

Saia PG5® FBox Builder

An efficient software tool is the key to more reliability and improved profitability in automation and control engineering.

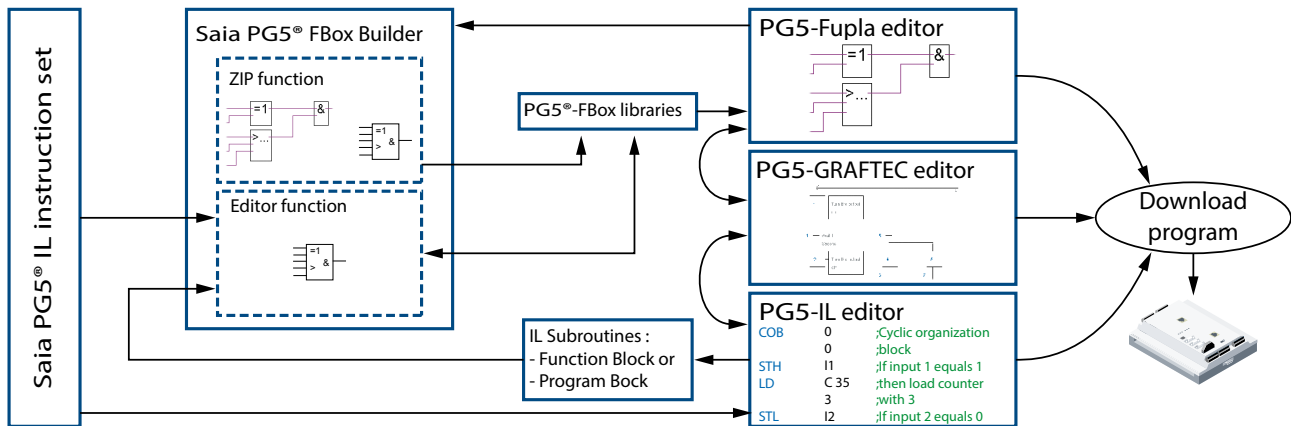
Why FBoxes and Saia PG5® FBox Builder?

- Work produced by programmers can be reused in many projects, rather than being recreated each time
- Staff require no special training to realize projects. Fewer capacity bottlenecks. Minimization of risk from staff changes
- Company automation standards can be set and maintained. Ease and safety when programs are used across borders between departments, businesses and countries
- The most difficult, complex functions in the fields of communication, motion, networks and data processing can safely be used without prior knowledge
- Reduction of programming complexity by packaging into graphical blocks with high functionality
- Manipulation and know-how protection : Text version of original program cannot be read or modified by unauthorized people
- Unforeseen costs and commissioning delays are avoided. Once FBoxes have been developed, tested and documented, they are eliminated as a source of system errors
- Reduced maintenance and service expenditure : Even staff with basic qualifications quickly find their way around the graphical environment and can use the convenient, error-proof commissioning operations of FBoxes

Saia PG5® FBox Builder

Excellence and efficiency in programming

Saia PG5® FBoxes for comfort and efficiency when realizing automation projects with PG5



The use of Saia PG5® FBox Builder in making projects with Saia PG5® engineering software

Flexible control platform

Various program editors are available for creating automation projects with Saia PG5® PCD. The choice of editor may be user-dependent and/or task-specific.

The IL editor uses Saia PG5.IL code to create controller applications close to hardware and optimized with regard to time, code and resources. The Graftec editor is ideally suited to controlling sequential processes and programs. In the Fupla editor, applications are produced and parameters set simply and efficiently with prefabricated, graphical Saia PG5® FBoxes. Programs written with these editors can be mixed and used in combination when creating Saia PG5® projects.

Saia PG5® FBoxes

Saia PG5® FBoxes are self-contained application objects that can be used for the purely graphical editing, commissioning and maintenance of even the most complex and sophisticated control applications.

Saia PG5® FBoxes, in their granularity and functionality, range from simple, basic functions (modules) to complete elements of a system (finished components). Standard FBox libraries are available for an enormous diversity of functions. As a result, it is possible to write 90 percent of new projects for Saia PCD® controllers without having to produce a single line of project-specific IL code. FBoxes are built and managed with the Saia PG5® FBox Builder.

System technology

In comparison with other engineering tools, very few resources are consumed for applications produced graphically with FBoxes. This is because Saia PG5® FBoxes use a bottom-up system technology, rather than top-down. The starting point of this bottom-up system is the platform-independent

Saia PG5.IL code, boxed up and modularized in controlled, fully traceable stages. This is the opposite of top-down systems, which take a graphical application description and generate from it an enormous amount of program code that requires huge resources and that the customer can no longer understand or maintain.

