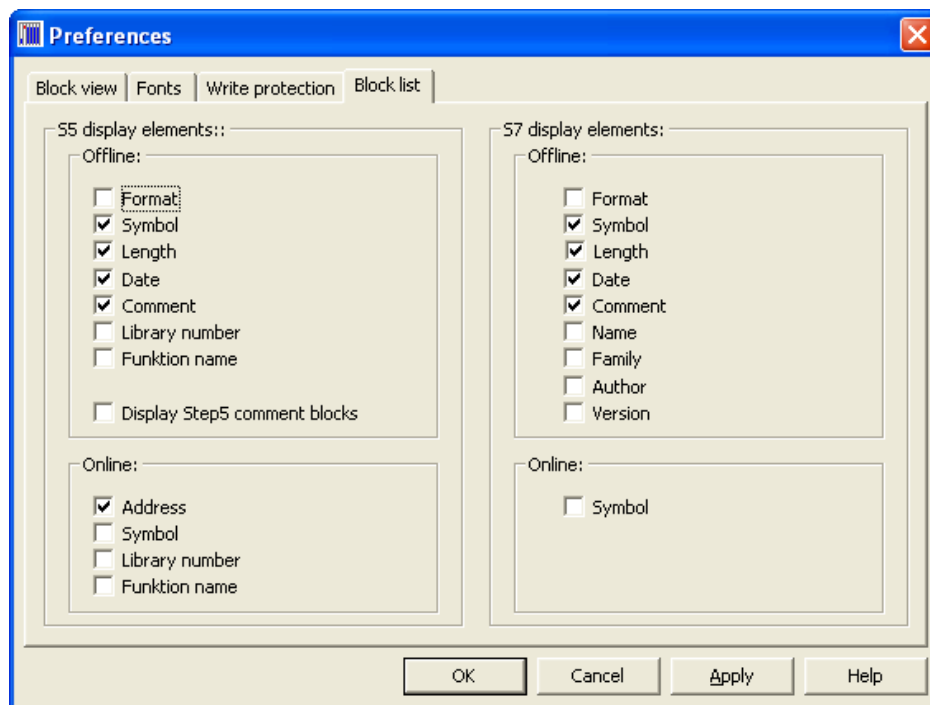
The font selection (done via the Presentation Fonts settings) is for the CRT display only. The fonts for the documentation printout are selected with the settings from the Font Type card of the Documentation Layout dialog box.

Write Protect Tab (normally set as shown)

With *S7 for Windows®* you can prohibit the online access to the PLC. The access can be password protected. If a password is assigned it is not possible to change the settings of this page.



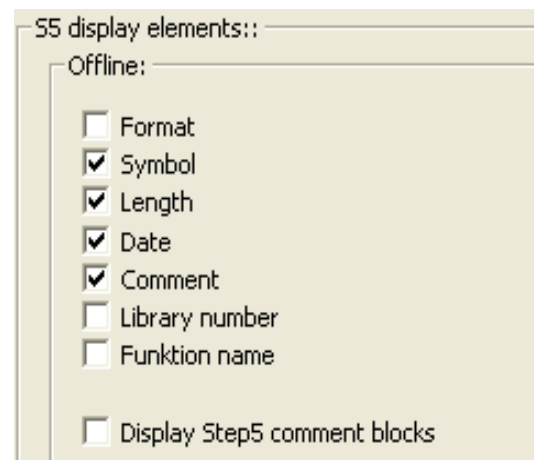
Block List Tab (normally set as shown)



S5 displayed elements – Offline

The settings are used to select the data to be displayed in the PC Block List. For each element selected a column will be reserved to display the appropriate data.

Also STEP 5 Comment Blocks can be displayed in the PC Block List if selected.



Format (normally OFF)

The editor integrated in the S5 / S7 for Windows® package "understands" the syntax of STEP® 7 and STEP® 5 PLC Blocks. The current syntax format of a PLC Block (S5 or S7) is displayed in the column Format. This column should only be activated when both options S5 for Windows® and S7 for Windows® are installed and a PLC program with both (S5 and S7) Blocks are present.

Symbol (normally ON)

It is possible to assign a name (Symbol) to a PLC Block in the Symbolic Table. If a Symbol is marked, the a name (Symbol) of the PLC Block is displayed in the symbol column of the PC Block List.

Length (normally ON)

The column displays the length of the PLC Block in bytes.

Date (normally ON)

The column displays the date and time the PLC Block was created or modified.

The date information is only available if the PLC Program is stored in the *S5 for Windows* format. If a PLC program is stored in the SIEMENS S5 format Block Dates are not supported. The SIEMENS S5 format supports only supports the date of the PLC program file (DOS date). This date is then the PLC Block date (all Blocks have the same date).

Comment (normally ON)

The column displays the PLC Block comment in the PC Block List. The comment displayed is assigned to a Block in the Block Properties dialog box.

Library Number (normally OFF)

A library number to the assign block may be displayed. The library number is a five (5) digit identification number and can be saved in the PLC. Original SIEMENS blocks usually have library number assigned. The library number is assigned to an S5 Block via the Block Properties dialog box. Only S5 Blocks can have library numbers.

Function Name (normally OFF)

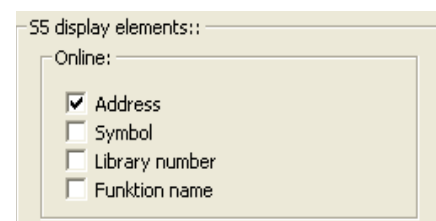
The column displays the name of the Function Blocks (FB, FX) being present in the S5 format. Function names are not available with S7 Blocks.

STEP 5 Comment Blocks (normally OFF)

STEP 5 allows the presents of PLC Blocks containing Comments only. These Comment Blocks can be listed in the PC Block List.

S5 displayed elements – Online

The settings are used to select the data to be displayed in the PLC Block List. For each element selected a column will be reserved to display the appropriate data. Some of the elements marked in the dialog box are not stored in the PLC memory. If this information is displayed it is based on information stored in the PLC Preprogram stored in the PC.



Address (normally ON)

The address displayed in the PLC Block List online is the absolute address within the PLC Memory. The addresses change whenever additional Blocks are loaded into the PLC.

Symbol (normally OFF)

It is possible to assign a name (Symbol) to a PLC Block in the Symbolic Table. If Symbol is marked the name (Symbol) of the PLC Block is displayed in the symbol column of the PLC Block List. The name (Symbol) is not stored in the PLC memory.

Library Number (normally OFF)

A library number to the assign block may be displayed. The library number is a five (5) digit identification number and can be saved in the PLC. Original SIEMENS blocks usually have library number assigned. The library number is assigned to an S5 Block via the Block Properties dialog box. Only S5 Blocks can have library numbers.

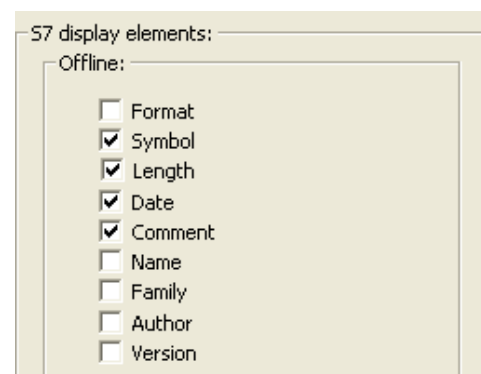
Function Name (normally OFF)

The column displays the name of the Function Blocks (FB, FX) being present in the S5 format. If Function Name is marked the name (Symbol) of the PLC Block is displayed in the Function Name column of the PLC Block List. The name (Symbol) is not stored in the PLC memory.

Function names are not available with S7 Blocks.

S7 displayed elements – Offline

The settings are used to select the data to be displayed in the PC Block List and the PLC Block List. For each name selected a column will be reserved to display the appropriate data.

**Format** (normally OFF)

The editor integrated in the S5 / S7 for Windows® package "understands" the syntax of STEP® 7 and STEP® 5 PLC Blocks. The current syntax format of a PLC Block (S5 or S7) is displayed in the column Format. This column should only be activated when both options S5 for Windows® and S7 for Windows® are installed and a PLC program with both (S5 and S7) Blocks are present.

Symbol (normally ON)

It is possible to assign a name (Symbol) to a PLC Block in the Symbolic Table. If Symbol is marked, then a name (Symbol) of the PLC Block is displayed in the symbol column of the PLC Block List.

Length (normally ON)

The column displays the length of the PLC Block in byte.

Date (normally ON)

The column displays the date and time the PLC Block was created or modified.

Comment (normally ON)

The column displays the PLC Block title or the comment in the PLC Block List. If a title is assigned in the title bar of the Block this information has priority. The title is also displayed in the Block Properties dialog box. The Block comment is assigned in the symbolic table.

Name (normally OFF)

The column displays the name of S7 Block assigned to the Block in the Block Properties dialog box. The name is part of the PLC Block Header and is stored with the Block in the load memory of the PLC.

Family (normally OFF)

The column displays the name of family that the S7 Block belongs to. It is assigned to the Block in the Block Properties dialog box. The family name is part of the PLC Block Header and is stored with the Block in the load memory of the PLC.

Author (normally OFF)

The column displays the name of author of the S7 Block. The author has to assign his name to the Block in the Block Properties dialog box. The author name is part of the PLC Block Header and is stored with the Block in the load memory of the PLC.

Version (normally OFF)

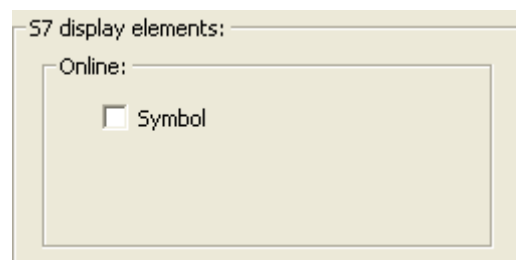
The column displays the version number of the S7 Block. The author has to assign the version number to the Block in the Block Properties dialog box. The version number is part of the PLC Block Header and is stored with the Block in the load memory of the PLC.

S7 displayed elements – Online

Symbol (normally OFF)

The setting is used to enable the data to be displayed in the PLC Block List.

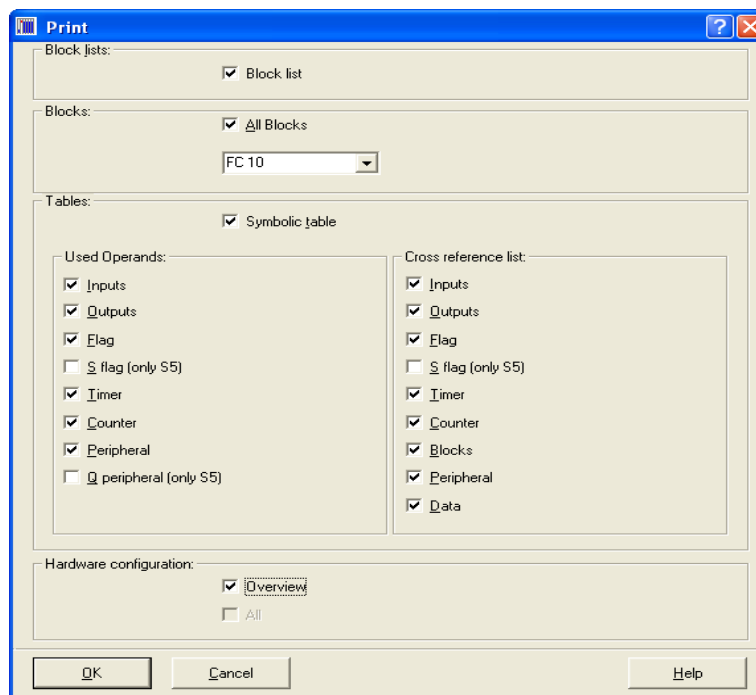
If a name (Symbol) is assigned to a PLC Block in the Symbolic Table and Symbol is marked the name (Symbol) of the PLC Block is displayed in the symbol column of the PLC Block List. The name (Symbol) is not stored in the PLC memory.



The command **Print** opens the dialog box **Print**. The dialog box gives you the ability to select the items to be printed.

Print

The **Print** command opens a dialog box to select the portions of the PLC program to be printed.



Block List

If the block list button is marked, a list is printed with the information displayed in the PC Block List window with the names of the blocks, their length, date and time of the last modification, and the comments that will be printed out.

Blocks

All Blocks displayed in the PC Block List or a single block can be select from the drop down list and be printed.

Symbolic Table

If the symbolic table button is marked, the symbolic table will be printed out.

Used Operands List

The portions of the Used Operands List to be printed can be selected. You may mark one, several, or all operand groups to be printed in the used operands list. The used operands list is printed, showing the selected operands and where they are used (block and segment number) within the PLC program.

Cross Reference List

The portions of the Cross Reference List to be printed can be selected. You may mark one, several, or all operand groups to be printed the cross- reference list. The cross-reference list is printed showing the selected operands and where they are used (block and segment number) within the PLC program.

Hardware Configuration

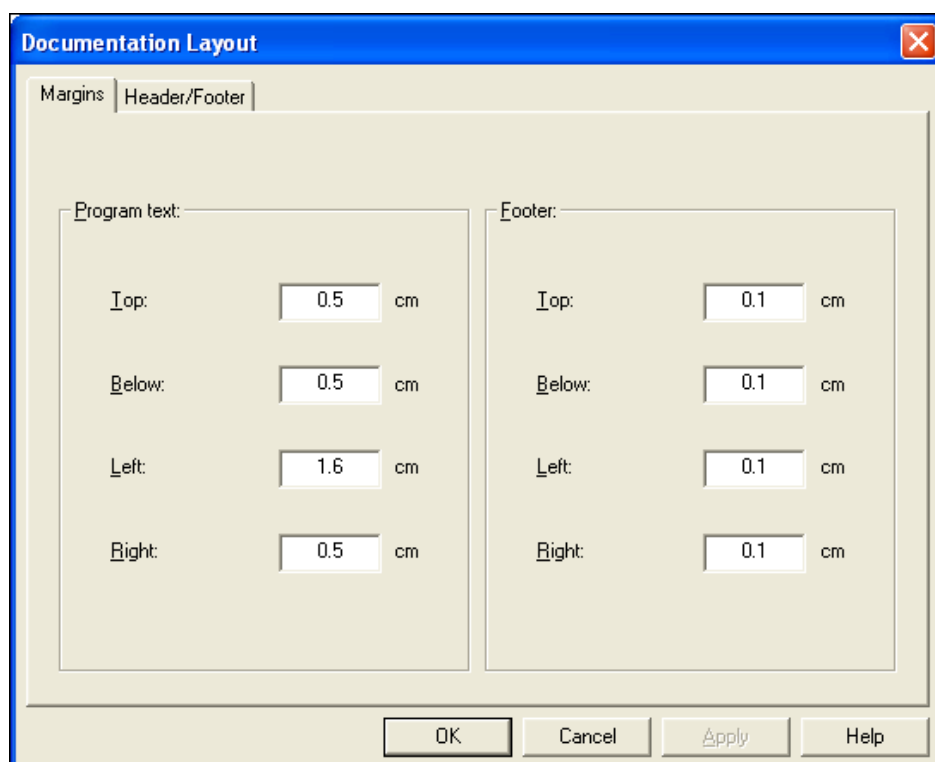
An overview or the complete Hardware Configuration can be printed .

Print Settings

The Print Settings command opens the Documentation Layout dialog box.

A rectangular button with a light beige background and a thin border. The text "Print settings..." is displayed in a blue, sans-serif font.

The dialog box is designed as a card file with tabs to separate the different subjects.

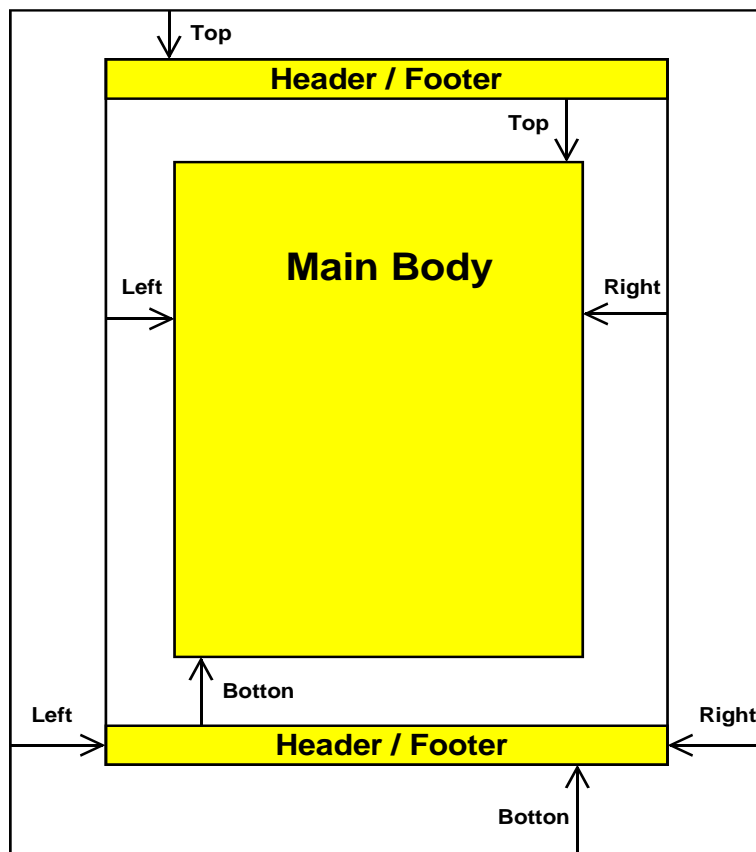


Margins Tab (Documentation Layout Dialog Box)

Select the set margins dialog box to customize the page layout. The margins of the Program Text (Main Body – area where the PLC logic is printed) and the Footer (Header / Footer) are set independently. The dimensions are in centimeters (cm).

- The measurements must be entered in centimeter (cm).
- The margins for the header and the footer are measured relative to the page.
- The margins of the main body are measured relative to the header and footer (inside).

