# FST User's Guide

This manual describes how to use the FST programming tool.

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### Contents

# FST 4.02.22 - Release Notes

**March 13th, 2001**

Here is release 4.02.21 of FST for Windows. This is the second product release on CD-ROM of the FST for Windows (FST4).

# Installation of the FST 4.02

When your CD drive has Auto Insert Notification enabled, a menu will appear with the option to install FST4.

You can also manually initiate the installation by starting SETUP.EXE in the \INSTALL subdirectory.

This version uses an InstallShield setup which will add appropriate entries in the Start menu for you.

If you do not have the permission to install programs on your PC, this version can also be installed from the self-extracting file FST40221.EXE in the \INSTALL subdirectory. It will try to create a directory/folder C:\FST40221. You can change this during the installation to whatever you like.

This FST 4 does NOT touch any of your system INI files (WIN.INI, SYSTEM.INI, ...) It will NOT replace any system library (xxx.DLL, xxx.VXD, ...) And it will currently NOT touch the registry in your box (except for the Uninstall information when using the InstallShield setup).

Also install the tools in the \TOOLS folder of the CD-ROM if required.

Some modules and drivers that have been part of former FST releases can be found in the \OLDLIB folder of the CD-ROM. Use these drivers only if required for old projects. Please regard the important information in the README files for the individual drivers.

# Uninstalling

If you installed FST 4 using the InstallShield setup, the uninstall information is stored in the Windows registry. FST 4 can be removed from your PC using the Windows Control Panel (Software).

To get rid of any FST 4 version installed from a self-extracting zip file simply remove the installation directory/folder, usually C:\FST40220, and all its subdirectories/folders.

# Known Problems

ONLINE HELP

> The FST 4 Online Help uses the HTML Help viewer. This requires that you have Internet Explorer 4 or higher installed.
>
> The HTML Help Installation and Update package (HHUPD.EXE in the \INSTALL folder) will update your installation to the latest version (on a Windows NT system this requires that you have administrator privileges). The update will not be executed if you already have a newer version of HTML Help installed.
>
> Windows 2000 users should not run the HTML Help Installation and Update Package. Help component updates are provided via Windows service packs.
>
> For more information see http://www.microsoft.com.
>
> If you do not want to use Internet Explorer the contents of the FST 4 Online Help are also available in PDF format in the folder \MANUALS of the CD-ROM.

If you want to make a printout of the entire Online Help it is suggested to use the PDF version.

EXTERNAL TOOLS

This version of FST 4 still uses some DOS programs, e.g. the OWS tools. Some of these programs will not work correctly if the current FST project is stored in a path that is not according to DOS rules, i.e. no spaces, max. 8+3 characters per folder name. Please use a project path that is according to DOS rules if you want to use these programs.

On Windows 2000 all DOS tools are troublesome and the mouse does not work.

It is currently not possible to use Ethernet for the online features of the fieldbus configurators.

TCP/IP

Before you can use TCP/IP for programming (download) and online displays you once have to download a project including the TCPIP driver via the RS232 connection.

When using TCP/IP for downloading a project, please make sure not to select the option "Delete project before download" in the Controller Settings, since this will also stop the TCP/IP driver.

When setting a password for the controller this will prevent modifications for both, serial and TCP/IP access.

IO1x/IO4x

Use the versions with a suffix "N" together with kernel 2.23.01 or later only. The versions without "N" will work with any kernel 2.2x, but may block the PLC cycle on defective or missing hardware. Therefore they are no longer include in the FST standard installation. If required you can install them from the folder \OLDLIB of the installation CD-ROM. If an upgrade of your CPU module is required please contact your local Festo dealer.

HC1X + RTC + DRAD + FESTOBUS

When the HC1X is equipped with a ZL16/ZL17 chip, accessing the real-time clock the FST modules F1x will cause the Festo fieldbus IO update to stop after some time. The problem is under investigation.

HC2X + AS-INTERFACE (CP96)

Only up to two CP96 modules with the switch settings KSW=1 and KSW=4 can be used together with the HC20 CPU. The switch positions KSW=2 and KSW=3 lead to memory conflicts.

HC2X + OM22 PLC SAFETY

Only IO modules OM22 with a version of P16 or higher can be operated in PLC Safety mode on the HC20 CPU.

FIND & REPLACE

When using the Find or Replace function of the STL Editor, the Allocation List Editor or the Message Window please close the Find/Replace dialog box before closing the editor/message window from which you opened the Find/Replace dialog. The dialog box will only work for the editor window from which it was opened. If you want to search in another window please close the dialog box and reopen it again after you have selected the other edior window.

STARTUP DRIVE

Be careful when you change the drive for the STARTUP.BAT file (Controller Settings - Drives). Make sure that the AUTOEXEC.BAT of the controller looks for a STARTUP.BAT on that drive and delete all STARTUP.BAT files on any other drives (using the Filetransfer tool). For information on possible STARTUP.BAT locations consult the manual or online help (chapter PLC operating system - miscellaneus). Usually it is best to keep the default for each controller type: FECs: B: - HC0X: B: - HC1X: C: - HC20: C:

FILE HANDLING WITH FLOPPY DISK

If no floppy in the drive and you try to access it with the file handling modules no error message is returned.

ONLINE

If you have problems with the online connection you should set the baudrate to 2400. This is often the case when Festo fieldbus is active or the CPU is busy with communication, e.g. on other serial

ports.

Avoid long steps in control programs that are executed frequently since this will shorten the time slot for CI communication. Please note that calling CFMs may take a considerable amount of time, especially if several CFMs are called in sequence in the same step, e.g. AMXX. Calling CMPs is uncritical since a task switch (invisible step) is inserted after each call automatically.

FIRST LOGIN TO NEW HC1X

If you have problems connection to a new HC1X CPU try using a baudrate different from 9600. If you are not successful try the following:

1. Exit FST
2. Reboot the HC1X
3. Execute SENDBRK.EXE that can be found in the directory where you have installed FST 4
4. Choose the COM port you are using for FST
5. Start FST and try again (do not reboot the HC1X)

Once you have successfully loaded a FST project the problem no longer exists since then FST is directly started when the CPU is booted.

# What is new compared to FST 4.01.16

- It is now possible to download the project without updating the driver files. This feature an be useful if making minor changes to old projects.
- Controllers of the FEC Standard family are now supported.
- FST 4 is now also available in German.
- In the English version the user can select if he wants to use the keyword ELSE instead of OTHRW in Statementlist.
- In the driver options dialog is now a help button to open the driver's chapter in the online help.
- New and imported programs or modules are now selecetd for download by default.
- When importing modules from the library more than one module can be selected at the same time.
- Modules can now be imported from any directory if required (this is a useful feature for module developers).
- New tab in the Online Display for Strings.
- Plattform dependent choices for controller settings.
- Show COM port or IP address in title bar of the STL Online window.
- The local IO for FEC and HC0X controllers are now automatically added to the IO configuration by default for new projects.

# Bug fixes since FST 4.01.16

- Longer timeouts for CI communication allow connection to busy CPUs.
- Out of range constants in STL are no longer ignored.
- Allow to switch program status in online display even with fast update speed.
- Direct printing of source code programs that are not selected for download is now possible.
- Sorted printout of source code and compilation log.
- Correct display of large timer values.
- Regard special case for EW in online display user defined tab.
- Enable switch selection for IO modules only if more than one choice possible.
- Sorted print out of cross reference list.

# What is new compared to FST 3

- Note! Changed run-time code.

  FST 4 now compiles code for CFMs which do NOT include a task switch. For this to work, CFMs no longer may have STEPs. This gives you a chance to have simple and direct "subroutines". The old FST 3.x method prohibited this entirely. The behaviour of CMPs haven't been touched.

  In most cases you cannot see the difference at all. If you have used CFMs with steps change them to CMPs - and (in most cases) forget this issue.

  The new rules are easy to remember:

  - A program may call CMPs and CFMs (unchanged),
    calling a CMP always include a task switch (unchanged),
    the called CMP may have steps (unchanged),
    calling a CFM will not cause a task switch (new).
  - A CMP may call CFMs (unchanged),
    but a CMP may NOT call another CMP (unchanged).
  - A CFM may call other CFMs (new),
    but a CFM may NOT call a CMP (new).

  In a diagram the rule looks as follows:

```
Program  -- calls -->  CFMs
         -- calls -->  CMPs
CMP      -- calls -->  CFMs
CFM      -- calls -->  CFMs
```

  The FST kernel (PLC operating system) from version 2.24.3 will check this at run-time.

  If you get error 36, check which function module you are calling in the step where the error occurred. Rename this module as a CMP and change your programs accordingly.

  The modules FWRITSTR and FREADSTR of the FST runtime library are using steps and can be used as CMPs only.
- Mr. Westrik from Festo-NL has contributed the TCP/IP part of the FST 4 software. After a first download of the FST TCP/IP driver, it is also possible to use TCP/IP for all online tasks - from CI commands to downloading. Simply change the settings in "Extras >> FST Preferences >> Communication port".
- The communication method has changed significantly. Well, we still use the old fashioned CI but we did further analysis on the implementation. The obvious situation where you will see this is a faster login to the remote controller.
- Make and Download are separated, a Build All is also available.

  "Make" will only compile and link what has been changed. This is what you are used to with FST 3.x. "Build", contrary to "Make," will compile and link everything. Our "Make" is pretty clever. So you don't need the "Build." But whenever in doubt - it's available.
- There is a project specific IPC controller setting which lets you automatically stop and unload a project on the IPC controller when downloading.
- Run-time options are selectable one by one instead of two pre-configured run-time modes ("Machine Mode" and "Unit Mode" in FST 3.x notion.)
- An AUTOSTART run-time option is available.
- All kinds of online displays can be used at the same time, have the online display in one window, a CI terminal in another window and STL online in one or more additional windows. Then try to transfer a file to or from the controller.

# Conversion of FST 3.x Projects to FST 4.x

The conversion program FST3TO4.EXE is accessible by menu entry "Extras >> Convert FST 3.x Projects". Just select the right path (of FST IPC 3.x or the FST IPC 3.x project path) and select a project to convert.

It is recommended to rebuild the entire project by selecting menue item "Project >> Build Project" or click the appropriate toolbar button.

# What is still incomplete

The "Tip of the Day" is just a start. It is not a very powerful wizard. Ideas and new tips are welcome.

# What is still missing

Here is a list of things which are not yet implemented in this version:

- Ladder diagram
- Windows version of OWS

# The following new features/bug fixes require an update of the kernel version (firmware)

- get runtime error when calling CFMs with steps (2.24.03)
- version checking when starting STL online (2.24.02)
- improved PLC Safety method (2.24.02)
- online display of counters (2.23.03)
- IO1x/IO4x (2.23.01)

You can check the detailed version with the CI command "L!". If this results in "ACCESS ERROR" you have kernel version 2.22 or less.

If you an upgrade of your CPU module is required please contact your local Festo dealer.

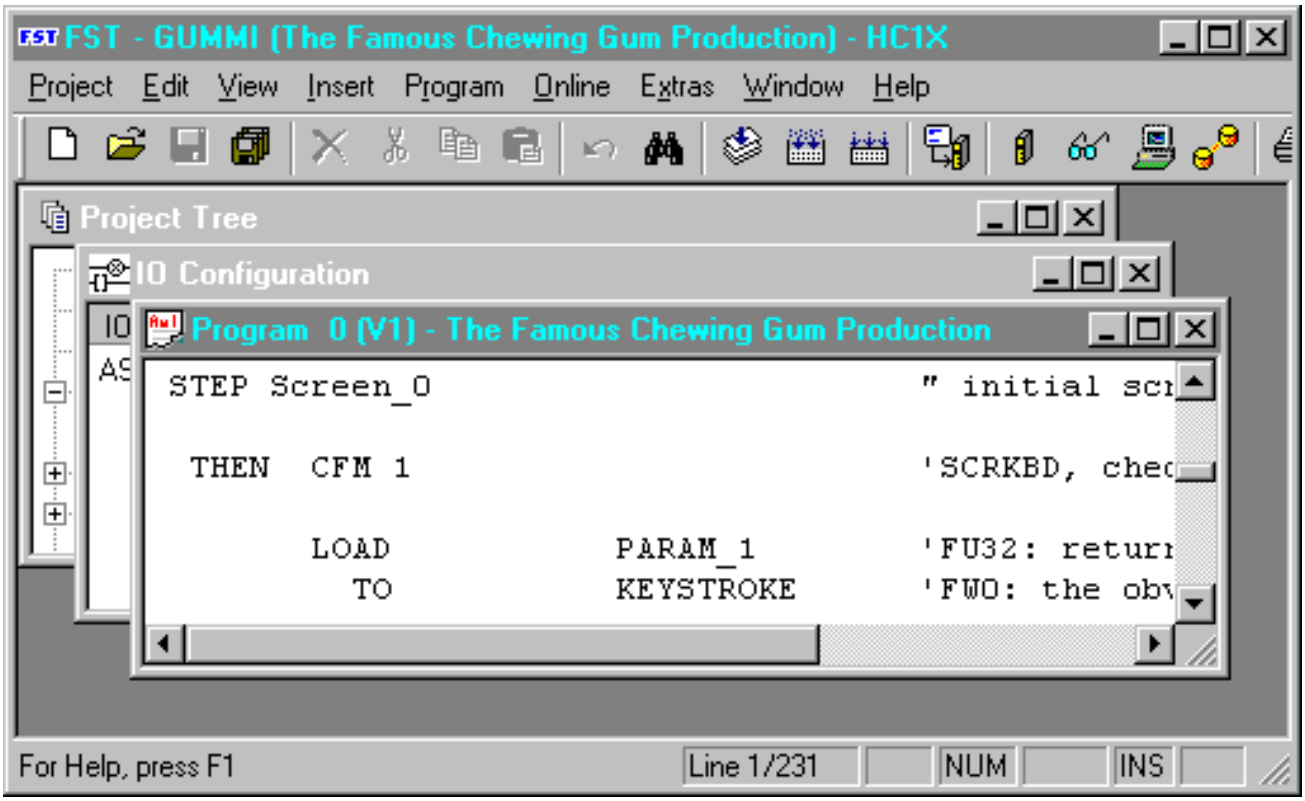
# History

```
2001/ 3/13    4.02.21    cd-rom "Edition April 2001"
2000/ 8/14    4.01.16    cd-rom "Edition August 2000"
```

# The Main Window

If you start FST a splash screen will be shown. It will be hidden automatically after a few seconds. Click on it to dismiss it immediately.

FST works with a so-called multiple document interface (MDI). For each document a child window will be opened inside the FST main window. The child windows can be accessed and arranged with the commands of the Window menu.




The size and position of the window is stored between sessions. If the resolution of the screen changes, the FST main window will receive the default size and position from Windows.

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### What do you want to do?

- Learn about the MS-Windows basics
- Learn about the Window menu
- Learn about the Toolbar
- Learn about the Status bar

# Windows Basics

This topic describes the most important standard controls of Windows windows:

- The Title Bar
- The System Menu
- The Window Border
- The Scrollbars

### The Title Bar

The title bar is located along the top of a window. It contains the name of the application and/or the document. To move the window, drag the title bar.


The title bar can contain the following buttons:

 Click the Minimise button to reduce the window to an icon.

 Click the Maximise button to enlarge the active window to fill the available space.

 Click the Restore button to return the active window to its size and position before you chose the Maximise or Minimise command.

 Click the Close button to close the window.

### The System menu

If you click on the title bar icon  the System menu will be shown. It offers the following commands:

Restore

Use this command to return the active window to its size and position before you chose the Maximise or Minimize command.

Size

Use this command to display a four-headed arrow so you can size the active window with the arrow keys.

Note! This command is unavailable if you maximise the window.

Move

Use this command to display a four-headed arrow so you can move the active window or dialog box with the arrow keys.

Note! This command is unavailable if you maximise the window.

Minimise

Use this command to reduce the window to an icon.

Maximise

Use this command to enlarge the active window to fill the available space.

Next

Use this command to switch to the next open document window. FST determines which window is next according to the order in which you opened the windows.

Previous

Use this command to switch to the previous open document window. FST determines which window is previous according to the order in which you opened the windows.

Close

Use this command to close the window. Closing the FST main window will terminate FST.

### The Window Border

Drag the size bars at the corners or edges of the window to size the window using the mouse.

### Scrollbars

Scrollbars are displayed at the right and bottom edges of the window. The scroll boxes inside the scroll bars indicate your vertical and horizontal location. Drag the slider or click on the arrow buttons to move the location.

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### See also...

- The Main Window
- The Window Menu Commands
- Terminating FST

# The Toolbar

The toolbar is displayed across the top of the FST main window, below the menu bar. The toolbar provides quick mouse access to many tools used in FST.

To hide or display the Toolbar, choose "View >> Toolbar" from the menu. A check mark appears next to the menu item when the Toolbar is displayed.

The following tools can be directly accessed from the toolbar. The tools that are currently not available are dimmed (greyed).

- Create a new program (Ctrl+N)
- Open a program for editing (Ctrl+O)
- Save the program code in the currently active editor window (Ctrl+S)
- Save all unsaved changes
- Remove the currently selected data from the document
- Remove the currently selected data from the document and put it on the clipboard (Ctrl+X)
- Copy selected data onto the clipboard (Ctrl+C)
- Insert a copy of the clipboard contents at the insertion point (Ctrl+V)
- Reverse the last editing action, if possible (Ctrl+Z)
- Find something in the currently active editor window (Ctrl+F)
- Compile the program in the active editor window (Ctrl+F7)
- Prepare the project for download (changes only) (F7)
- Prepare the project for download (rebuild all)
- Transfer the project to the controller (F5)
- Open the Online Control Panel
- Open an (other) Online Display window
- Open the Online CI Terminal
- Open the File Transfer window
- Print the contents of the currently active window (Ctrl+P)

 Context Help (Shift+F1)

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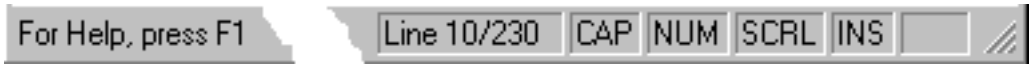
**See also...**

- The Main Window
- The Status Bar

# The Status Bar

The status bar is displayed at the bottom of the FST FST main window.
To display or hide the status bar, select "View >> Status Bar" from the menu. A check mark appears next to the menu item when the status bar is displayed.




The status bar offers the following features:

- The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus. This area similarly shows messages that describe the actions of toolbar buttons as you depress them, before releasing them. If after viewing the description of the toolbar button command you wish not to execute the command, then release the mouse button while the pointer is off the toolbar button.
- The second area shows the number of lines and the cursor position or the number of entries in the currently active window.
- The right areas of the status bar indicate which of the following keys are latched down:

| Indicator | Description |
|---|---|
| CAP | The Caps Lock key is latched down. |
| NUM | The Num Lock key is latched down. |
| SCRL | The Scrl Lock key is latched down. |
| INS | Insertion mode is active. Use the Ins key to toggle. |

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**See also...**

- The Main Window
- The Toolbar

# The Menu

The menu is displayed across the top of the FST main window, below the title bar.


From the different pulldown menus you can access the following commands:

**Project menu**

Work with projects and exit FST.

**Edit menu**

Undo, Clipboard commands, find and replace, select all, delete

**View menu**

Display the Project Tree window, start the various internal tools like the IO Configuration or the Controller Settings, display the message window, show or hide the toolbar, status bar and STL shortcuts

**Insert menu**

Add new programs or modules to the project and make new entries to the active window, e.g. Adding a New Driver

**Program menu**

Manage control programs and print the contents of the active window

**Online menu**

Various online tools like the Online Display and download of the active project

**Extras menu**

Edit preferences, manage the FST Library, configure and execute external tools

**Window menu**

Close the active window and arrange the child windows

**Help window**

Online Help, Tip of the Day, About FST

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### See also...

- The Main Window
- The Toolbar

# The Window Menu Commands

FST works with a so-called multiple document interface (MDI). For each document a child window will be opened inside the FST main window.

The Window menu offers the following commands, which enable you to arrange the child windows in the FST main window.

**Close**

Use this command to close the active client window. FST suggests that you save changes to your document before you close it. If you close a document without saving, you lose all changes made since the last time you saved it.

You can also close a window by using the Close icon  on the document's window.

**Cascade**

Arranges windows in an overlapped fashion.

**Tile horizontal**

Arranges windows vertically in non-overlapped tiles.

**Tile vertical**

Use this command to arrange multiple opened windows side by side.

**Arrange Icons**

Use this command to arrange the icons for minimised windows at the bottom of the FST main window. If there is an open document window at the bottom of the FST main window, then some or all of the icons may not be visible because they will be underneath this document window.

**Window 1, 2, ...**

FST displays a list of currently open document windows at the bottom of the Window menu. A check mark appears in front of the document name of the active window. Choose a document from this list to make its window active.

## The Edit Menu Commands

The Edit menu offers the following commands:

**Undo**

Use this command to reverse the last editing action, if possible.

**Cut**

Use this command to remove the currently selected data from the document and put it on the clipboard. This command is unavailable if there is no data currently selected.

Cutting data to the clipboard replaces the contents previously stored there.

**Copy**

Use this command to copy selected data onto the clipboard. This command is unavailable if there is no data currently selected.

Copying data to the clipboard replaces the contents previously stored there.

**Paste**

Use this command to insert a copy of the clipboard contents at the insertion point. This command is unavailable if the clipboard is empty.

**Delete**

Use this command to remove the currently selected data from the document. This command is unavailable if there is no data currently selected. The removed data is NOT copied to the clipboard.

**Find**

Use this command to find a certain text within the active editor window using the standard Find dialog.

**Repeat**

Use this command to repeat the last find.

**Replace**

Use this command to replace a certain text within the active editor window by another text using the standard Replace dialog.

**Select All**

Selects everything in the document.

# Viewing Properties

Select "View >> Properties" from the menu or "Properties" from the right click popup menu to display and edit the properties of the selected entry in the active window.

# Terminating FST

Select "Project >> Exit" from the menu to end your FST session.
FST prompts you to save documents with unsaved changes.

You can also use the Close command on the application System menu 

or click the Close icon  of the FST main window .

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**See also...**

- The Main Window
- MS-Windows Basics

# Getting Help

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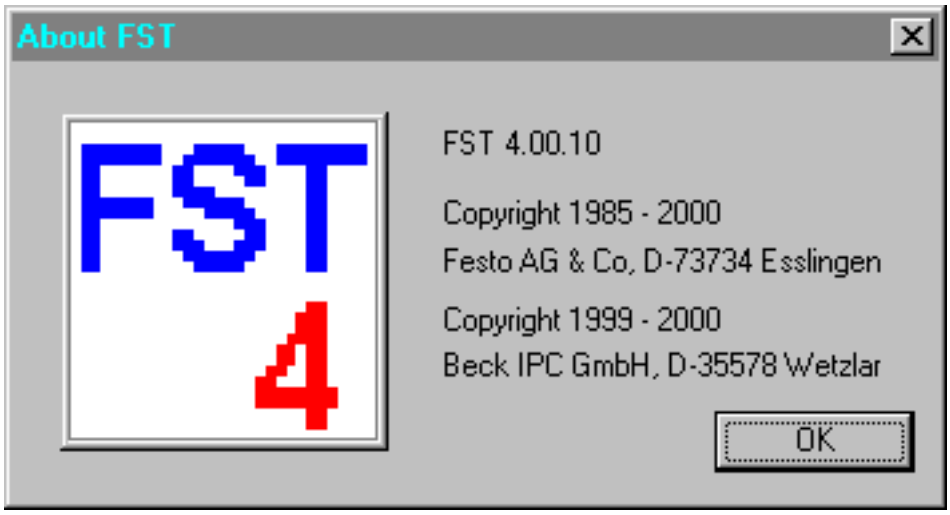
**What do you want to do?**

- Get context help
- Browse the online help topics
- Get some tips & tricks
- Get the version number and copyright notice

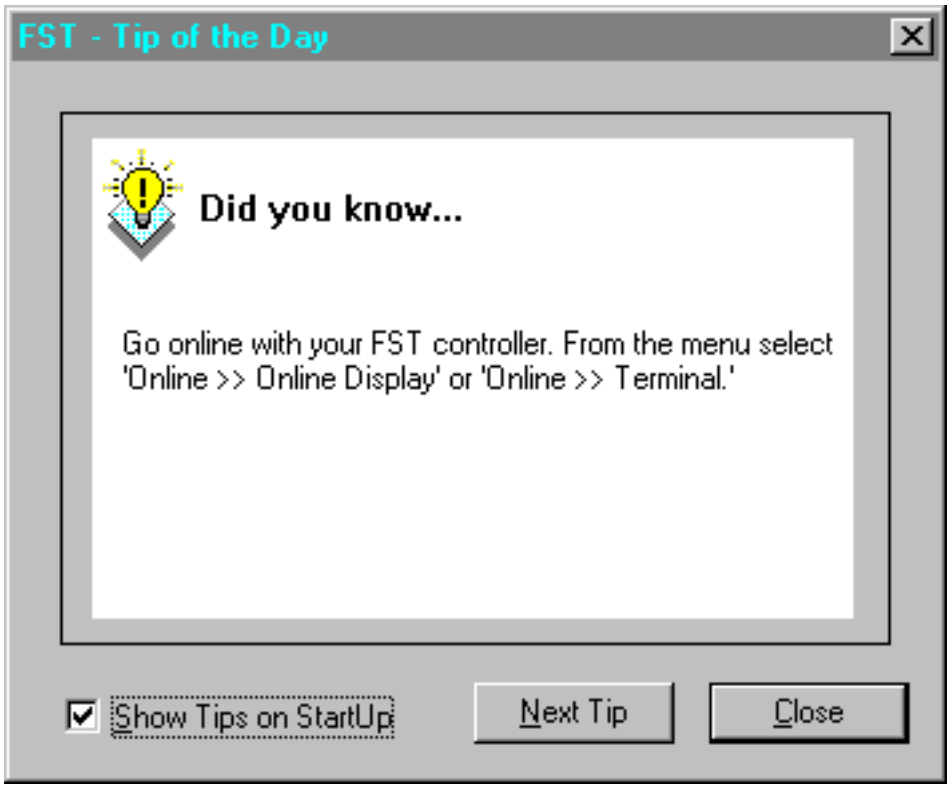
# The Aboutbox

Select "Help >> About FST" to display the copyright notice and version number of your copy of FST.



# Tip of the Day

Select "Help >> Tip of the Day" to display a dialog box with a short tip.




The Tip of the Day dialog is also shown on each start-up of FST unless you disable the option "Show Tips on StartUp".

- Click the Next button to show another tip.
- Close the dialog box by clicking the Close button.

# Help Topics

Select "Help >> Help Topics" from the menu to display the opening screen of the FST Online Help.

From the opening screen, you can jump to step-by-step instructions for using FST and various types of reference information.

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### See also...

- Context Help

# Context Help

Use the Context Help command to obtain help on some portion of FST.

When you choose the toolbar's Context Help button  , the mouse pointer will change to an arrow and question mark. Then click somewhere in the FST window, such as another toolbar button. The help topic will be shown for the item you clicked.

If you press the F1 key the help topic will be shown for the active window or command.

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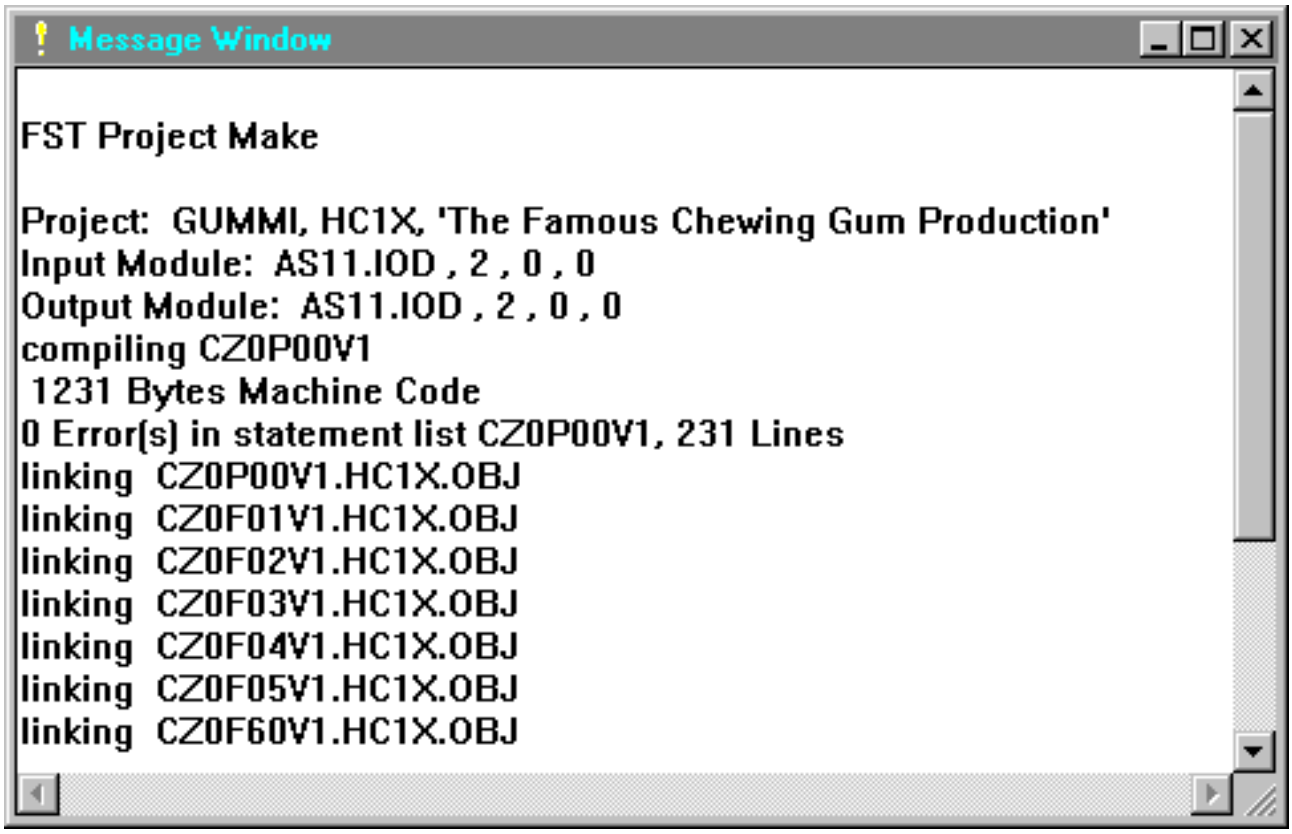
### See also...