FBox Builder functions

The «Basic Version» of the Saia PG5® FBox Builder software tool (included free-of-charge in the PG5 Controls Suite) contains a «ZIP» function that makes existing FBoxes even more efficient and easier to use. It enables a structured group of FBoxes (Fupla Pages) to be combined into one large macro FBox. The FBox-Builder can then be used to document, maintain and export the new macro FBox as a new «product».

The «Advanced Version» of the FBox Builder is subject to a licence fee and contains an additional «Source Editor» function, which enables programmers to develop totally new FBoxes based on Saia PG5.IL code and manage them in their own library.

Management Summary

Increased use of FBoxes will not only make the implementation, commissioning and maintenance of applications more convenient, it will also improve profitability for our customers, as a result of more recyclability, lower error rates and reduced demands on on-site personnel.

Saia PG5® FBox Builder

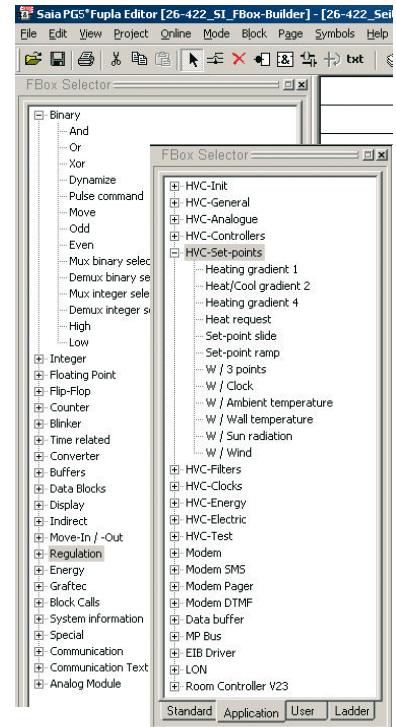
The specific nature of FBoxes

Graphical application objects for program editing, commissioning, diagnosis and maintenance

Saia PG5® FBox libraries for all control tasks

The Saia PG5.Controls-Suite contains comprehensive FBox libraries for many tasks and applications.

- ▶ **Powerful standard library** with over 250 functions divided among 21 families. Includes all basic functions, such as logical linkages and operations, mathematical functions, standard communications, special functions, etc.
- ▶ **Technology and applications libraries**
The following FBox libraries are available in the PG5 Core package, or separately as optional libraries:
- ▶ **HeaVAC library**, with convenient functions (controllers, timer programs, heating curves, setpoint programs, energy, electrical, alarm, test, etc.) for implementing heating, ventilation and air-conditioning applications
- ▶ **Communications libraries** (modem/SMS, EIB, LonWorks®, MP-Bus, Modbus,...)
- ▶ **Function-specific** (ladder, data logging, alarm handling,...)
- ▶ **User-specific libraries**
With the FBox Builder, users generate their own, specific FBoxes and FBox libraries, that can be integrated and supported in the Saia PG5®, like other libraries.



Examples of two open FBox-Libraries

Saia PG5® FBox much more than just a graphical programming interface

The features and functions of Saia PG5® FBoxes go far beyond the capabilities of traditional, graphical function plan boxes. Apart from the graphical representation – or encapsulation – of simple basic functions and even complex system components, Saia PG5® FBoxes have the following outstanding features:

Inputs/outputs with online display

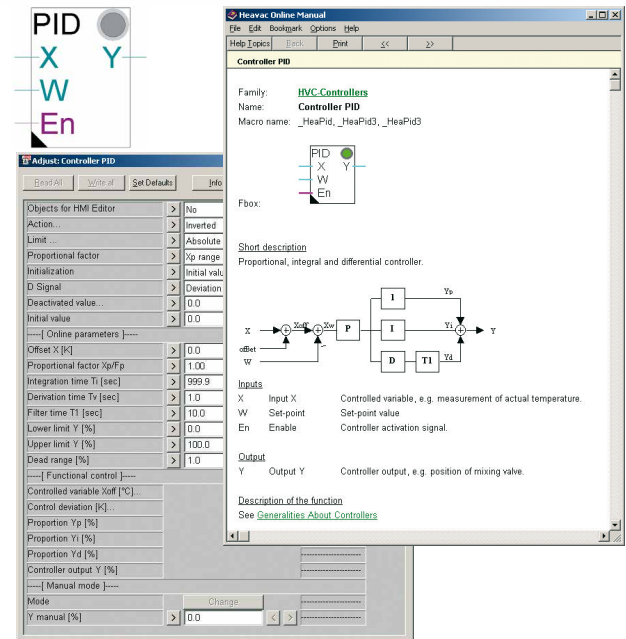
The various data types for inputs and outputs are differentiated by colour. In online mode, binary signal states and current values of integer and floating-point data are displayed online.