Page Layout Margins

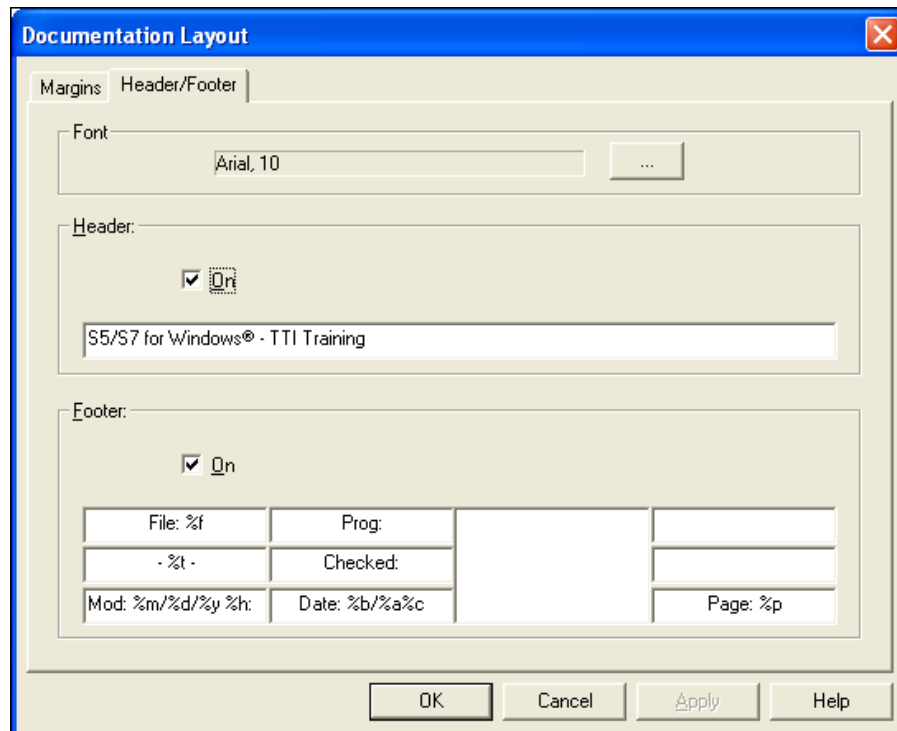


Header / Footer Tab (Documentation Layout Dialog Box)

The tab provides fields to customize the appearance of the page of documentation for the PLC program.

You may type any text in the text fields. There are field abbreviations available to assist you when entering PLC program information and date and time information to the header and footer. Buttons are available to disable the footer or header. The font for the header and footer may also be set.

Header / Footer Tab



Font

The font can be selected. Clicking the button will open a dialog box to change the fonts.



The font selections made in the Fonts Type settings box, are used for printing only.

Header

The tab provides a field (you may enable / disable the header) to customize the appearance of the page header of documentation for the PLC program. You may type any text in the text field.

Footer

The tab provides a field (you may enable / disable the footer) to customize the appearance of the page footer of documentation for the PLC program.

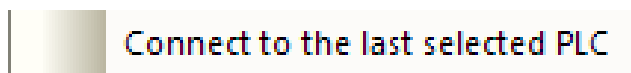
There are field abbreviations available to assist you when entering PLC program information and date and time information to the footer. You may type in addition to the abbreviations any text in the text field.

Footer Field abbreviations

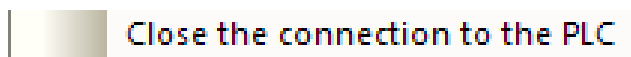
%f	File name of the PLC program without file name extension.
%t	List name (Title).
%p	Page number.

Footer Field abbreviations (Continued)

%a	Day	Printing date
%b	Month	Printing date.
%c	Year	Printing date.
%d	Day	File creation/modification date.
%m	Month	File creation/modification date.
%y	Year	File creation/modification date.
%h	Hour	File creation/modification date.
%l	Minutes	File creation/modification date.
%s	Seconds	File creation/modification date.

Connect to the last PLC selected

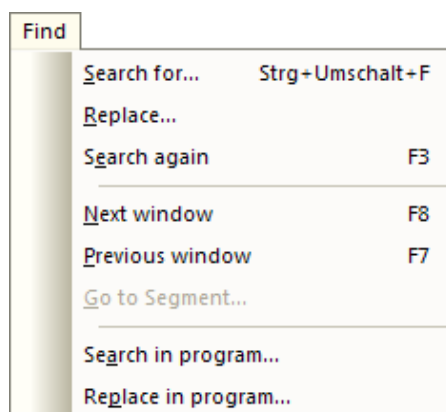
The last selected PLC online connection is established again (how to select and establish an online PLC connection see chapter 2).

Close the Connection to the PLC

The PLC online connection is disabled.

1.9 Find Menu

The "Find Menu" provides a command to search and replace operands or text in the market section of a Block. That section of the Block is momentarily displayed in the workplace; a PLC Block, or in the entire PLC program.



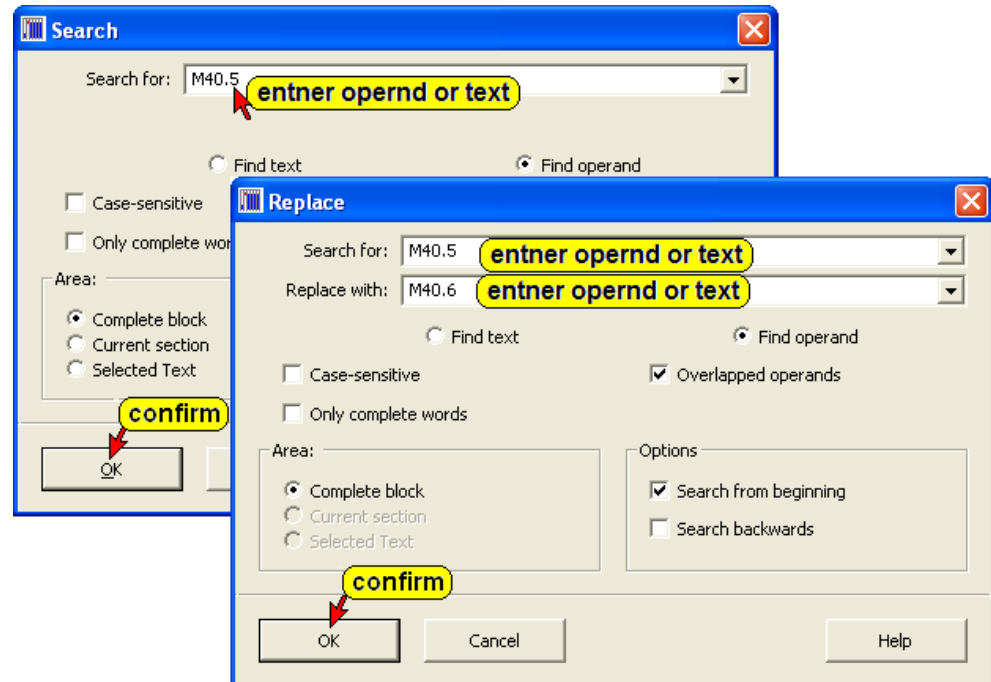
It is also possible to switch the Block displayed to its next / previous window (section to enter text or logic) or to a specified segment.

Search For / Replace

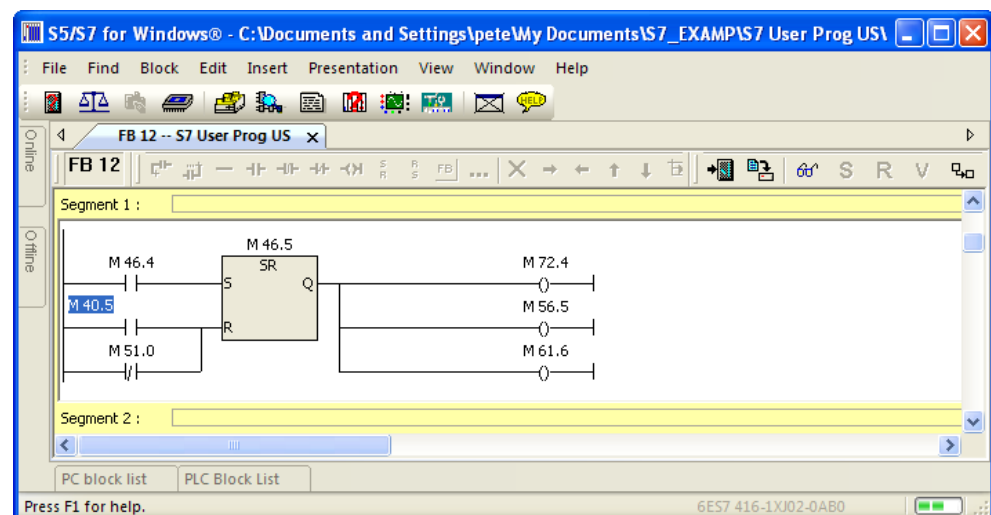
A dialog box is opened

providing the tools to search for / replace an operand or text within the PLC Block or the Current Section or the Selected (marked) Text.

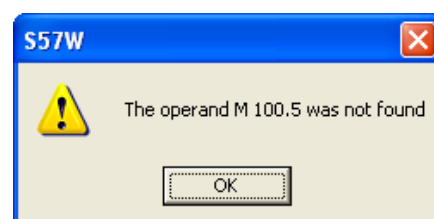
This feature works when the Block is open in the PC Block List or the PLC Block List, and active.



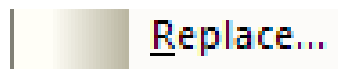
The found operand is highlighted.



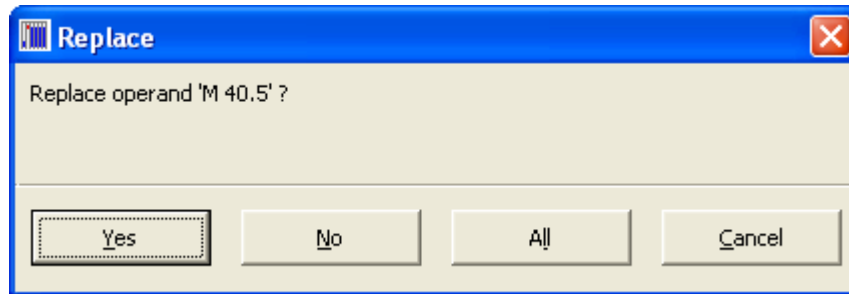
A message is displayed if an operand or text was not found.



Replace

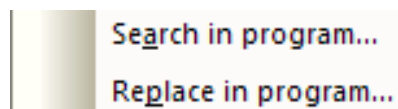


If **“Replace”** has been selected, in addition to the highlighted operand, a dialog box is opened where you can decide whether or not to replace the operand.

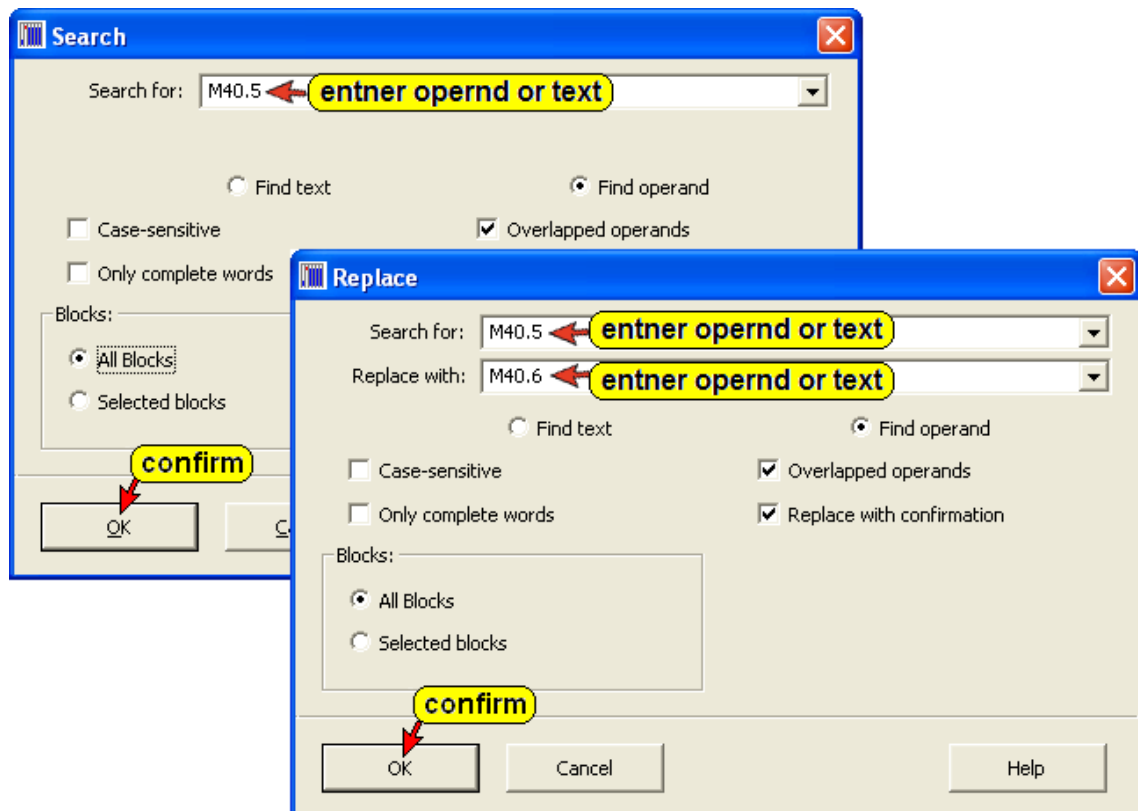


If Yes or No is clicked, the next operand is highlighted and the “Replace” dialog box is opened for the next decision.

Search in Program / Replace in Program

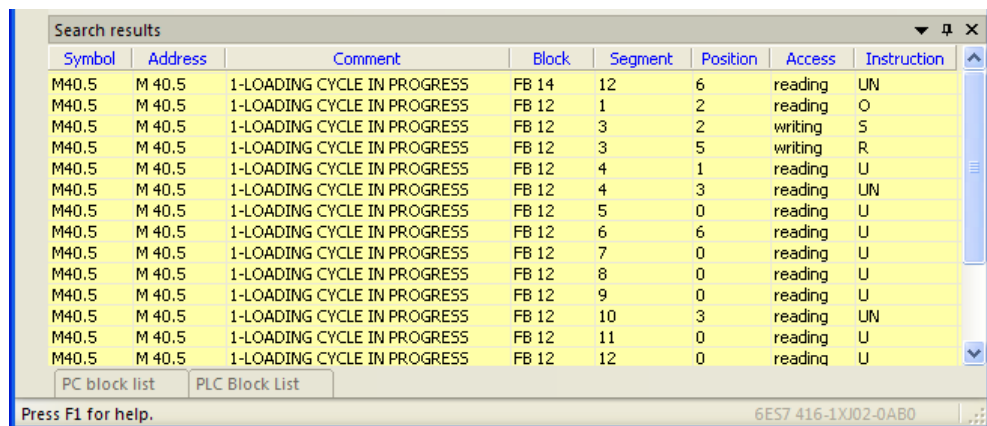


A dialog box is opened providing the tools to search / replace an operand or text within the whole PLC Program. This feature works with the Blocks listed in the PC Block List only.



Search in Program

The result is shown in the “Search result” window.



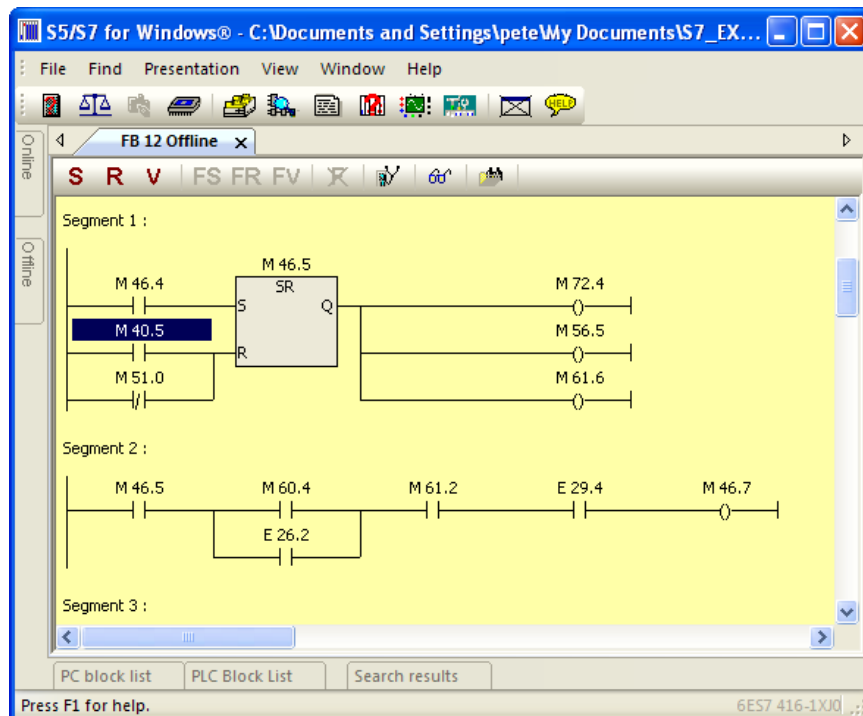
Symbol	Address	Comment	Block	Segment	Position	Access	Instruction
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 14	12	6	reading	UN
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	1	2	reading	O
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	3	2	writing	S
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	3	5	writing	R
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	4	1	reading	U
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	4	3	reading	UN
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	5	0	reading	U
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	6	6	reading	U
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	7	0	reading	U
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	8	0	reading	U
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	9	0	reading	U
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	10	3	reading	UN
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	11	0	reading	U
M40.5	M 40.5	1-LOADING CYCLE IN PROGRESS	FB 12	12	0	reading	U

PC block list PLC Block List

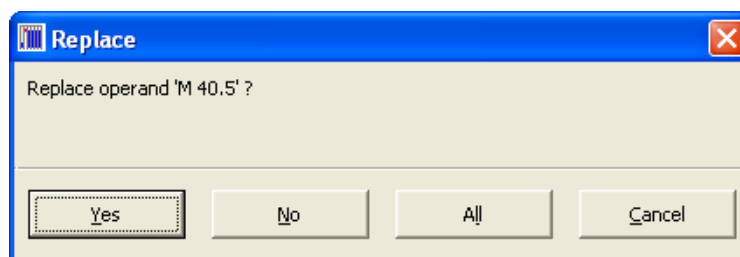
Press F1 for help. 6ES7 416-1XJ02-0AB0

Replace in Program

The operand is highlighted.



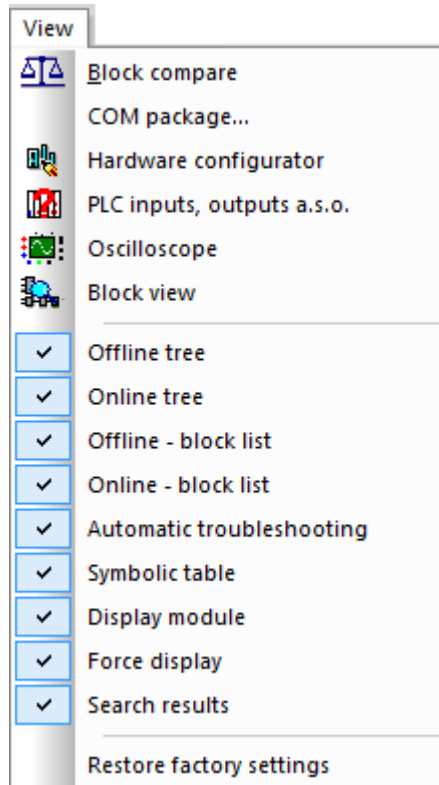
If “**Replace in Program**” has been selected, in addition to the highlighted operand, a dialog box is opened to decide to replace or not the operand.