- Online Help

# The Message Window

The message window is used to log results, e.g. of translating a program or downloading the project.




Select "View >> Message Window" to bring the message window to the top and view its contents.

Note! If you close the message window, its contents will be lost.

# Working with Projects

Everything in FST is organised in projects. A project contains your source code for programs, imported (compiled) modules from the library, the IO and driver configurations, the Allocation List and several settings and properties.

### Project Name and Comment

Each project has a short name and a comment.
The name can be up to 8 characters long and is used to identify the project and will also be transferred to the controller when it is downloaded. The project name is not case sensitive and must be unique within the same project directory. The character set that is allowed for project names is not restricted, but it is recommended to limit it to characters, numbers and underlines. Spaces are not allowed.

The comment can be up to 255 characters long. Different from the project name the project comment will not be available at runtime (in the controller) but can be used to give a short description for your projects for easier recognition. Whenever you have to select a project in FST this comment will be displayed together with the project name and can be used for sorting lists. An even more detailed description can be stored in the project documentation, which is usually a simple text file.

### Controller Types

FST supports several controller types of the IPC family. In order to choose the correct drivers or options for the controller your project is designed for, your project has a controller type attribute. Projects can only be downloaded to a controller of the correct type. You are free to change the controller type of a project if required.

Note! There is a separate instance of some project parts for each controller type within a project. If you switch between controller types, you will work on the set of project parts that belongs to the current controller type.

| Common for all controller types | Different set for each controller type |
|---|---|
| • project name and comment<br>• your source code for programs<br>• the project documentation<br>• the Allocation List | • imported (compiled) programs from the library<br>• the IO configuration<br>• the driver configuration<br>• the controller settings |

### Organisation on Hard Disk

Everything that belongs to a project is stored in a single directory on your hard disk. The name of that directory is the project's name. The project name is not stored at any other location. For each project there is a file `PROJECT.FW4` in the project's directory which is used to store the current settings and elements of that project such as the comment and controller type. Please do not modify this file manually. There are more files in the project's directory to store program source code, the project documentation, the Allocation List and others which are created and managed by FST and/or related tools. If you want to store your own files or files created by other tools that belong to the project in the same directory, you can do so, but be careful with choosing names. No general rule can be given which names are not used by FST.

All projects are subdirectories of one common project root directory. There is no index file listing the existing projects. FST will create new projects as subdirectories of that project root directory and will look for existing projects in that directory.

The project root directory can be anywhere on your computer, the network or even removeable media. It need not necessarily be a subdirectory of your FST installation. It is recommended that you use this project root directory for storing FST projects only. Do not choose the same directory as the one you have used for

FST 3.x projects. FST 4.x will not allow to create a new project if a directory with the desired project name already exists.
You can change the project root directory. This allows organising your projects on groups. However you have to remember the different locations where you have stored FST projects.

If you want to use DOS based tools for you project, such as fieldbus configurators, use a project path that does not contain long file names (max. 8 characters) or spaces.

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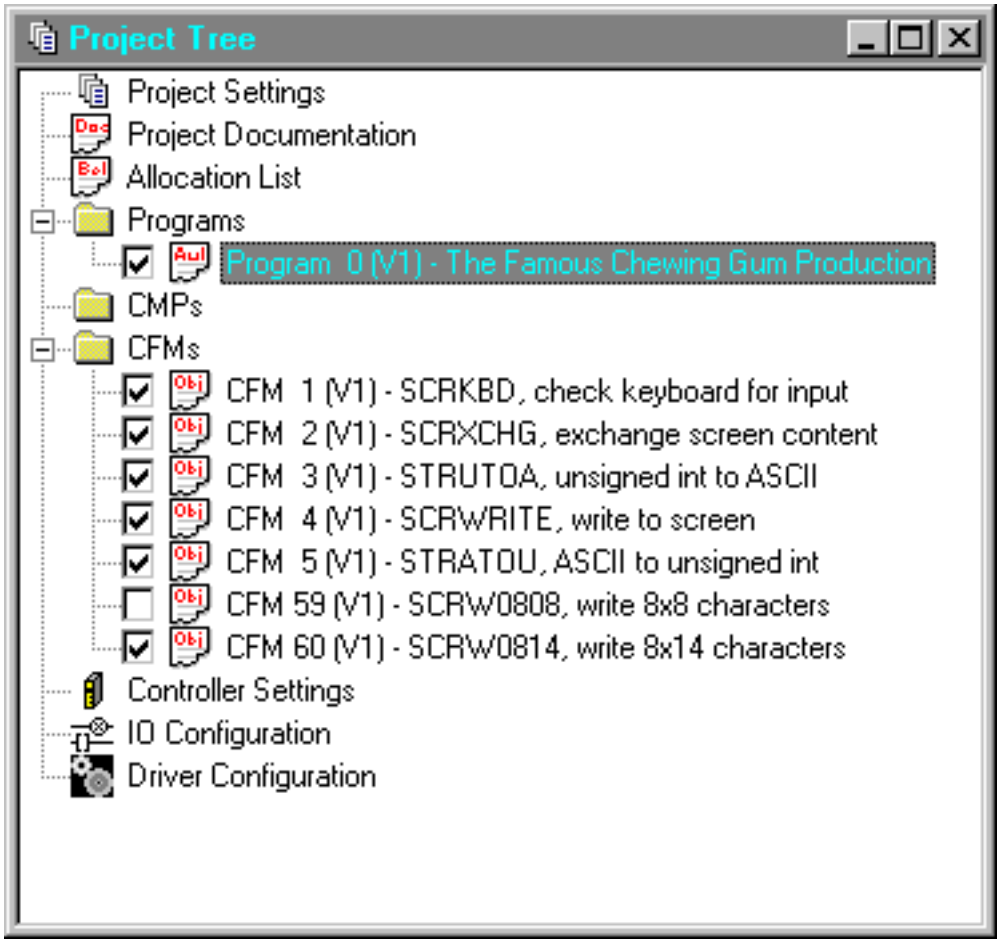
### What do you want to do?

- Open an already existing project
- Create a new project
- Change the project's settings
- Delete or copy projects
- Prepare a project for download
- Edit the project documentation
- Backup and restore projects
- Print the parts of a project
- Change the location where projects are stored (project directory)

# The Project Tree Window

The Project Tree window gives you an overview of all the parts that belong to a project and can be used as a shortcut bar to access the corresponding tools. Double click on the item or use the right click popup menu for more features on some items.

When you create a new project the project tree will be displayed by default. You can close it as any MDI child window if you don't need it. You can display the project tree again or bring it to the top by selecting "View >> Project Tree" from the menu.




The project tree basically has always the same entries. Only the items "Programs", "CMPs" and "CFMs" will have child items depending on the programs you are using for the individual project. The Project Tree offers the following features for accesing programs:

- Double click on the entry of a source code program to open it in the editor. For imported modules no source code is available. They cannot be edited.
- Right click on a program entry and then select "Properties" from the popup menu to open the Program Properties dialog. This dialog will allow to change the program's name, comment, type and number. It is not possible to change a program's language once it has been created.
- To delete a program right click on a program entry and then select "Delete" from the popup menu. You can also press the DEL key to delete the selected program.
- All programs that have a check mark in the box left to the name and comment will be downloaded to the controller. If a program is not checked it will not be avaiable at runtime. Select only one version of the same program at the same time.
- Right click on a program entry or the "Programs", "CFMs" or "CMPs" folder and then select "Insert..." from the right click popup menu to insert a new source code program.
- Right click on a program entry or the "Programs", "CFMs" or "CMPs" folder and then select

"Import..." from the popup menu to import an already compiled module from the library.

---

### See also...

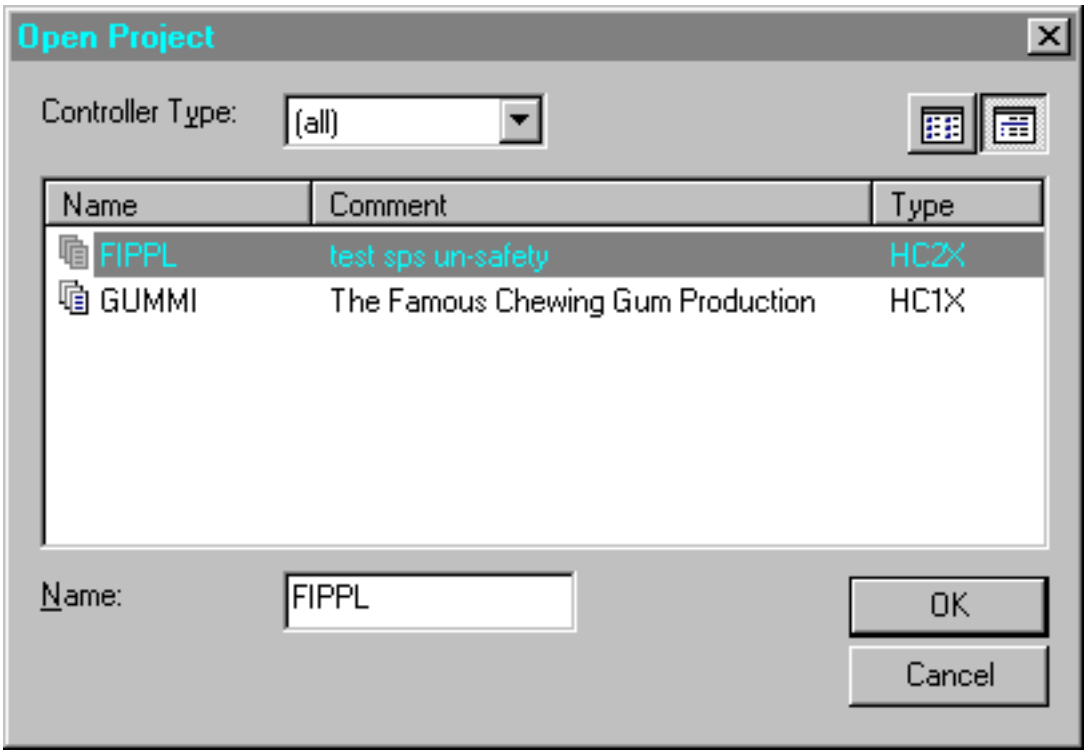
- Working with Projects

# Open an Existing Project

In order to work with a project and its parts you have to load it into the FST development environment.

To open an already existing project select "Project >> Open..." from the menu. Then the Open Project dialog will be displayed that lists all projects in the currently configured project directory. Select the project you want to open by double clicking on it or type its name in the edit field below the list box and select the OK button. The currently open project - if any - will be closed and the selected project will be loaded into the FST development environment.

The same dialog with a different caption is used to select a project for backup.




The Open Project dialog offers the following features:

- The name, comment and the controller type are displayed for each project in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- You can only display projects for one controller type by making the appropriate selection in the combo box above the list box.
- If you only want to display the project names in a simple list, toggle the radio buttons in the upper right corner of the dialog.

The size and position of most windows will be restored to how it was the last time before you closed the project. The name, comment and controller type of the currently active project is displayed in the caption of the FST main window.

To access the projects you have most recently worked on up to eight projects are listed in the Project menu just before the Exit command. Simply select the project you want to open.

When you start FST the project that was open when you quit FST the last time will be opened automatically.

Note! You can have more than one instance of FST running, but the same project can be opened only once at the same time. If a project is opened it is marked with a lock file.

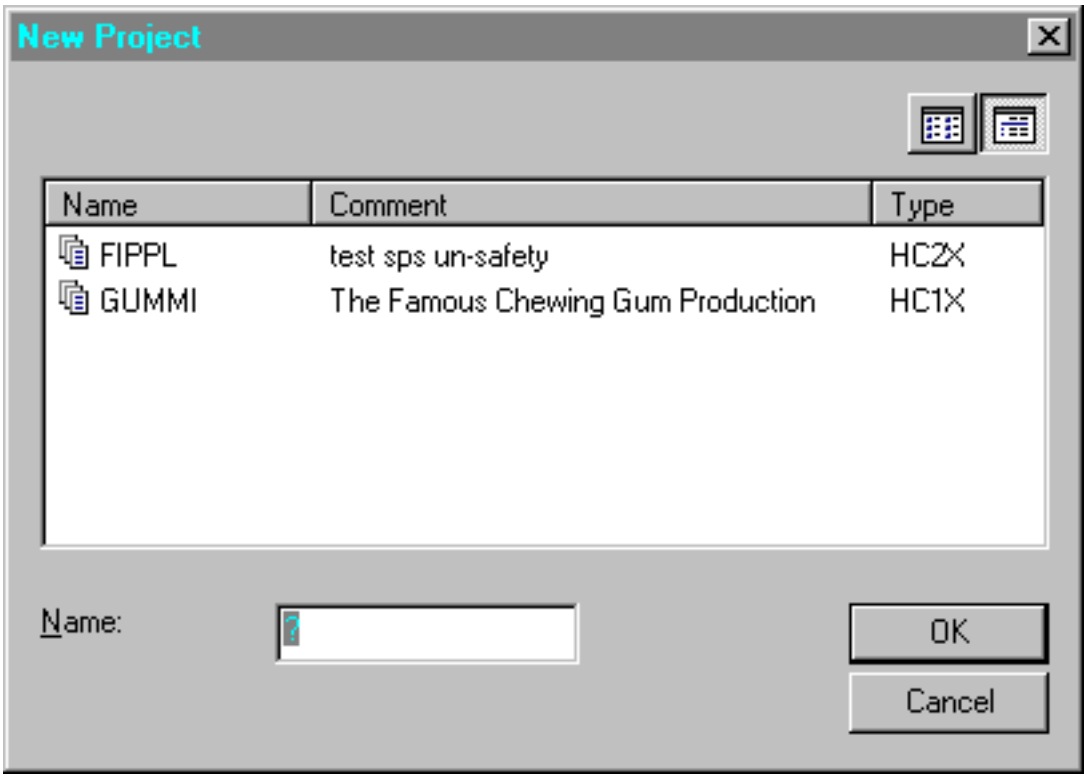
### See also...

- Working with projects

# Creating a New Project

To create a new project select "Project >> New..." from the menu. Then the New Project dialog will be displayed that allows you to enter the name for the new project in an edit field. Select the OK button to create a new project with that name. The currently open project - if any - will be closed and the new project will be loaded into the FST development environment.

The same dialog with a different caption is also used for renaming or copying a project and to restore a project from backup or uploaded sources.




The New Project dialog offers the following features:

- A list of the already existing projects in the current project directory will help avoid using the same name again. The comment and the controller type are displayed for each project in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- If you only want to display the project names in a simple list, toggle the radio buttons in the upper right corner of the dialog.

Note! The project name is limited to 8 characters.

Note! The project name must not contain spaces.

---

**See also...**

- Working with Projects

# Close the Current Project

Select "Project >> Close" from the menu to close the currently active project.

It is, however, not necessary to close a project before opening another project or creating a new project since this is done automatically.

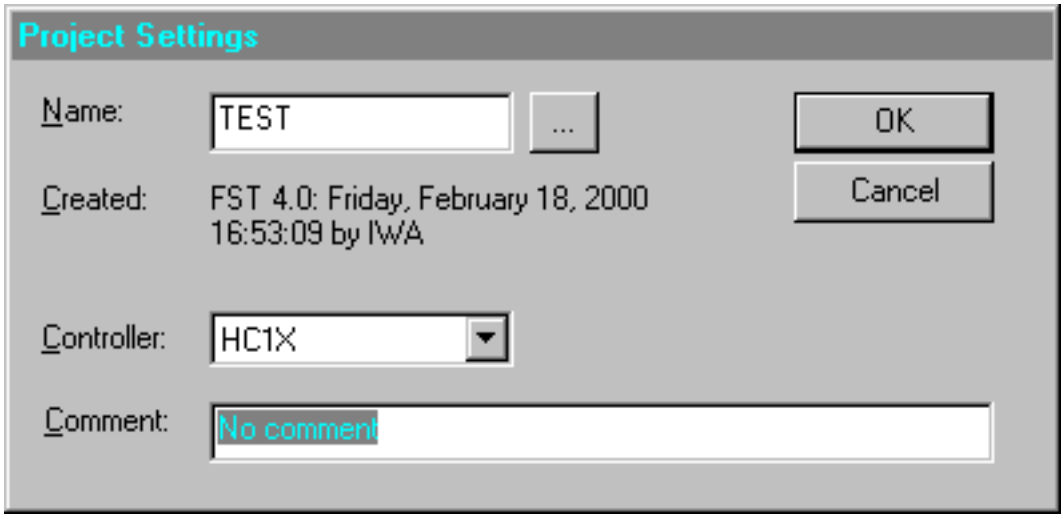
---

### See also...

- Working with Projects

# The Project Settings

After creating a new project you will automatically be prompted to enter a comment for the new project and have the possibility to select a controller type. You can change these settings again later by selecting "Project >> Settings.." from the menu or "Project Settings" from the Project Tree window.




The Project Settings dialog offers you also the following features:

- Change the name of the project by entering it into the edit field.
- Click on the button with three dots to get a list with the already existing projects. That dialog is the same as it is used for entering the name of a new project.
- The date when the project was created, which FST version has been used and the user name will be displayed.

---

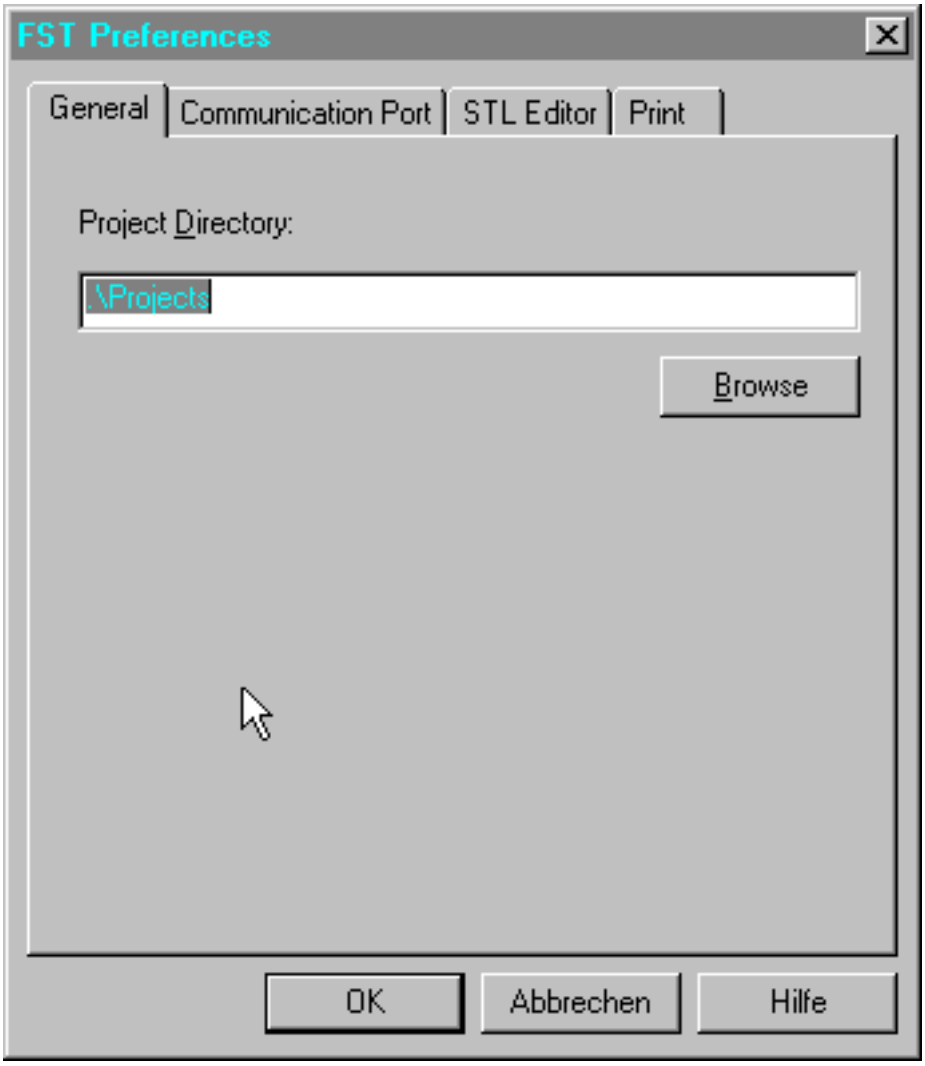
**See also...**

- Working with projects

## The Project Directory

Using different project directories is useful to sort a larger amount of projects in groups. But you have to remember the different locations where you have stored FST projects.

If you want to view or change the current common root directory for FST projects, select "Extras >> Preferences..." from the menu. In the tabbed dialog that will be displayed select the General tab. Enter the path of the new directory or press the Browse button to select an already existing directory. Relative paths (beginning with a dot) are subdirectories of the directory where you have installed FST.




After changing the directory path and closing the dialog the currently open project will be closed.

Note! If you want to use DOS based tools for you project, such as fieldbus configurators, use a project path that does not contain long file names (max. 8 characters) or spaces.

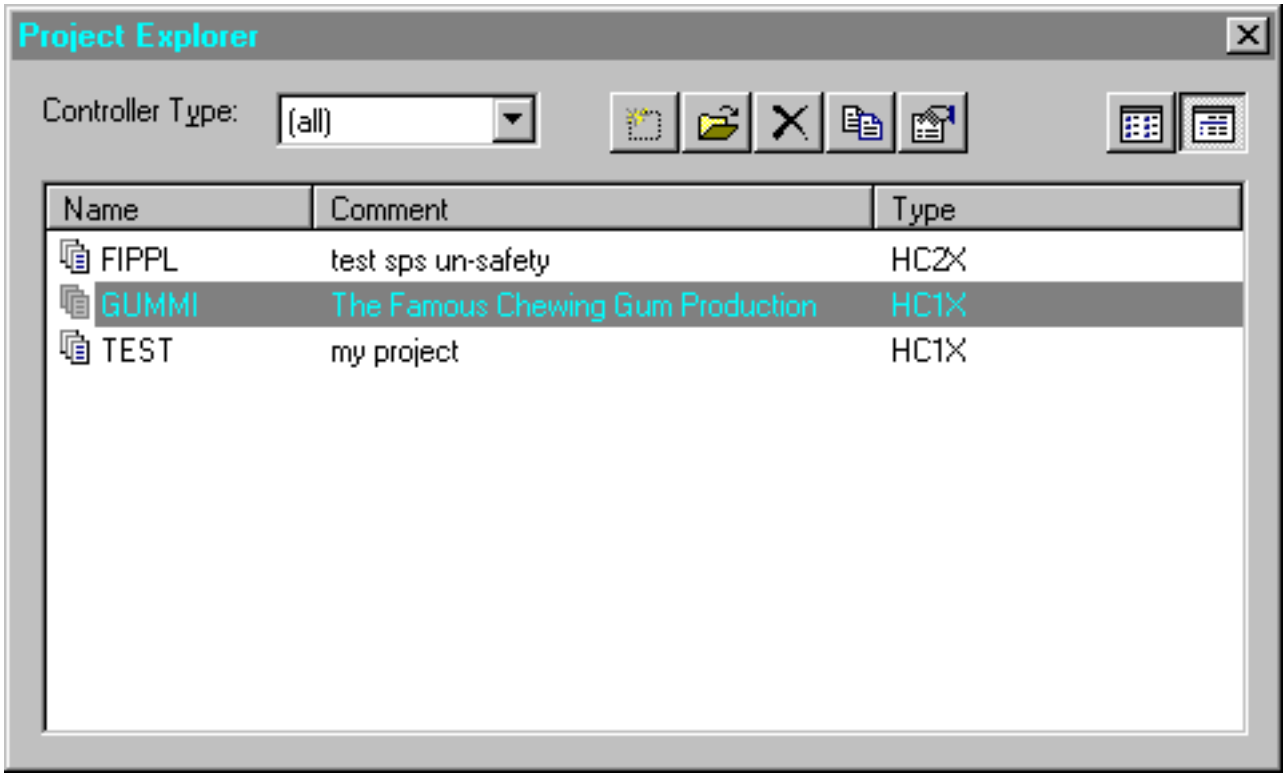
---

**See also...**

- Working with projects

# The Project Explorer

If you want to delete, copy or rename projects use the Project Explorer. To open the Project Explorer dialog select "Project >> Explore..." from the menu. A list with all projects in the current project directory will be displayed in a dialog box.




Above the list box there are several buttons to execute the following operations:


Create a new project. you will be prompted for a project name and settings


Open the selected project.


Delete the selected project.


Create a copy of the selected project. You will be prompted for a name and settings as for a new project.


This will display the Project Settings dialog for the selected project that allows you to change the project's name, comment and controller type.

The Project Explorer dialog also offers the following features:

- The projects are listed together with their comment and the controller type; each displayed for each project in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- To change the name of a project select it and then click on the name. An inplace edit field appears. When you are finished press the "Enter" key or click outside the edit field. To cancel editing press "Esc".

- You can only display projects for one controller type by making the appropriate selection in the combo box above the list box.
- If you only want to display the project names in a simple list, toggle the radio buttons in the upper right corner of the dialog.

---

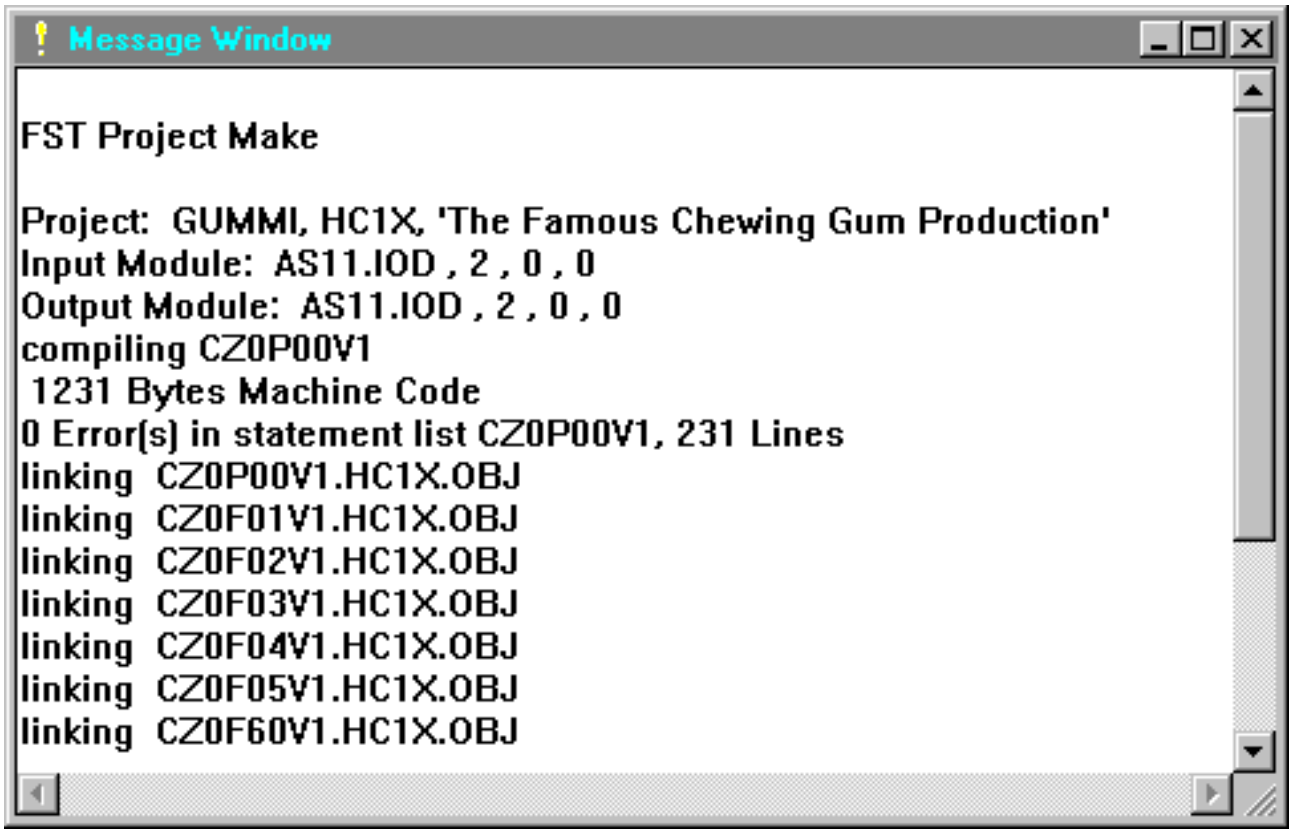
**See also...**

- Working with Projects

# Preparing the Project for Download

Before a project can be downloaded and executed on the controller its components must be compiled to a binary format. The results will be linked together to the project runfile.

To prepare the project for download select "Project >> Make Project" from the menu. All modifications are automatically saved to disk and the progress and result of the compilation and linking is displayed in the message window.




"Make Project" will only compile the programs that have not been changed since the last make. If you want to compile all programs regardless whether they are changed select "Project >> Build Project" instead. This is recommended after restoring a project from another computer or a change in the FST version, in case the translators have been changed.

---

**See also...**

- Working with Projects
- Removing Intermediate Files
- Listing the Compiled Project File

# Downloading the Project to the Controller

To download the project to the controller, select "Online >> Download Project" from the menu. All required files will be transferred to the controller. The Download dialog gives you some information about the progress of the transfers. Press the Abort button to stop the downloading. Watch the message window for details.


Note! Before you can download a project it has to be prepared for download first.

Note! Projects can only be downloaded to a controller of the same type as specified in the project settings.

---

**See also...**

- Working with Projects
- Preparing the Project for Download

# Downloading an Update of the Project to the Controller

Instead of downloading the complete project to the controller, it is also possible to transfer only the changes.

To download an update of the project to the controller, select "Online >> Update Project" from the menu. All required files will be transferred to the controller. The Update dialog gives you some information about the progress of the transfers. Press the Abort button to stop the downloading. Watch the message window for details.


Note! An update can only be downloaded if you at least once downloaded the complete project to the same controller.

Note! An update is not possible

- If you add or remove programs.
- After some changes to the driver configuration.