Parameter adjust window with online mode

The more complex FBoxes have an additional parameter adjust window. In this window, the properties and functions of application objects are adjusted and set. In the project planning phase, this is a way of specifying basic settings and initial values. In the commissioning or maintenance phases, parameters can be monitored online and adjusted or optimized in line with the process (e.g. controller fine tuning). Status and diagnostic information can also be displayed and evaluated.

Online help and documentation

The individual online information and help functions of each FBox leave no question unanswered. In addition, each FBox can be given an individual name and comment, to enhance documentation.



Online Help and Adjust Window for PID FBox

Library and version management

Powerful version management ensures problem-free version updates and allows a mixture of old and new versions to be used in the same project.

Syntax checks

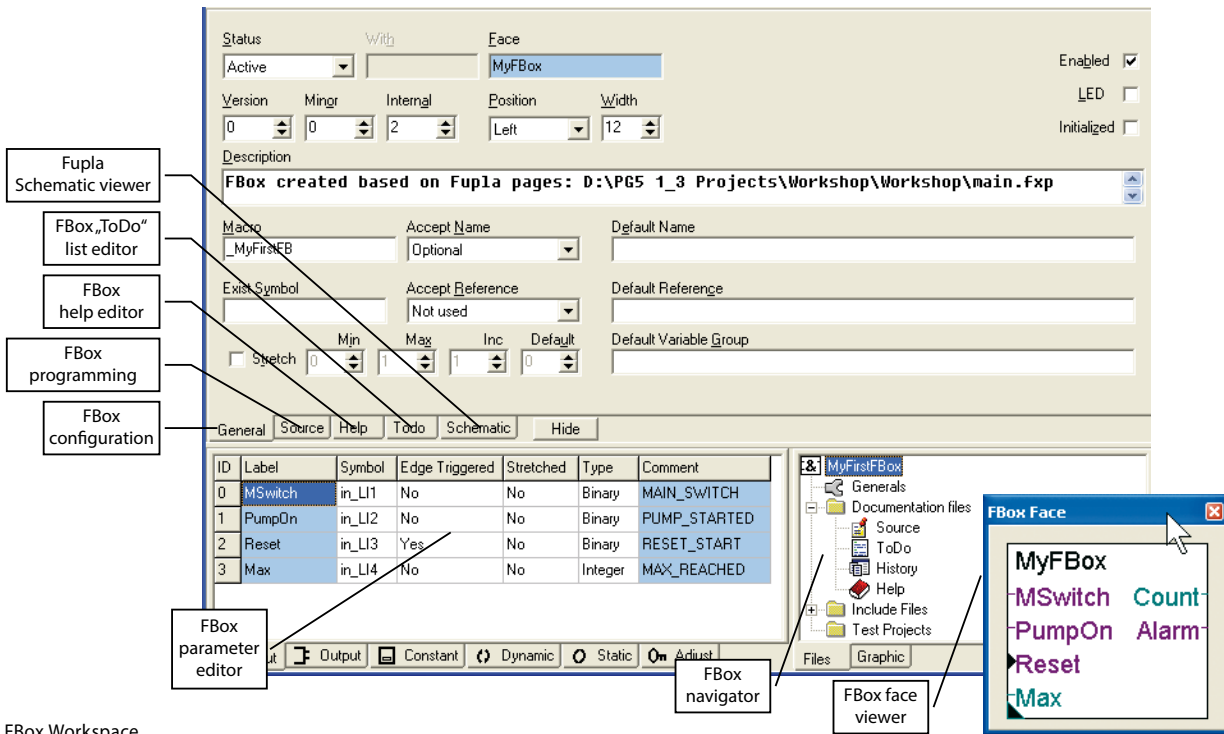
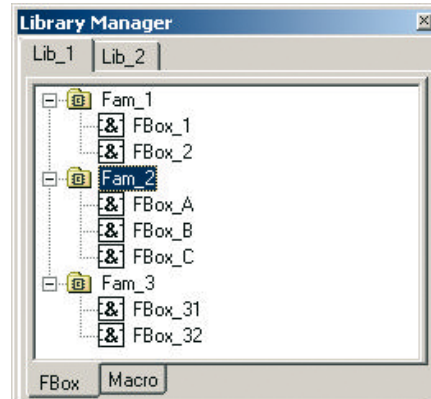
Extensive syntax checks prevent invalid entries.