If Yes or No is clicked the next operand is highlighted and the “Replace” dialog box is opened for the next decision.

1.10 View Menu

The “View Menu” provides command to open windows to perform additional tasks.



Block Compare



Block compare

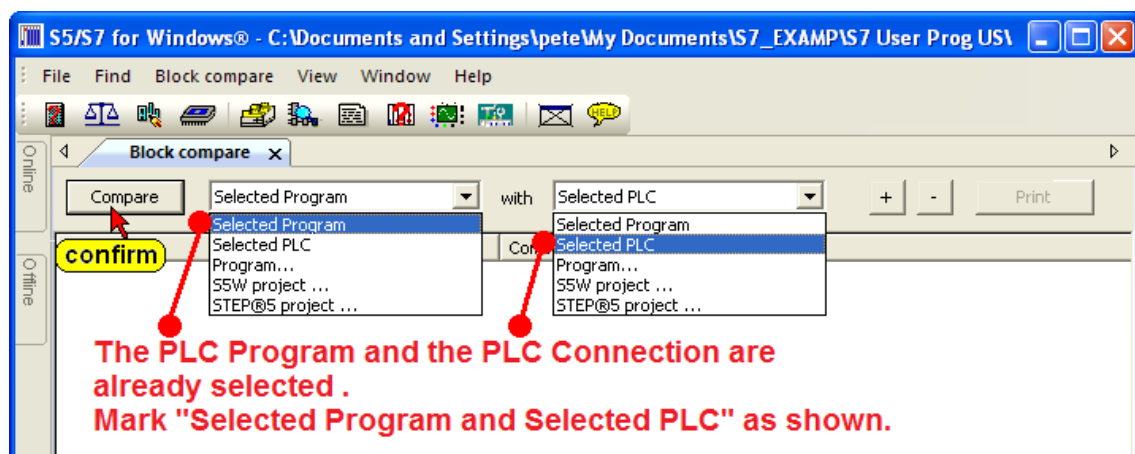


Compare PLC programs and blocks.

Click the icon to open the Compare window.

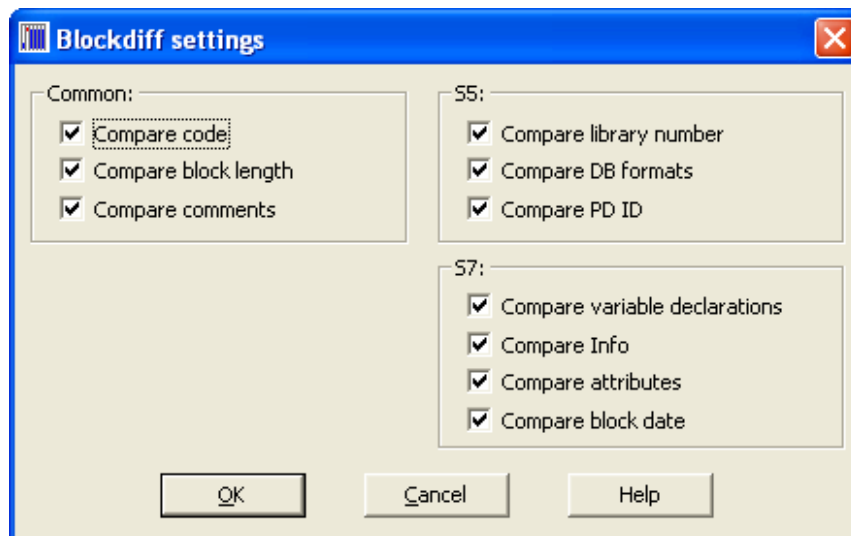
Select the two locations where the files to be compared are located.

The PLC Programs to be compared could be the program selected in the offline tree and the program stored in the PLC selected with the online tree or any other PLC Programs stored on the PC.

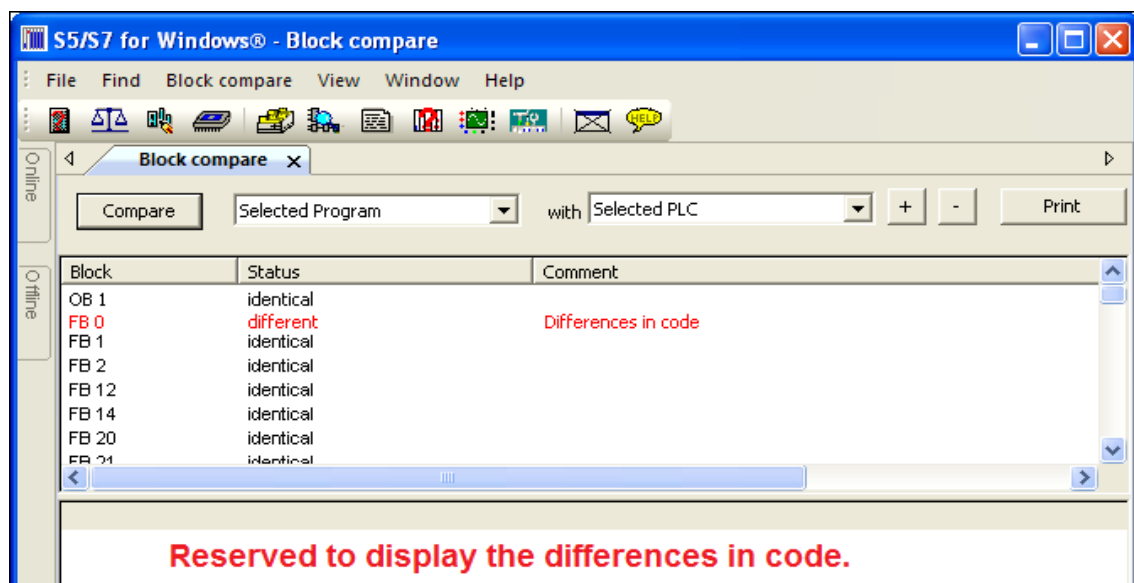


Clicking Compare will open a dialog box to define how the comparison should take place.

Compare



When comparing a PLC Program on the PC with the Program executed on the PLC, only the code is relevant. Mark "Compare code". To start the comparison confirm by clicking the "OK" button.



The compare result is shown in the upper part of the compare window. PLC Block names written in black are identical, PLC Block names shown in red have differences in the code.

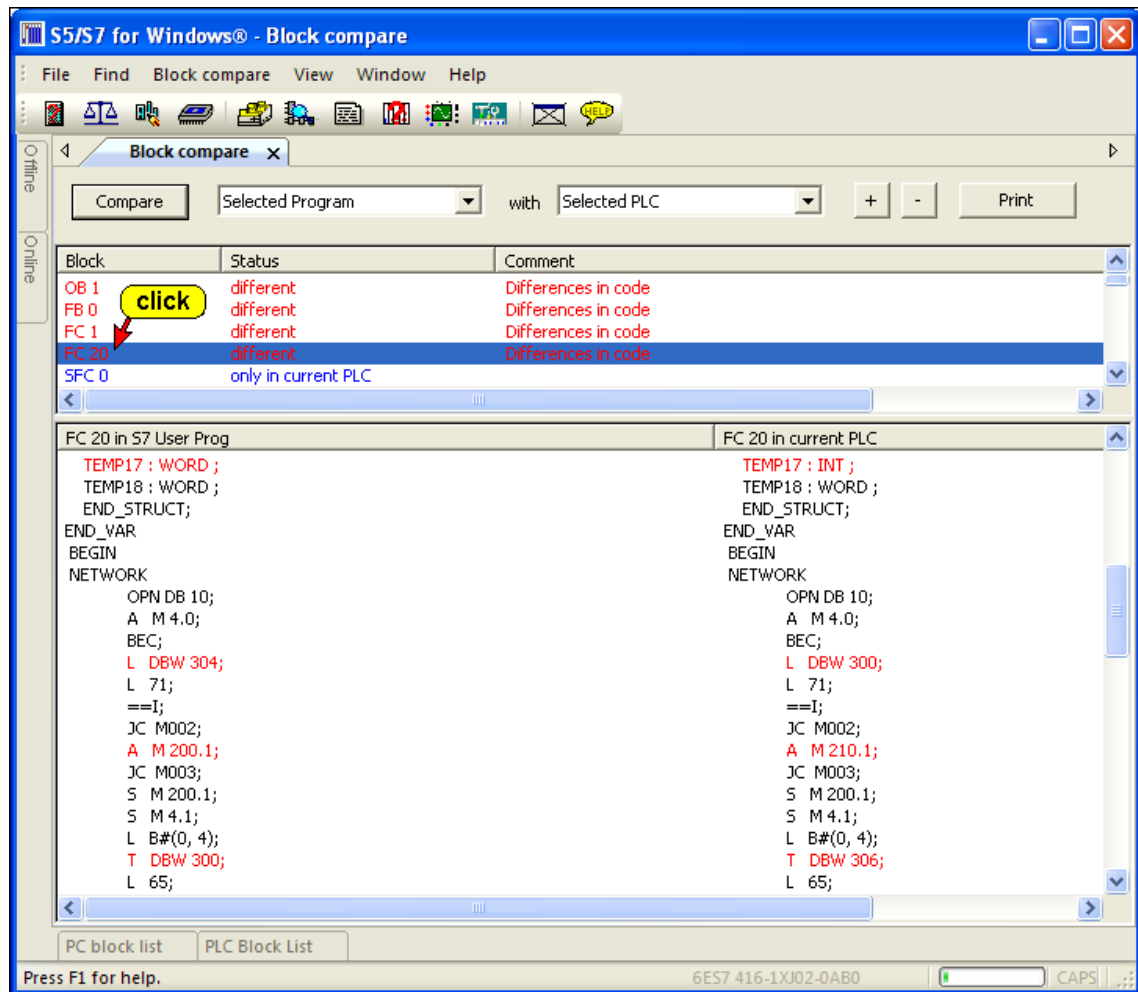
ATTENTION:

Do not transfer blocks from the PLC to the PC if the selected blocks exist in the PC RAM.

If a block in the PC is overwritten by a PLC block, it is possible that comments will be shifted and labels may not be valid anymore (labels are exchanged with substitute labels (M001 etc.).



Differences in Code



Clicking the Block name opens a window with the details of the compared Blocks. Any differences are displayed in red.

ATTENTION:

Comparing a PLC Program on the PC with the Program executed on the PLC will show (most of the time) differences in Data Blocks (DBxx). This is normal if the data stored in the Data Block is collected from the PLC.

In any event the length of the Data Blocks must be identical.



COM Package



With S5/S7 for Windows it is possible to execute Original Siemens S5 – COM-Software Packages.

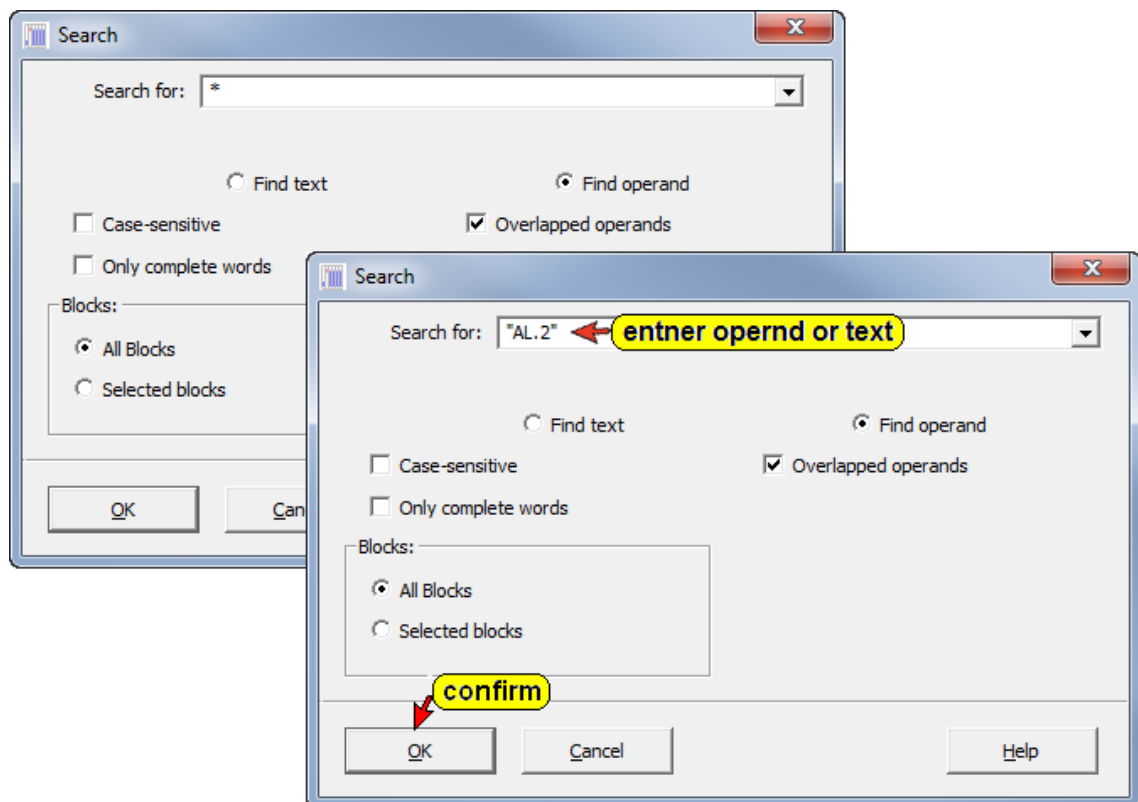
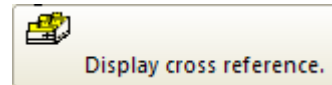
The S5 – COM-Software Packages can only be used with special S5 Hardware.

1.11 Cross Reference

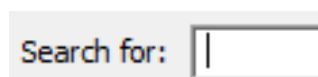


S5 / S7 for Windows provides a tool to list the operands, their use, and origin. The internal cross-reference list is constantly updated. Whenever searched for the use of an operand, the displayed list provides the current state of the operand in use.

The Cross Reference command is identical with Search in Program command. A click on the command opens a dialog box providing the tools to display an operand or text within the whole PLC Program or the momentary active PLC Block. This feature works with the Blocks listed in the PC Block List only.



Search for



The name of the operand listed in the cross reference can be entered in the text field in its symbolic or absolute form (or any text to be searched for).

Enter the name of the operand to be displayed in the cross-reference list in the text field. Mark "Find Operand". Mark the desired buttons and confirm by activating the OK button.

Overlapped Operands

When the Overlaid Operands button is marked, the specified bit displayed in the cross-reference is listed as a bit and if the bit is present in a byte, word, or double word that will also listed. A byte will be found in a word or double word and a word will be found in a double word.

If the button is not marked the specified operand will only be found in its specified format.

S7 for Windows can display a cross-reference list for the following operands. Absolute operand names can be entered in lower or uppercase letters. Spaces are ignored.

Operand	The cross reference list displays	Example
*	the complete cross reference list	*
B	all Blocks	B
C	all Counters	C
Cn	the specified Counter	C12
D	all Data Words	D
DBBn	the specified Data Byte in a Data Block	DBB12
DBDn	the specified Data Double Word in a DB	DBD6
DBn	the specified Data Block (DB)	DB5
DBWn	the specified Data Word in a DB	DBW23
DBXn.n	the specified Bit in a Data Block	DBX12.7
DIBn	the specified Data Byte in a Instance DB	DIBn
DIDn	the specified Data Double Word in a Instance DB	DIDn
DIWn	the specified Data Word in a Instance DB	DIWn
DIXn.n	the specified Bit in a Instance DB	DIXn.n
FBn	the specified Function Block (FB)	FB567
FCn	the specified Function (FC)	FC890
I	all Inputs	I
IBn	the specified Input Byte	IB44
IDn	the specified Input Double Word	ID24
In.n	the specified Input Bit, also from a Input Byte or Input Word	I34.5
IWn	the specified Input Word	IW15

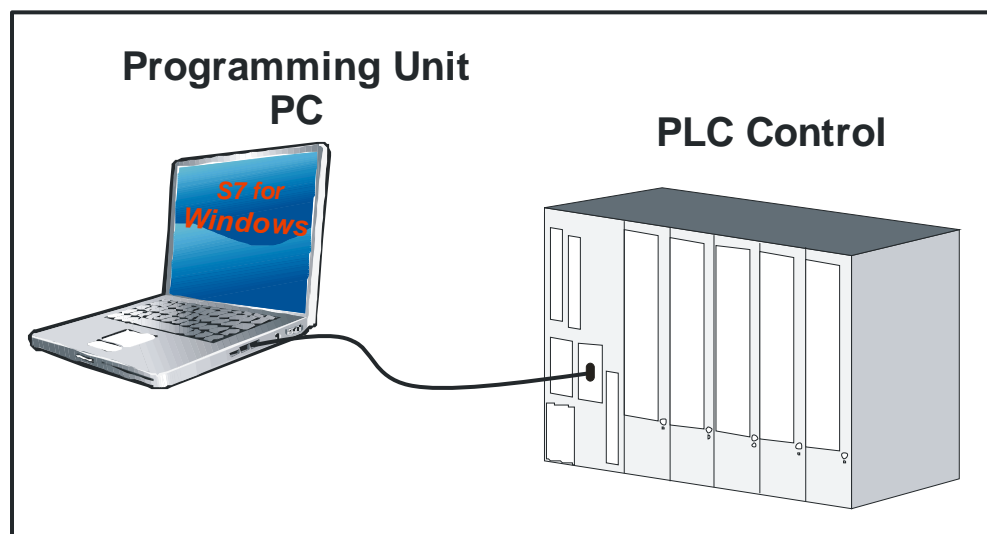
Operands possible to be displayed in the S7 cross reference list
(continued)

Operand	The cross reference list displays	Example
LBn	the specified Local Data Byte	LB23
LDn	the specified Local Data Double Word	LD16
Ln.n	the specified Local Data Bit, also from a Local Data Byte or Local Data Word	L26.7
LWn	the specified Local Data Word	LW35
M	all Memory Bits	M
MBn	the specified Memory Byte	MB34
MDn	the specified Memory Double Word	MD54
Mn.n	the specified Memory Bit, also from a Memory Byte or Memory Word	M56.4
MWn	the specified Memory Word	MW23
PIBn	the specified Peripheral Input Byte (direct I/O access)	PIB123
PIDn	the specified Peripheral Input Double Word (direct I/O access)	PID456
PIWn	the specified Peripheral Input Word (direct I/O access)	PIW246
PQBn	the specified Peripheral Output Byte (direct I/O access)	PQB76
PQDn	the specified Peripheral Output Double Word (direct I/O access)	PQD452
PQWn	the specified Peripheral Output Word (direct I/O access)	PQW346
Q	all Outputs	Q
QBn	the specified Output Byte	QB487
QDn	the specified Output Double Word	QD345
Qn.n	the specified Output Bit, also from a Output Byte or Output Word	Q411.7
QWn	the specified Output Word	QW24
T	all Timers	T
Tn	the specified Timer	T126