---

**See also...**

- Working with Projects
- Downloading the Project to the Controller

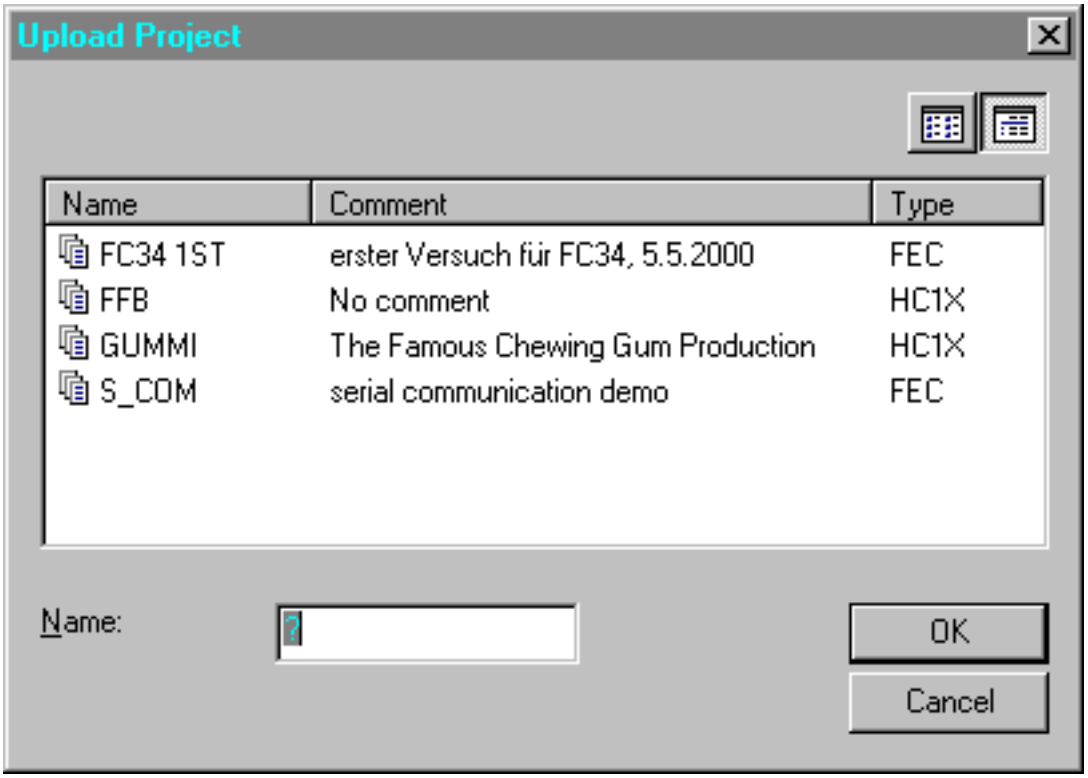
# Uploading Project Sources from the Controller

It is possible to store the sources of a project in the controller.

If you want the sources to be stored in the controller you have to select the option "Load sources" in the Download tab of the Controller Settings dialog.

To upload the sources that have been stored in the controller, select "Online >> Upload Project" from the menu. The controller will be searched for the sources and the file will be uploaded. The Upload Source dialog gives you some information about the progress of the transfer. Press the Abort button to stop the uploading. View the message window for more details.


Then the Upload Project dialog will be displayed that allows you to enter the name for the uploaded project in an edit field. Select the OK button to restore the project with that name. The currently open project - if any - will be closed and the uploaded project will be loaded into the FST development environment.




The Upload Project dialog offers the following features:

- A list of the already existing projects in the current project directory will help avoid using the same name again. The comment and the controller type are displayed for each project in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.

- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- If you only want to display the project names in a simple list, toggle the radio buttons in the upper right corner of the dialog.

Note! The project name is limited to 8 characters.

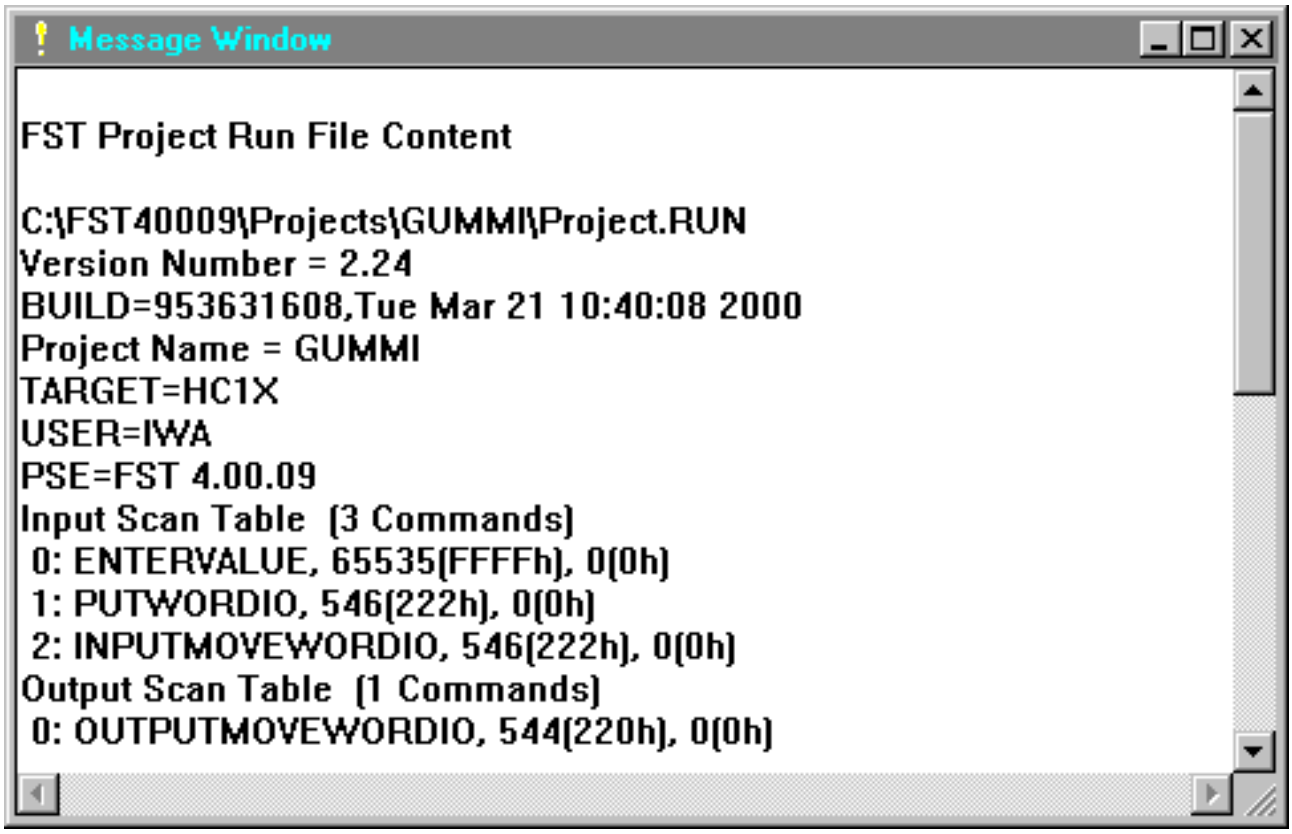
---

### See also...

- Working with Projects

# Listing the Compiled Project File

If you select the menu item "Project >> List Project File" you will get a listing of the contents of the project file in the message window. This file is the result of preparing the project for download and will be transferred to the controller. This feature can be useful for debugging.




Note! This function is only available after preparing the project for download.

---

**See also...**

- Working with Projects
- Preparing the Project for Download

# Removing Intermediate Files

During the process of preparing the project for download several intermediate files will be generated. In order to free disk space you can clean up the project by selecting "Project >> Clean Up" from the menu.

If you want to download the project again to a controller, all required files will be created again.

This function is automatically called before backing up a project.

---

**See also...**

- Working with Projects
- Preparing the Project for Download

# The Project Documentation

FST does not implement it's own text editor. For writing your project documentation you can use any tool you like.

By default for each new project an empty file with the file name `PROJECT.TXT` will be created in the project's directory. Double click on the item "Project Documentation" in the Project Tree window or select "View >> Project Documentation" from the menu to open the document with whichever tool is registered for `.txt` files on your PC.

You can change the name and/or extension if you like by choosing "Properties" from the right click popup menu of the entry "Project Documentation" in the Project Tree window. Make sure you use an extension that is registered on your PC for the editing tool you want to use. E.g. using the extension `.doc` will usually open Microsoft Word.

---

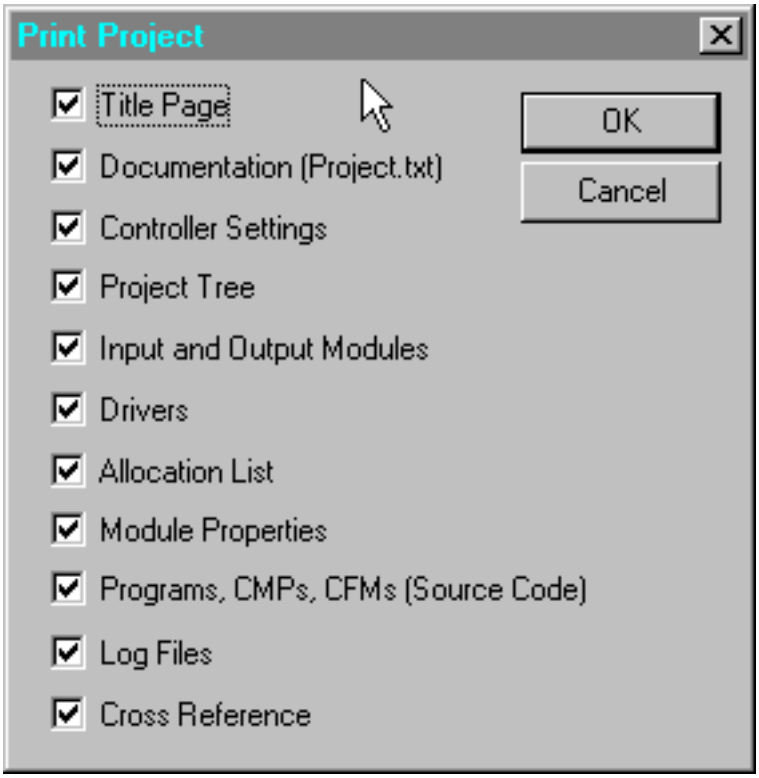
**See also...**

- Working with projects

# Printing Projects

You can print all or selected parts of the current project.

Select "Project >> Print..." from the menu to display the dialog to select the parts you want to print.




**Title Page:**

The title page displays the project name together with some information on the FST version, date and time and the user name.

**Documentation:**

The project documentation will only be printed, if the file `PROJECT.TXT` still exists. If you have changed the name and/or extension of the project documentation, you have to use the tool you are using to edit the file for printing.

**Controller Settings:**

The options you have chosen.

**Project Tree:**

The project tree shows all programs in a sorted list including the comment. If a program is selected for download is indicated by an asterisk.

**Input and Output Modules:**

Print the IO configuration.

**Drivers:**

Print the driver configuration including the options for each driver

**Allocation List:**

Print the Allocation List.

**Program Properties:**

Print the file size and date and other information for each program.

**Log Files:**

Print the results of the last compilation for source code programs or the source path for imported

modules.

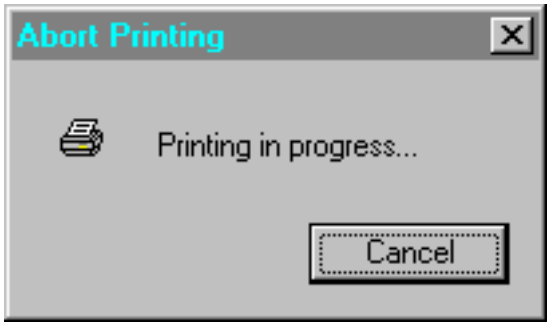
**Cross Reference:**

The cross-reference is a list of all operands that are used in your programs together with their occurrence in a sorted list.

Note! Printing the cross-reference list requires that you prepare the project for download before you start printing, since the required data to build the cross reference list will be collected while the programs are compiled.

Note! You can also print the contents of the currently active window by selecting "Program >> Print" from the menu.

Before printing starts you will be asked for the printer and the paper size using the standard Printer Setup dialog. While the pages are formatted and sent to the printer you can stop the printing process by pressing the Cancel button in the Abort Printing dialog that is displayed.




A header and footer will be printed on each page except the title page. The header shows the project's name, controller type and comment and which project part is printed on this page. The footer contains the page number, time and date of the printout.

Note! Headers and footers cannot be customised.

You can change the print font and the margin widths of the printout.

---

### See also...

- Working with Projects

## Print Preferences

You can change the print font and the margin widths of the printout. Select "Extras >> Preferences..." from the menu. In the tabbed dialog that will be displayed select the tab "Print".


If you press the Browse button you will be asked for a printer to display the correct list of available fonts before the standard font selection dialog is displayed.

Note! If you choose the margins smaller than the minimum printer margins, the printout will be clipped.

---

**See also...**

- Preferences
- Printing Projects

# Project Backup and Restore

Projects will be backed up as standard zip files.

Select "Project >> Backup" from the menu to select the project you want to update. Then choose the location for the backup file using the standard file dialog. After removing all intermediate files all files in the project directory will be zipped and stored in the file you have selected.

We use the world wide accepted ZIP format (RFCs 1950 to 1952).

Many THX to Jean-loup Gailly and Mark Adler for zlib.

Select "Project >> Restore" from the menu to restore a project. Using the standard file dialog select a zip file that contains a FST project. It will be restored at the current project directory and opened into the FST development environment.

---

### See also...

- Working with projects

# Managing Control Programs

Programs, CMPs and CFMs represent pieces of executable code. Since programs, CMPs and CFMs are handled very similar they are referred to as programs as a common name.

A project can contain up to 64 programs, 100 program modules (CMPs) and 100 function modules (CFMs). For each program FST can store up to 9 versions, but only one version can be used in the controller at the same time.

You can write program yourself with FST using the Statement List language or use the already compiled program of the FST library for special tasks that usually have been created from C source code. No matter how program have been created (in terms of source code), always a compiled version (machine code) will be used in the controller.

---

### What do you want to do?

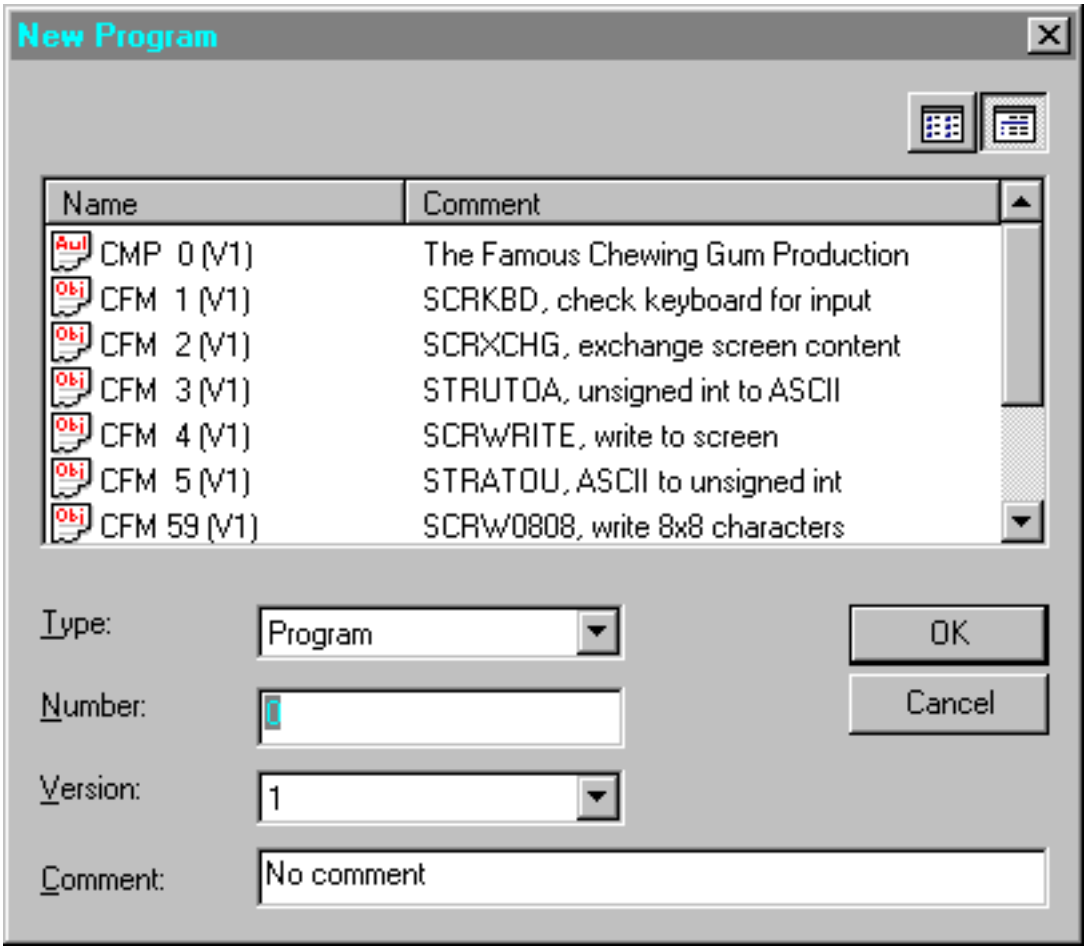
- Create a new program
- Open a program for editing
- Check the syntax of a program
- Import a compiled module from the library
- View or change program properties
- Delete a program
- Select programs for download

# Creating New Programs

To create a new source code program select "Program >> New..." from the menu. Then the New Program dialog will be displayed that allows you to select the program type, number and version and to enter a comment. Select the OK button to create a new program with those settings. It will be automatically opened for editing.

You can also invoke the New Program dialog from the right click popup menu of the Project Tree window or from the Insert menu ("Insert Program...", "Insert CMP...", "Insert CFM...").

The same dialog with a different caption is used to add imported modules from the library and to save programs with a different name.




**Type:**

Select "Program" if you want to create a program, "CMP" if you want to create a subroutine with or without steps and "CFM" if you want to create a subroutine without steps.

**Number:**

This number is used to refer to the program or subroutine later in the code. A program can have the numbers from 0 to 63, CMPs and CFMs from 0 to 99. You can assign the numbers as you like, but note the following special cases:

- Only Program 0 will be executed automatically on start-up.
- The context of Program 63 will be used for CI commands, avoid using this number for programs.
- If you import a program with a file name like F<n> it is recommended to use the number <n>.

**Version:**

FST can store up to 9 versions of each program.

**Comment:**

This text will be displayed in lists and captions for easier identification of the program. The string can be up to 255 characters long.

The New Program dialog offers the following features:

- A list of the already existing programs in the current project will help avoid using the same number again. The program name and comment are displayed for each project in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- If you only want to display the program names without comments in a simple list, toggle the radio buttons in the upper right corner of the dialog.

Note! There can be only one program with the same type, number and version! If you try to create a program that already exist you will be prompted to overwrite it.

Note! If another version for the source code program you are about to create exists the new program will be a copy of the already existing program if it is a source code program of the same language.

---

### See also...

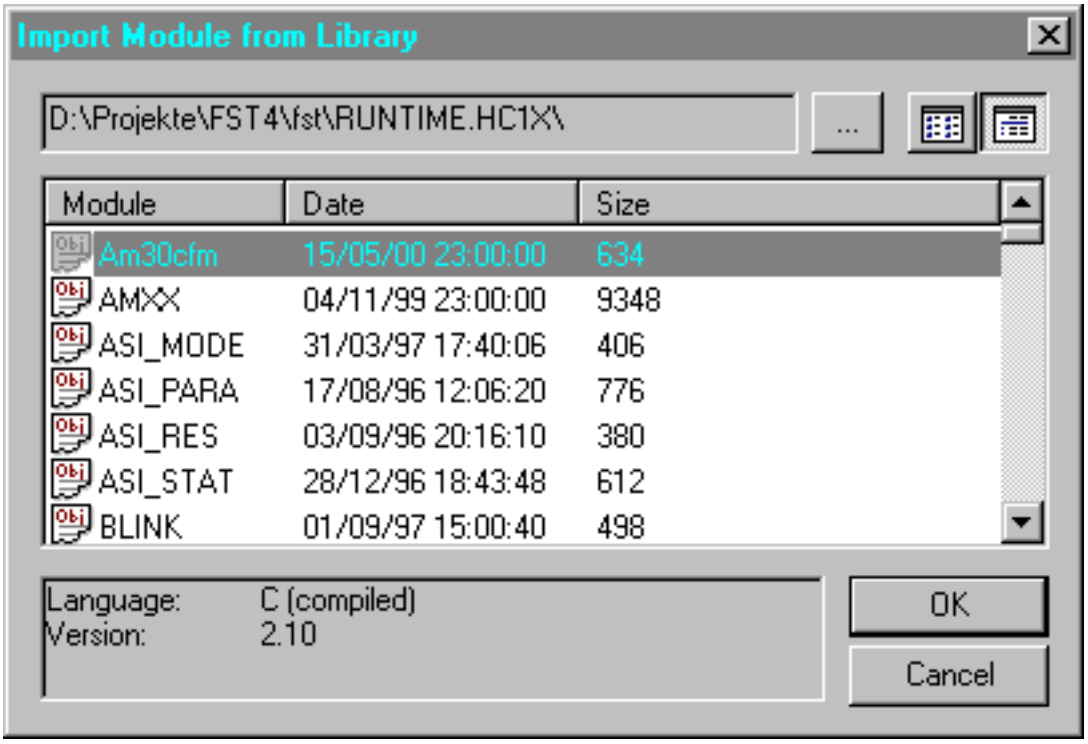
- Managing Control Programs
- Importing Modules from the Library

# Importing Modules from the Library

To import a module from the library select "Program >> Import..." from the menu. Then a dialog box will be displayed that allows you to select the file for import.

You can also invoke the Import Module dialog from the right click popup menu of the Project Tree window ("Import...").

Select a filename and press the OK button or double click the file name to open a dialog as for New Program to select the program type, number and version. The comment text entry will be automatically initialised to the file name in the library. Select the OK button to import the file as program from the library with that type, number and version.




The Import Module dialog offers the following features:

- The file name, size and date are displayed for each file in the library in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- If you only want to display the file names without further information in a simple list, toggle the radio buttons in the upper right corner of the dialog.
- The original source code language and FST version number is displayed for the selected file in the field below the list box.

Note! There is a different library for each controller type. The correct folder will be selected automatically. If you later change the controller type the modules have to be re-imported from the library for the new controller type. You can however switch back to the previous controller type without re-importing since the imported modules are stored in separate files for each controller type.

You can change the import folder manually by selecting the "..." button. this can be useful if you develop your own modules and store them in a different location.

---

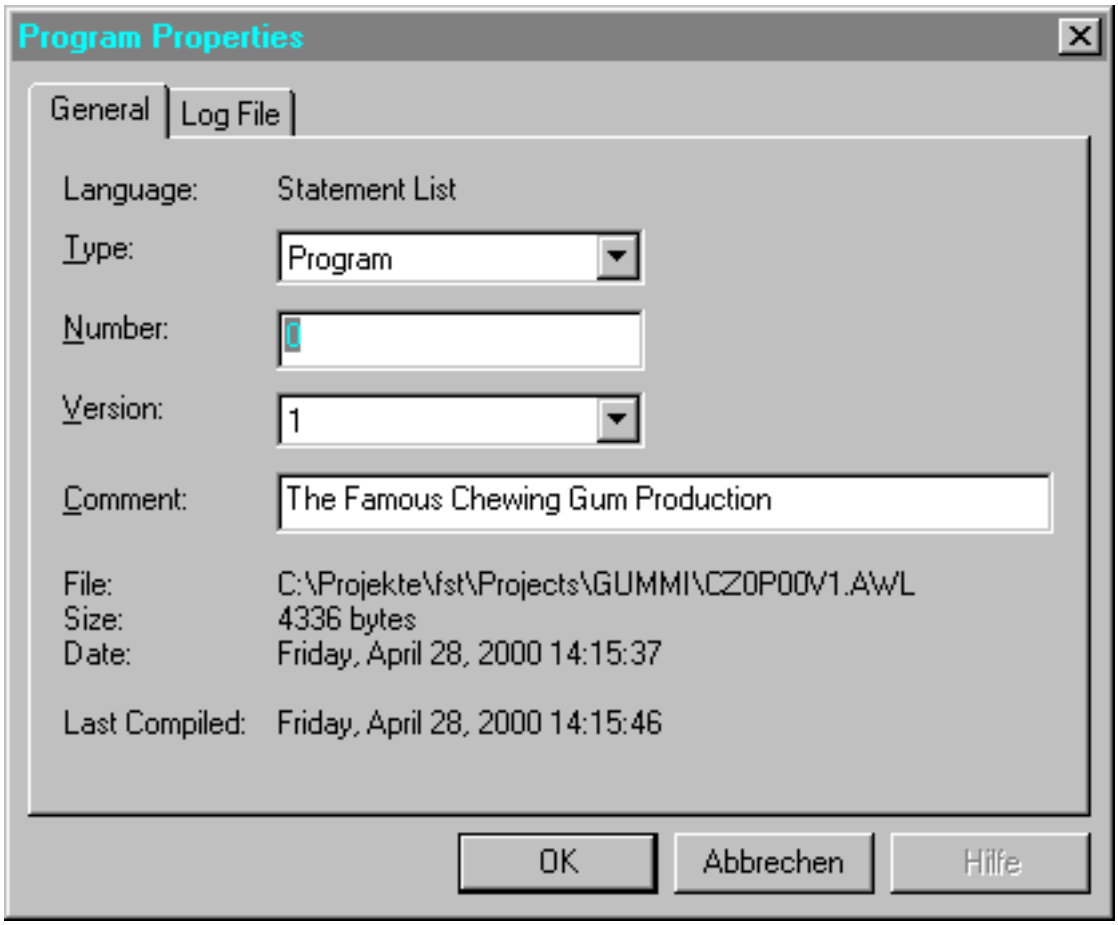
**See also...**

- Managing Control Programs
- Creating New Programs

# Program Properties

The name and comment of a program can be changed using the Program Properties dialog. To show the Program Properties dialog select it in the Project Tree window and select "Properties" from the right click popup menu. Select the OK button to change the properties of the program after editing the fields of the dialog.

You can also invoke the Program Properties dialog from the right click popup menu of the editor window of that program or from the View menu.




**Language:**

The source code language of the program.

**Type:**

Select "Program" if you want to have a program, "CMP" if you want to create a subroutine with or without steps and "CFM" if you want to create a subroutine without steps.

**Number:**

This number is used to refer to the program or subroutine. A program can have the numbers from 0 to 63, CMPs and CFMs from 0 to 99. You can assign the numbers as you like, but note the following special cases:

- Only Program 0 will be executed automatically on start-up.
- The context of Program 63 will be used for CI commands, avoid using this number for programs.
- If you import a program with a file name like F<n> it is recommended to use the number <n>.

**Version:**

FST can store up to 9 versions of each program.

**Comment:**

This text will be displayed in lists and captions for easier identification of the program. The string can be up to 255 characters long.

**File, Size and Date:**

Some information on the program's file on your computer

**Last compiled:**

Date of the last successful compilation of the source code program. See the tab "Log file" for the compiler output if any.

**Version:**

The operating system version of the compiled program, see the tab "log file" for the path name of the source file in the library.

Note! There can be only one program with the same type, number and version! If you try to create a program that already exists you will be prompted to overwrite it.

Note! The language of a program cannot be changed!

---

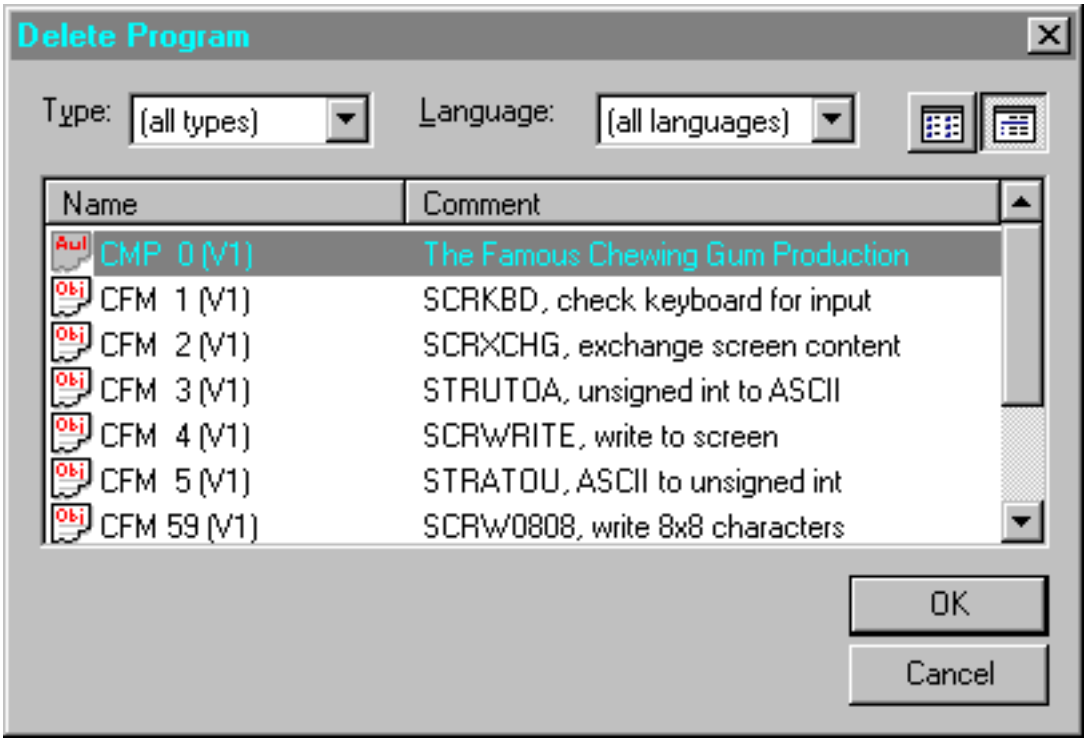
### See also...

- Managing Control Programs

# Deleting a Program

To delete a program from the project select "Program >> Delete..." from the menu. Then a dialog box will be displayed that allows you to select a program. Double click a program or select it and press the OK button to delete it.

You can also delete programs by selecting it and pressing the DEL key or via the right click popup menu using the Project Tree window.




The Delete Program dialog offers the following features:

- The name and comment are displayed for each program in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- You can only display programs of one type or language by making the appropriate selection in the combo boxes above the list box.
- If you only want to display the program names without comments in a simple list, toggle the radio buttons in the upper right corner of the dialog.