Saia PG5® FBox Builder – Overview

Simple Access to all functions

The primary function of the FBox Builder is to generate custom libraries. The overall aim, however, is to simplify and optimize work with the Saia PG5®, because every extra minute spent programming increases project costs and makes the whole system more expensive.

The «**FBox Library Manager**» allows the entire contents of a library to be viewed in a directory tree format. One or more FBoxes may be located in one or more FBox families. Double-click to open the «**FBox Workspace**», where the interface can be configured and the source code programmed for the chosen FBox and graphical overview.



FBox Workspace

All functionalities needed to develop personal libraries are included in this professional tool, in one of the most ergonomic environments:

- ▶ for generating FBoxes (**Source Editor***, **Parameter Editor***, **ToDo and History List Editor**, **FBox Face Viewer**)
- ▶ for online help (**Library Help Generator**), for testing (**Message Window**, **Debug FBox***)
- ▶ for documentation of development (**Documentation Generator**)
- ▶ for distribution (version management with «**Version Handling**» and «**Installation Package**», with or without a licence key provided by the **Key Generator**)
- ▶ and everything in the language of your choice (**Language Editor**)

*only with advanced version

Saia PG5® FBox Builder

Basic function

Included in every PG5 package – at no extra charge

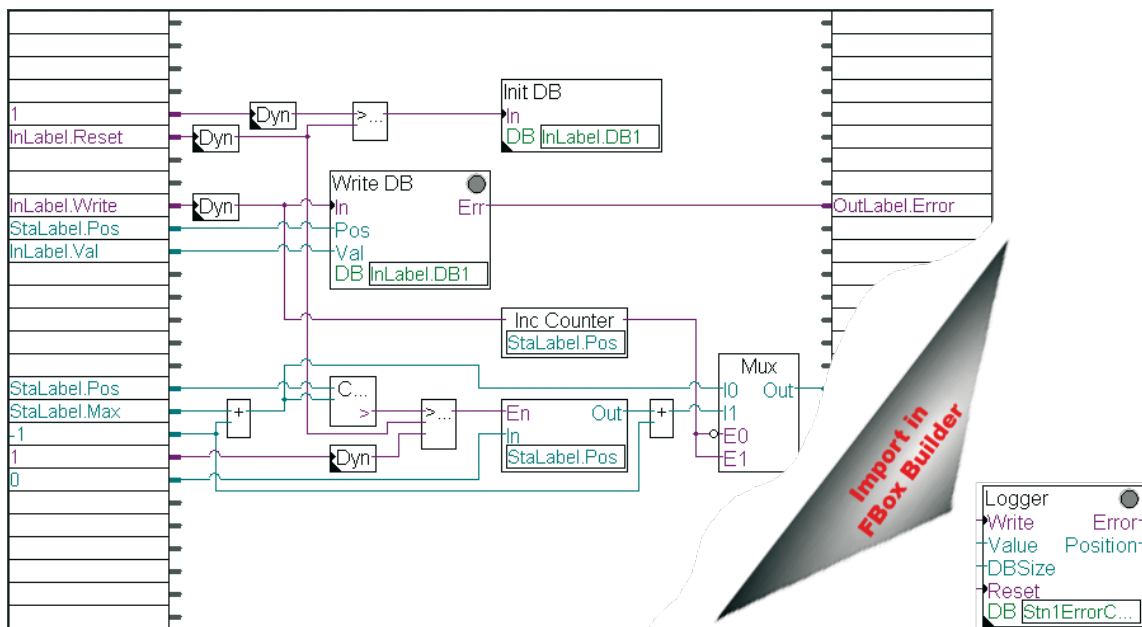
SBC PG5® FBox Builder Zip Function

Users who have built their standard Fupla pages can export them as .fxp files (a .fxp file includes one or up to 3 Fupla pages). To reuse the pages, the .fxp files must be located and then imported. This operation is greatly simplified by the FBox Builder. Users can import their .fxp files in the FBox Builder and then archive them as FBoxes. This capability allows custom libraries to be built up for any ulterior use.

The great thing about the FBox Builder is that the function described above can be used without additional costs. Just a standard Saia PG5 licence is required.