2 S7 for Windows® Online Functions

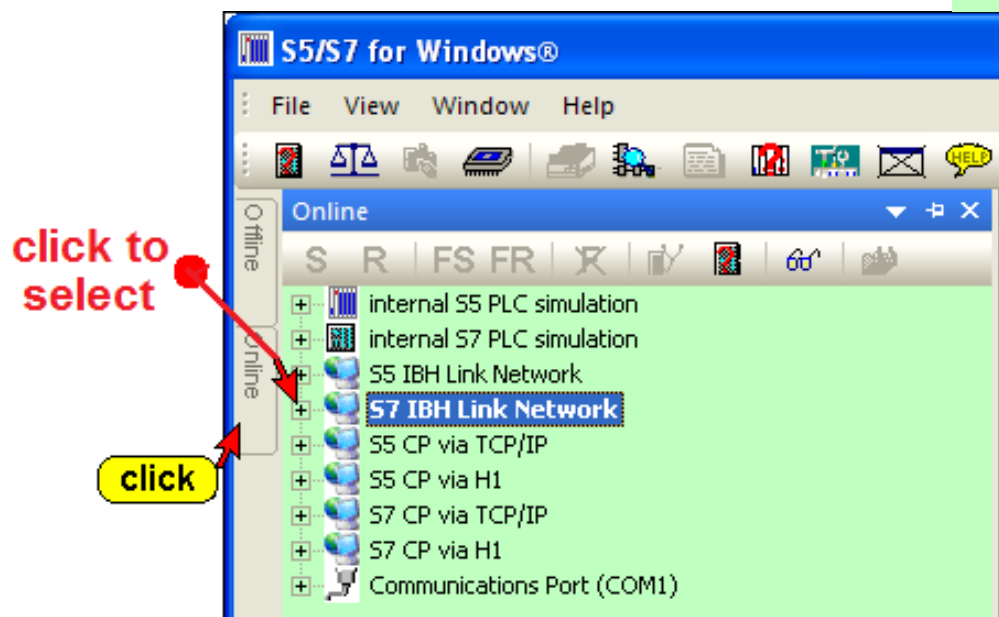
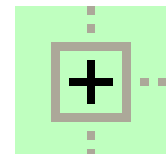
How to troubleshoot an On-Line connection to the PLC

2.1 Connecting the S7 PLC with a PC

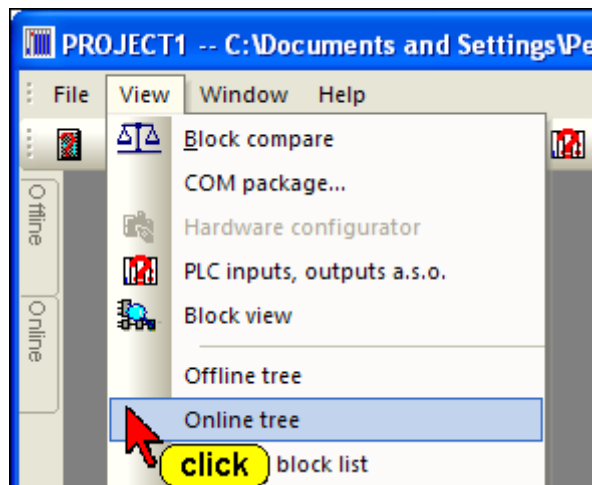


An S7 PLC (one or more) connected to the PC are listed in the “Online – Tree”.

All possible connections are listed. To select a connection click the icon in front of the name. The established connection is displayed in bold letters.



If the “**Online**” tab is not shown, use the command “Online tree” from the “File” menu.



It is recommended that you use the “Auto Hide” icon to lock the tab at the outside border of *S7 for Windows®*. By moving the mouse pointer to the tab, the window will automatically open.



S7 SoftPLC internal



An S7 SoftPLC can be installed (optional), on the PC executing *S7 for Windows®*. That Software PLC could be used to control machinery. Inputs and outputs are handled via a bus system (Profi Bus etc.).

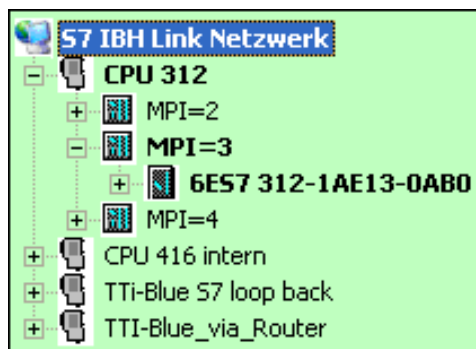
Internal S7 PLC Simulation



S7 for Windows® provides an internal Simulation PLC. With the integrated Simulation PLC you can test PLC programs. For testing you do not need additional hardware. The programs are tested directly within your PC. The status is displayed, you can force inputs, and you can display the outputs.

The internal Simulation PLC is fully compatible with the S7 CPU 416.

S7 IBH Link Network



The **IBHLink S7** is an Ethernet-converter within a 15-pin Sub-D-housing for a connection via a switch, a hub or even directly to a PC with a common network adaptor. The protocol used is the standard TCP/IP protocol. In this way, the user can benefit from all the advantages of Ethernet, such as remote maintenance via a standard router or VPN-connections (Virtual Private Network). Likewise, a direct connection to the Internet is possible.

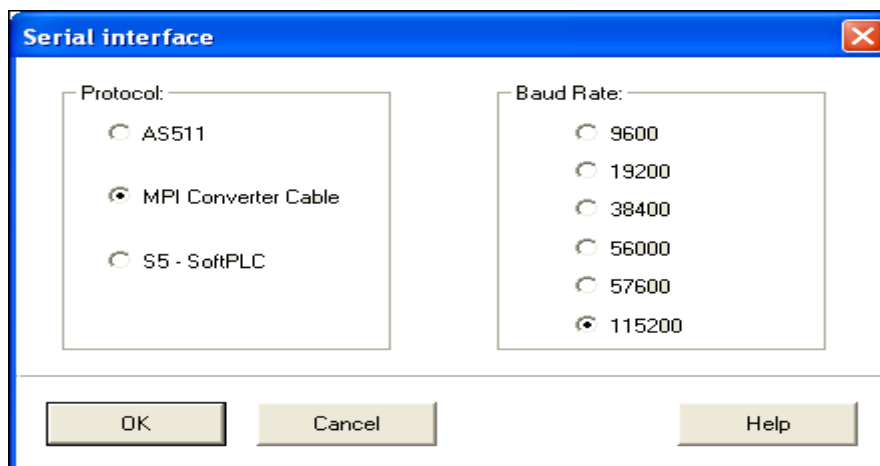
S7 CP via TCP/IP; S7 CP via H1

These connections require “Communication Processer Boards” in the PLC. The connections are listed because a standard Ethernet connection is required at the PC side.

Communication Port (COM1)



Selecting the Communications serial ports (COM 1 – COM 4) will open a dialog box to select the Baud Rate and the Protocol. USB Cables require conversion software.



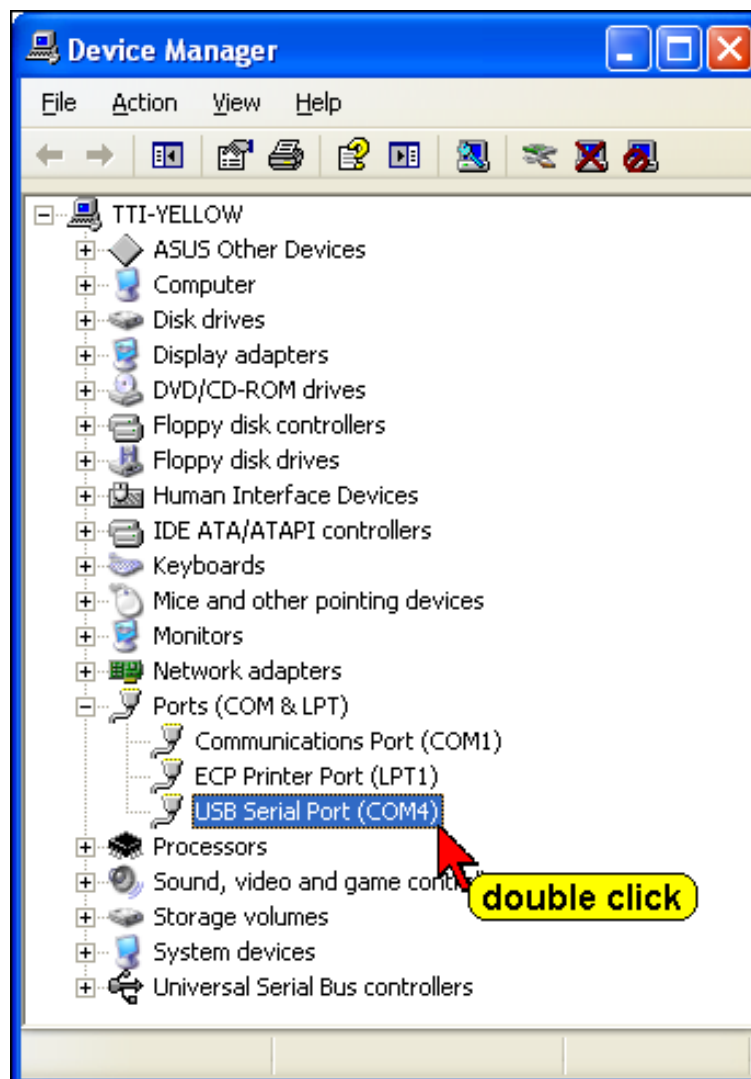
The Simatic S7 PLC must be connected to one of the serial ports (COM 1 – COM 4) of your PC via a MPI Converter Cable.

Depending on the type (manufacture) the MPI Converter Cable can handle Baud Rates of 1920 Baud, 38400 Baud or, 115200 Baud.

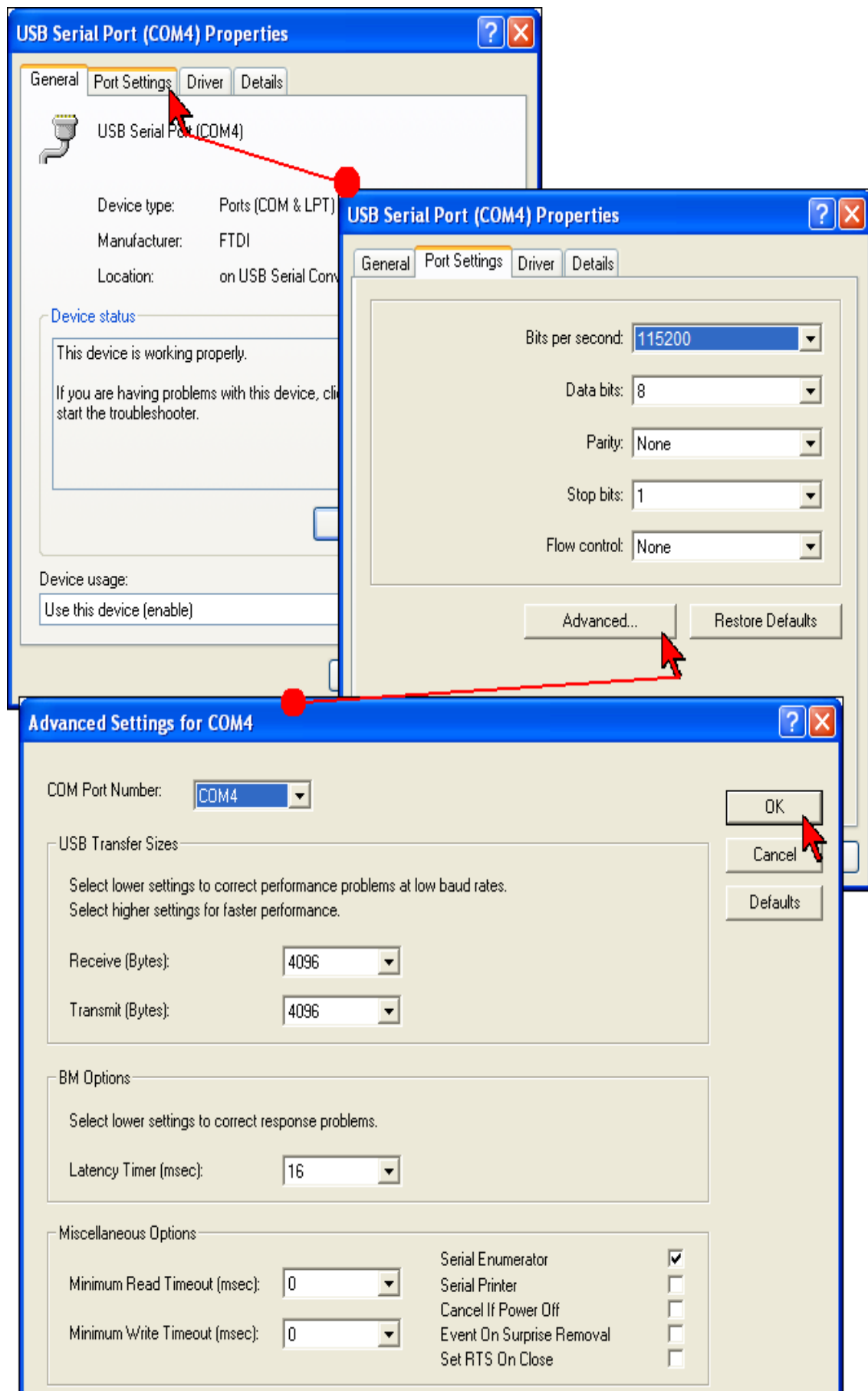
USB Serial Port (COM4)



S7 for Windows® cannot handle an USB Port connection directly. To use an USB connector cable, software must be installed to convert the COM port connection to a USB port. This software driver is provided with the USB cable. The following pictures show the correct settings of the USB Serial Port conversion. Double click the “USB Serial Port (COM3)” to open the dialog to set the port parameters.



Device Manager Settings (USB – COM conversion)



2.2 Transferring all PLC Blocks of a STEP® 7 Program to the PLC

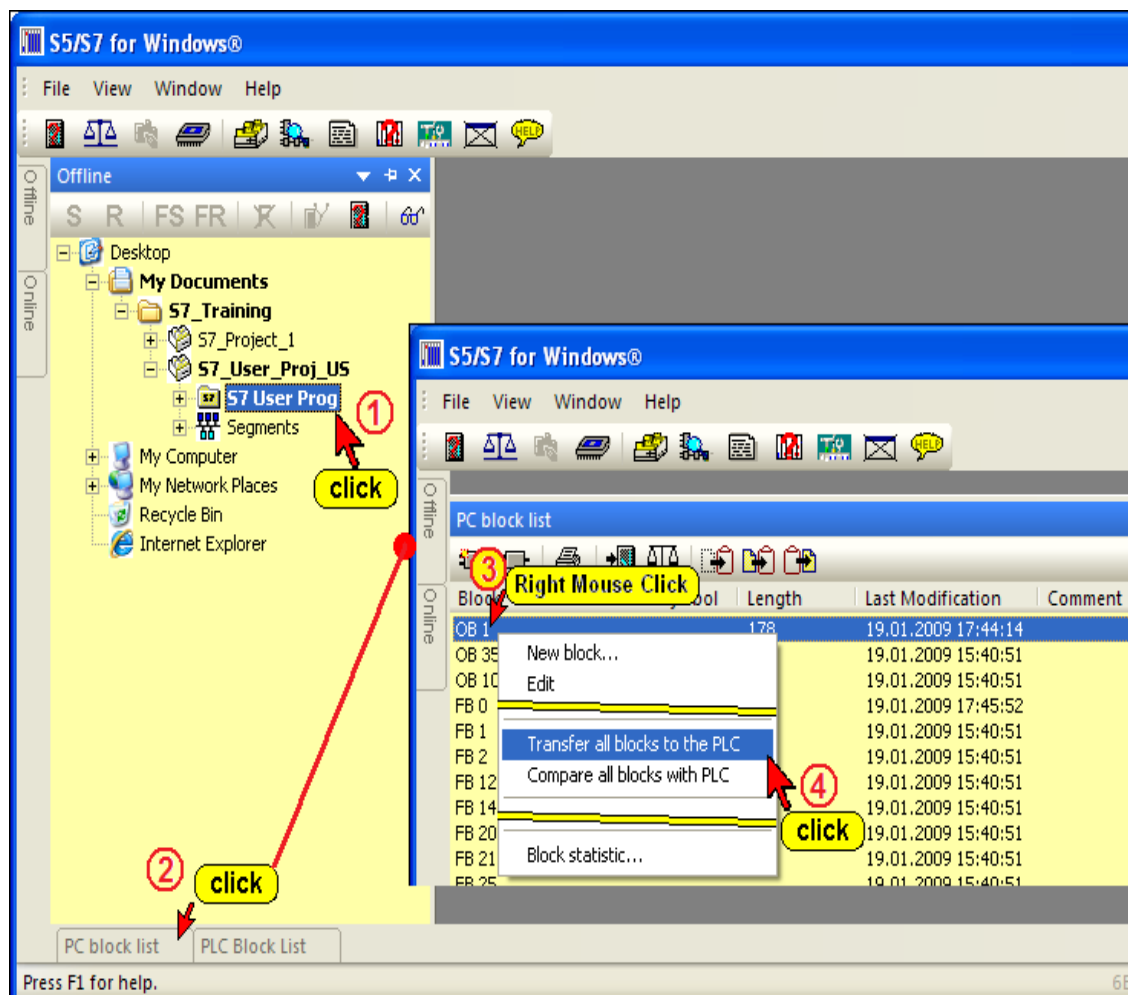
The PLC Blocks of a STEP® 7 Program can be directly transferred to the connected PLC. No conversion is necessary.

Transferring a STEP® 7 Program to the PLC

The following icon identifies a STEP® 7 Program. PLC projects (programs) created with the basic PLC programming package STEP® 7 from SIEMENS may be directly be transferred to the PLC.