---

**See also...**

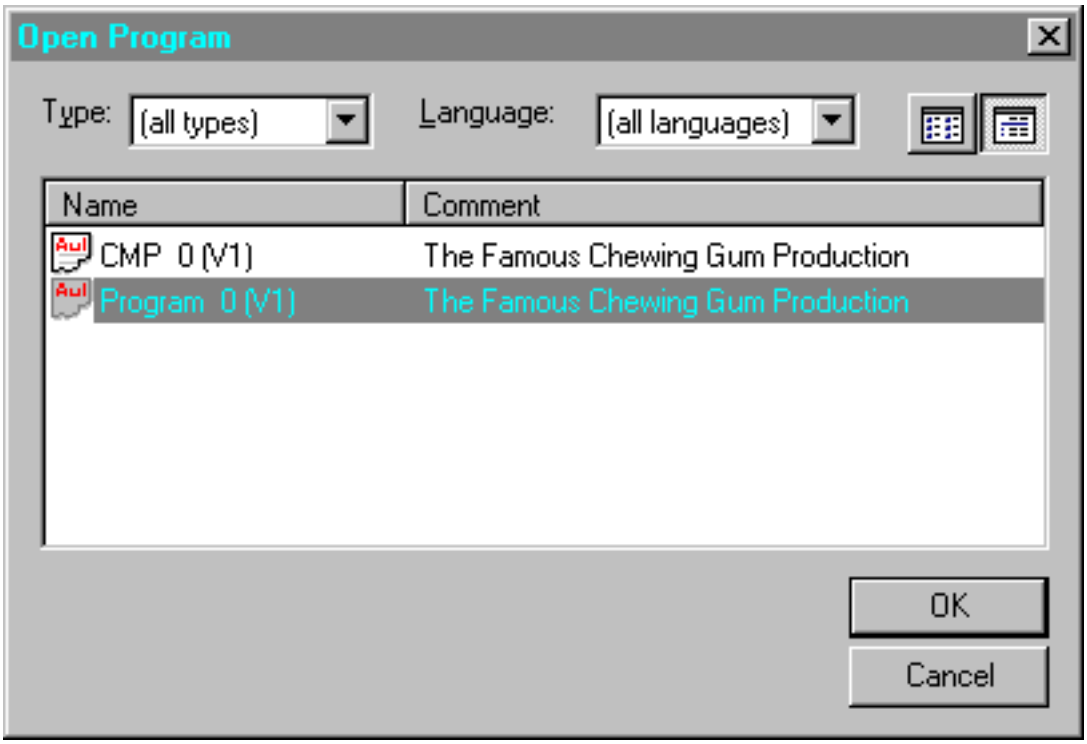
- Managing Control Programs

# Open a Program for Editing

To open a source code program for editing select "Program >> Open..." from the menu. The Open Program dialog will be displayed that allows you to select a program. Double click a program or select it and press the "OK" button to open it in the editor window.

You can also open a program for editing by double clicking on it in the Project Tree window or via the right click popup menu of the Project Tree window.

The same dialog with a different caption is used to select a program to be deleted or a module to be called.




The Open Program dialog box offers the following features:

- The program name and comment are displayed for each program in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- You can only display programs of one type or language by making the appropriate selection in the combo boxes above the list box.
- If you only want to display the program names without comments in a simple list, toggle the radio buttons in the upper right corner of the dialog.

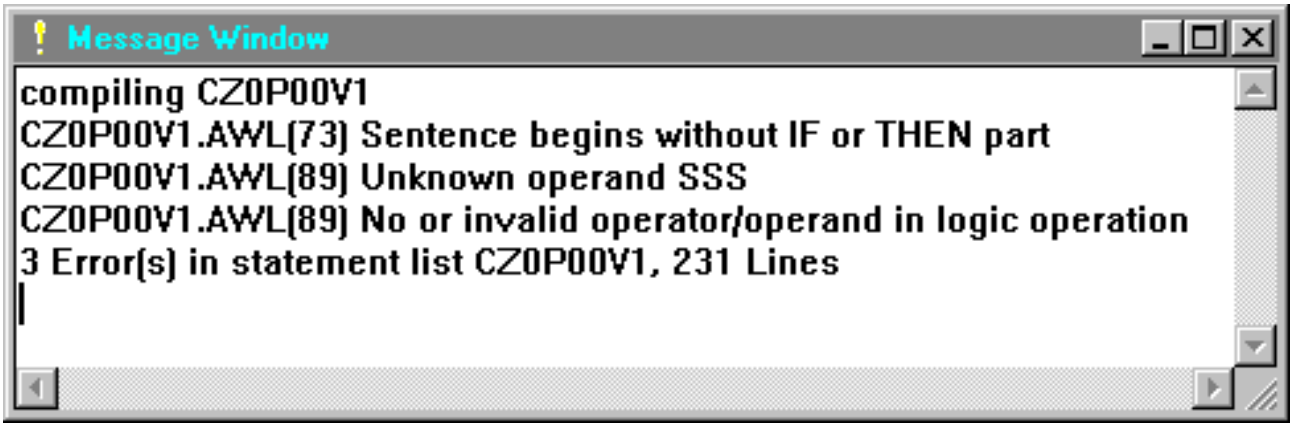
---

**See also...**

- Managing Control Programs

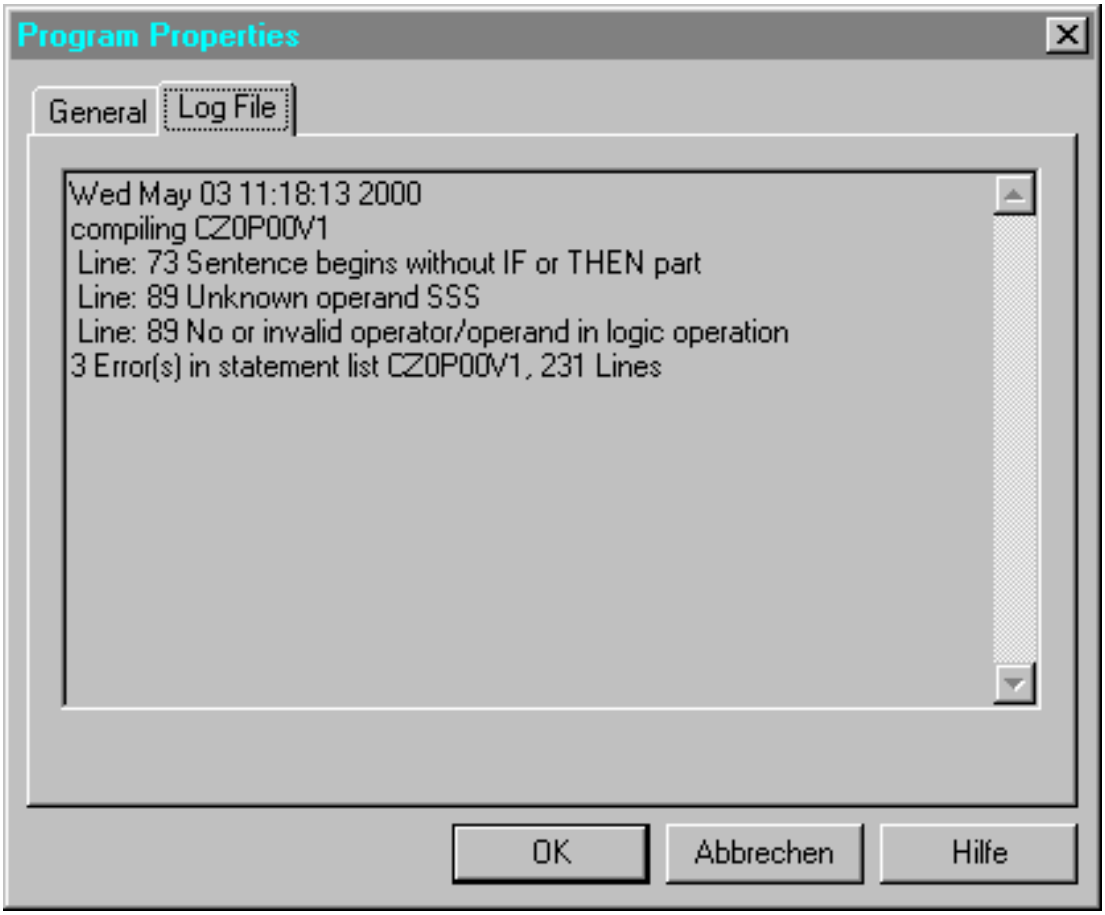
# Compiling a Program

To check the syntax of a source code program compile it. Open the program for editing, then select "Program >> Compile..." from the menu and watch the output in the message window.




Note! Unsaved changes in the source code will automatically be saved prior to the compilation.

The results of the compilation will also be stored in a log file. To view it select "View >> Properties" from the menu. Then select the "Log file" tab of the Program Properties dialog.




---

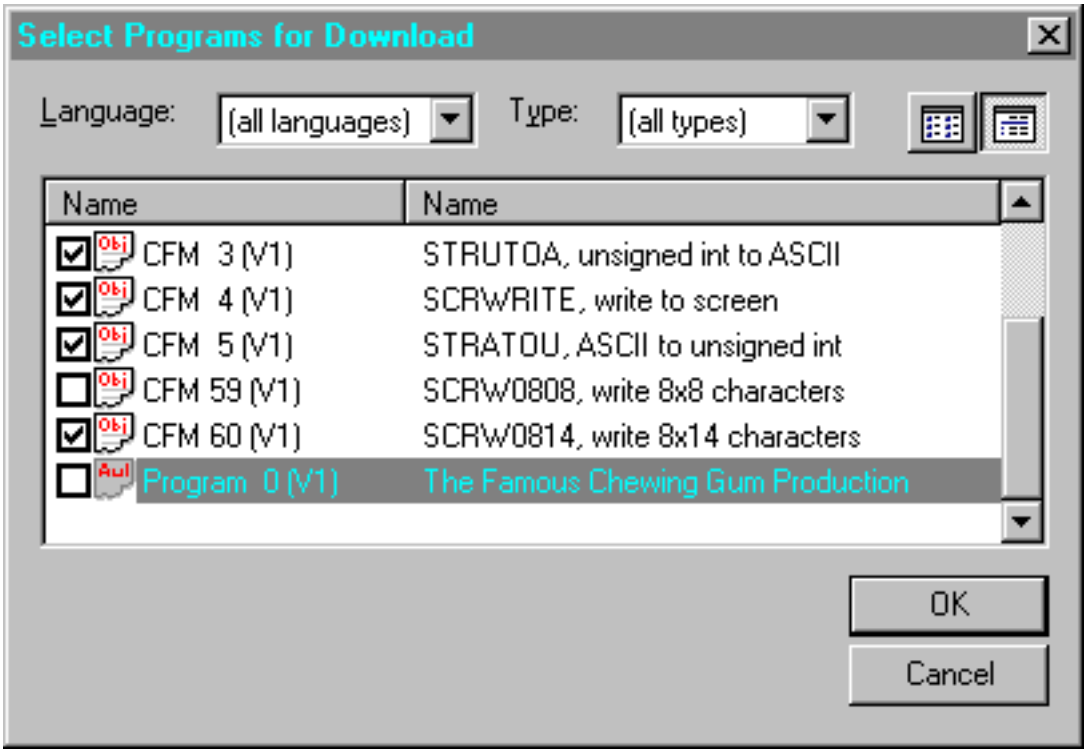
**See also...**

- Managing Control Programs
- The STL Editor

# Selecting Programs for Download

Select "Program >> Select for Download..." from the menu to display a dialog box that allows you to select the programs for download. If a program has a check mark in the box next to it it will be downloaded to the controller.

You can also select the programs by placing a check mark in the box next to it in the Project Tree window.




The Select Programs for Download dialog offers the following features:

- The program name and comment are displayed for each program in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- You can only display programs of one type or language by making the appropriate selection in the combo boxes above the list box.
- If you only want to display the program names without comments in a simple list, toggle the radio buttons in the upper right corner of the dialog.

Note! Only one version of the same program can be selected for download.

---

### See also...

- Managing Control Programs

# Controller Settings

There are several runtime and download options for a FST project. They can be modified using the tabbed dialog Controller Settings.

Double click on the entry Controller Settings in the Project Tree or select "View >> Controller Settings" from the menu to show the Controller Settings dialog.

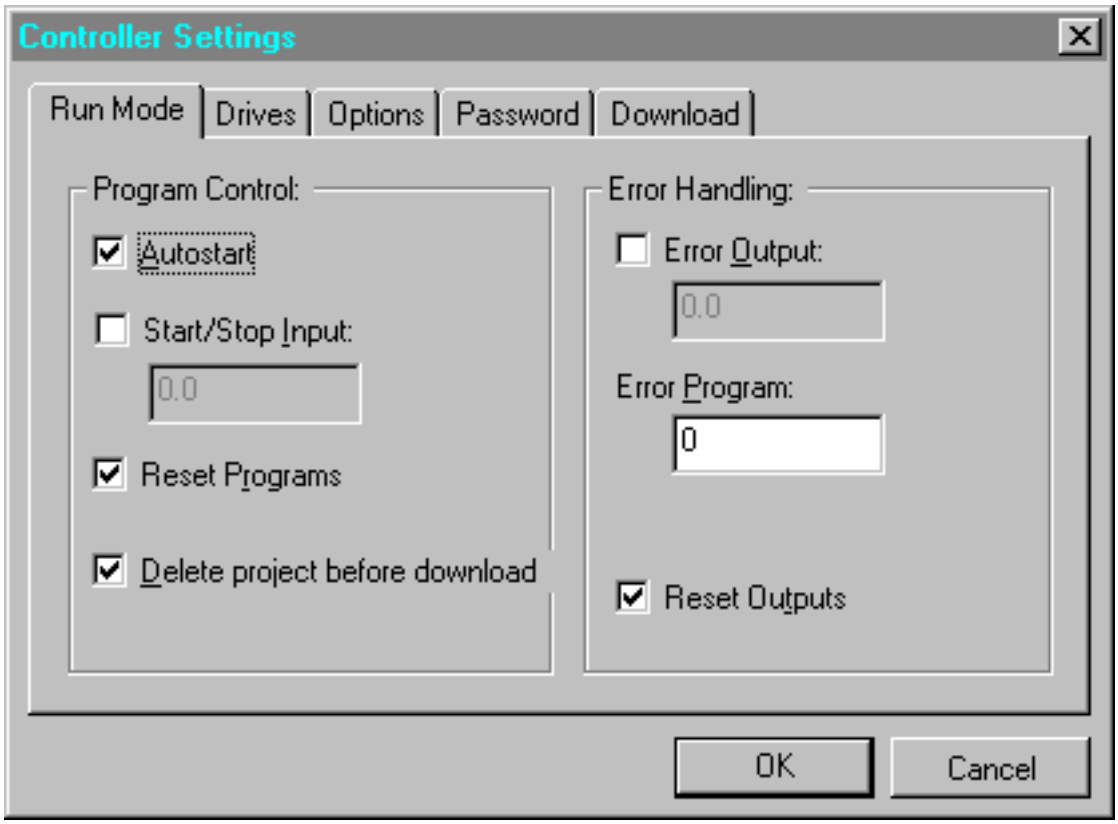
---

### What do you want to do?

- Edit the runtime modes
- Select kernel options
- Set or change the password
- Select the drives on the controller
- Select download options

# Run Mode (Controller Settings)

The Run Mode tab is the default tab of the Controller Settings dialog.




**Autostart:**

Check this option if you want the project to start after download without giving an explicit Run command and regardless of the Start/Stop input.

The default setting is Off.

**Start/Stop input:**

Check this option if you want to configure a start/stop input. Enter the input to be used in the edit box.

Note! It will not be checked if there is any hardware configured for this input. If there is no hardware configured for this input it is always off unless explicitly set by CI command or a driver.

The default setting is Off.

**Reset programs:**

Check this option if you want all programs to be inactivated (resetted) - rather than stopped (breaked) - if

- The start/stop switch is switched to stop (falling edge)
- An error occurs without the presence of an error program

Check this option if you do *not* want - in addition to activating program P0 - all stopped (breaked) programs to be re-activated if

- The start/stop switch is switched to run (rising edge)
- The CI command "R" is executed

The default setting is On.

**Delete project before download:**

Check this option if you want the project that is active on the controller to be unloaded from the

memory *before* the download. If this option is not checked the operation of the project in the controller will continue during the file transfers that are necessary to download the new project.

Note! Do not enable this option if you want to use TCP/IP for downloading the project. Deleting the project will also stop all FST drivers including TCP/IP.

The default setting is Off.

**Error output:**

Check this option if you want the output specified in the edit box below to reflect the error state of the controller.

Note! It will not be checked if any hardware is configured for this output.

Note! The error output will not be switched off unless the error is reset.

The default setting is Off.

**Error program:**

Enter a program number other than zero (1..63) to configure it as error program. In case of an error this program will be started.

The default setting is 0 (Off).

**Reset outputs:**

Check this option if you want all outputs to be resetted if

- The start/stop switch is switched to stop (falling edge)
- The CI command "S" is executed
- An error occurs without the presence of an error program
- When the project is started - rather than using the old values from the retentive storage of operands

The default setting is On.

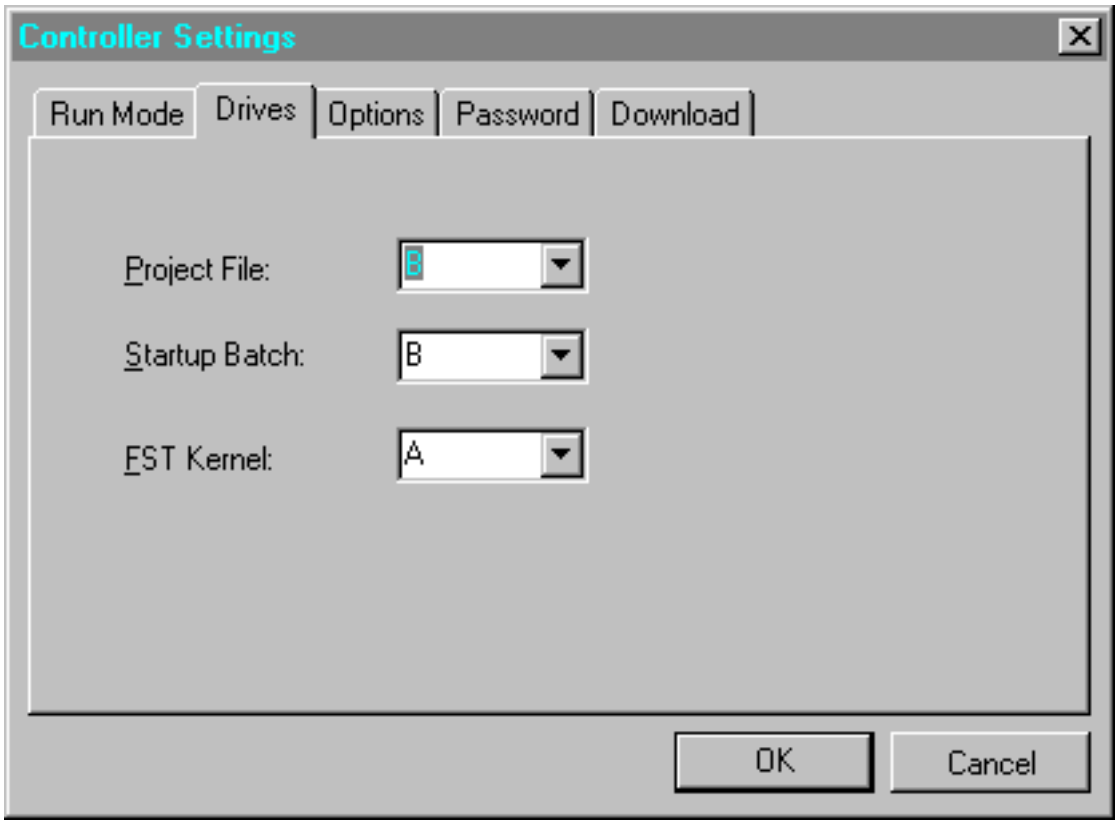
---

### See also...

- Controller Settings
- The FST PLC Operating System

# Drives (Controller Settings)

Select the Drives tab on the Controller Settings dialog.




**Project File:**

Enter the drive where the project file should be stored on the controller.

If the drive you want is not listed in the combo box you can simply type the drive letter. If the drive you choose is available of the controller will be checked prior to the download.

The default depends on the controller type

```
FEC Compact     B:
FEC Standard    B:
HC0X            B:
HC1X            C:
HC2X            C:
```

**Startup Batch:**

Enter the drive where the startup batch file should be stored on the controller.

If the drive you want is not listed in the combo box you can simply type the drive letter. If the drive you choose is available of the controller will be checked prior to the download. Only choose a drive where the STARTUP.BAT will be automatically started. This depends on the controller type you are using.

The default depends on the controller type

```
FEC Compact     B:
FEC Standard    B:
HC0X            B:
HC1X            C:
HC2X            C:
```

**FST Kernel:**

Enter the drive where the FST kernel resides on the controller. If the drive you want is not listed in the combo box you can simply type the drive letter. If there is a FST kernel installed on the drive you choose will be checked prior to the download.

The default depends on the controller type

```
FEC Compact     A:
FEC Standard    A:
HC0X            A:
HC1X            A:
HC2X            C:
```

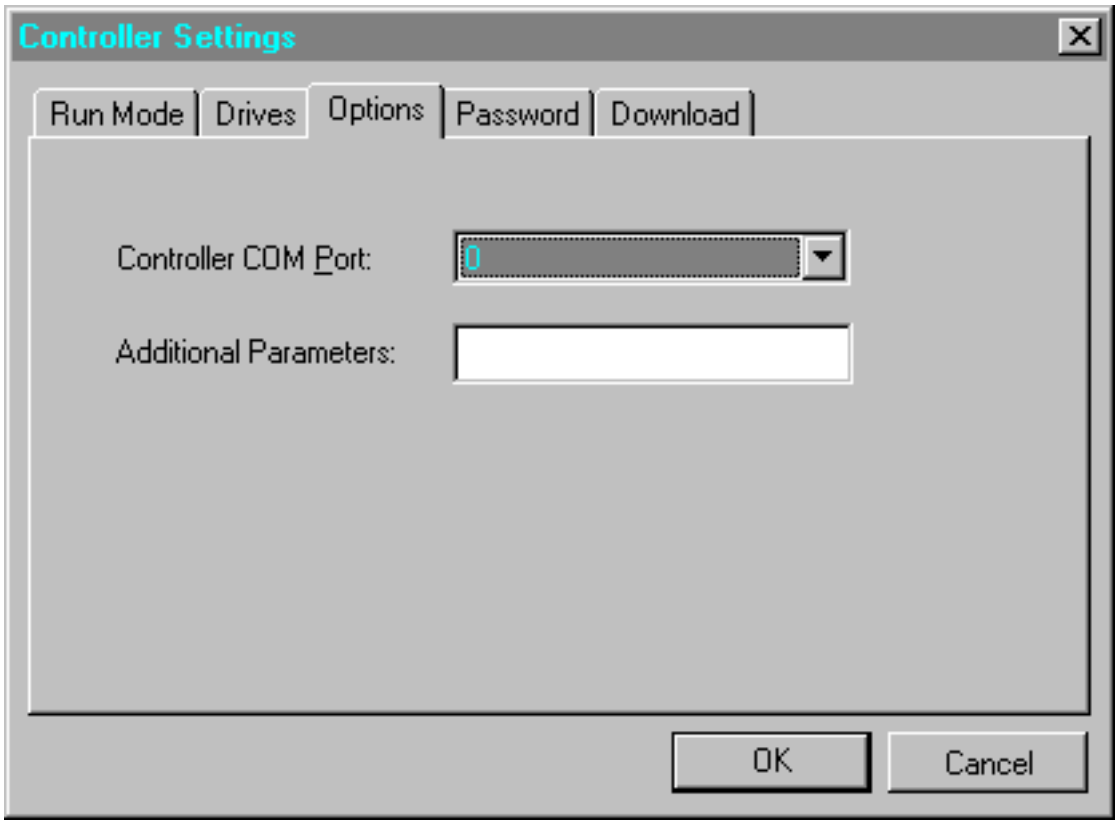
---

### See also...

- Controller Settings
- The FST PLC Operating System

# Options (Controller Settings)

Select the Options tab of the Controller Settings dialog.




**Controller COM port:**

There can be more than one COM port on a controller. This option indicates the FST PLC operating system which COM port on the controller should be used for CI communication.

The default depends on the controller type

```
FEC Compact     0
FEC Standard    0
HC0X            0
HC1X            1
HC2X            1
```

**Additional parameters:**

This text will be appended to the kernel's command line. It is usually blank and meant for future extensions.

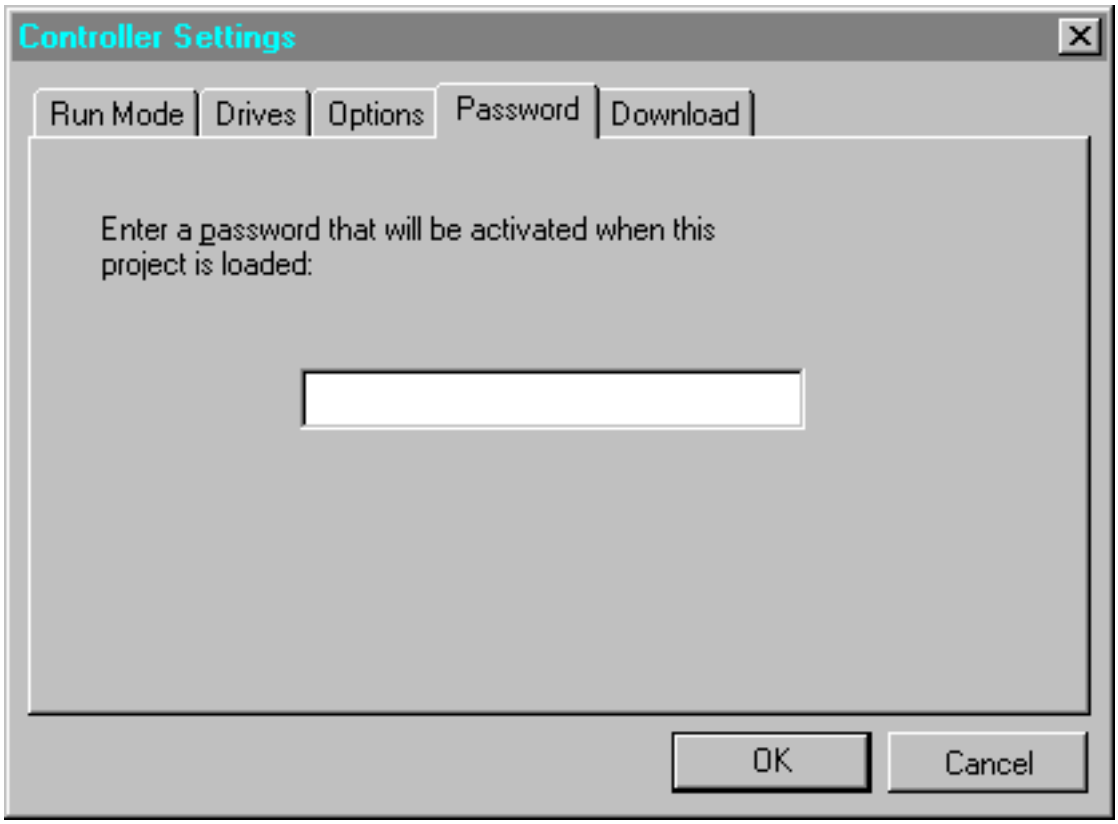
---

### See also...

- Controller Settings
- The FST PLC Operating System

# Password (Controller Settings)

Select the Password tab of the Controller Settings dialog.




Enter a password that will be activated on the controller when the project is started. If you do not want a password leave this field blank.

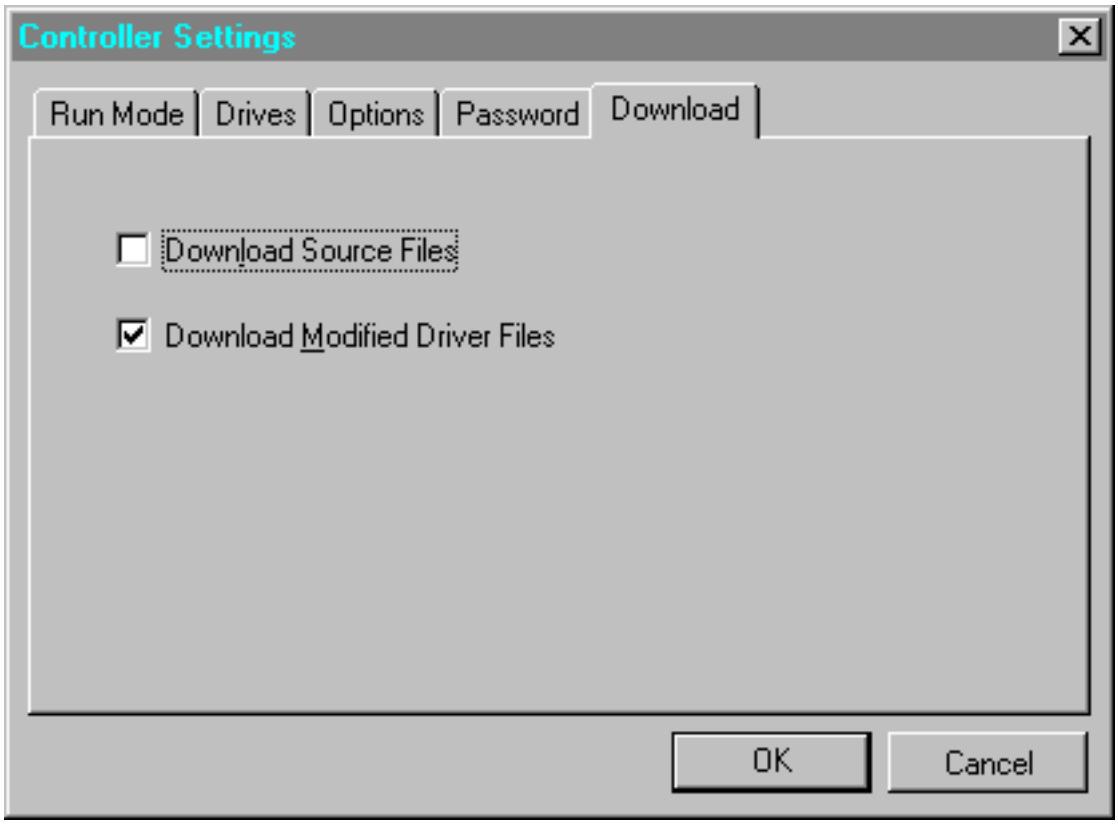
---

**See also...**

- Controller Settings
- The FST PLC Operating System

# Download (Controller Settings)

Select the Download tab in the Controller Settings dialog.