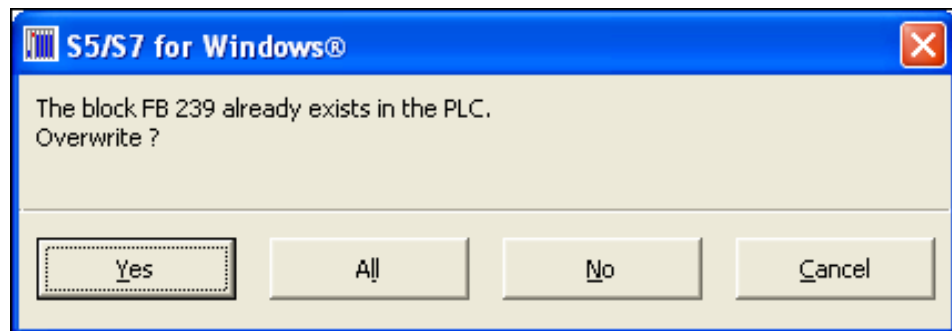


Open the “Offline – Tree” and click the program name **①** with the mouse button. Click the “PC block list” tab. **②**



The PC block list window opens. Open the context menu with a right click on any of the Block names. With **③** a click on the command “Transfer all Blocks to the PLC” the S7 Program is transferred to the connected PLC. **④**

If a block is currently stored in the PLC, a dialog box will open to allow you to overwrite the block or to abort the transfer.



Activating the “**Yes**” button will only overwrite the PLC block mentioned in the dialog box. If another block is stored in the PLC, the dialog box will be opened again.

2.3 Transferring a PLC Program or PLC Blocks to the PC

To transfer Blocks from the PLC to the PC, an S7 project must be available in the PC to store the transferred Blocks. The project must be selected prior transferring Blocks to the PC.

A single Block, several Blocks or all Blocks can be transferred via the serial link to the PC. The selected (marked) blocks in the PLC block list are transferred to the PC. This can be a single block or multiple blocks.

Warning:

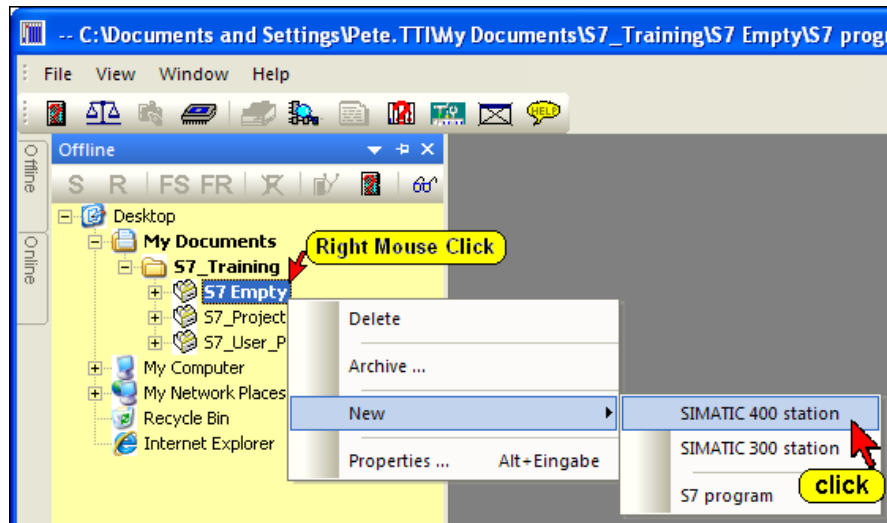
You should only transfer blocks from the PLC to the PC if the selected blocks do not exist in the PC Block List.



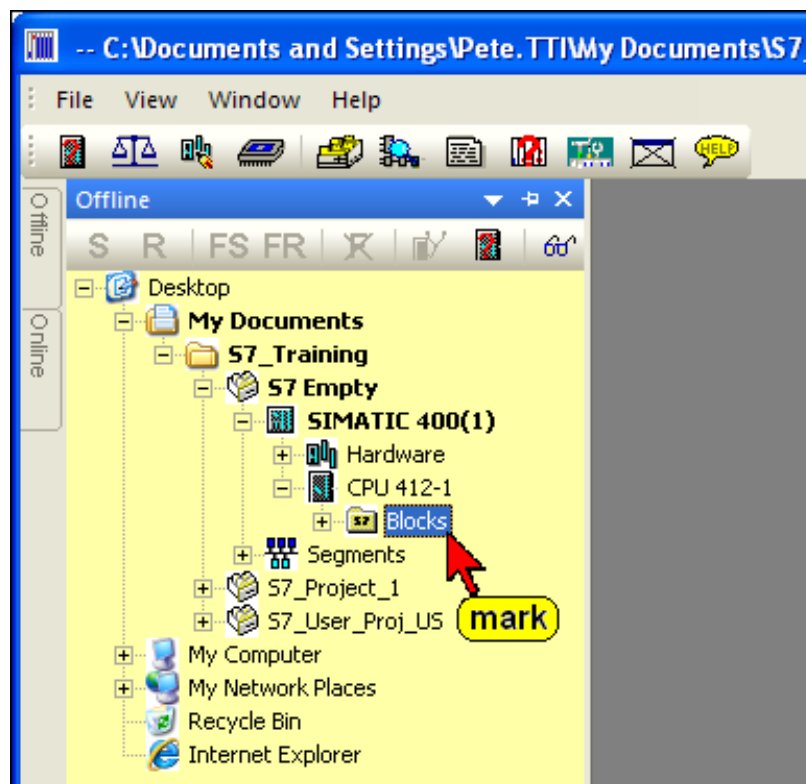
If a block in the PC is overwritten by a PLC block, it is possible that comments will be shifted. Jumps may not be valid anymore and jump labels may be exchanged with substitute labels (M001 etc.) and shifted.

The names of Local Variables are changed into substituted names (IN1, OUT2, IN_OUT3, STAT4, TEMP5, etc.).

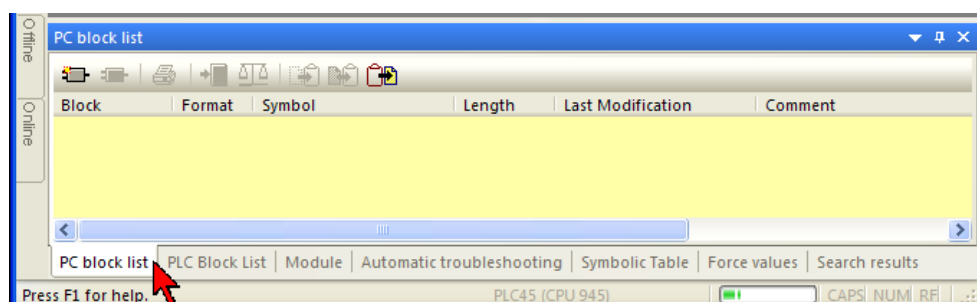
Select the Project, the Hardware Station and the S7 Program where you want to save the PLC Program (from the online connected PLC).



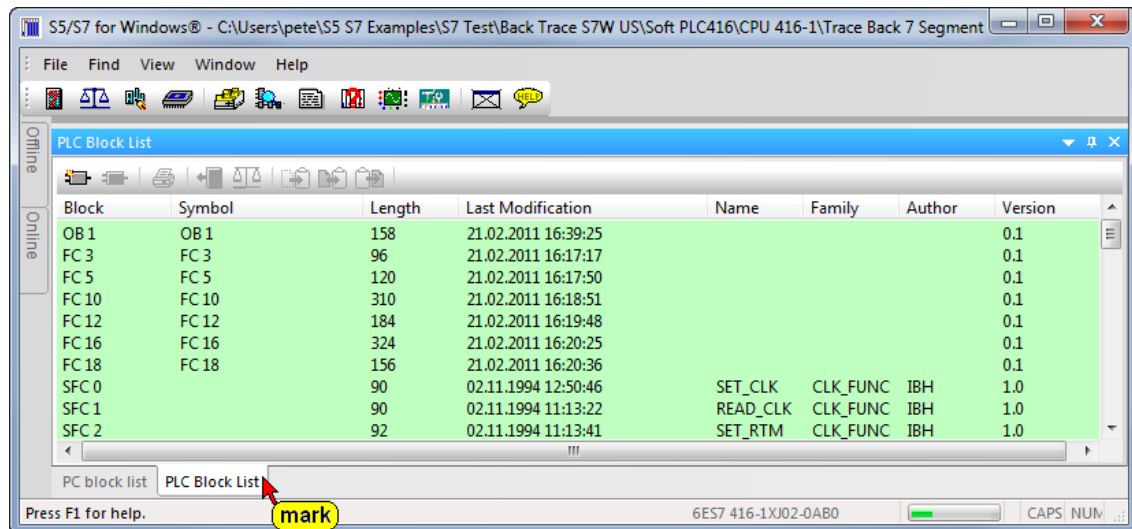
Please see chapter 1.3, on how to generate a project and an S7-300/400 Hardware station. Mark the S7 Program folder.



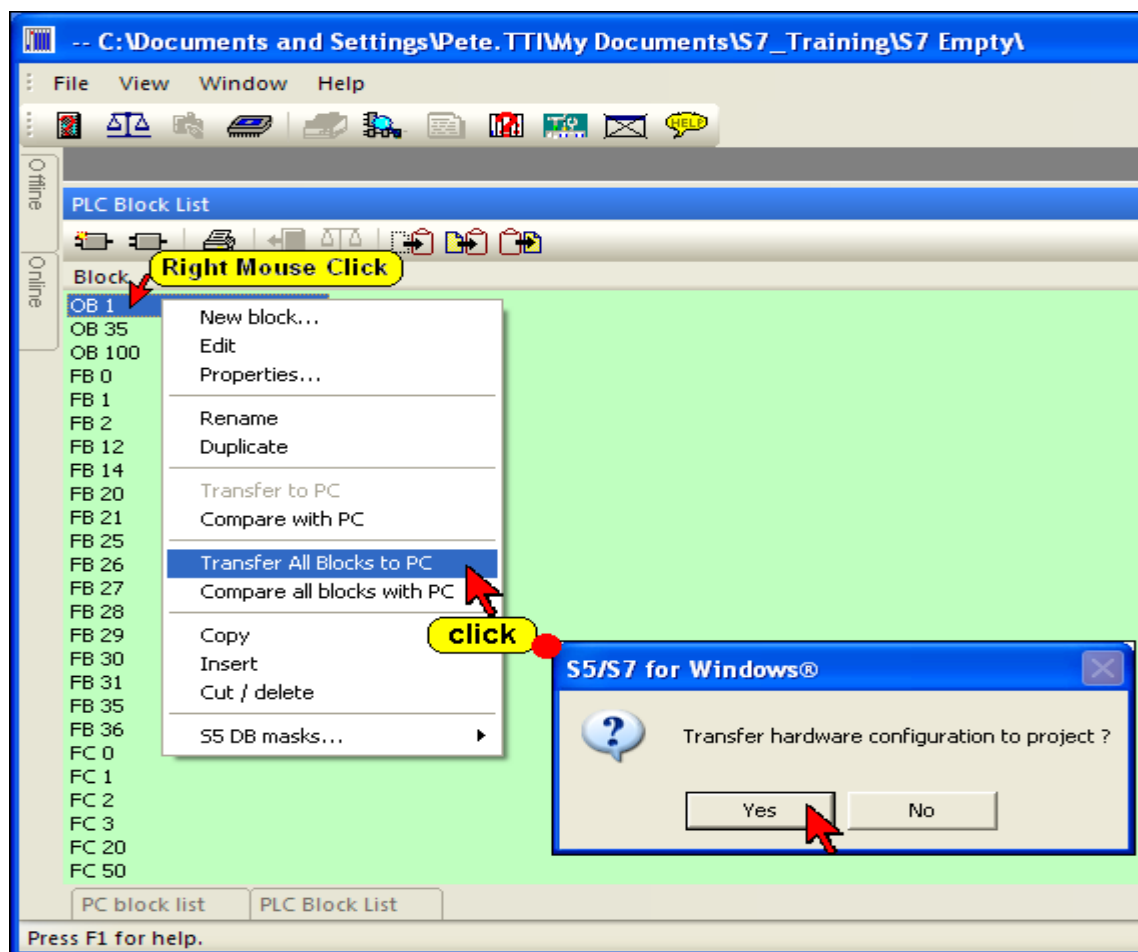
Make sure the PC Block List is empty.



Open the PLC Block List



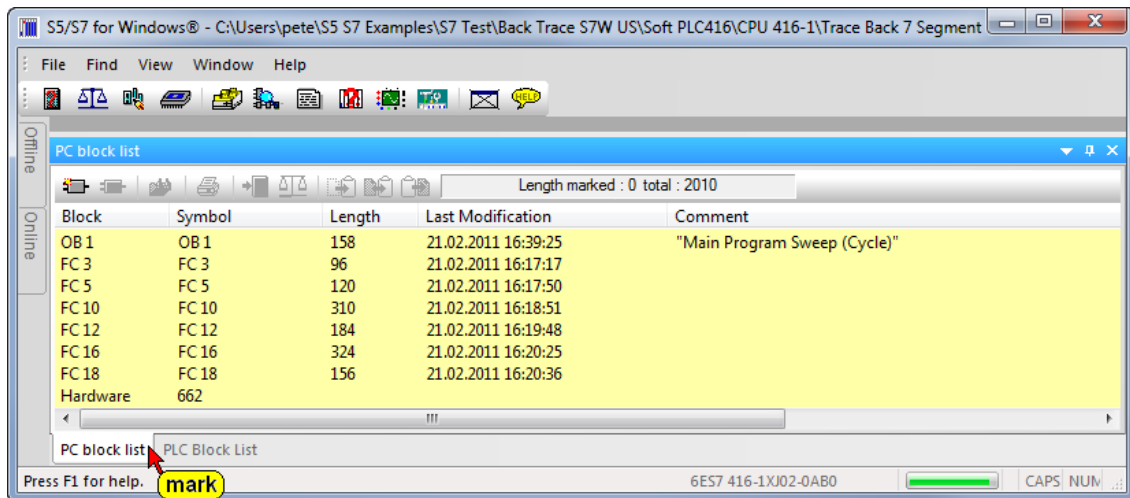
To transfer all PLC Blocks from the PLC to the PC, use the command “Transfer all blocks to PC”. Click on one of the marked Blocks with the right mouse button. Click “Transfer all blocks to PC”.



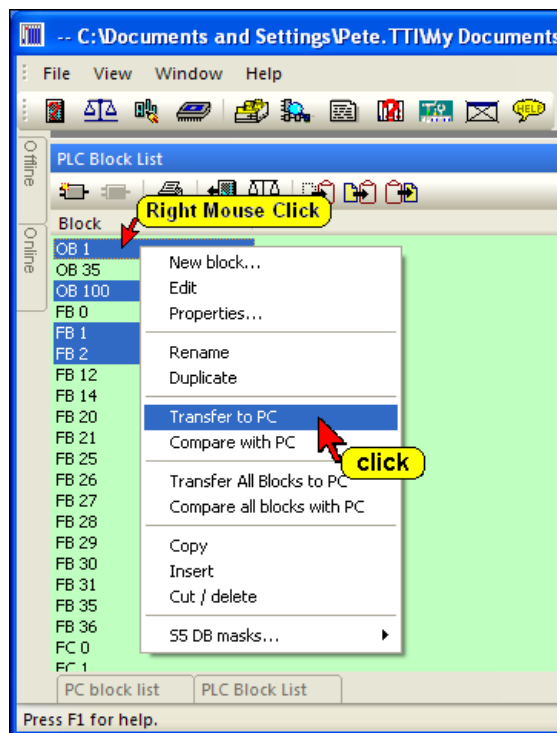
All Blocks from the PLC are transferred to the PC and are listed in the “PC Block List”.

If you want to transfer the hardware configuration as well, (recommended), click “OK” in the opened information box.

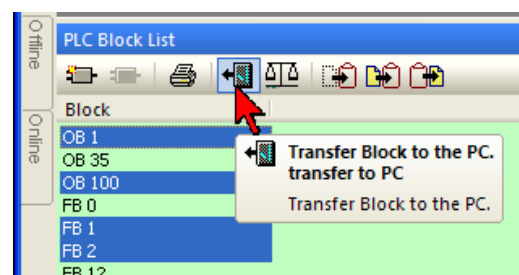
The marked Blocks are transferred to the PC and are listed in the “PC Block List”.



If you want to transfer one or several blocks to the PC, mark these blocks in the PLC Block List and click on one of the marked Blocks with the right mouse button. Click “Transfer to PC”.



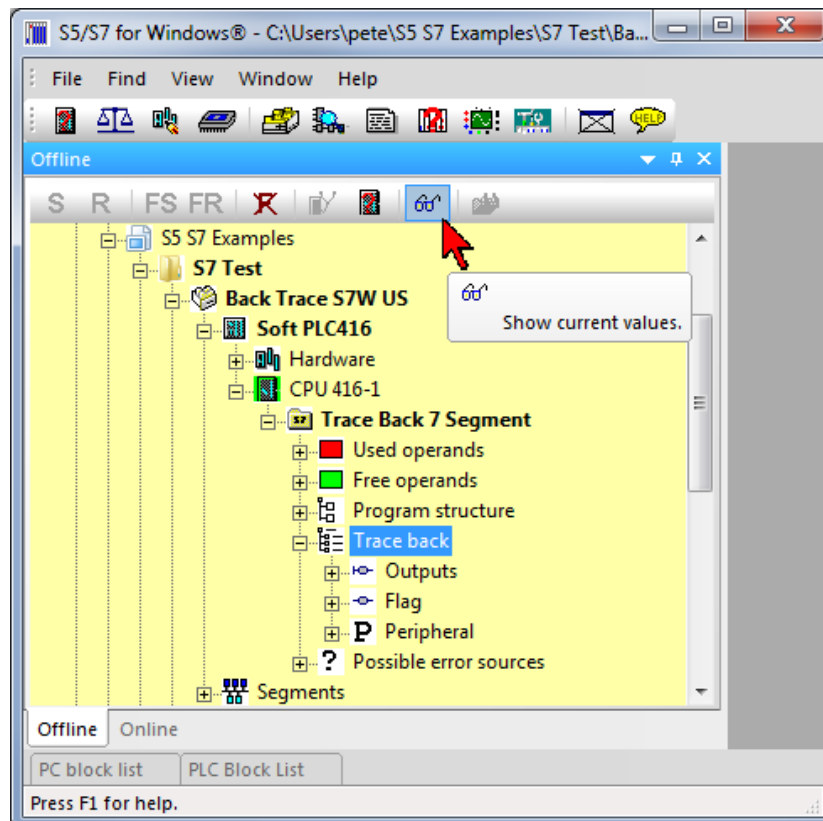
Instead of using the right mouse button and the command “Transfer to PC” you may use the “Transfer to PC” icon.



2.4 Trace Back

S5 / S7 for Windows® has an integrated “Trace Back” function to find out why an operand (Output Qx, Peripheral Px, or Memory Flag Mx) has a certain signal state (ON or OFF).

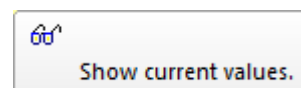
The Trace Back function is available from the Online and the Offline Tree as soon as the status is activated.



Clicking “Trace Back” followed by Outputs, Flag, or Peripherals the searchable operands are shown. If a symbol has been assigned to an operand in the symbolic table the symbol and its symbol comment are displayed as well.



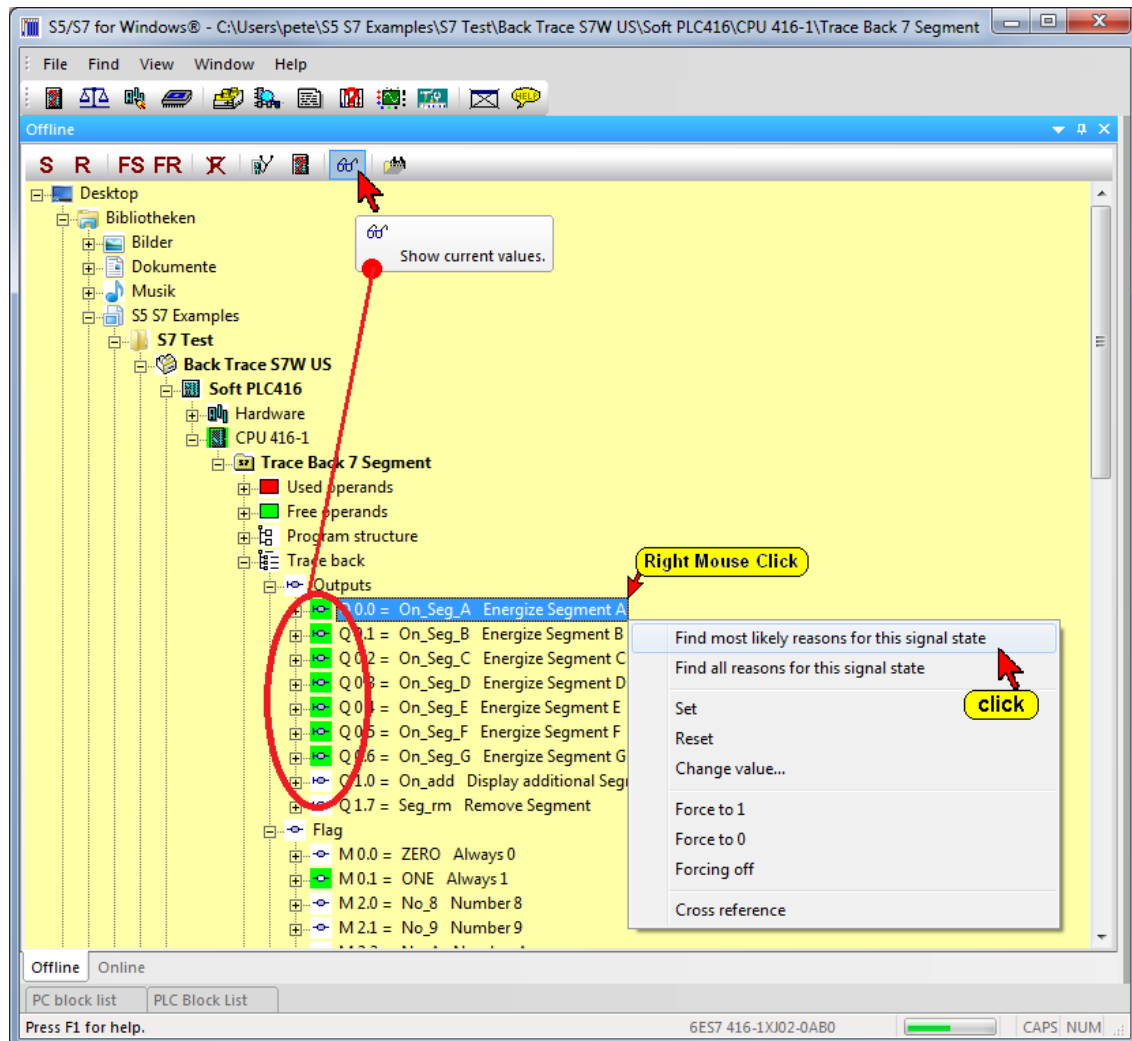
The state (status) of the listed operands are shown as soon as the status is activated by clicking the icon “Show Current Values”



Clicking an operand with the right mouse button will open the context menu to activate one of the Trace Back functions.

The Trace Back is an automated Search-Engine using the cross references. It is determined the origin (Source) of a signal. If a signal is formed by a logic function, the input operands of this logic function are traced back until finally one or more inputs (operands) are found causing the state (status) of the operand traced back.

Trace Back

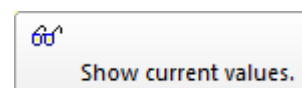


The Trace Back algorithm assumes that a function on the system is not being executed. This means that an output signal (Output Qx, Peripheral Px, or Memory Flag Mx) is missing.

The cause for not executing the function is not the missing output signal, but that one or more input signals of a logical connection are missing.

Because such a logical connection chains can be very complex, is not expected that the cause is always found by the Trace Back function.

Each Trace Back step displays the causes found (missing operand). The state (status) of the operands can be displayed by clicking the icon "Show Current Values". The forced setting or resetting of the operand by clicking with the right mouse is possible (context menu). Also the next trace back step can be initiated. With a double click the PLC Block editor will open.



S5 / S7 for Windows® offers two algorithms to execute the “Trace Back” function.

Find the Most Likely Reasons for this Signal State

Find most likely reasons for this signal state

Clicking this command will activate the trace back function with an algorithm, which takes not all but the most likely possibilities into account to find the reason for the output signal state. This algorithm often gives a fast result. This traceability is advantageous especially for simple logical connections.



Find all the Reasons for this Signal State

Find all reasons for this signal state

Clicking this command will activate the trace back function with an algorithm, which takes all possibilities into account to find the reason of the output signal state.

Example:

The output signal Q0.0 – On_Seg_A – Energize Segment A – should be traced back to find the reason of its state (currently “0”).

1. Mark the operand to be traced back. Open the context menu with a right mouse click and click the command “Find most likely reasons for this signal state”.
2. The window “Automatic troubleshooting Q 0.0” opens automatically and lists the operands (I 0.7) which causes the output Q 0.0 to have its signal state. Clicking the icon “Show Current Values” to show the status of output Q 0.0. 
3. Double-click the line of the operand (I 0.7) to open the PLC Block Editor.
4. Clicking the icon “Show Current Values” to show the status of the opened segment. 
5. The "status" (content) of the operand is I 0.7 is "0".
6. By using the "Forcing" function the state of the operand I 0.7 can be changed. To do this, the window “Automatic troubleshooting Q 0.0” has to be opened again by clicking the tab “Automatic troubleshooting Q 0.0”.

7. Mark the line of the operand (I 0.7), Click the icon "Show Current Values" and by clicking the button "Force to 1" the state of input I0.7 changes to "1" (Set).
8. Open the "Offline – tree" window to check the state of the output Q0.0. It should be "On" (Q0.0 = 1)

Note:

The "Trace Back" function has its limitations when using indirect addressing and local variables.

Display the Operands Affecting an Output Signal

In addition to the automatic "Trace Back" of output signals there is the possibility to display the state (status) of all operands that can affect an output (output, flags or periphery).

By clicking on the "+" symbols in front of the output signal and the following PLC Blocks / networks the operands belonging to this logic are displayed. Also if the icon "Show Current Values" has been clicked the status of all the operands belonging to the logic will be shown. Operands with the State of "1" will have a green background.



The context menu is opened by a right mouse click on an operand. In addition to the "Trace Back" the signal state of the operands can be changed by using the "Set / Reset" or the "Force" functions.

Set (set signal state to 1)

An operand is selected, the State (status) of the operand is set to "1" is set by clicking on the "Set" command (set bit). This "set" is made before the first command in the OB1 is processed (start of cycle). This State remains until the operand of the program is overwritten. The marked operand is an input signal (In.n), the State is overridden by cyclic reading of inputs with the start of the next cycle.

Reset (reset signal state to 0)

An operand is selected, the State (status) of the operand "0" is set by clicking on the "Reset" command (bit reset). This "reset" is made before the first command in the OB1 is processed (start of cycle). This State is unchanged until the operand of the program is overwritten. The marked operand is an input signal (In.n), the State is overridden by cyclic reading of inputs with the start of the next cycle.

Note:

Operands are not used in the program and inputs that have no physical mapping (input card not present) keep their State (1 = set or reset = 0), until the mode is set to "STOP" the SPS.

Inputs, outputs and markers can set / reset.

Forcing to 1

By clicking on the command "Forcing to 1" the state (status) of the marked operand is set to "1" (bit = 1). This "set" is made before the first command in the OB1 is processed (start of cycle). This state of the operand remains until the command "Forcing out" for these selected operands.

Forcing to 0

By clicking on the command "Forcing to 0" the state (status) of the marked operand is set to "0" (bit = 0). This "set" is made before the first command in the OB1 is processed (start of cycle). This state of the operand remains until the command "Forcing out" for these selected operands.

Forcing Off

An operand is selected, the operand is released by clicking on the command "Forcing out". Or the State of the operand is again dependent on the itinerary follows the State of the input signal.

Attention:

Special care is necessary when "Forcing" or "Set".
Unexpected functions can be started!

Forcing is possible with inputs, outputs and the periphery.
S7-400 CPUs allow the "forcing" of memory flags.

Not all CPUs allow the "forcing".



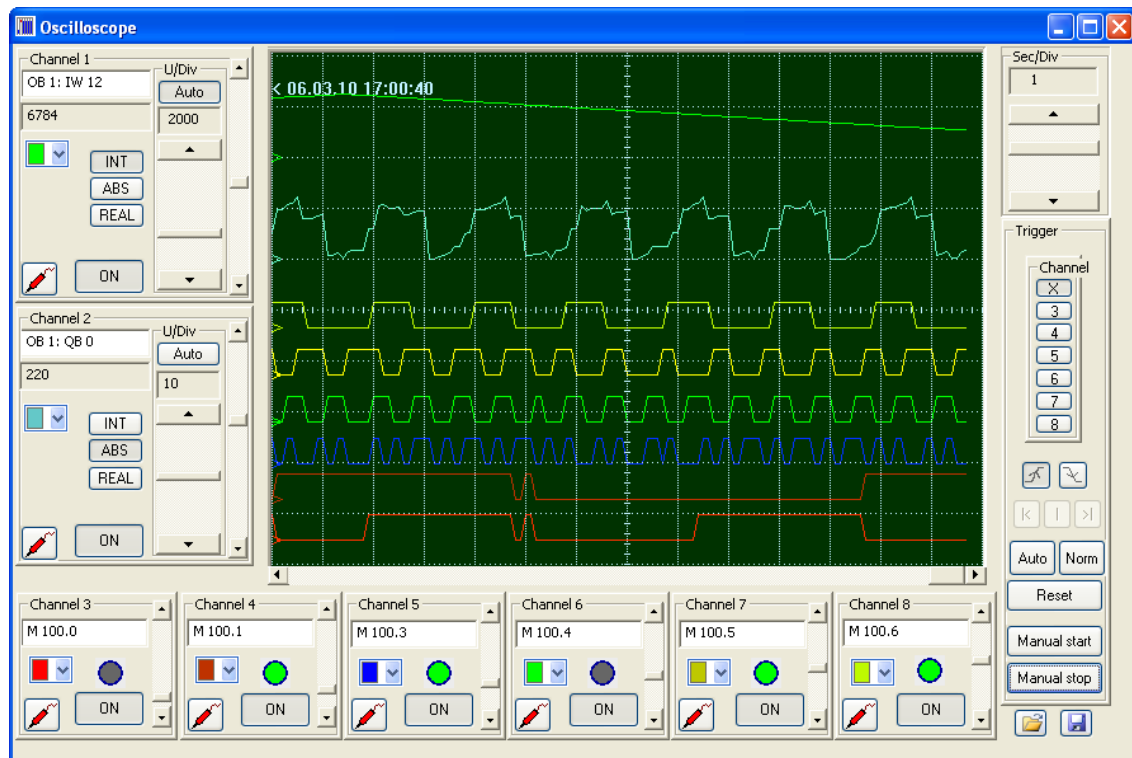
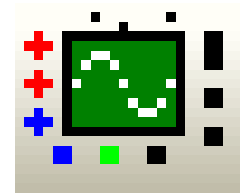
2.5 Oscilloscope

S5 / S7 for Windows® has a built in oscilloscope to monitor the response time of signals (operands / variables) present in the PLC.

There are two (2) channels available to monitor the response time of analog signals. These signals (operands) can be displayed as a 32 bit floating point values (REAL) or as a 16 bit or 32 bit fixed point (integer [INT] or double integer [DINT]) or as an absolute decimal (unsigned) value.

In addition, six (6) channels are also available to monitor digital signals. All types of Bit Operands can be used for monitoring.

Temporary local variable cannot be monitored.

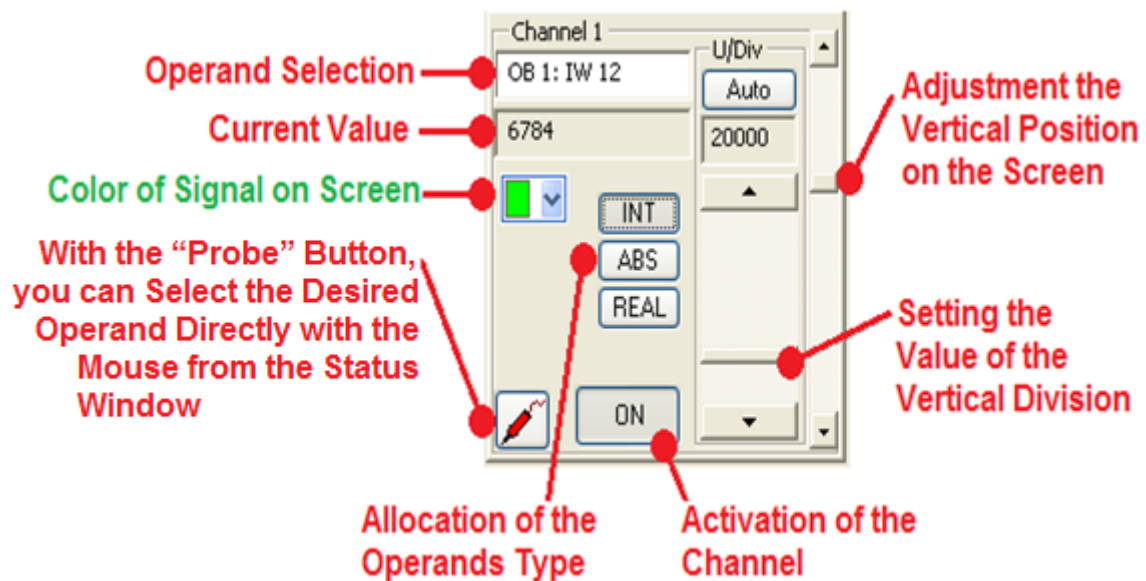


Time base of the Oscilloscope

The time base can be adjusted from 0.2 sec / div up to 200 sec / div with the mouse.



Analog Channel Setup

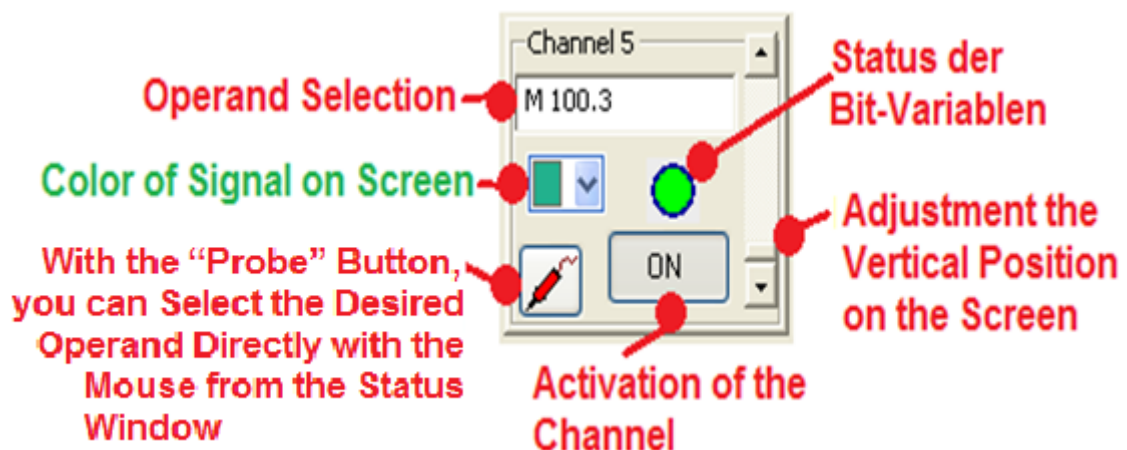


With the "Probe" button (on the right), an operand (variable) present in the "PLC Block Editor Status window" can be assigned to a channel by using the "Drag and Drop" function of the mouse. The displayed value of the variable is the value displayed in the status.



The operand (variable) can be assigned to a channel directly.