**Download Source Files:**

Check this option if you want all source files that are necessary to restore the project to be stored on the controller in a ZIP file. To later restore the project select "Online >> Upload Project" from the menu.

**Download modified driver files:**

If you do not want to update the driver files in the controller, uncheck this option. This may be useful if the controller has been programmed with a different FST installation with a different driver version. Usually this option should be enabled.

this option does not affect the driver configurations since they are stored inside the project file togehther with the programs and modules.

---

### See also...

- Controller Settings

# The IO Configuration

The IPC is a modular system and there are numerous input and output modules available. They are usually accessed by your control programs trough the FST input and output operands.

If you want to use an IO module in your project you have to configure it in order to assign it to the FST input and output operands you want to use for them. The physical configuration of your controller hardware does not automatically determine the FST operands that are used to access the hardware.

Each IO module occupies a certain range in the IO area of the processor. Many modules support several ranges that usually can be selected by a rotary switch on the bottom side of these units. To identify a module for the FST IO configuration select it from the list of supported modules and enter the chosen switch setting. FST will check your configuration for valid switch positions and overlapping in the IO area of the processor. It however will not suggest switch positions that are still available. The documentation for the individual modules contains the necessary information about the occupied IO area of the processor. For some modules there are more options than just the selection of an IO range. Some of these options require modifications on the hardware (e.g. jumpers) whilst others are programmable by software, i.e. the FST IO driver. All of these options are usually reflected in the name of the IO driver. Make sure to always select the appropriate driver for the module's configuration. More details are given in the extra documentation for the individual IO modules.

You are free to choose any FST input or output word you like for the individual modules. How many input and/or output words a module occupies is listed in the special documentation for the modules. FST will check your configuration for overlapping in the FST operands. If there is an input word required for output modules these operands are usually used for status information. This is described in the module's documentation as well.

Please note that there is a separate IO configuration for each controller type. If you switch a project from one controller type to another the IO configuration will be empty. If you switch back however, you again will have the original IO configuration for that controller type. In the IO configuration you can only insert IO modules that are available for the current controller type setting of the project.

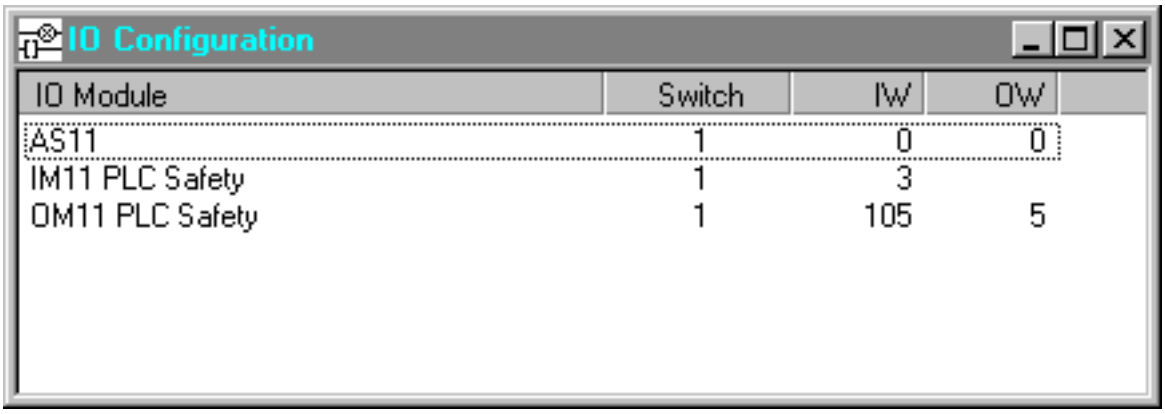
---

### What do you want to do?

- Open the IO Configuration window
- Insert IO modules
- Edit IO module properties

# The IO Configuration Window

To open the IO Configuration window select "View >> IO Configuration..." from the menu or simply double click on the "IO Configuration" entry in the Project Tree window. A MDI child window with the current IO configuration is shown.




The IO Configuration window offers the following features:

- The IO driver description, the switch setting and FST operands are displayed for each module in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- The list is always sorted by definition. The order reflects the execution order at runtime. It is not possible to sort the list alphabetically.
- You can move the entries using the clipboard. The clipboard commands are available from the Edit menu or the right click popup menu and always refer to the selected entries. Insertion is always done before the selection, if no entry is selected at the end of the list.
- In the status line the current number of entries is shown.
- To remove the selected entries from the IO configuration simply press the DEL key or select "Edit >> Delete" from the menu or "Delete" from the right click popup menu.
- To insert a new entry simply press the INS key or select "Insert >> IO module" from the menu or "Insert IO module" from the right click popup menu or double click an empty line.
- To edit an entry select "View >> Properties" from the menu or "Properties" from the right click popup menu or double click on the entry you want to edit.
- To print the current IO configuration select "Module >> Print" from the menu.

Note! There is no undo function available. All changes are immediately saved to disk.

Note! If an entry refers to a module type that is unknown to the FST library the missing file name will be shown in brackets []. To select another type of IO module for the entry open it for editing as for any other entry. A project with an IO configuration that contains unknown IO modules cannot be downloaded to the controller.

---

**See also...**

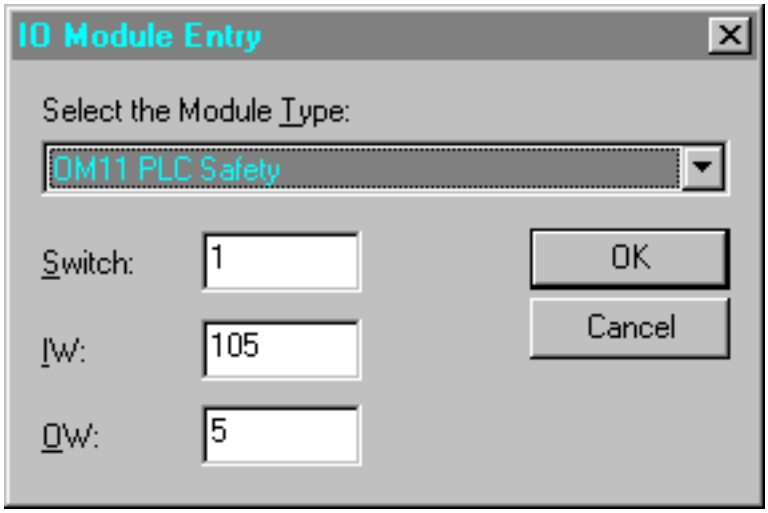
- The IO Configuration
- Adding and Editing IO Modules

# Adding and Editing IO Modules

To insert a new IO module to the IO configuration select "Insert >> IO module..." from the menu, "Insert IO module" from the right click popup menu of the IO Configuration window or simply double click on an empty line in the IO Configuration window.

To change the settings of an IO configuration entry select it in the IO Configuration window and select "View >> Properties" from the menu, "Properties" from the right click popup menu or simply double click on the setting you want to change.

The IO Module Entry dialog will be shown that allows you to enter the required settings.




**Select the IO module type:**

Select the IO module from the list of available module types that corresponds to your hardware. For some module types more than one IO driver is available. Select the one that fits your needs. Please note that some options can be activated by simply choosing the appropriate IO driver while others require hardware settings (e.g. jumpers) or even a special version of the module. Details for the individual modules are given in the extra documentation for each module.

**Switch:**

Enter here the switch setting for the IO module.

Each IO module occupies a certain range in the IO area of the processor. Many modules support several ranges that usually can be selected by a rotary switch on the bottom side of these units. For some IO drivers this switch setting might be used for other purposes.

**IW:**

Enter here the FST input word you would like to use to access the IO modules input data from your programs. If the IO module supplies more than one input word consecutive input words will be used. How many input words are used for each IO module can be read in the extra documentation for the individual IO module.

**OW:**

Enter here the FST output word you would like to use to access the IO modules output data from your programs. If the IO module supplies more than one output word consecutive output words will be used. How many output words are used for each IO module can be read in the extra documentation for the individual IO module.

Note! FST will check your configuration for overlapping both in the IO range of the processor and the FST operands.

Note! If there is an input word required for output modules only these operands are usually used for status information. This is described in the module's documentation.

### See also...

- The IO Configuration
- The IO Configuration Window

# The Driver Configuration

Certain functions in the controller (such as fieldbus operation) are supported by drivers. These drivers are normally started before the FST operating system when the controller is powered up. FST supports the management of these drivers. FST handles loading and preparations for automatic starting of the drivers. The driver configuration is used to select and configure the drivers for a project.

Each driver has its driver number. This number is usually used for only one driver, except there are more drivers that are for the same purpose. In one project you can only use one driver with the same number. Some drivers use the functions of other drivers. In this case both drivers have to be configured for the project. For most drivers there are options which are individual for each driver.

There are drivers that require a more comprehensive configuration, such as a fieldbus configuration. This configuration is usually edited using a special configuration tool and stored in a file. The contents of this file are incorporated into the project file that will be downloaded to the controller and will be used by the driver.

Please note that there is a separate driver configuration for each controller type. If you switch a project from one controller type to another the driver configuration will be empty. If you switch back however, you again will have the original driver configuration for that controller type. In the driver configuration you can only insert drivers that are available for the current controller type setting of the project.

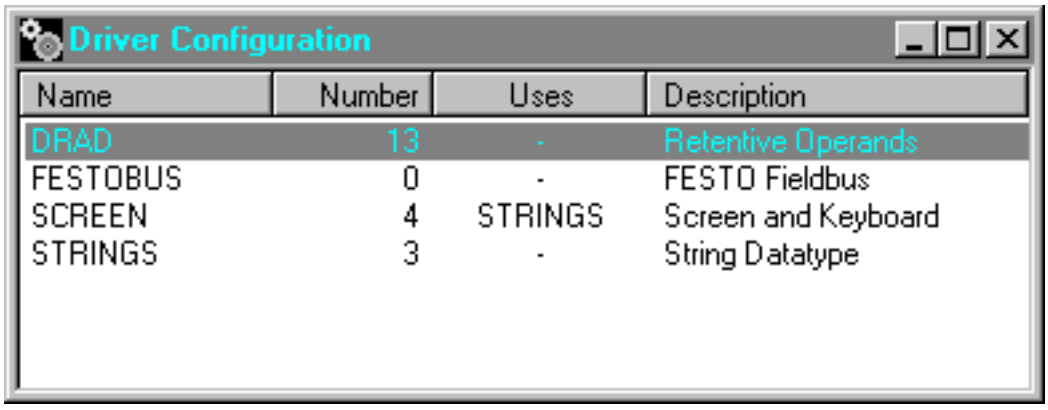
---

### What do you want to do?

- Open the Driver Configuration window
- Add a new driver
- Edit driver options

# The Driver Configuration Window

To open the Driver Configuration window select "View >> Driver Configuration..." from the menu or simply double click on the "Driver Configuration" entry in the Project Tree window. A MDI child window with the current driver configuration is shown.




The Driver Configuration window offers the following features:

- The name, number, required other drivers and a short description are displayed for each driver in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- In the status line the current number of entries will be shown.
- To remove the selected drivers from the driver configuration simply press the DEL key or select "Edit >> Delete" from the menu or "Delete" from the right click popup menu.
- To insert a new driver simply press the INS key or select "Insert >> Driver..." from the menu or "Insert Driver..." from the right click popup menu or double click on an empty line in the configuration window.
- To edit a driver's options select that driver and then "View >> Properties" from the menu or "Properties" from the right click popup menu or double click on the driver.
- To print the current driver configuration select "Program >> Print" from the menu.

Note! There is no undo function available. All changes are immediately saved to disk.

Note! If an entry refers to a driver that is unknown to the FST library its name will be shown in brackets []. If you select "View >> Properties" for that driver, the option settings will be shown if available. However, they cannot be edited. A project with a driver configuration that contains unknown drivers cannot be downloaded to the controller.

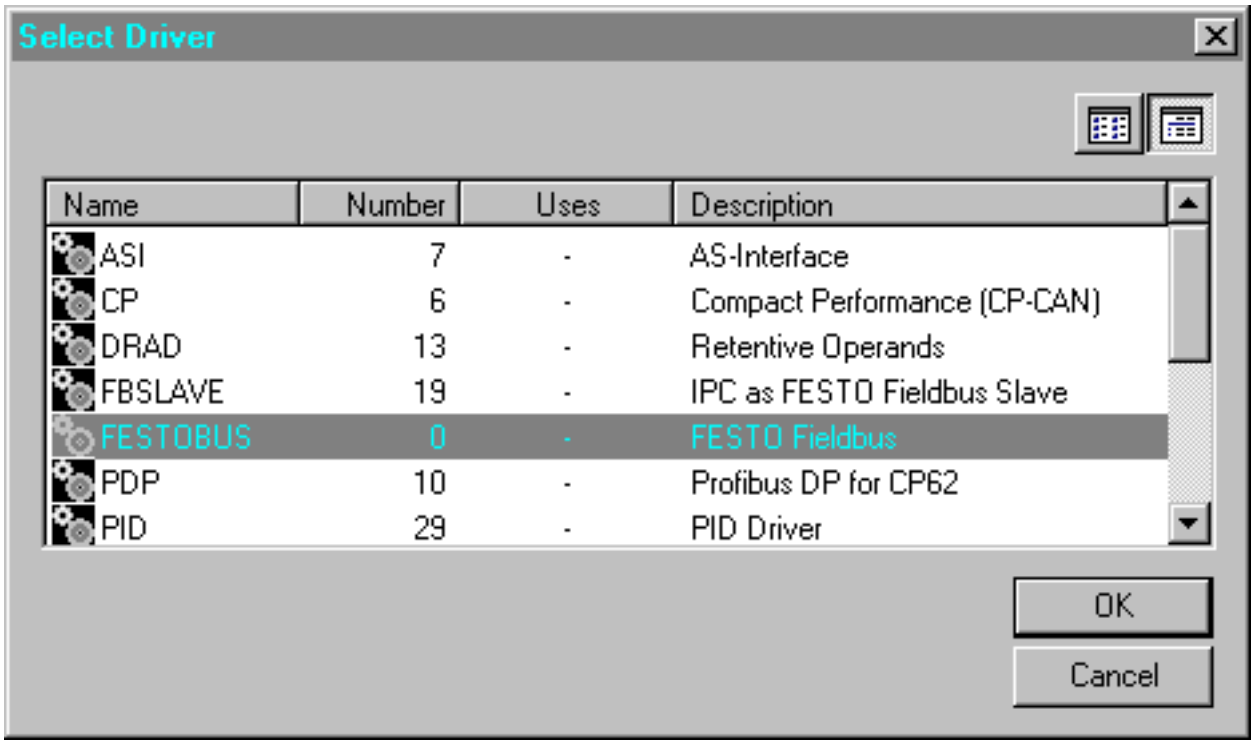
---

**See also...**

- The Driver Configuration
- Adding a New Driver
- Editing Driver Options

# Adding a New Driver

To insert a new driver to the configuration select "Insert >> Driver..." from the menu, "Insert Driver..." from the right click popup menu of the Driver Configuration window or simply double click on an empty line. The Select Driver dialog will be shown that allows you to choose a driver. Double click on the driver you want to add or press the OK button to add the selected driver.




The Select Driver dialog offers the following features:

- The name, number, required other drivers and a short description are displayed for each driver in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- If you only want to display the driver names without description in a simple list, toggle the radio buttons in the upper right corner of the dialog.

After inserting the driver you automatically will be prompted to edit the driver's options.

---

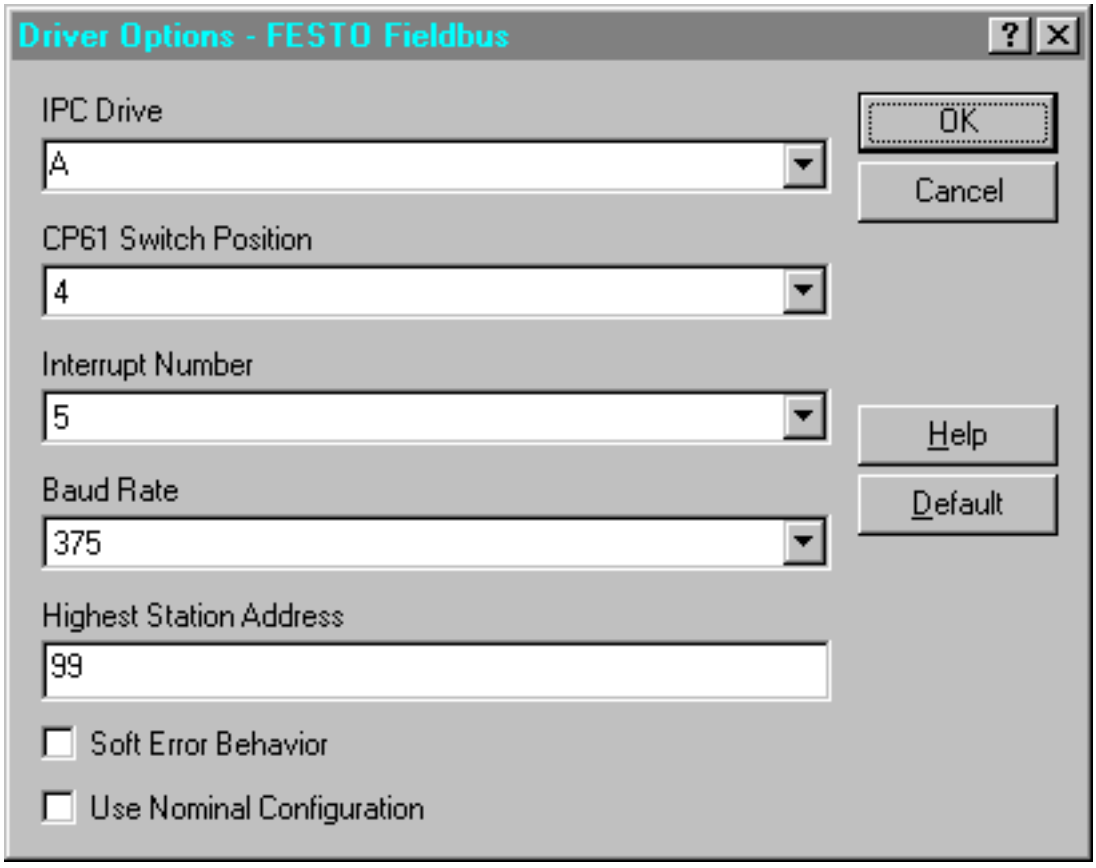
**See also...**

- The Driver Configuration
- The Driver Configuration Window
- Editing Driver Options

# Editing Driver Options

To change the options of a driver select it in the Driver Configuration window and select "View >> Properties" from the menu, "Properties" from the right click popup menu or simply double click on it. The Driver Options dialog will be shown that allows you to make the required settings.

The Driver Options dialog is different for each driver depending on the required settings. The required settings are described in the separate documentation for the individual drivers. This is an example how a typical dialog will look like:

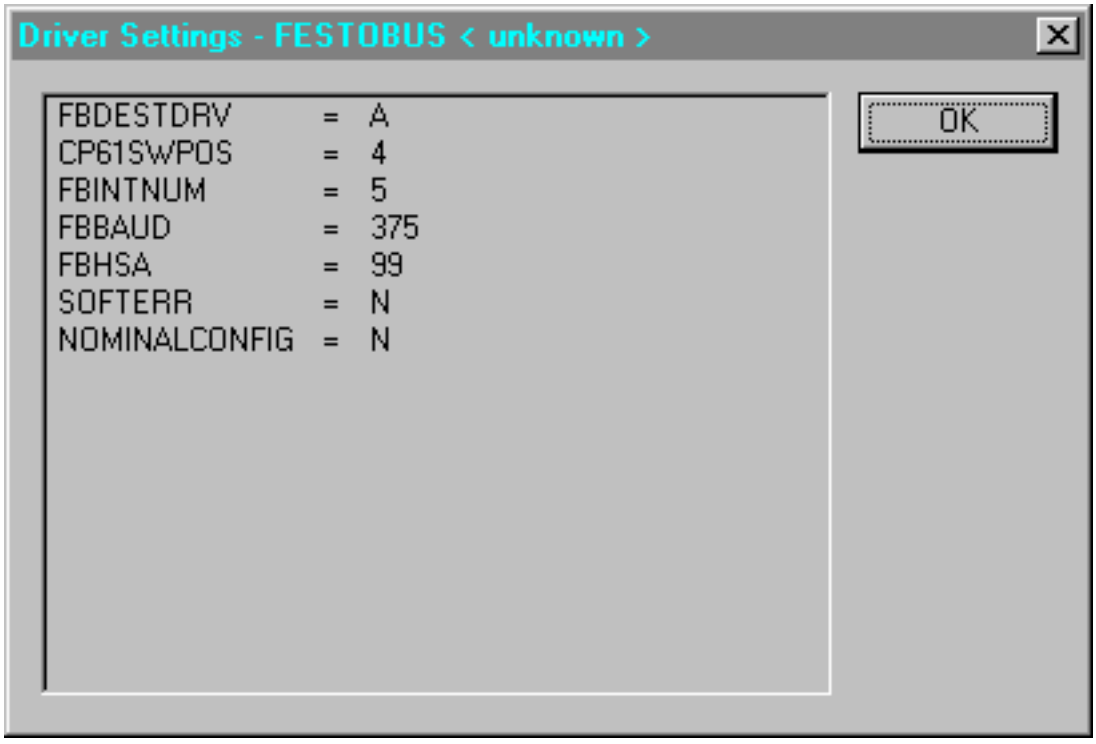



For each option there is a default value available. If you want to reset all options to their defaults, press the Default button.

Most drivers are asking for a controller drive. Enter here the drive of the controller where you want the driver executable file to be downloaded or where it already resides. If the chosen drive is available on the controller will be checked prior to downloading the project.

Press the Help button to open the driver's chapter in the online help viewer.

Note! The options of an unknown driver cannot be edited. They are only displayed in a simple dialog.




---

**See also...**

- The Driver Configuration
- The Driver Configuration Window
- Adding a New Driver

# The Allocation List

PLC programs consist of program code for handling of data. This data is available in the form of operands. An operand consists of an abbreviation identifying the equipment group and an address specifying a level within the group. Output 3 in output word 5, for example, is identified as O5.3.

FST also allows you to use symbolic designations for the operands: output O5.3 may switch a motor on and off, for example, in which case you can refer to it as "MotorOn" in your programs. In this way you can make the programs more easily comprehensible, and also retain a clear overview even when there is a large number of operands.

You are largely free to decide on the names of the symbolic operands yourself. A name may consist of up to nine characters, but the first character must be a letter or an underline character (_). You can use any combination of letters, digits or underlines for the sub-sequent characters, but no spaces. The designation must, however, be different from that of an absolute operand.

In the following the direct entry of an operand (such as O5.3) is referred to as an absolute operand, whereas an entry in symbolic form (MotorOn) is referred to as a symbolic operand. The assignment of symbolic operands to absolute operands is defined in the Allocation List.

It is advisable to create the Allocation List before program entry and then only to use the symbolic operand designations in the control programs. The Allocation List can be edited with the Allocation List editor, covering all functional aspects. It is also possible to insert operands in the course of program entry, however.

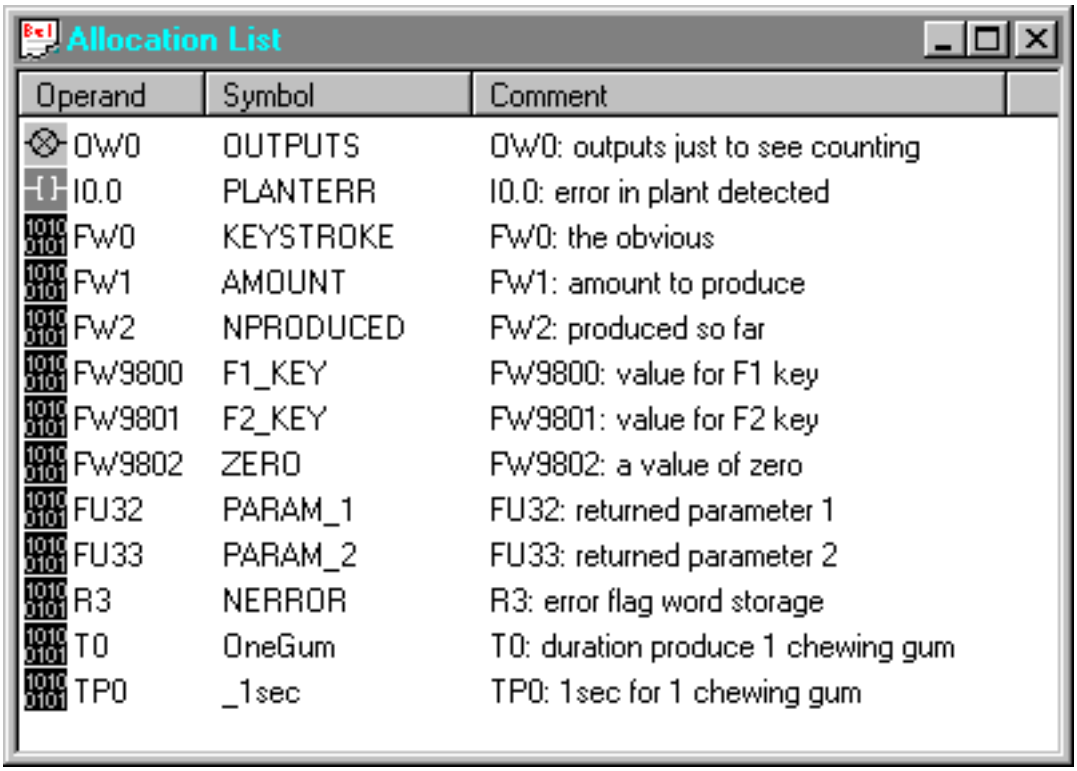
---

### What do you want to do?

- Open the Allocation List editor
- Add Allocation List entries
- Edit Allocation List entries

# The Allocation List Editor

To open the Allocation List editor select "View >> Allocation List" from the menu or simply double click on the "Allocation List" entry in the Project Tree window. A MDI child window with the current Allocation List is shown.




The Allocation List editor offers the following features:

- The absolute operand, the symbolic operand and a comment are displayed for each entry in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- In the status line the current number of entries will be shown.
- The use of different icons makes it easy to distinguish inputs and outputs from internal operands.
- To remove the selected entries from the Allocation List simply press the DEL key or select "Edit >> Delete" from the menu or "Delete" from the right click popup menu.
- To insert a new entry simply press the INS key or select "Insert >> Operand..." from the menu or "Insert Operand" from the right click popup menu or double click an empty line.
- To edit an entry select "View >> Properties" from the menu or "Properties" from the right click popup menu or double click on the entry you want to edit.
- To print the current Allocation List select "Program >> Print" from the menu.
- To find and replace text in the comments use the appropriate functions from the Edit menu.

Note! There is no undo function available. All changes are immediately saved to disk.

---

**See also...**

- The Allocation List

- Adding and Editing Allocation List Entries

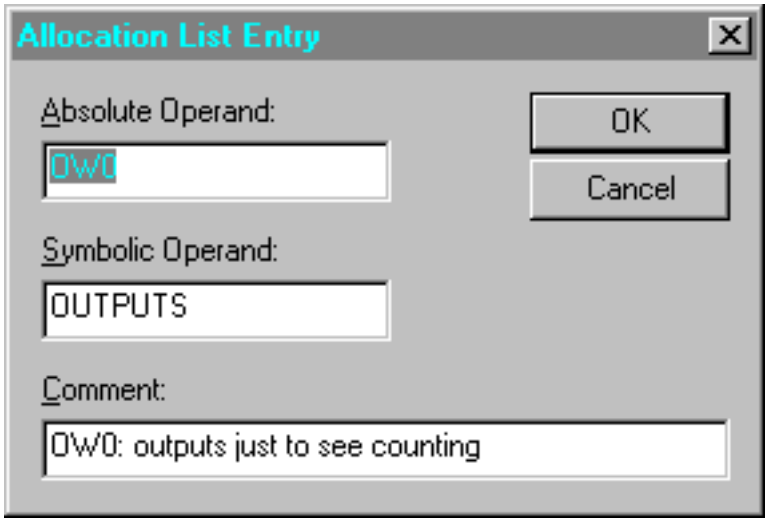
# Adding and Editing Allocation List Entries

To insert an operand to the Allocation List select "Insert >> Operand..." from the menu, "Insert Operand" from the right click popup menu of the Allocation List editor or simply double click on an empty line in the Allocation List editor.

It is also possible to add entries to the Allocation List while typing the control programs in the Statement List editor.

To change an entry in the Allocation List select it in the Allocation List editor and select "View >> Properties" from the menu, "Properties" from the right click popup menu or simply double click on the operand you want to change.

The Allocation List Entry dialog will be shown that allows you to enter the required settings.




**Absolute Operand:**

Enter here the absolute operand, e.g. O3.2 or FW4.

**Symbolic Operand:**

Enter here the symbolic operand, e.g. MotorOn.

You are largely free to decide on the names of the symbolic operands yourself. A name may consist of up to nine characters, but the first character must be a letter or an underline character (_). You can use any combination of letters, digits or underlines for the sub-sequent characters, but no spaces.

**Comment:**

Enter here a short comment for the operand. It can be up to 36 characters long.

If you use an operand in your programs, its comment from the Allocation List will be automatically inserted into the program text.

Note! There can be only one entry for the same absolute or symbolic operand.

Note! The symbolic operand must be different from that of an absolute operand.

Note! You can enter an absolute operand with or without a symbolic designation, but a symbolic operand always requires an absolute operand.