Digital Channel Setup

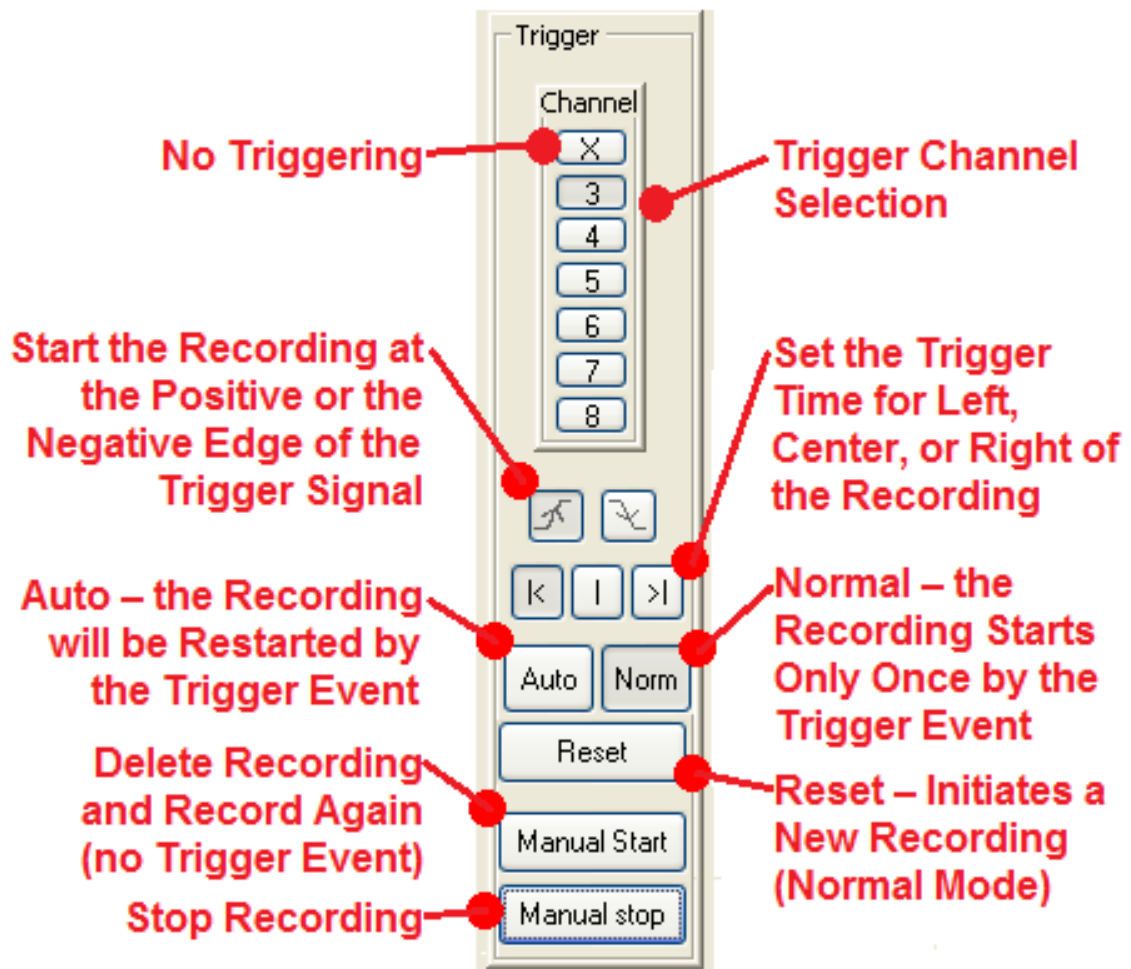


Up to six (6) bit variables (operands) can be monitored. Each of these bit variables can be used to start the monitoring function.

The variables (operands) you want to monitor can be assigned directly or by using the "Drag and Drop" function (with the "Probe" Button) in conjunction with the "PLC Block Editor Status window".



Trigger Setup



Oscilloscope settings Save / Load

The settings of the oscilloscope can be stored on disk. To use the oscilloscope with the same settings at a later date, the settings can be reloaded.



3 S7 for Windows® Tools to Debug a S7 PLC Program

Most tools to debug a S7 PLC Program can only be used if the PLC Program is present in the online PLC, **and** also saved in a S7 Project on the PC.

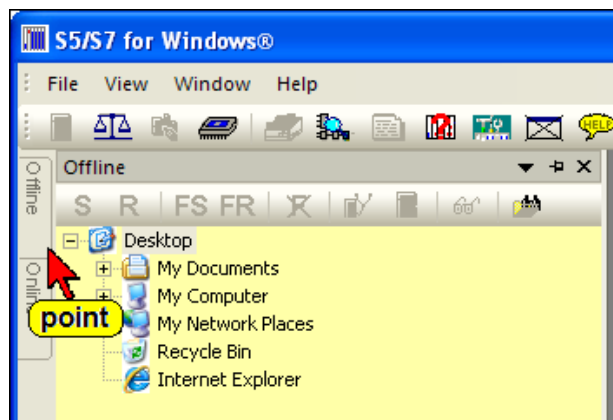
ATTENTION:

If you don't have the original PLC program with symbols and comments we recommend that you download the PLC program to the PC as described in chapter 2.

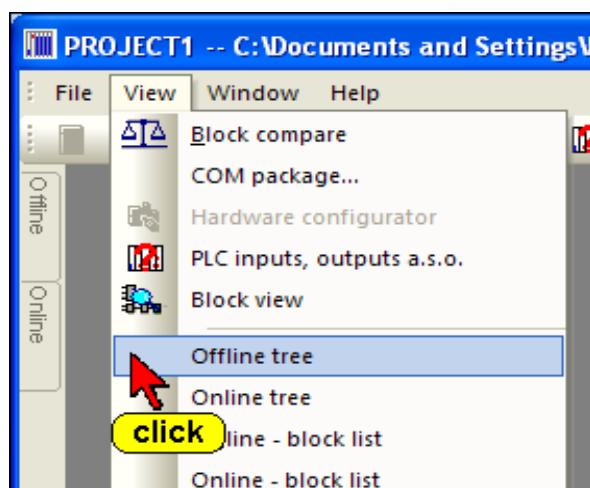


3.1 Opening a S7 PLC Program saved in a “S7 Project”

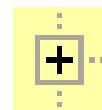
Open the “Offline – Tree” by pointing at the “Offline” tab.



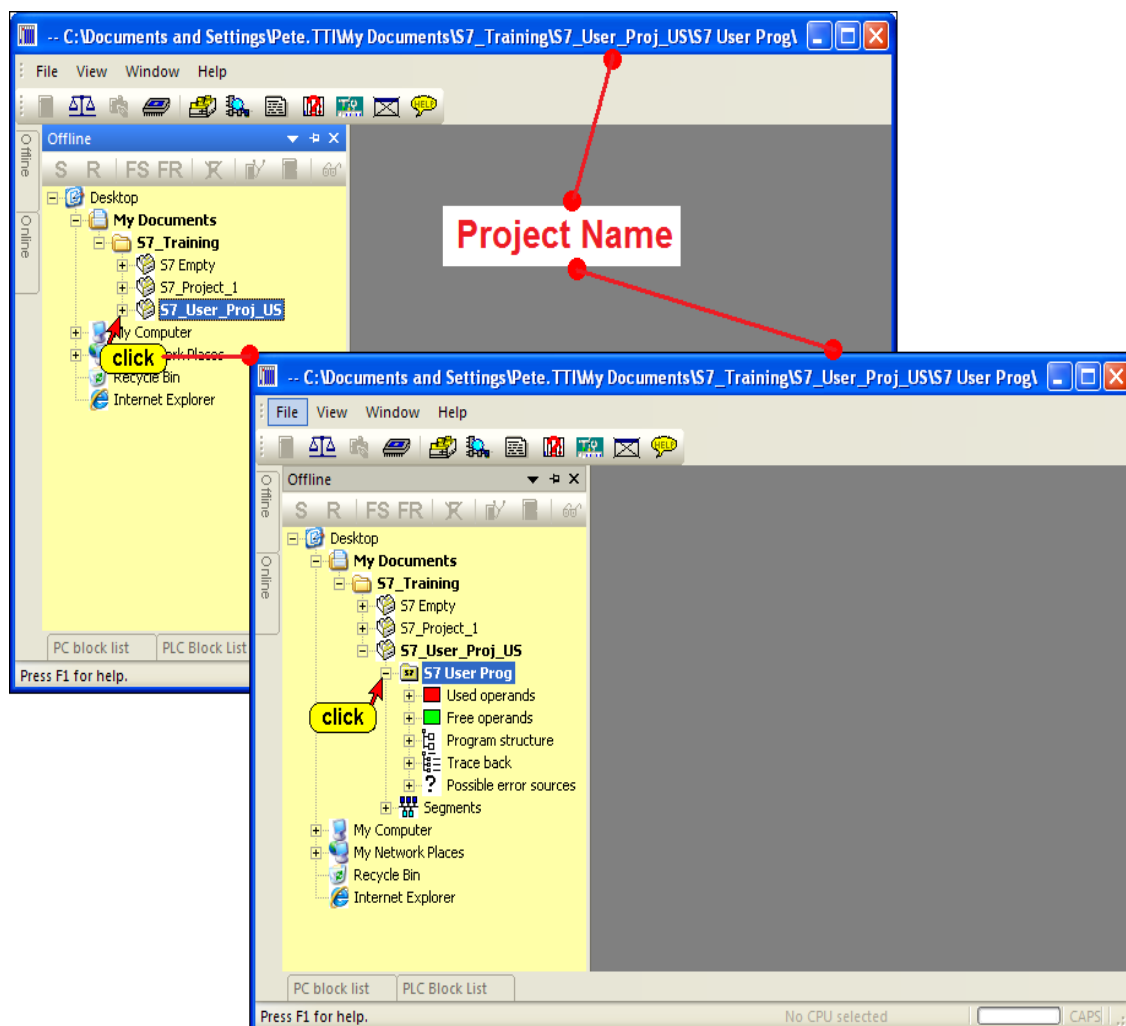
If the “**Offline**” tab is not shown, use the command “Offline tree” from the “File” menu.



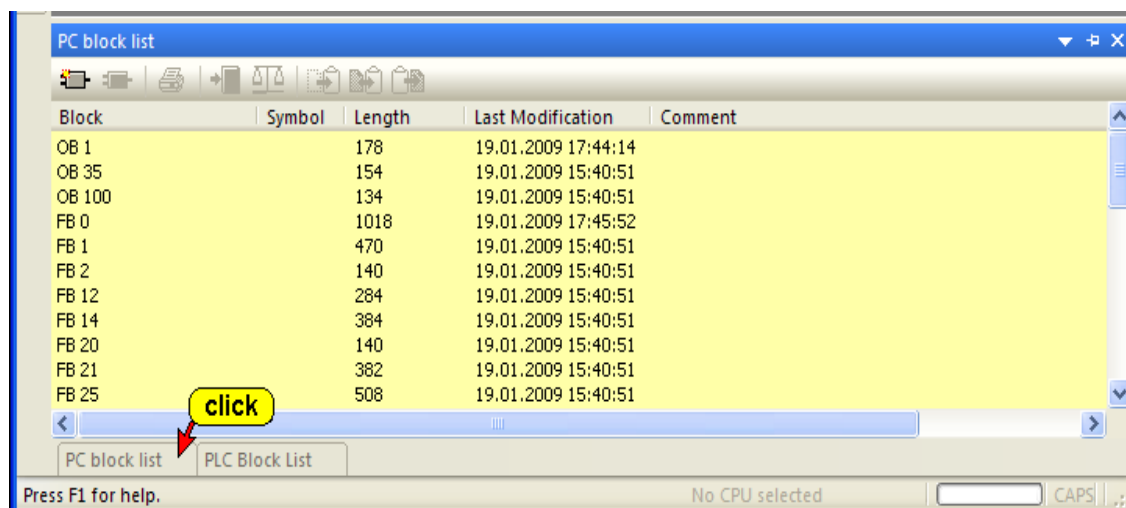
In the “Offline” window select the path and click on the icon in front of the project name (**S7_User_Proj_US**).



The project files and other tools are shown.



The project name and the S7 Program name (**S7 User Prog**) with its path, is shown. Also the Blocks are listed in the “PC Block List”.



The PLC Program is now open for further use.

3.2 Comparing the existing Online and Offline PLC Program

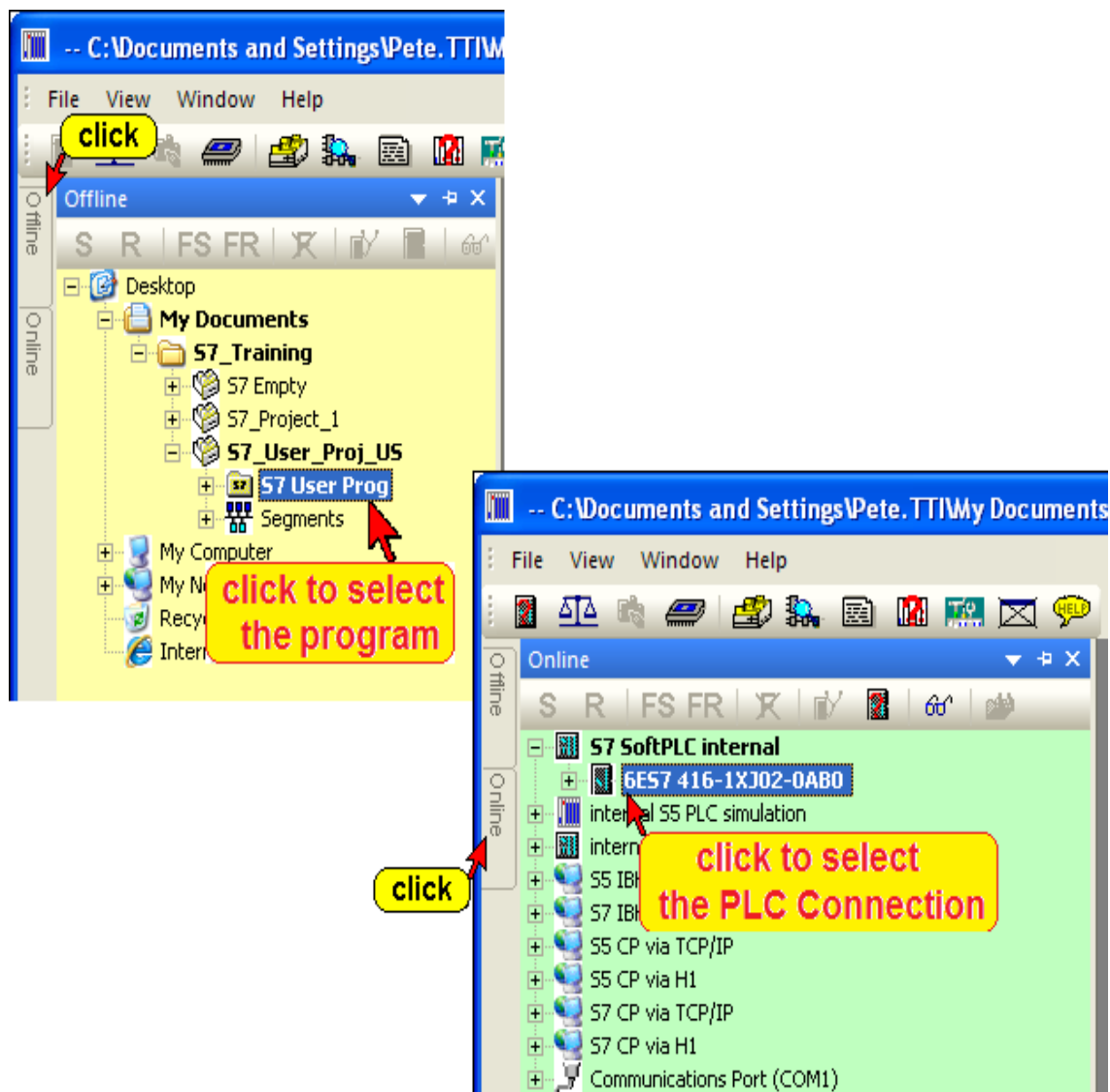
ATTENTION:

If you are using the original PLC program with symbols and comments make sure that the program executed at the PLC is identical with the original PLC program you have on the PC.

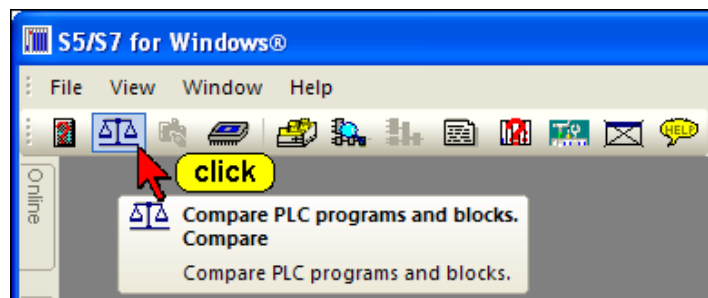


Use the “Compare Tool” to verify that the Program on the PC has the same code as the PLC program executed at the PLC.

Select the required PLC at the “Offline – Tree” and the PLC to be connected to from the “Online – Tree” (see chapter 1).

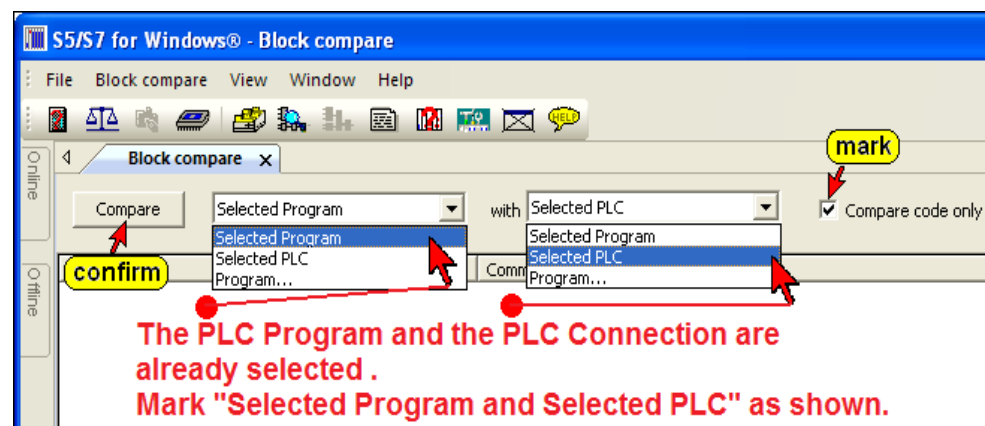


Compare Tool

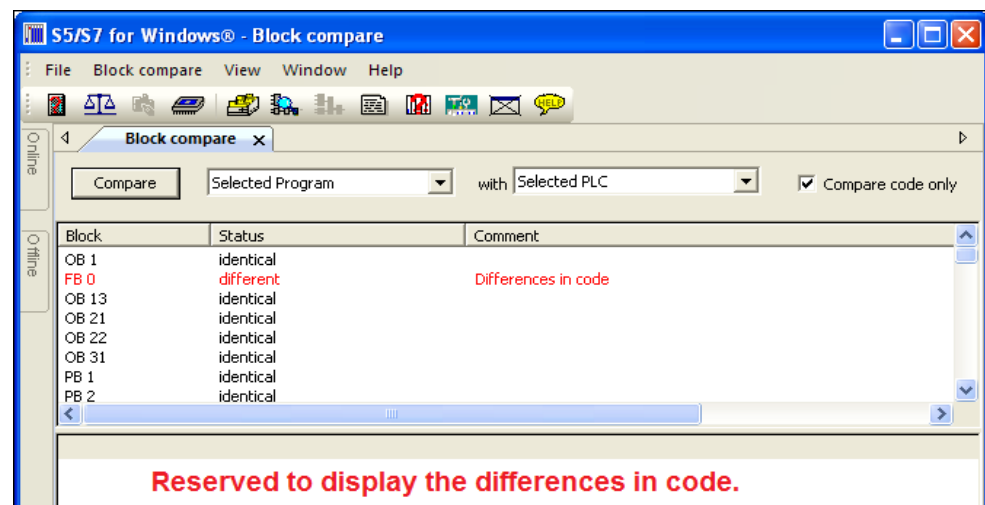


Click the icon to open the Compare window.

You may select the two locations where the files to be compared are located.



When comparing a PLC Program on the PC with the Program executed on the PLC, only the code is relevant. Mark "Compare code only". To start the comparison confirm by clicking the "Compare" button.

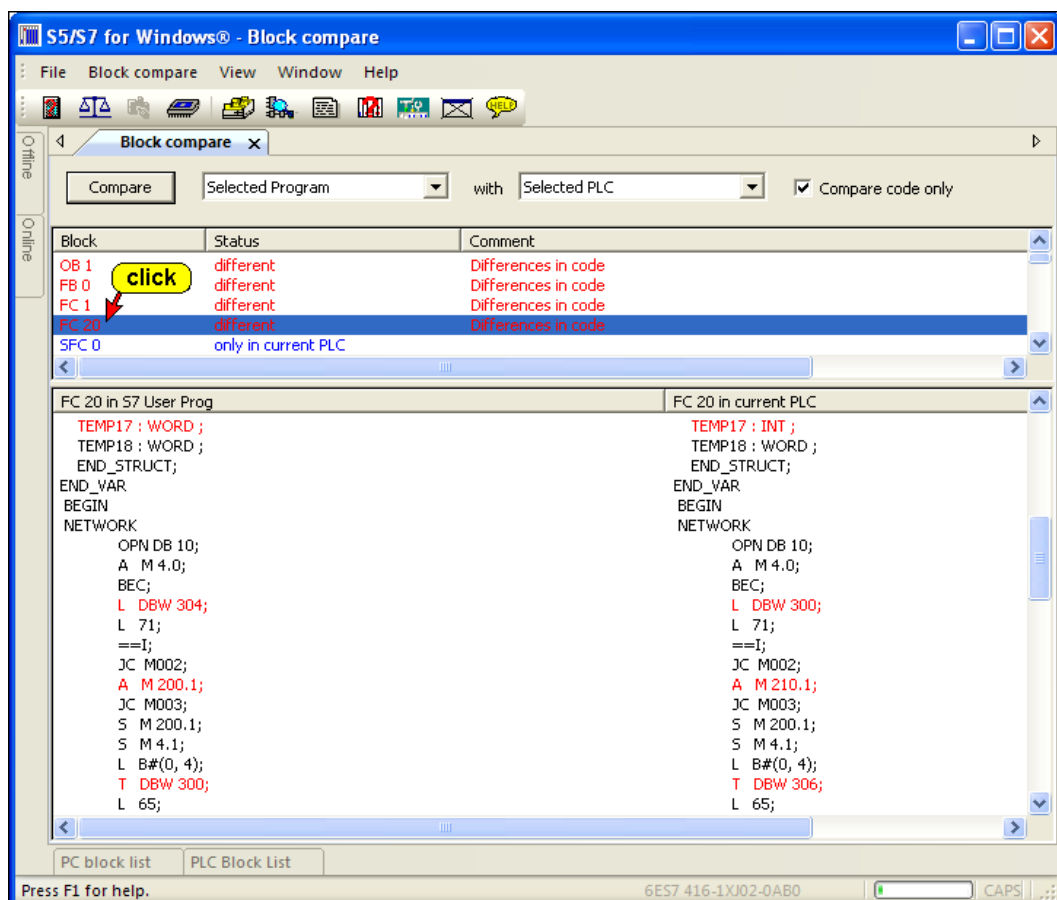


The compare result is shown in the upper part of the compare window. PLC Block names written in black are identical, PLC Block names shown in red have differences in the code.

ATTENTION:

Do not transfer blocks from the PLC to the PC if the selected blocks exist in the PC RAM.

If a block in the PC is overwritten by a PLC block, it is possible that comments will be shifted and labels may not be valid anymore (labels are exchanged with substitute labels (M001 etc.).

**Differences in Code**

Clicking the Block name opens a window with the details of the compared Blocks. Any differences are displayed in red.

ATTENTION:

Comparing a PLC Program on the PC with the Program executed on the PLC will show (most of the time) differences in Data Blocks (DBxx).

This is normal if the data stored in the Data Block is collected from the PLC.

In any event the length of the Data Blocks must be identical.



3.3 Arranging Window in the Workplace

Version 6.x of *S7 for Windows®* has a new concept to open and close windows in the workplace.

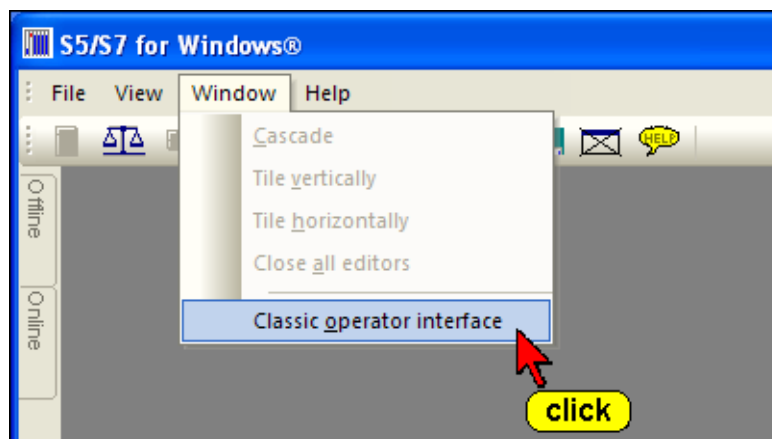
You can use the “Auto Hide” icon to lock the tab at the outside border of the workplace and by moving the mouse pointer to the tab the window will open automatically.

It is also possible to open the “PC Block List” in the workplace and start the “Debug Tools” from there. The “PC Block List” window stays open until you close “PC Block List” the window.

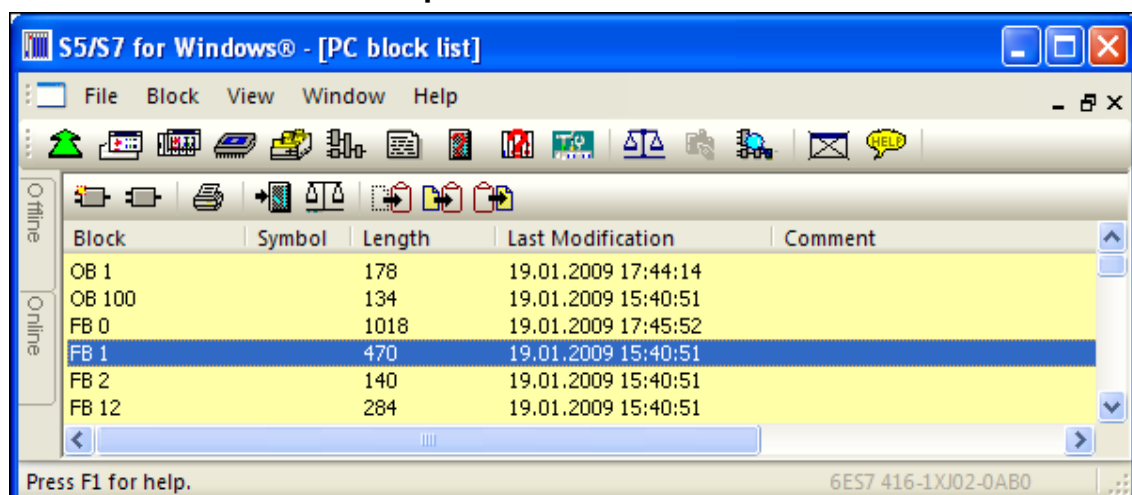
This mode is preferable if you want to change between Blocks being displayed online and offline for modifications.

To work in this “Classic Operator Interface” mode the S7 PLC Program must be opened (see chapter 3.1).

To select the previously described mode, click “Classic operator interface” in the “Window” menu.

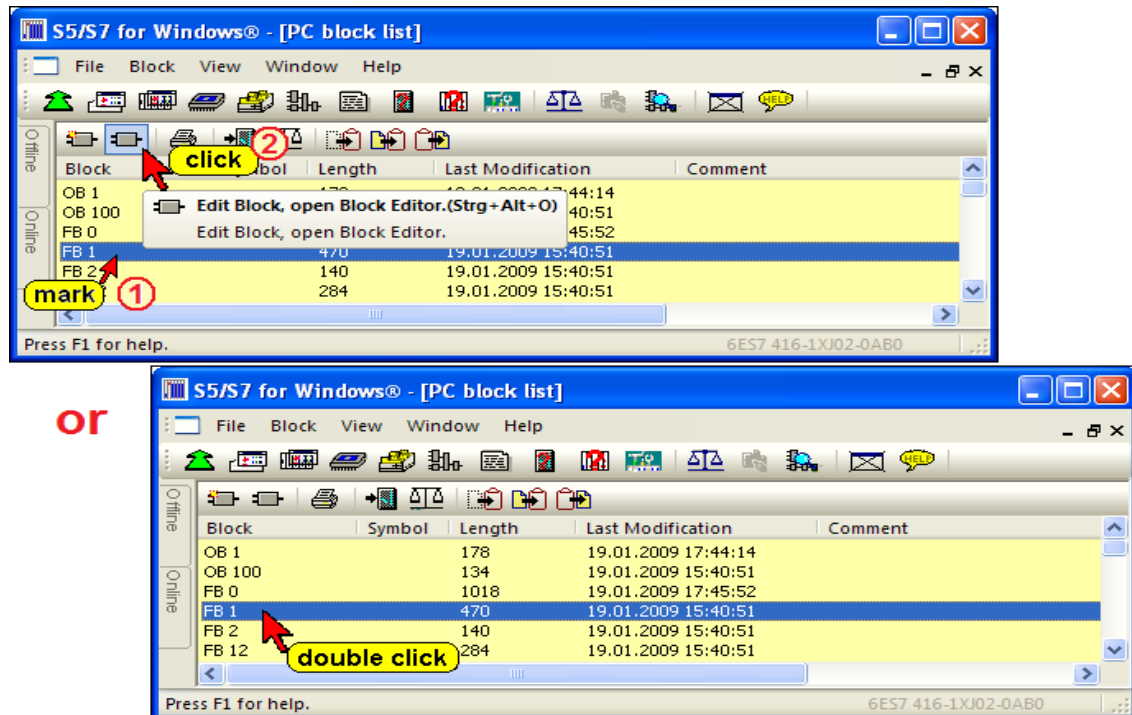


PC Block List in “Classic Operator Interface” mode



3.4 PLC Block Status display

To display the PLC status you must open the desired PLC Block with the “Editor”. You may open the Editor by double clicking the Block name or by marking the Block name and clicking the icon.



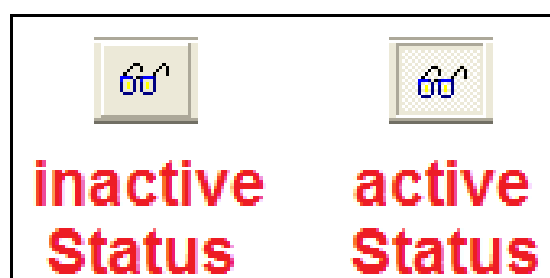
The Block may be selected from the “PC Block List” or the “PLC Block List”. If you use the “PC Block List” existing symbolic comments may be displayed within the status display.

Note:

We recommend that you select the Block from the “PC Block List”. If any modifications are made they are saved in the PC and therefore are available the next time the Block is opened.

Activating the Status

An icon is provided to activate the status. Clicking the icon again will deactivate the status.



Status Display, Statement List (STL) Presentation

S5/S7 for Windows®

File Block Edit Find Insert Presentation View Window Help

FB 1

Segment 1:

Label	Instruction	Operand	Comment	Address	RLO	Contents	Accu1	Accu2	Status
AN	T 126		AUX START METERCOUNTER REFRESH DELAY	0000	1	000.0			000000011
L	S5T#10S			0002	1		00001100	00000300	000000011
SD	T 125		START METERCOUNTER A/B REFRESH DELAY	0006	1	032.1			000000010
NOP	0			0008	1				000000010
NOP	0			000A	1				000000010
NOP	0			000C	1				000000010
A	T 125		START METERCOUNTER A/B REFRESH DELAY	000E	0	032.1			000000001
R	M 5.2		ANTIREP. TX METER COUNTER "A" RESET	0010	0	0			000000000
R	M 7.2		ANTIREP. TX METER COUNTER "B" RESET	0012	0	0			000000000

Segment 2:

Label	Instruction	Operand	Comment	Address	RLO	Conte...	Accu1	Accu2	Status
A	T 125		START METERCOUNTER A/B REFRESH DELAY	0014	0	032.1			000000001
L	S5T#100MS			0016	0		00000010	00001100	000000001
SD	T 126		AUX START METERCOUNTER REFRESH DELAY	001A	0	000.0			000000000

Segment 3:

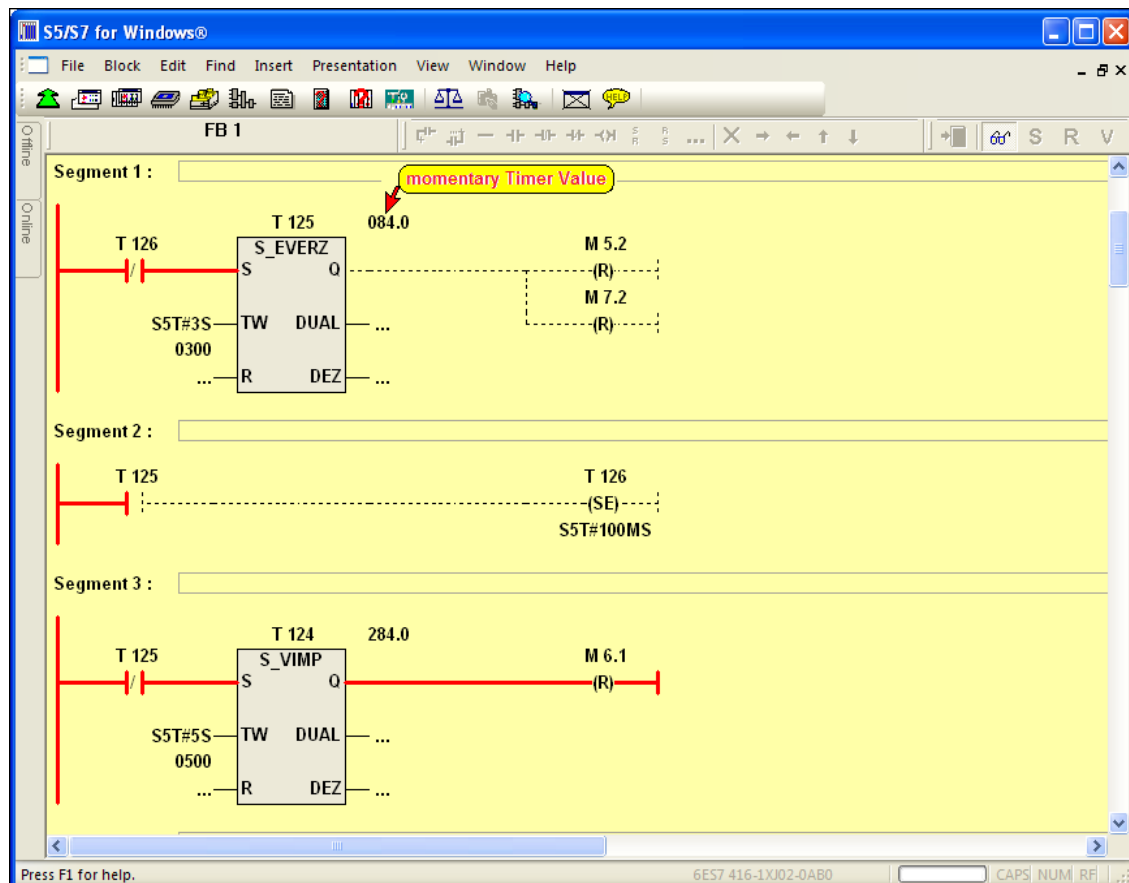
Label	Instruction	Operand	Comment	Address	RLO	Conte...	Accu1	Accu2	Status
AN	T 125		START METERCOUNTER A/B REFRESH DELAY	001C	1	032.1			000000011
L	S5T#100MS			001E	1		00000010	00000010	000000011
SE	T 124		RUNNING MACHINE REFRESH PULSE	0022	1	000.0			000000010
NOP	0			0024	1				000000010
NOP	0			0026	1				000000010
NOP	0			0028	1				000000010
A	T 124		RUNNING MACHINE REFRESH PULSE	002A	0	000.0			000000001
R	M 6.1		ANTIREP.FOR RUNNING MACHINE	002C	0	0			000000000

Segment 4:

Label	Instruction	Operand	Comment	Address	RLO	Conte...	Accu1	Accu2	Status
A	I 25.3		1-SPOOLER IN AUTOMATIC SELECTOR	002E	0	0			000000001

Press F1 for help. 6ES7 416-1XJ02-0AB0 CAPS NUM RF

Status Display, Ladder Logic (LAD) Presentation



Status Display, Ladder Logic (LAD) Presentation with Symbolic Table

The screenshot shows the S7 for Windows interface with the Ladder Logic (LAD) presentation. The main window displays a ladder logic diagram for Function Block 1 (FB 1). The diagram includes a timer T 124 (S_VIMP) with a value of 203.0, a memory bit M 6.1 (R), and a memory bit M 31.0 (SR). A red line indicates a segment not online updated. The symbolic table at the bottom lists the following data:

Symbol	Operand	Data type	Comment
I25.3	I 25.3	BOOL	1-SPOOLER IN AUTOMATIC SELECTOR
I25.4	I 25.4	BOOL	1-1ST PRESELECTION ACHIEVED
I25.5	I 25.5	BOOL	1-2ND PRESELECTION ACHIEVED
I25.6	I 25.6	BOOL	...
I25.7	I 25.7	BOOL	...

Status Display, Control System Flowchart (CSF) Presentation

The screenshot shows the S7 for Windows interface with the Control System Flowchart (CSF) presentation. The main window displays a flowchart for Function Block 1 (FB 1). The flowchart includes a timer T 124 (S_PEXT) with a value of 263.0, a memory bit M 6.1 (R), and a memory bit M 31.0 (SR). The symbolic table at the bottom lists the following data:

Symbol	Operand	Data type	Comment
T125	T 125	TIMER	START METERCOUNTER A/B REFRESH DELAY
T126	T 126	TIMER	AUX START METERCOUNTER REFRESH DELAY
T127	T 127	TIMER	...
C1	C 1	COUNTER	1-SPOOLER BINDING REVOLUTIONS COUNTER
C3	C 3	COUNTER	1-SPOOLER INITIAL BINDING COUNTER