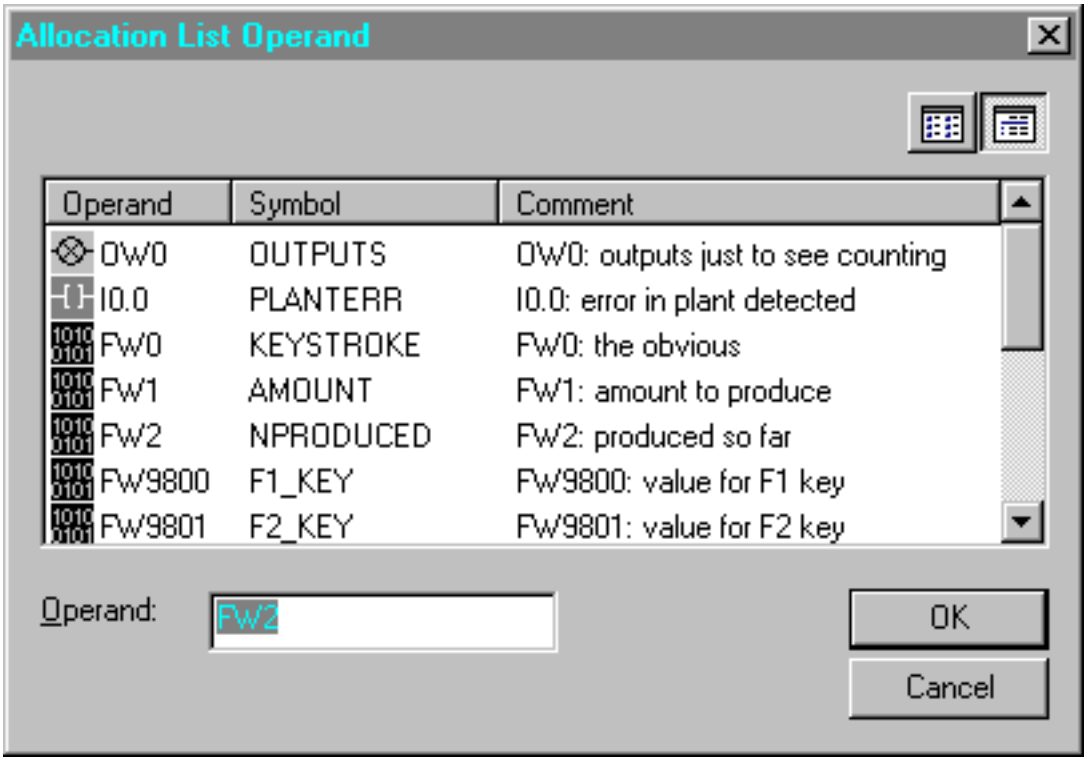
---

### See also...

- The Allocation List

# Selecting an Operand from the Allocation List

The Select Operand dialog is used for different purposes where you have to select an operand. It allows you to choose an operand from the Allocation List or to enter it directly (absolute or symbolic) in the edit field below the list box. Press the OK button to accept the operand entered.




The Select Operand dialog offers the following features:

- The absolute operand, symbolic operand and comment of each Allocation List entry are displayed in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.

---

**See also...**

- The Allocation List

# Online Mode

The FST programming environment and the controller can establish a communication link via an RS 232 or TCP/IP connection. This link is used to transfer the compiled and linked project to the controller and to exchange information for debugging, for example operand values.

### Using the RS 232 connection

The traditional way to connect to the controller is serial communication over RS 232. This is using the COM ports of the PC and IPC and a simple point to point connection.

### Using the TCP/IP connection

Using TCP/IP to connect to the controller has some advantages over the RS 232 connection, e.g. higher transmission speed and the possibility to connect several controllers and PCs in a network.

### What do you want to do?

- Configure the online connection
- Establish and test the connection to the controller
- Display and modify operand values
- View, transfer and delete files in the controller
- Start or stop the project loaded into the controller
- Monitor the error state of the controller
- Lock the controller with a password
- Enter CI commands manually

---

### See also...

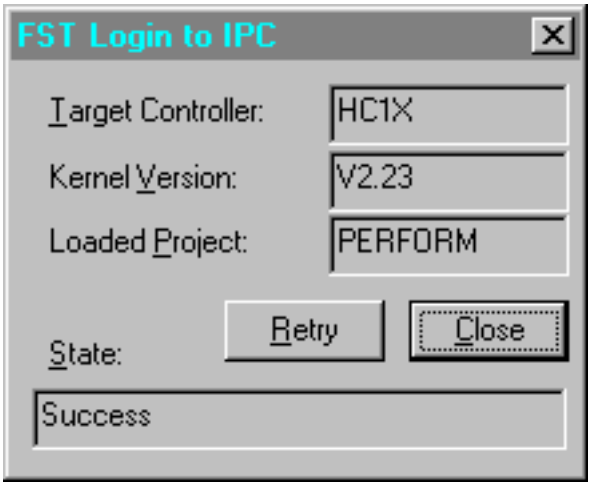
- The FST PLC Operating System

# Connecting the Controller to the PC for Online Mode

If using RS232 connect the controller and your PC with a null modem cable. Make sure to use the COM port of your PC you have configured in your Communication Port Preferences (the default is COM1). On the controller side use the COM port you have configured to be used for the CI in the Controller Settings. This is by default the RS232 port on the CPU module of your controller, labelled COM or COM1.

Before you can go online via TCP/IP you also have to load a project including the TCPIP driver into the controller first. You also have to select TCP/IP in the Communication Port Preferences and enter the IP address of the controller. Make sure the controller and the PC are connected to the same network.

To test the connection to the controller select "Online >> Login" from the menu. A small dialog box will be displayed that informs you about the progress of the login procedure and will display the result and other useful information about the controller if the login is successful.




Press the Retry button to start the login procedure again.

Press the Close button to dismiss the dialog box.

Note! This dialog box is also displayed when starting other online displays. In these cases the dialog box will be hidden automatically on success.

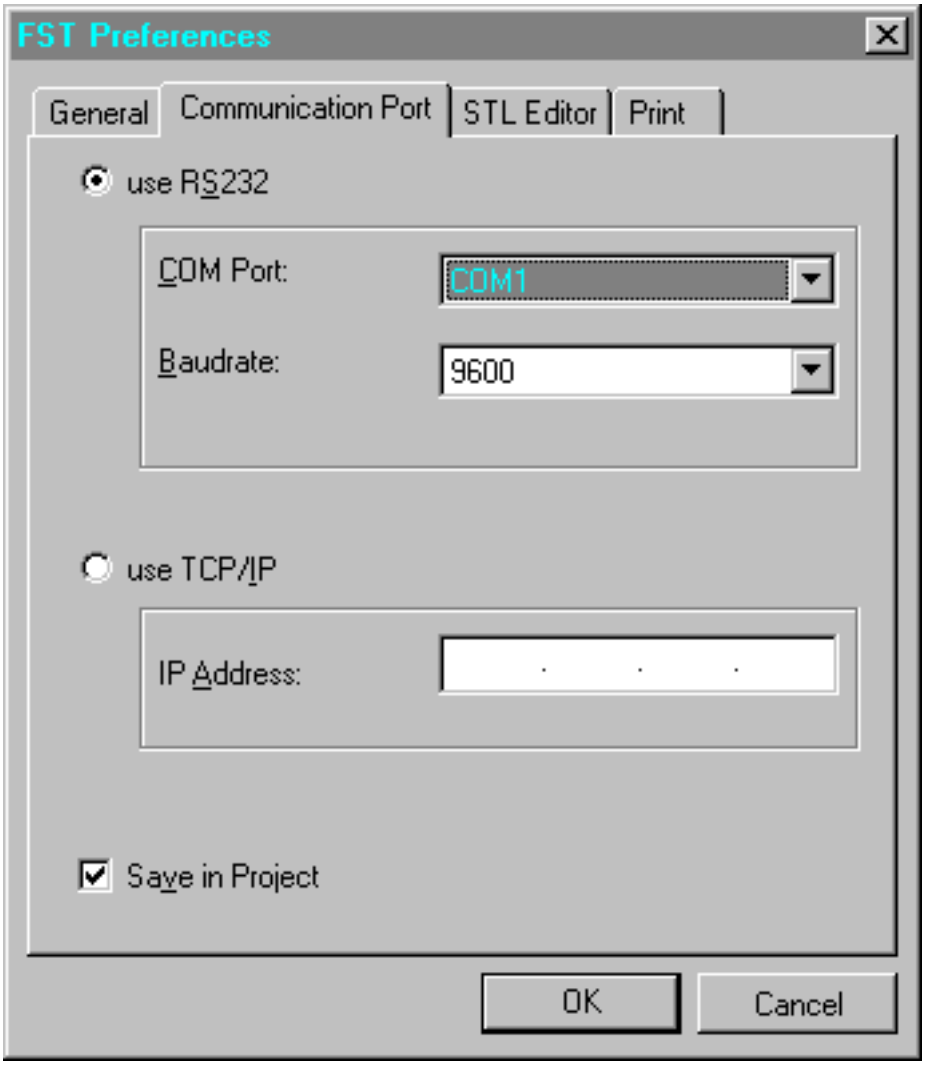
---

**See also...**

- Online Mode
- Communication Port Preferences
- The FST PLC Operating System

## Communication Port Preferences

Select "Extras >> Preferences" from the menu to open the Preferences tabbed dialog. Select "Communication Port" to choose the communication method and configure the specific settings.




If you want to use TCP/IP for the online connection select the "use TCP/IP" radio button, or "use RS232" to use RS232.

For the RS232 connection you have to specify a com port and a baudrate. The com port can be selected from the first combo box. It offers all COM ports found on your PC. Choose the baudrate from the second combo box. Please note that not all controllers allow high baudrates. 9600 is usually a good choice, if not successful, try 2400. Please see the system documentation of the controller for details.

If using TCP/IP you have to enter the IP address of the controller.

If you check the option "Save in Project" the settings will be stored in the project rather than for FST in general.

Press the OK button to accept the new settings. All online displays will be closed automatically if you have made any changes.

---

**See also...**

- Online Mode

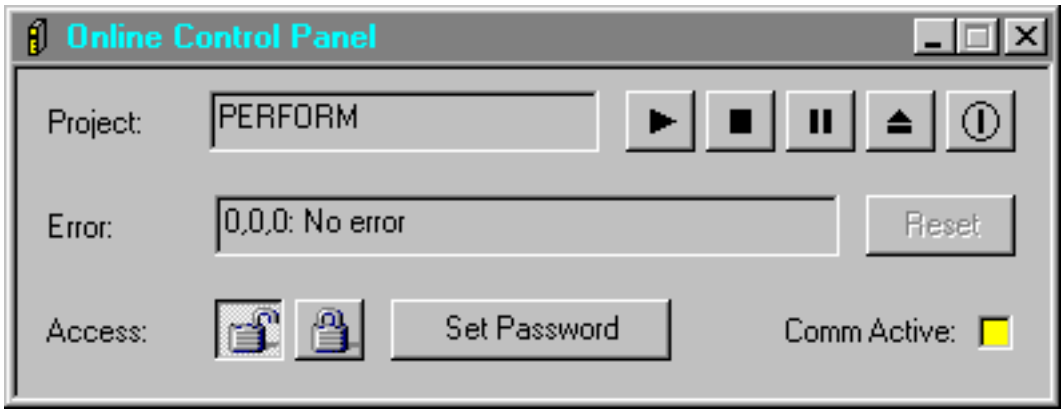
- Connecting the controller to the PC for Online Mode

# The Online Control Panel

The Online Control Panel is used to

- Display the name of the project that is currently loaded into the controller
- Start and stop the project
- Unload the project
- Reboot the controller
- Display the error in the controller
- Reset any error in the controller
- Display if the controller is protected by a password (locked)
- Lock or unlock the controller
- Change the password of the controller

To start the Control Panel select "Online >> Control Panel" from the menu. A small MDI child window with the controls is shown.




### Project

The name of the project currently loaded in the controller is displayed in a text field, or "<none>" if no project is loaded.

Press the Run button to start the project. This will activate program 0 and activate any stopped programs depending on the Controller Settings.

Press the Stop button to stop the project. This will inactivate (reset) all programs and reset all outputs depending on the Controller Settings.

Press the Break button to break the project. This will stop (break) any active program depending on the Controller Settings.

Press the Unload button to unload the project. All drivers are killed and the project is unloaded from the memory. To load the project again you have to download it or reboot the controller.

Press the Boot button to reboot the controller.

### Error

The number and a short description of the error in the controller are displayed in a text field. Press the Reset button to reset the error in the controller.

### Password

If the controller is protected by password (locked) is indicated by the two radio buttons for the locked or unlocked state. Press either the Lock  or Unlock  radio button to lock or unlock the controller. If you want to unlock the controller you have to enter the password.

The button next to the radio buttons is labelled either "Set Password" if currently no password is stored in the controller, or "Change Password" if a password is stored in the controller. Click on it to set or change the password that is stored in the controller.

Note! If no password is stored in the controller it can be unlocked without entering a password.

Note! There is also the possibility to store a password with the project.

### Remarks

Note! Before you can go online you have to connect the controller to your PC and possibly configure the online settings.

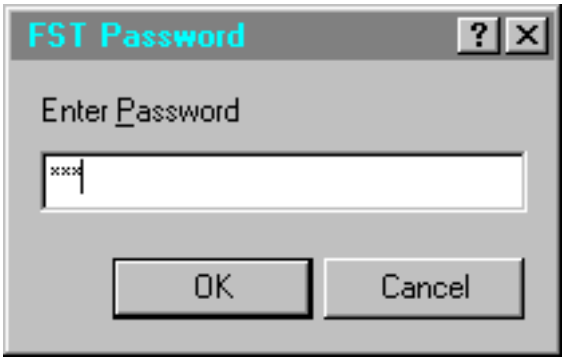
---

### See also...

- Online Mode
- Connecting the controller to the PC for Online Mode
- Communication Port Preferences
- The FST PLC Operating System

# Entering the Controller Password

If the controller is protected by a password and you want to unlock it for having full access you have to type in the password. The FST Password dialog is displayed to enter the password.




Note! If no password is stored in the controller it can be unlocked without entering a password.

---

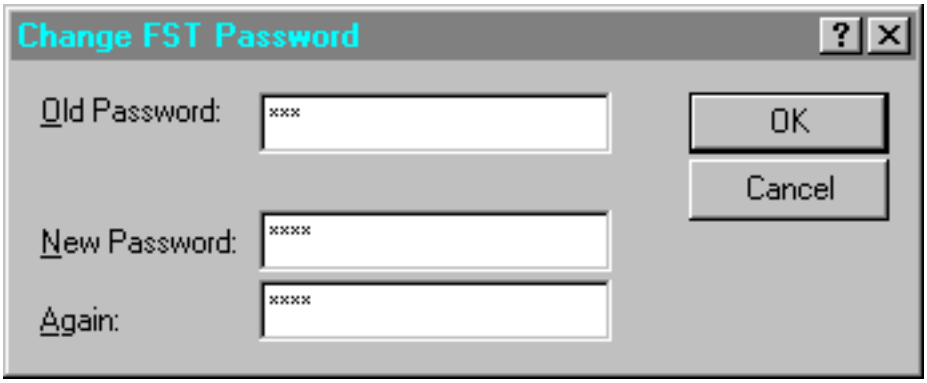
**See also...**

- Online Mode
- The Online Control Panel
- The FST PLC Operating System

# Changing the Controller Password

To change the password stored in the controller open the Online Control Panel. Press the button labelled "change Password" or "Set Password".

The Change Password dialog will be displayed.




**Old Password:**

If you want to change the password you have to enter here the old password first.

**New Password:**

Enter here the new password. Leave blank to erase the password from the controller.

**Again:**

Enter here the new password again (same as for "New Password:").

Note! There is also the possibility to store a password with the project. See Controller Settings.

---

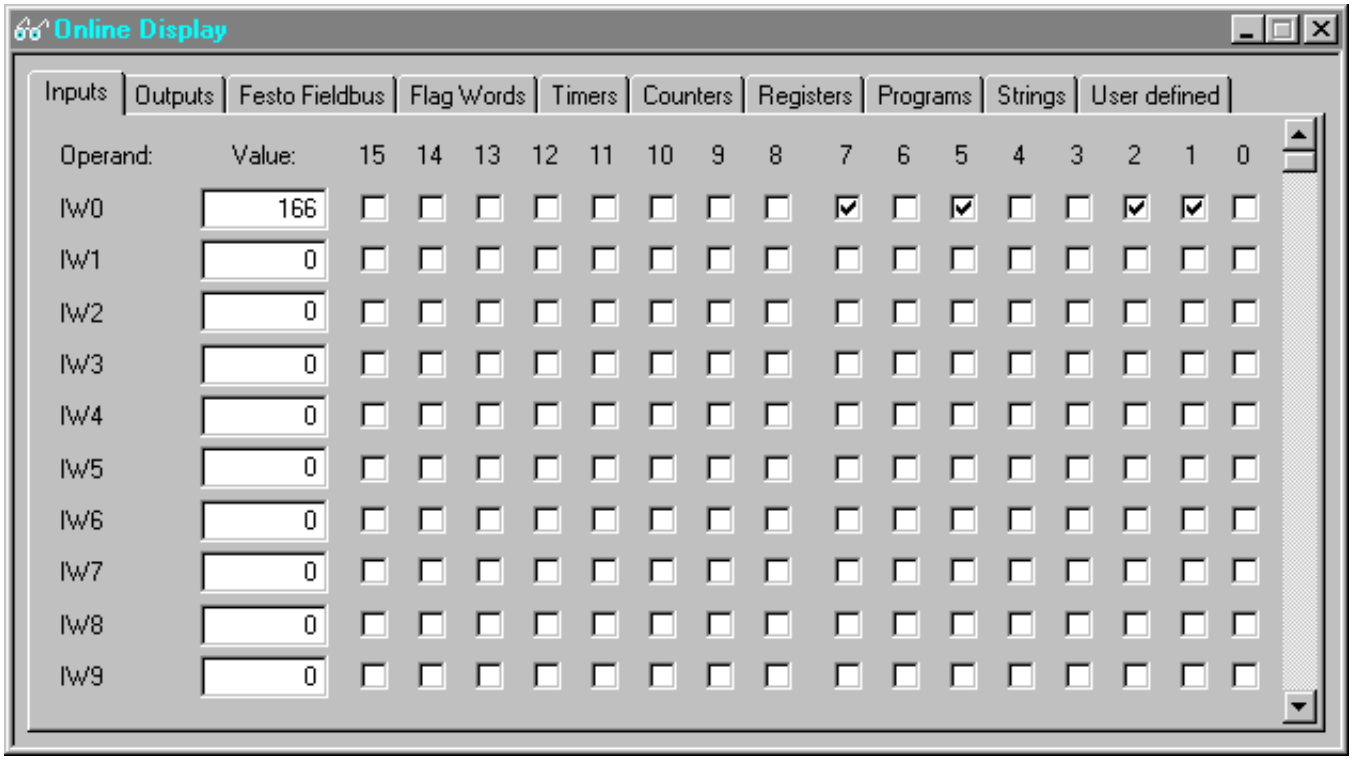
### See also...

- Online Mode
- The Online Control Panel
- The FST PLC Operating System

# The Online Display

The Online Display is used to display and modify the current values of the PLC operands.

To start the Online Display select "Online >> Online Display" from the menu. A MDI child window with several tabs is shown.




The Online Display offers the following features:

- Click on the tabs to select the type of operands that are displayed.
- Use the scrollbar or Page keys to select a range within the operands.
- Directly goto an operand by entering its number in a dialog window.
- Display a mixed list of operands that are of interest in the User Defined tab.
- Open two or more Online Display windows to display several tabs at the same time.
- The word values can be displayed in signed, unsigned or hexadecimal format.
- If available the bit values of the operands are displayed as sixteen check boxes next to the operand value.
- If the mouse cursor is placed over an operand value or a checkbox the symbolic name is displayed in a small popup window (like ToolTips) if available.
- The update speed can be changed.
- Modify operand values.
- Forcing of inputs and outputs is supported.
- The Festo Fieldbus tab shows the slaves found on the bus and allows scaning or assigning the configuration in the master.

### Modifying Operand Values

There are the following shortcuts for modifying operand values available:

- Double click on a word, timer value or string to open the Modify Operand dialog (Modify Timer, Modify String) for it.
- Check (or uncheck) the boxes for the single bits to toggle their value.
- Check (or uncheck) the boxes for the timer and counter states to start (or stop) the timer or counter.
- Select the new program run state from the combo box to start, stop or inactivate the program. Please note that programs can only be stopped from the active state.

### Festo Fieldbus

The Festo Fieldbus tab shows the slaves found on the bus when selecting the tab the first time. If the configuration in the master has changed select "Refresh Display" from the right click popup menu to update the list.

To update the configuration in the master according to the actual configuration in the bus select "Scan for Actual Configuration" from the right click popup menu. Please note that this will temporarily disconnect all slaves from the master. All fieldbus outputs are reset to zero.

To assign the nominal configuration (i.e. the slaves used by the control programs) to the master's slave list select "Assign Nominal Configuration" from the right click popup menu. Please note that this will temporarily disconnect all slaves from the master. All fieldbus outputs are reset to zero.

### User Defined List

You can display a list of operands of different types that are of interest in the User Defined tab.

To configure an entry click the label button. A dialog will be shown that allow you to choose or enter an operand.

Note! The operands configured for the User Defined tab are stored with the project as absolute operands.

### Remarks

Note! Before you can go online you have to connect the controller to your PC and possibly configure the online settings.

---

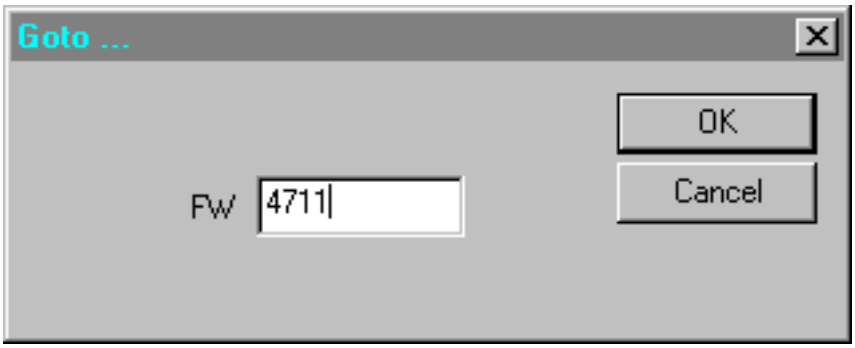
### See also...

- Online Mode
- Connecting the controller to the PC for Online Mode
- Communication Port Preferences
- The FST PLC Operating System

# Online Goto...

To position on a certain operand within the active page of the Online Display or a step in Statement List Online select "Online >> Goto..." from the menu or "Goto.." from the right click popup menu.

The Goto... dialog will be displayed that allows you to enter the number of the operand or step.




---

**See also...**

- Online Mode
- The Online Display
- Statement List Online

# Changing the Online Display Format

The word values of the online displays can be displayed in signed, unsigned or hexadecimal format. Select the appropriate mode from the Online menu or the right click popup menu.

---

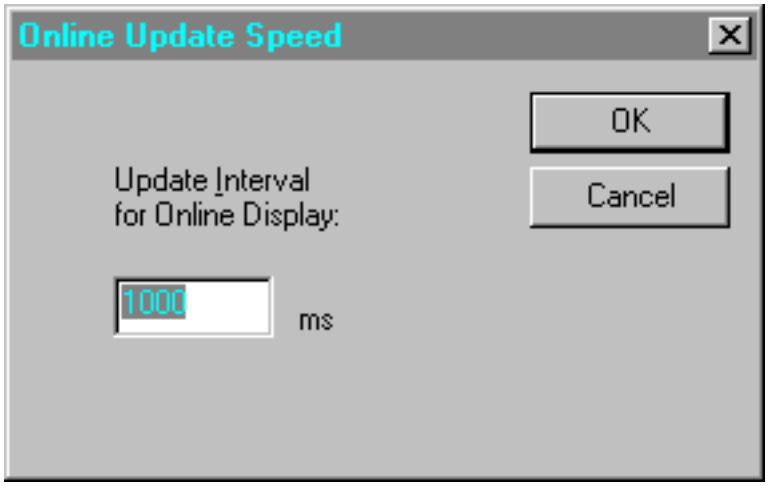
**See also...**

- Online Mode
- The Online Display
- Statement List Online

# Changing the Update Interval of the Online Display

To change the update speed of the active online display select "Online >> Change Update Speed..." from the menu.

The Online Update Speed dialog will be shown that allows you to enter the update interval in milliseconds. The allowed range is from 10ms to 10000ms; the default value is 1000ms.




Note! The setting is valid for all online windows of the same type, e.g. all Online Display windows.

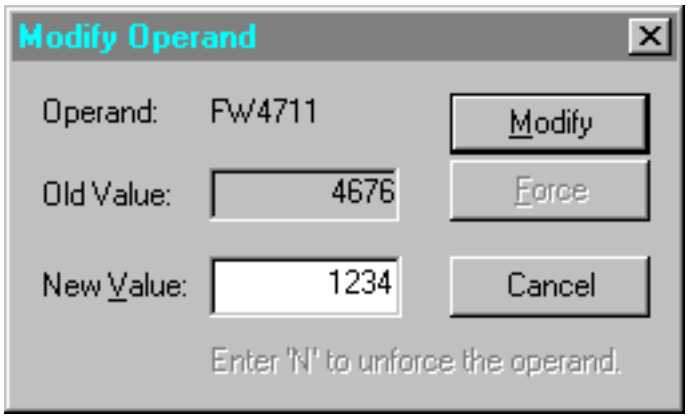
---

**See also...**

- Online Mode
- The Online Display
- Statement List Online

# Modifying Online Display Operand Values

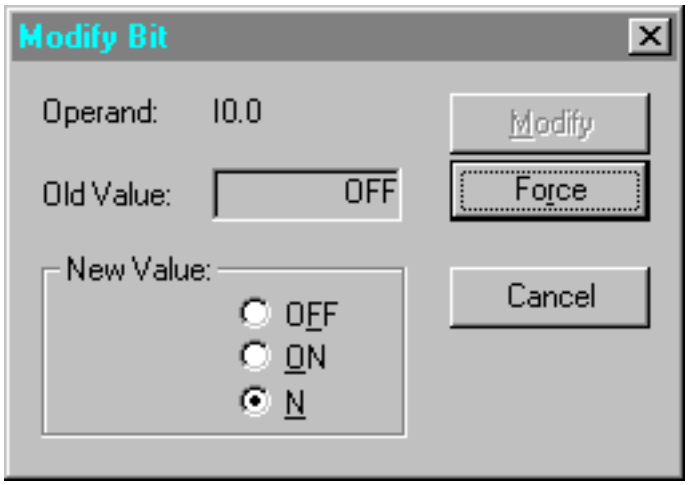
To modify an operand value place the mouse cursor over it and press the right mouse button (or select it using the Tab and Direction keys and press the Context Menu key). Select "Modify operand..." from the popup menu. Depending on the operand type a dialog is shown that allows you to change the value. Press the Modify button to transfer the new value to the controller.




To simply toggle a one-bit operand Select "Toggle" from the popup menu.

### Forcing Inputs and Outputs

Inputs and outputs can also be forced using the Modify Operand dialogs. Press the Force button to force the input or output to the new value entered in the controller instead of the Modify button. To un-force an input or output enter "N" for the new value before pressing the Force button.




Note! In the online displays the values are always shown as seen by the control programs. To reset all inputs and outputs to their natural value select "Clear Force Table" from the right click popup menu of the Online Display window

---

### See also...

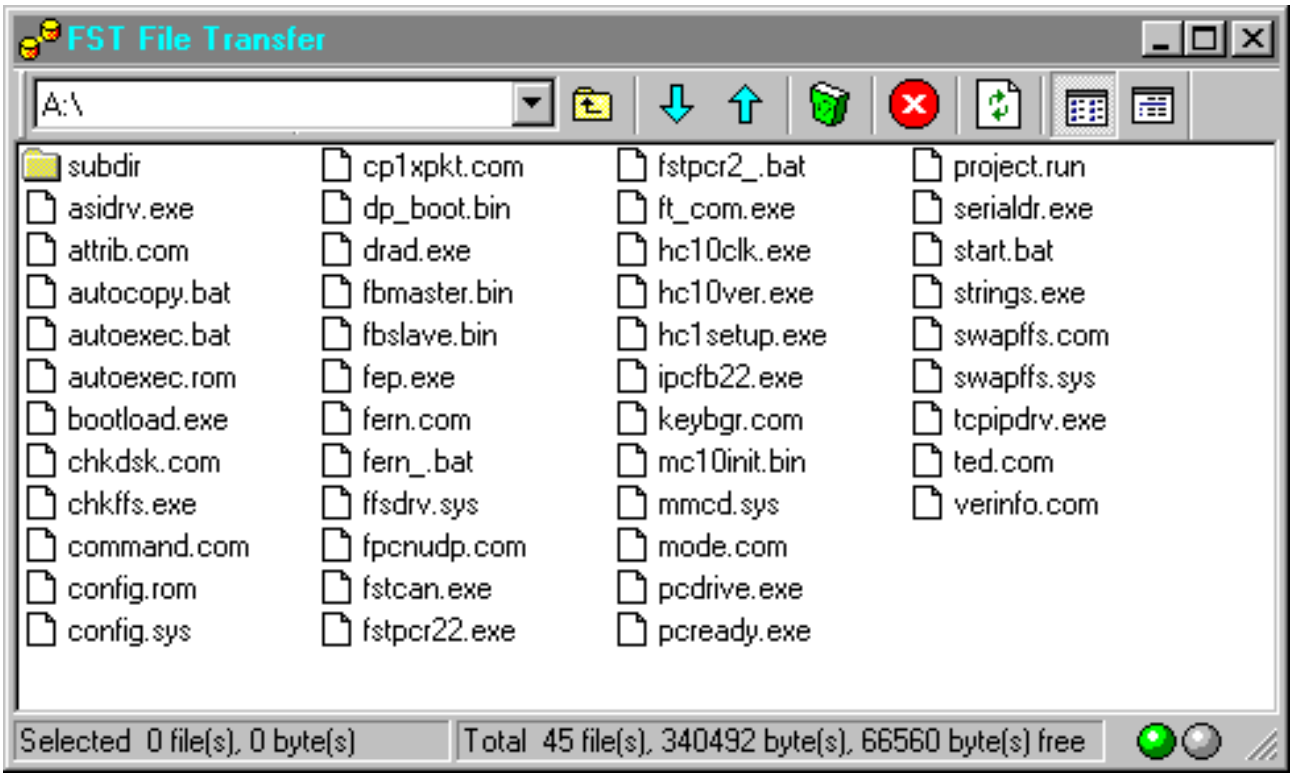
- Online Mode
- The Online Display
- Statement List Online
- The FST PLC Operating System

# File Transfer

The File Transfer window offers the following features:

- Display the files and directories on the different drives of the controller
- Information on the file dates and sizes
- Information on the free space on the controller drives
- Upload files from the controller to the PC
- delete files on the controller
- Download files from the PC to the controller

To open the File Transfer window select "Online >> File Transfer" from the menu. A MDI child window with a directory listing of the controller and several buttons is shown.




 Display the contents of the parent directory (Parent Dir)

 Download a file from the PC to the controller (Download)

 Upload a file or display the contents of a subdirectory (Upload)

 Delete a file on the controller (Delete)

 Stop the current transfer (Stop)

 Transfer the currently displayed directory again (Refresh)

 Display simple list of file names (List)

 Display the date and size of each file (Details)

### Directory Listing

If you open the File Transfer window all files and directories of the current drive and working directory of the controller is displayed. Subdirectories (folders) will be labelled with a folder icon  ; files are labelled with a sheet icon  . The directory path is shown in the combo box in the toolbar of the File Transfer window.

In the status line of the File Transfer window the sizes of the selected and the sum of all files are shown as well as the free space of the drive.

To display the date and size of each file, press the Details radio button in the File Transfer window's toolbar. To switch back to the simple list of file names press the List radio button.

To display the contents of a subdirectory, double click on the directory name in the list box (or select it and press the Upload button. To display the contents of the parent directory or another drive, select it from the combo box or press the Parent Dir button.

To transfer the currently displayed directory again press the Refresh button.

Note! Displaying the directory takes a little time. While the information is transferred the lights in the status bar will be red. As soon as the transfer is finished it will be switched to green again. If you want to stop the current transfer press the Stop button.

### Uploading Files to the PC

To upload a file from the controller to the PC double click on the file name in the list box (or select it and press the Upload button).

You will be asked for the location where to store the file on your PC using the standard file dialog.

During the file transfer the progress is shown in the status bar and the lights are switched to red. If you want to stop the current transfer press the Stop button.

### Deleting files on the controller

To delete a file on the controller select it and press the Delete button.

You will be asked if you are sure, then the file is removed from the controller.

### Downloading files from the PC

To download a file from the PC to the controller press the Download button.

You will be asked to select a file for download using the standard file dialog. The file will be transferred to the directory of the controller of which the directory is currently displayed (see the combo box in the toolbar).

During the file transfer the progress is shown in the status bar and the lights are switched to red. If you want to stop the current transfer press the Stop button.

### Remarks

Note! Before you can go online you have to connect the controller to your PC and possibly configure the online settings.

Note! The File Transfer window does not work correctly if the controller is protected by a password (locked).

---

### See also...

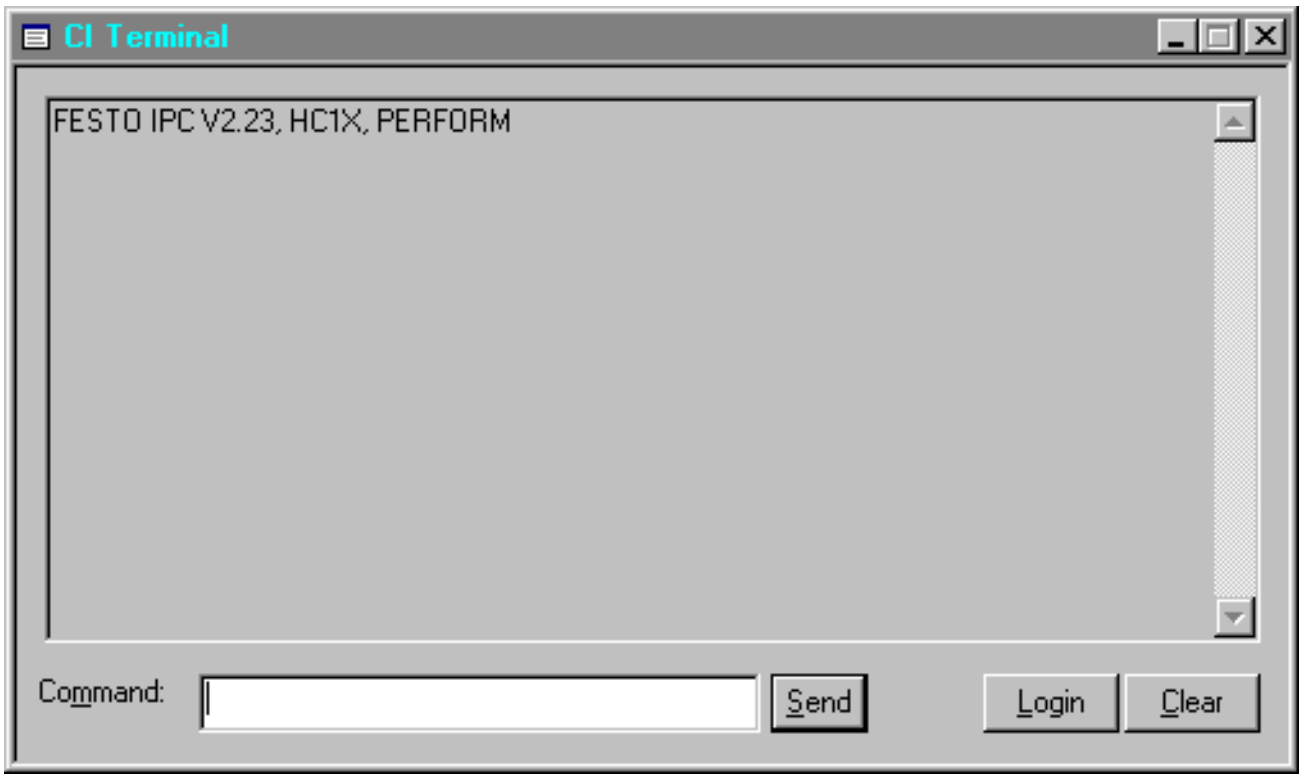
- Online Mode
- Connecting the controller to the PC for Online Mode
- Communication Port Preferences
- The FST PLC Operating System

# The Online CI Terminal

The FST PLC operating system is communicating with the FST program using the so-called Command Interpreter (CI). The CI offers various commands to display and modify operand values, start and stop control programs, transfer files etc.

These commands are used by the FST online displays. If you want to type the CI commands directly you can do so for special purposes by using the CI Terminal.

To start the CI Terminal in a MDI child window select "Online >> Terminal" from the menu.




Note! Before you can go online you have to connect the controller to your PC and possibly configure the online settings.

Enter the CI command in the edit field at the bottom of the window. Press the Enter key or the Send button to send the command. The command and the reply will be displayed in the window above.

Press the Enter key or the Send button again to repeat the last command.

Press the Clear button to erase the contents of the display window.

Press the Login button to start a login. If successful the version of the FST operating system, the controller type and the name of the loaded project is displayed.

**See also...**

- Online Mode
- Connecting the controller to the PC for Online Mode
- Communication Port Preferences
- The FST PLC Operating System

# Programming in Statement List

The Statement List (STL) language is a text-based language for programming control programs in FST.

---

### What do you want to do?

- Edit STL programs
- Debug STL programs in online mode

---

### See also...

- Statement List Program Structure
- Statement List Instructions Reference

# The Statement List Editor

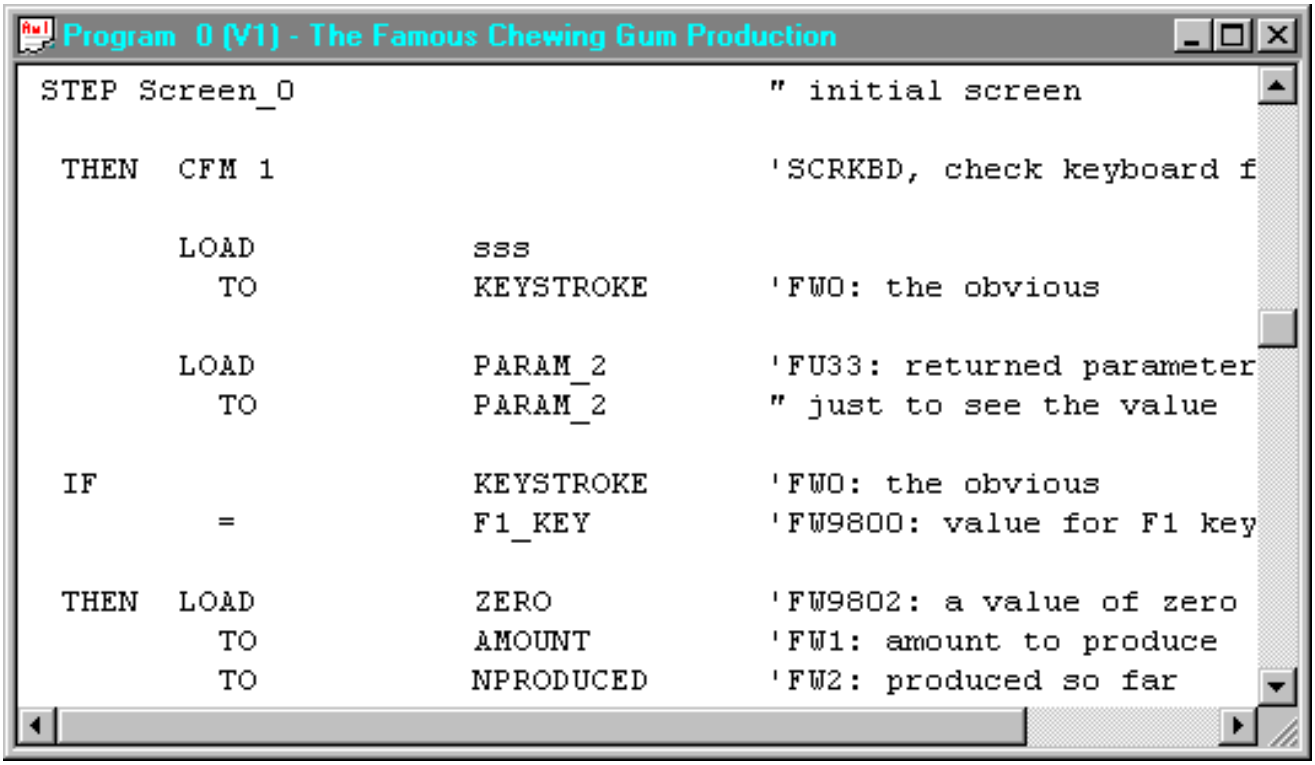
This chapter describes the features and user interface of the Statement List editor. For a description of the statement List language see the separate documentation on that subject.

The Statement List editor offers the following features:

- Automatic formatting of the entered lines of text
- Standard Windows text editor features such as undo, clipboard support, find and replace
- Insert and overwrite mode
- Shortcut bar for all keywords
- Automatic prompt for Allocation List entries
- Automatic insertion of the comment to operands of the Allocation List
- Insertion of operands from the Allocation List
- Dialog based insertion of module calls
- Syntax check
- A different font for the program text can be selected

Before you can start programming in Statement List you have to create a project first. Then add a new Statement List program to that project. The Statement List editor will be automatically opened. Of course you can also open an already existing program from the current project.

If you have opened a program, you will see the code of the program in the work area of the Statement List editor. If you have created a new program, the work area is blank.




### Auto Format

You can now start to enter the program text. Whenever you leave a line it will be formatted according to its syntax. If there are syntax errors in the line, formatting is not possible, and the line will stay as you have entered it.

### Allocation List Support

If there is an operand in the formatted line, which is entered in the Allocation List with a comment, that comment will be

used as the comment for the line, if it has not already a comment entered. The automatic comment for operands is prefixed by a simple quote and cannot be edited in the Statement List editor.

If a line is formatted and an operand is detected, that is not yet entered in the Allocation List, you will be prompted to make an Allocation List entry. If you do not want to enter the operand, click the cancel button or press the ESC key. The automatic prompt for Allocation List entries can be switched off completely in the Statement List editor preferences.

Select "Insert >> Operand" from the menu to choose an operand from the Allocation List to be inserted at the current cursor position instead of typing it.

### Inserting Keywords Using the Shortcut Bar

The Statement List shortcut bar allows an overview and quick insertion of all available Statement List instructions. For each keyword a button is available from a floating toolbox.

### Inserting Module Calls Using a Dialog Box

If you use the Module Call dialog for inserting a module call comments for the call parameters will be inserted automatically for modules from the library.

### Syntax Test

If you want to check the syntax of the source code in the currently open editor window you can simply compile the program.

### Clipboard Support

The Statement List editor supports the Windows Clipboard. This allows you to copy or move portions of text within the program, between different programs that are opened in FST or to exchange text with other Windows applications.

Before you can move or copy text you have to make a selection. Drag the mouse over the portion you want to select, or hold down the shift key while you are moving the insertion point with the direction keys. To select all text select "Edit >> Select All" from the menu.

From the Edit menu or right click popup menu choose "Cut" or "Copy". The cut or copied text is placed onto the Clipboard and is available for pasting. Move the insertion point to the location where you want to insert the text and select "Edit >> Paste" from the menu or "Paste" from the right click popup menu.

Note! If you simply delete text by pressing the DEL key or selecting "Edit >> Delete" from the menu or "Delete" from the right click popup menu, the deleted text will not be copied to the Clipboard.

### Undoing Changes

To undo the last modification select "Edit >> Undo" from the menu. To undo all changes you have made since you last saved the program or opened it close the program without saving.

Note! Preparing the project for download (Make) or compiling the program to check the syntax will automatically save all changes.

### Find and Replace

To find certain text within the Statement List source code position the insertion point from where you want to start the search and select "Edit >> Find" from the menu. The standard Find dialog will be displayed. Enter the text you want to search for and select any options. Then click the Find next button to find, select and scroll to the next occurrence of the text to find. The Find dialog will be kept open. Click the Find Next button again to proceed to the next occurrence of the text. Click the Cancel button to dismiss the Find dialog.

To replace certain text in the Statement List source code position the insertion point from where you want to start the search and select "Edit >> Replace" from the menu. The standard Find and Replace dialog will be displayed. In the "Find What?" text box type the search text. In the "Replace With:" text box type the replacement text. Select any find options. Click the Find next button to find, select and scroll to the next occurrence of the text to find. Then click on Replace to replace the current selection with the replacement text. Click on Replace all to replace all occurrences at once. Click the Cancel button to dismiss the dialog.

If you want to search for the same text as the last search again select "Edit >> Find Next" from the menu. This will directly find, select and scroll to the next occurrence without opening the standard Find dialog.

### Insertion and Overwrite Mode

For the Statement List editor you can toggle between insertion or overwrite mode with the INS key. If the editor is in insertion mode the text "INS" is visible in the status line. By default the Statement List editor starts up in insertion mode.

### Saving Changes

The changes you make to the source code will be saved to file...

- If you explicitly save it by selecting "Program >> Save", "Program >> Save As..."or "Program >> Save All" from the menu.
- When you are changing the program properties
- Prior to compiling it (syntax check) or preparing the project for download (make).
- If the project is closed.
- Prior to printing the project.

Select "Program >> Save As" if you want to make a copy of the program. The same dialog as for creating a new program will be displayed. The original program will not be erased. It will keep the source code how it was saved the last time before the Save As.

### Printing

Select "Program >> Print" to print the source code of the active Statement List editor. You will be prompted to save any unsaved modifications first. Then the standard print dialog will be shown to select a printer.

### Changing the Text Font

The font used for the program text can be changed in the Statement List Preferences.

---

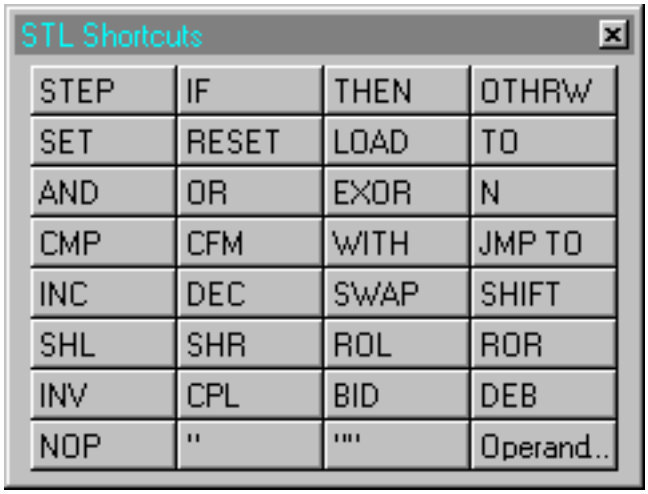
### See also...

- Programming in Statement List
- Creating a New Project
- Adding a New Program
- Opening a Program for Editing
- The Edit Menu
- Statement List Shortcuts
- Inserting an Operand from the Allocation List
- Inserting a Module Call
- Compiling a Program
- Printing the Project
- Statement List Preferences

## The Shortcuts Window

The Statement List shortcut bar allows an overview and quick insertion of all available Statement List instructions. For each keyword a button is available from a floating toolbox.

To display the shortcut bar select "View >> Shortcut bar" from the menu or "Shortcut bar" from the right click popup menu. Click on the keyword to insert it at the insertion point of the active Statement List editor window.




Note! The shortcut bar will be automatically hidden, if the active window is not a Statement List editor and will be displayed again if you make a Statement List editor the active window. If you do not want the shortcut bar to be displayed close the floating toolbox window by clicking its close icon in the titlebar or select "View >> Shortcut bar" from the menu or "Shortcut bar" from the right click popup menu again.

Note! The visibility, size and position of the Shortcuts window will be saved between FST sessions.

Note! The Statement List instructions are also available from the "Insert >> STL Instruction" menu.

---

### See also...

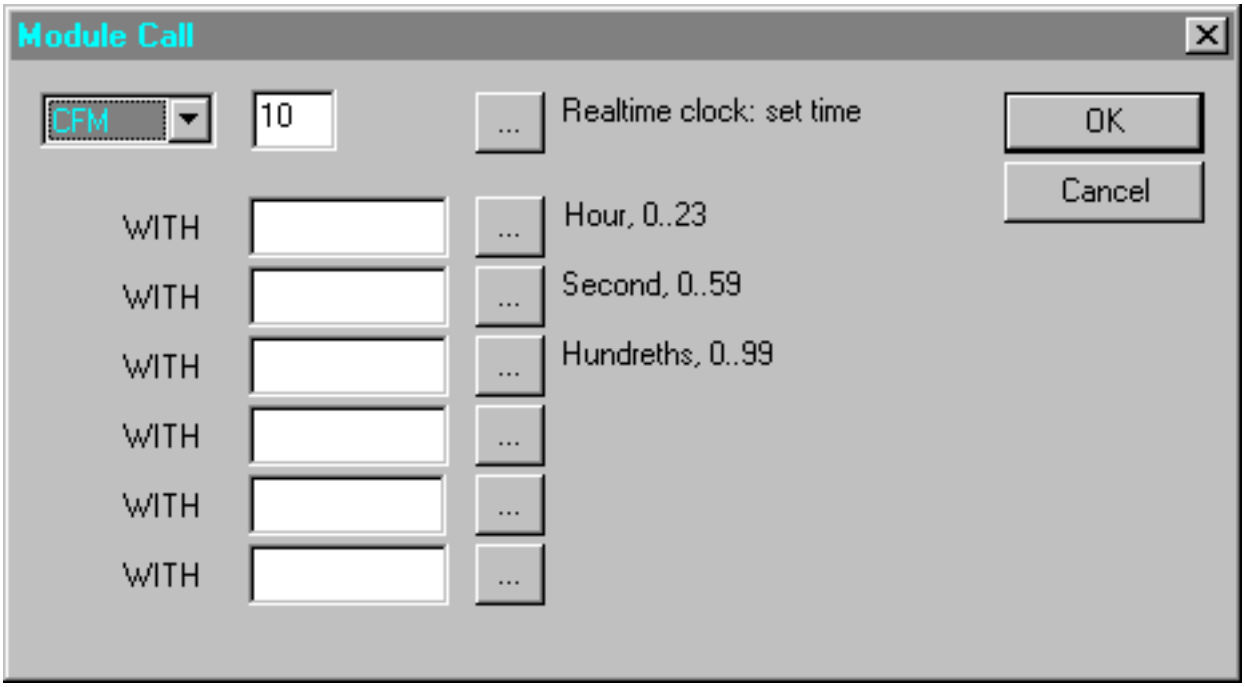
- Programming in Statement List
- The Statement List Editor
- Statement List Instructions Reference

## Inserting Module Calls

To insert a module call at the current editing position of your program select "Insert >> Module Call" from the menu. A list with all program and function modules of the project will be displayed. Choose the one you want to call by double clicking it, or select it and press the OK button.

Then the Module Call dialog is displayed. Enter the required parameters in the edit fields after the keyword "WITH".

If a description file is available for the module you have selected, a comment for each of the parameters will be displayed. If you choose the OK button the module call including the comments will be inserted into your source code.




The module Call dialog also offers the following features

- Select another module by changing the selection of the combo box and the number in the first row.
- To select a module from the list of available modules of the project click on the button with three dots in the first row.
- Click on the buttons with three dots on it next to the parameter edit fields to choose an operand from the Allocation List.

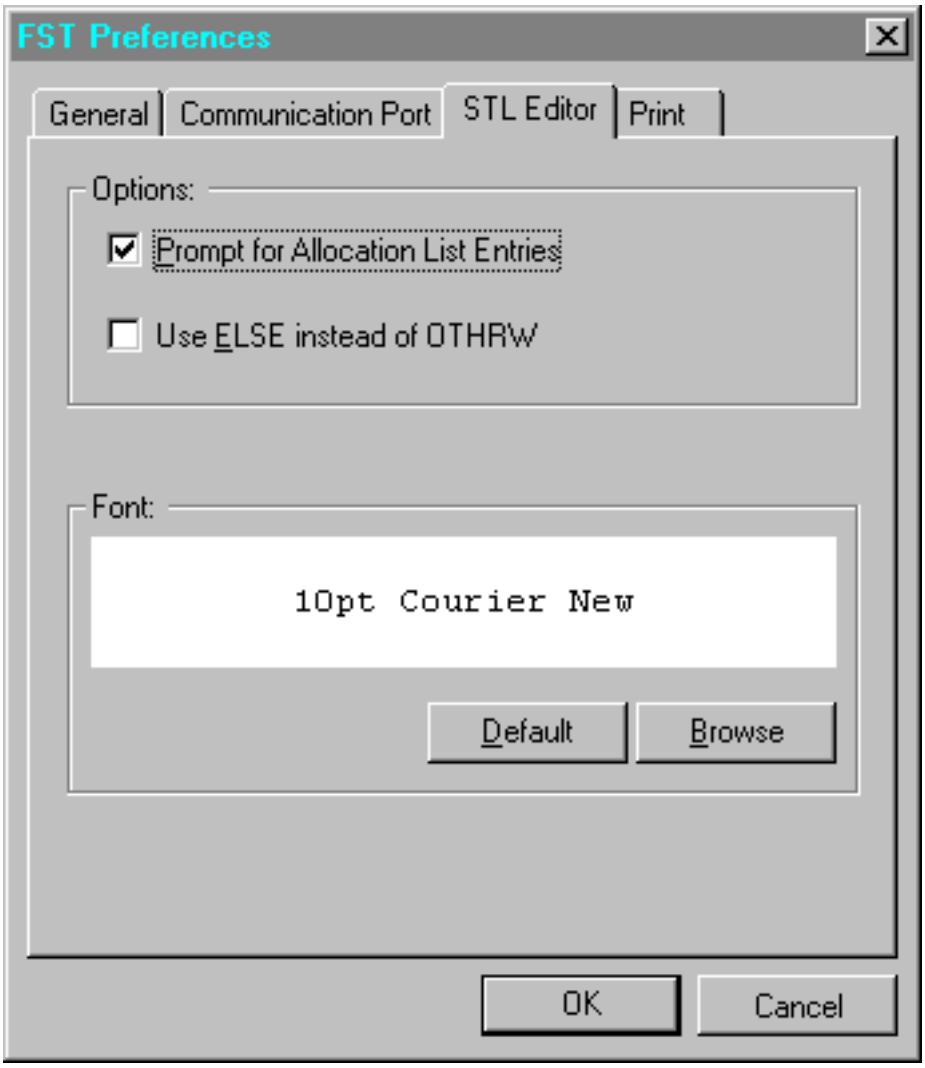
---

**See also...**

- Programming in Statement List
- The Statement List Editor

## Statement List Preferences

To view or change the preferences for the Statement List editor select "Extras >> Preferences" from the menu and select the "STL editor" tab.




**Prompt for Allocation List entries:**

Check this option if you want to be prompted for Allocation List entries if a new operand is used in the Statement List source code

**Use ELSE instead of OTHRW:**

Check this option if you want to use the STL keyword ELSE instead of OTHRW. The default is OTHRW.

**Font:**

The font name and size used for the Statement List editor windows are displayed in the preview window using the actual font.

**Default:**

Click this button to use the Windows default font.

**Browse:**

Click this button to display the standard font selection dialog to make your selection.

Note! The options and the font are common for all Statement List editor windows.

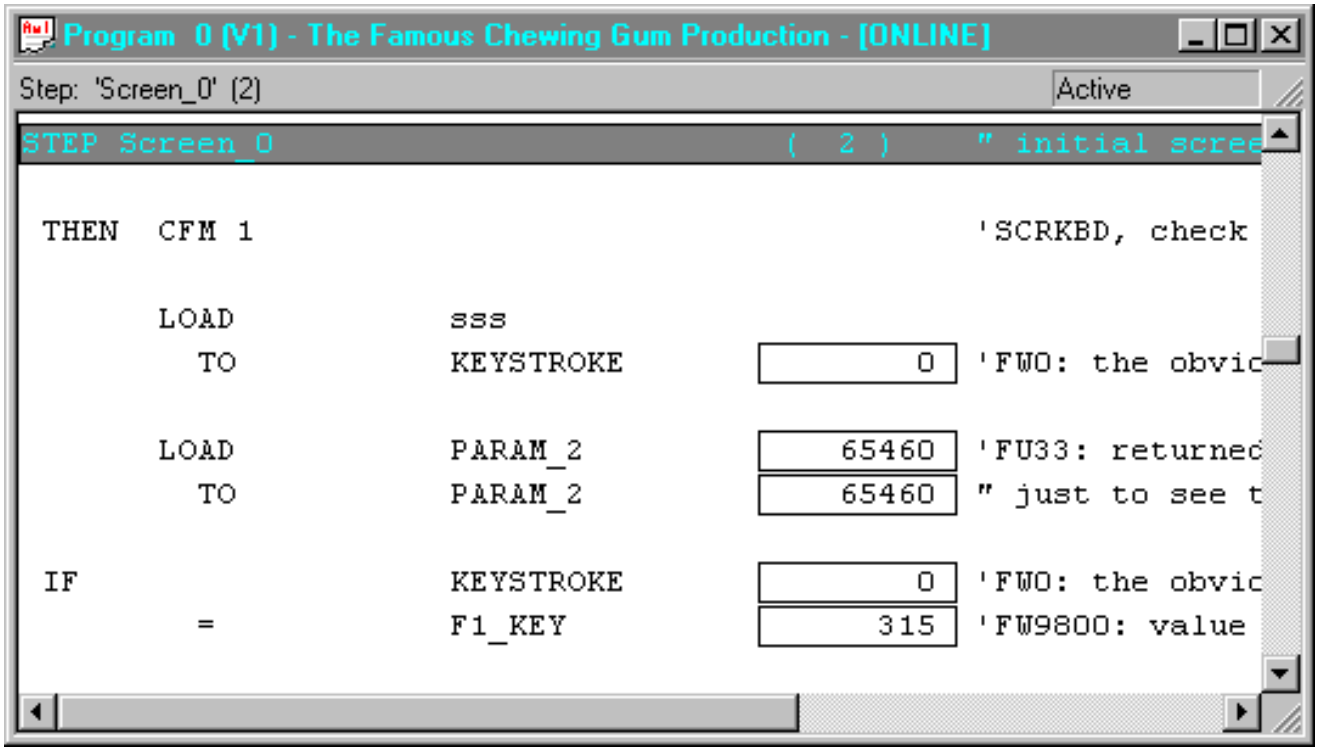
Note! If you change the font it will be used for newly opened windows only. Re-open the project to apply the new font for the already open editor windows as well.

**See also...**

- Programming in Statement List
- The Statement List Editor
- Preferences

# Statement List Online

Statement List Online allows debugging your programs online. Status information and operand values are displayed and operand values can be modified. To start STL Online open the program for editing first. Then select "Online >> Online" from the menu or "Online" from the right click popup menu. The window will now be switched to online mode. To switch back to editing mode, select "Online >> Editor" from the menu or "Editor" from the right click popup menu.




STL Online offers the following features:

- The active step is highlighted and its name and number displayed in a status line.
- The current values of the operands are displayed next to their occurrence in the source code.
- The program run status is displayed in a status line.
- The current FST runtime error is displayed in the status line.
- Directly scroll to a step by entering its number in a dialog window.
- The word values can be displayed in signed, unsigned or hexadecimal format.
- If the mouse cursor is placed over an operand value the symbolic name is displayed in a small popup window (like ToolTips) if available.
- The update speed can be changed.
- Modify or toggle operand values.
- Forcing of inputs and outputs is supported.

### Modifying Operand Values

There are the following shortcuts for modifying operand values available:

- Double click on a word or timer value to open the Modify Operand dialog for it.
- Double click on the "OFF" or "ON" value of a single bit operand to toggle its value.

---

### See also...

- Programming in Statement List
- Opening a Program for Editing

- The Statement List Editor
- The Online Display

# Statement List Program Structure

An STL control program is made up of a number of statements. By way of an example, take the following short program:

```
STEP    <Mark>
IF              Switch1
        AND     I1.1
THEN    SET     O1.0
OTHRW   SET     Horn
...
```

Each individual line represents a statement for the controller. A statement is composed of the following parts:

1. STL instructions (e.g. IF, AND, THEN, SET, OTHRW)
2. PLC operands (e.g. inputs or outputs)

"Switch1" and "Horn" are symbolic operands.

When you are entering a new program you can write it as a:

- Step program
- Parallel logic program
- Executive part

### Step program

A step program can contain up to 255 steps (1 to 255). Each step can be labelled with a symbolic step mark.

In a step program you can set up branches or jumps to other parts of the program (JMP TO step mark). Your program then continues with a step other than the directly following step.

A step may consist of one or more sentences.

A complete sentence contains an IF clause, a THEN clause and possibly an OTHRW clause.

The first sentence of a step may be an incomplete sentence. In this case this is an executive part only (THEN...). This THEN clause is always executed, without an input condition.

The program is executed step by step.

Note! Control does not pass to the next step until a THEN or OTHRW statement has been executed in the last sentence of the current step. Until this condition is met, the instructions in the current step are executed again, cyclically each time the program is executed.

Note! The STL language does not use "edge triggering". Conditions are evaluated for truth each time they are processed without regard as to their prior status.

Example of a simple step program:

```
STEP    Mark1
  IF            I1.0
  THEN  SET     F1.5
  OTHRW RESET   F1.5

STEP    Mark2
  THEN  RESET   F0.0
  IF            F1.5
  THEN  SET     O0.7
```

```
        SET     F0.0
  OTHRW SET     O0.0
        JMP TO  Mark1

STEP    Mark3
  IF            F0.0
        AND     I0.0
  THEN  SET     O0.4

STEP Mark4
...
```

### Parallel logic program

A parallel logic program consists purely of sentences; in other words no step marks are programmed. This means that a parallel logic program is identical to a step of a step program. Branches cannot be programmed in a parallel logic program.

The first sentence in a parallel logic program may be an incomplete sentence. All subsequent sentences must be complete sentences.

A parallel logic program is processed cyclically until it is reset (as is a ladder diagram program). If you want the program to be executed only once, you must reset it in the last sentence. Example of a parallel logic program (P1) that is executed only once:

```
THEN    RESET   F0.0
IF      N       I1.0
THEN    SET     O0.7
IF              I1.7
THEN    SET     O1.7
OTHRW   SET     F0.0
        RESET   O1.7
...
...
IF              F0.0
        AND     I1.0
THEN    SET     O1.0
        RESET   P1
OTHRW   RESET   P1
```

### Executive part

An executive part is essentially structured in the same way as an incomplete sentence in a parallel logic program. There is no introduction with a THEN clause. All of the statements entered are executed without an input condition. No branching is possible within the program. If you enter an IF clause further on in the executive part, an error results. Example of an executive part:

```
SET     F0.0
RESET   O1.0
LOAD    V50
TO      TW7
SET     T7
CMP2
...
```

### Comments

There are two types of comment that you can add to your STL program:

Short comments with up to 36 characters can be appended to a program line. They are introduced with one quotation mark.

Example:

```
IF      N       I1.7    "No signal from sensor
```

Long comments can extend over a whole line. They are introduced with two quotation marks.

Example:

```
""This is a long comment that can be as long as an entire line.
```

---

### See also...

- Programming in Statement List
- Statement List Instructions Reference

# Statement List Instructions Reference

This chapter gives an overview of the Statement List instructions.

STEP

The STEP statement is very important in sequence programs as it determines the structure of the program or, if branches are used, the sequence of processing.

STEP can be followed by a step mark with a maximum of nine characters or a number (label). A step mark is required if you want to branch to this step from elsewhere in the STL program.

Example:

```
STEP    Setup
...
...
  THEN  JMP TO  Setup
```

During the translation process the steps are renumbered internally, beginning at step 1 through to the maximum number.

Note! In an STL program a step is not processed until a THEN or OTHRW clause in the last sentence of the preceding step has been executed. Processing of a step program is not cyclical.

IF

IF always introduces a conditional part. Operands can be interrogated and linked by logical associations within the statement. The result represents the condition for further processing.

Example:

```
  IF            I1.0
        AND N   I1.1
...
```

THEN

THEN introduces the executive part. This part is executed if the condition is true. The statement may contain commands to modify outputs or flags etc., to carry out arithmetic operations, to activate timers or counters, or to call other programs or program modules.

Example:

```
  THEN  LOAD    V100
        TO      TP7
...
```

OTHRW

OTHRW introduces a second, alternative executive part. This part is executed if the result of the conditional part of the step is not true and hence the THEN clause cannot be executed.

Example:

```
...
  THEN  SET     O1.0
  OTHRW RESET   O1.0
```

### STL conditional part

These statements enable you to construct complex input conditions.

AND

This is the logical operator AND. It allows logical ANDing of a number of input conditions. The condition is fulfilled when all ANDed input conditions are true.

Example:

```
IF              I1.0
AND             I1.1
THEN    SET     O1.0
OTHRW   SET     O1.7
```

OR

This is the logical operator OR. This operator allows you to create a logical expression with several input conditions. The condition is fulfilled when at least one of the conditions is true.

Example:

```
IF              I1.0
        OR      I1.1
        OR      I1.7
THEN    SET     O1.0
OTHRW   SET     O1.7
```

EXOR

This is the logical operator EXOR. This allows you to create a logical expression with two input conditions. The condition is fulfilled when only one or the other input condition is true.

Example:

```
IF              I1.0
        EXOR    I1.1
THEN    SET     O1.0
OTHRW   SET     O1.7
```

NOP

NOP means No operation. You can use this statement when you want to carry out an executive part without an input condition.

Example:

```
IF              NOP
THEN    SET     F1.0
```

N

This is a negation. It allows you to invert an input condition. In the example below, if output O1.0 is not active, the program jumps to the Setup step.

Example:

```
IF      N       O1.0
THEN    JMP TO  Setup
```

### STL executive part

SET

SET activates a one-bit operand. You can use this for setting an output to logical one, for example.

RESET

RESET is the counterpart to SET. It deactivates one-bit operands, used, for example, for setting an output to logical zero.

LOAD

A LOAD statement reads a register or a multibit operand, i.e. its value is written to a multibit accumulator. Normally this statement is followed by the keyword TO, indicating the destination of the operation.

Example:

```
THEN    LOAD    V500
        TO      TP31
```

TO

A TO statement assigns a value to a word operand. TO specifies the destination of the operation.

Example:

```
THEN    LOAD    V100
        TO      R6
```

The value 100 is loaded into register 6.

JMP TO

A JMP TO statement causes the program to branch to a specific program step.

Example:

```
STEP    Mark
IF              I1.0
THEN    SET     O1.0
JMP TO  Start
...
...

STEP    Start
...
```

The program branches to the step mark Start and the program continues executing there.

### Special functions - Extended STL

These functions allow you to enter statements for multibit operands in your STL program.

SWAP

The higher-order byte and the lower-order byte are swapped in the multibit accumulator.

Example:

```
THEN    LOAD    V$55AA
        TO      OW0
        SWAP
        TO      OW1
```

$55AA is loaded to OW0, but $AA55 is loaded to OW1.

SHIFT

The SHIFT instruction executes a swap between the Single Bit Accumulator (SBA) and a Single Bit Operand (SBO).

This instruction can be used to construct Shift Registers of varying lengths...longer or shorter than the 16 bit manipulations performed by the SHL and SHR instructions.

To operate properly, the SBA must first be loaded and then any number of single bit SHIFT's can be programmed.

Example:

```
STEP 10
IF              I1.0    " input activated
THEN    LOAD    I1.1
        TO      F0.0    " a flag is used here to avoid
                        " writing to an input, which
                        " would otherwise occur
        SHIFT   O1.1    " SWAP F0.0 <-> O1.1
        SHIFT   O1.2    " SWAP O1.1<-> O1.2
        SHIFT   O1.3    " SWAP O1.2<-> O1.3
        SHIFT   O1.4    " SWAP O1.3<-> O1.4
STEP 20
IF      N       I1.0    " wait for input to go away
THEN    JMP TO  10      " repeat
```


SHL stands for shift left. This statement is used to shift the contents of the multibit accumulator one bit position to the left. The right-most bit is filled with a zero. The effect is multiplication by 2. If you call the SHL statement three times in succession, this is equivalent to multiplication by 2x2x2, therefore multiplication by 8.

Example:

```
THEN    LOAD    V16
        SHL
        TO      R7
```

The value of R7 is then 32.


SHR stands for shift right. This statement is used to shift the contents of the multibit accumulator one bit position to the right. The left-most bit is filled with a zero. The effect is division by 2. In similar fashion to SHL, repeated shifting to the right results in division by 2 each time.

Example:

```
THEN    LOAD    V16
        SHR
        TO      R7
```

The value of R7 is then 8.


The effect of this statement is the same as that of SHL except that the highest-order, left-most bit is shifted out of the accumulator and is re-inserted as an overflow on the right as the lowest-order bit.


As in the case of SHR, the bits in the multibit accumulator are shifted, but this time to the right. The right-most bit is pushed out of the accumulator and re-inserted as the highest-order bit.


A BID statement converts the contents of the multibit accumulator from binary to BCD representation. You can use BCD code to drive LEDs on control panels, for example.

Example:

```
THEN    LOAD    IW0
        BID
        TO      OW7
```

DEB

A DEB statement converts the contents of the multibit accumulator from BCD to binary code. This conversion is necessary if you have connected BCD switches to an input in your controller and you want to transfer the switching status of the switches from the input word for processing in a counter.

Example:

```
THEN    LOAD    IW7
        DEB
        TO      CW7
```

INV

This command complements (INVerts) the contents of the multibit accumulator using the one's complement method.

Example:

```
THEN    LOAD    OW1
        INV
        AND     IW1
        TO      OW1
```

CPL

This command complements the contents of the multibit accumulator using the two's complement method. In principle, the effect of using the CPL instruction is the same as multiplying a number by -1 when applied to signed integers.

Example:

```
IF      (       R32
        <       V0      )
THEN    LOAD    R32
        CPL
        TO      R22
```

### Arithmetic functions

INC

The INCrement instruction increases the value of any multibit operand by 1. Unlike other arithmetic instructions, the INCrement operation may be carried out directly without the need to first load the operand to be INCremented to the multibit accumulator.

While the INCrement instruction can be used with any multibit operand, it is most often used in conjunction with Counters.

Example:

```
IF      I1.3
THEN    INC     R9
```

DEC

The DECrement instruction reduces the value of any multibit operand by 1. Unlike other arithmetic instructions, the DECrement operation may be carried out directly without the need to first load the operand to be DECremented to the multibit accumulator.

While the DECrement instruction can be used with any multibit operand, it is most often used in conjunction with Counters.

Example:

```
IF              I2.2
        AND   N I3.6
THEN    DEC     R9
```

In addition to the statements previously explained, the following arithmetic operations are available:

```
(, ), +, -, *, /, <, <=, =, >=, >, <>
```

These functions allow you to program arithmetic operations and comparisons.

Example:

```
IF      (       FW0
        =       V1234
        )
        AND
        (       R1
        <>      V0
        )
THEN...
```

Note! In statements of this type you must be absolutely clear whether you need parentheses (brackets), and if so for which expressions. It is all too easy to corrupt the logical structure by omitting or wrongly placing parentheses.

### Module calls

CFM

The Call Function Module instruction is used to request execution of an external program routine. Function modules may be considered similar to special function calls.

Function modules may be written in one of several languages including STL and C.

Some program modules may use function units (FU) to pass information to/from user programs and function modules. Depending upon the specific function module being called, it may be necessary to provide several parameters when using a CFM, see WITH instruction.

Note! CFMs must not contain steps. No task switch takes place after a call to a CFM.

CMP

The Call Program Module instruction is used to request execution of an external program routine. Program modules may be considered similar to subroutines.

Program modules may be written in one of several languages including STL and C.

Some program modules may use function units (FU) to pass information to/from user programs and program modules. Depending upon the specific program module being called, it may be necessary to provide several parameters when using a CMP, see WITH instruction.

Note! It is not permissible to use the CMP instruction from within a program module.

Note! After each call to a CMP a task switch will take place to allow for steps inside the program modules.

WITH

The WITH instruction is used to pass parameters to function or program module calls using the function units (FU).

Example:

```
IF              I1.2
THEN            CFM 0
        WITH    V2
```

### See also...

- Programming in Statement List
- General Program Structure

# Customising FST

There are several possibilities to customise the FST program and runtime library.

---

### What do you want to do?

- Change the directory where projects are stored
- Change the settings for online communication
- Change the options for the Statement List editor
- Change the settings for printing
- Install drivers and IO modules
- Configure external tools

# Preferences

FST offers some options that can be set to individual needs or preferences.

Select "Extras >> Preferences" from the menu to open the Preferences dialog.

---

### What do you want to do?

- Change the directory where projects are stored
- Change the settings for online communication
- Change the options for the Statement List editor
- Change the settings for printing

# The FST Runtime Library

FST allows configuring various input and output modules and drivers. All available drivers are registered in the FST Runtime Library.

If new hardware is developed new IO scripts or drivers or updates will be needed. FST gives the necessary support to manage the FST Runtime Library.

---

### What do you want to do?

- Add or remove IO scripts of the library
- Add or remove drivers of the library
- Add or remove IO scripts of a FST project
- Add or remove drivers of a FST project

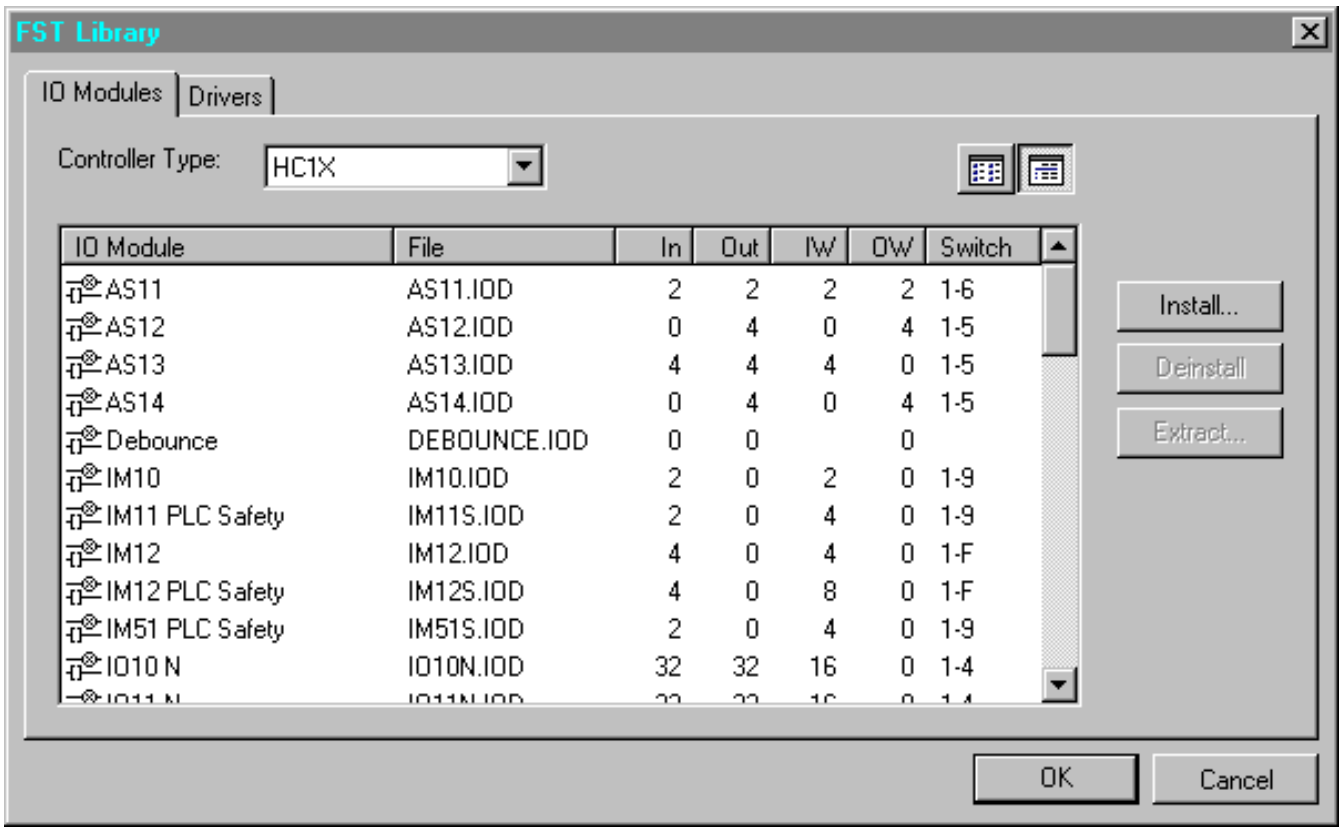
---

### See also...

- FST Drivers Reference

## IO Scripts (Runtime Library)

Select "Extras >> Library..." from the menu to open the FST Library tool. "IO Modules" is already the default tab.




The Library IO Module dialog offers the following features:

- Select the controller type for the library from the combo box above the list box.
- The IO script description, the file name, and other information (see below) are displayed for each installed IO script in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column except the last one of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- If you only want to display the IO script descriptions in a simple list, toggle the radio buttons in the upper right corner of the dialog.
- To deinstall the selected entry from the FST library press the DEL key or the Deinstall button.
- To install a new IO script press the INS key or the Install... button.
- To extract the selected entry onto a floppy or somewhere else to be reinstalled later press the Extract button.

The additional data in the list box is for your information only and cannot be edited.

**In:**

Number of input bytes that are used in the processor's IO area.

**Out:**

Number of output bytes that are used in the processor's IO area.

**IW:**

Number of FST input words that are occupied by a module of this type.

**OW:**

Number of FST output words that are occupied by a module of this type.

**Switch**

The possible switch positions for a module of this type.

### Installing a new IO Script

To install a new IO script press the INS key or the Install... button. You will be asked for the path name of the new script using the standard file dialog. Then the new script will be installed. It is now available for your projects.

### Extracting IO Scripts

To extract the selected entry onto a floppy or somewhere else to be reinstalled later press the Extract... button. You will be asked for the path name where to store the script file using the standard file dialog. Then a copy of the IO script will be created at the given location. The IO script will not be removed from the FST Library.

### Remarks

Note! There is a different library for each of the different controller types.

Note! Changing the FST Library does affect the FST installation rather than a single project.

Note! If you are deinstalling IO scripts that are used by projects, these projects no longer can be loaded into the controller with this FST installation unless the IO script will be installed again.

Note! IO scripts always have the extension ".iod".

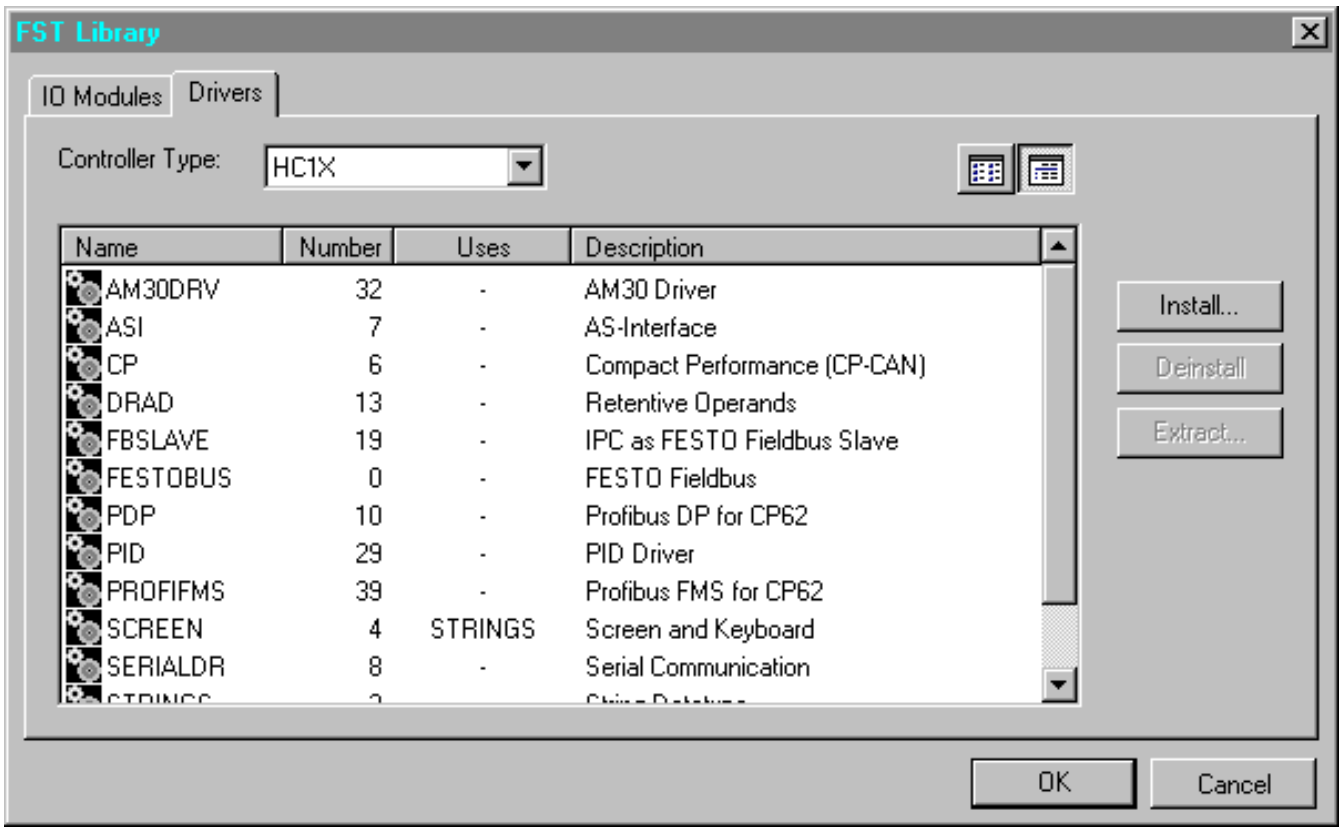
---

### See also...

- The FST Runtime Library

## Drivers (Runtime Library)

Select "Extras >> Library..." from the menu to open the FST Library tool. From the FST Library dialog select the tab "Drivers".




The FST Library Drivers dialog offers the following features:

- Select the controller type for the library from the combo box above the list box.
- The driver name, the driver's number, dependencies and a short description are displayed for each installed driver in a separate column.
- Adjust the width of each column by moving the separator in the header with the mouse.
- Each column except the last one of the list box can be sorted alphabetically by clicking on the column header. Click again to reverse the sorting order.
- If you only want to display the driver names in a simple list, toggle the radio buttons in the upper right corner of the dialog.
- To deinstall the selected entry from the FST library press the DEL key or the Deinstall button.
- To install a new driver press the INS key or the Install... button.
- To extract the selected entry onto a floppy or somewhere else to be reinstalled later press the Extract button.

### Installing a new driver

To install a new driver press the INS key or the Install... button. You will be asked for the path name of the new driver using the standard file dialog. Then the new driver will be installed. It is now available for your projects.

### Extracting Drivers

To extract the selected entry onto a floppy or somewhere else to be reinstalled later press the Extract... button. You will be asked for the path name where to store the driver files using the standard file dialog. Then a copy of the driver and all required files will be created at the given location. The driver will not be removed from the FST Library.

### Remarks

Note! There is a different library for each of the different controller types.

Note! Changing the FST Library does affect the FST installation rather than a single project.

Note! If you are deinstalling drivers that are used by projects, these projects no longer can be loaded into the controller with this FST installation unless the drivers will be installed again.

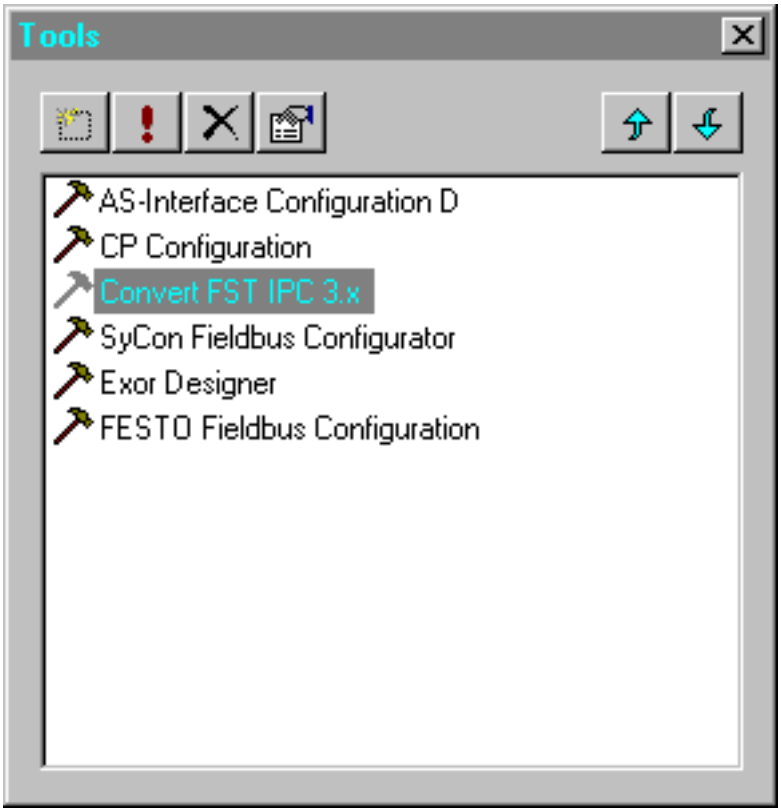
Note! FST driver scripts always have the extension ".dmk".

**See also...**

- The FST Runtime Library

# External Tools

FST allows calling external tools directly from the Extras menu and to pass to these programs parameters such as the name of the currently open project. Select "Extras >> Configure Tools..." from the menu to open the Tools dialog. This dialog allows adding, removing or editing the list of external tools.




The Tools dialog offers the following features:

 Add a new tool to the Extras menu

 Remove the selected tool from the Extras menu

 Edit the settings for the selected tool

 Execute the selected tool

 Move the selected tool one position to the top

 Move the selected tool one position to the bottom

Note! The tools appear in the order in the list box as they are in the Extras menu.

Note! Only the first 25 tools will be added to the Extras menu.

---

**See also...**

- Editing External Tool Properties

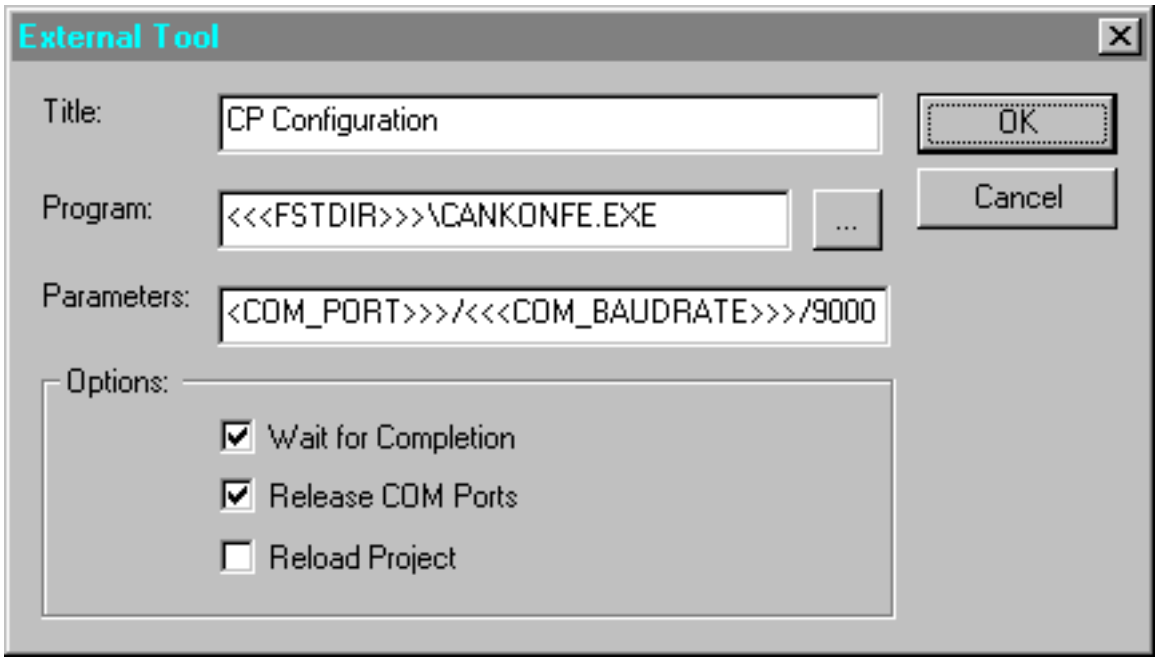
## Adding or Modifying an External Tool

From the Tools dialog:

Press the New button to add a new tool to the Extras menu *or*

Press the Properties button to edit the settings for the selected tool

The External Tool dialog will be opened to enter the required settings.




**Title:**

Enter here the text that will appear in the Extras menu. You can use the Ampersand sign (&) to define the following character as the shortcut. It will be underlined in the menu text. To insert an Ampersand type "&&".

**Program:**

Enter here the path for the program to be executed. Press the "..." button to browse through the files on your computer. It is also possible to use the macros described below.

**Parameters:**

Enter here the parameters for your program. It is also possible to use the macros described below.

**Wait for Completion:**

If this option is enabled, when calling the tool, the FST main window will be minimised until the execution of the tool has terminated. If you do not check this option, the tool will just be called and FST and the tool run in parallel.

**Release COM ports:**

Enable this option, if the tool will use the COM port that is used for FST. If you enable this option you should also enable the option "Wait for Completion".

**Reload project:**

This option will only work if you also enabled the option "Wait for Completion". If the execution of the tool has been finished, the current project will be read in again to update any changes the tool may have caused.

### Macros

the following macros will be replaced in the program and parameter strings:

<<<FSTDIR>>>

where FST.EXE sleeps

<<<RUNTIMEDIR>>>

one of "runtime.," e.g. "Runtime.FEC"

replacement for obsolete <<<DRIVERDIR>>> and <<<FBLIBDIR>>>

<<<ALLPROJECTS>>>

path to directory with project directories

<<<CURRENTPROJECT>>>

path to current project, == <<<ALLPROJECTS>>>\<<<PROJECT_CUR>>>

<<<TARGET>>>

new entry, "HC1X," "FEC," "HC2X," "HC0X"

<<<LANGUAGE>>>

new entry, "GB", "D"

the following macros will be replaced in the parameter string only:

<<<COM_PORT>>>

e.g. "COM1"

<<<COM_BAUDRATE>>>

e.g. "9600"

<<<#1>>> (obsolete)

"VFNM"

<<<#2>>> (obsolete)

"x"

<<<#3>>> (obsolete)

<<<CURRENTPROJECT>>>

<<<#4>>> (obsolete)

"IPC"

<<<#5>>> (obsolete)

<<<COM_PORT>>>"/"<<<COM_BAUDRATE>>>"/9000"

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### See also...

- External Tools