Using Fupla Page(s) Import

The FBox Builder helps users develop their own FBoxes, without writing a single line of instruction list code. The entire FBox functionality can be based on one or more Fupla page(s). The maximum depth of nesting can reach up to 5 levels. By nested level we understand imported pages that use FBoxes consisting of already imported pages, which also comprise FBoxes consisting of imported pages etc.

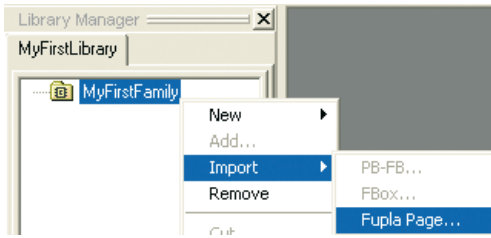


Example : All FBoxes placed on the Fupla are zipped into just one FBox

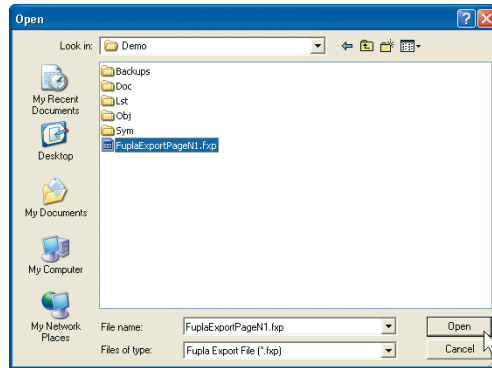
Saia PG5® FBox Builder basic version

FBox development with zip function

Example: How to create Saia PG5® FBoxes by importing Saia PG5® Fupla pages

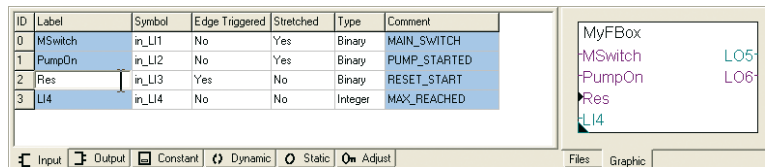


To make an FBox, just give the path of the exported Fupla page. The FBox Builder will import it automatically.

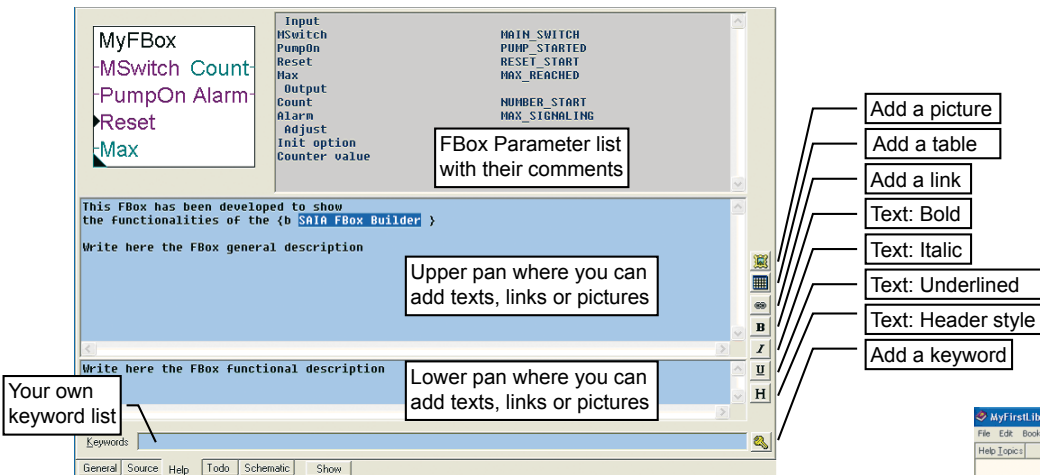


Adapt Input/Output variables in the «Parameter Editor»:

Default values from importation need to be renamed. The place order may also be changed.



Create a help file using the Saia PG5® FBox Builder's «Help Generator»:

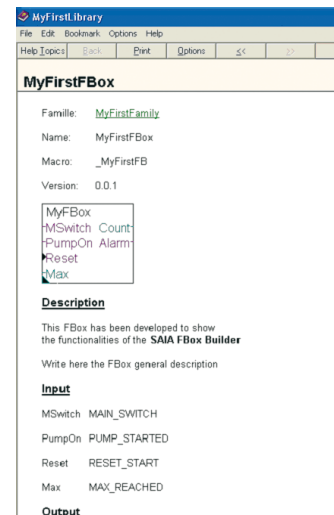


Hilfe-Editor

This help file is based on the comments entered for each FBox parameter. The FBox now includes all help text entered for the library and family. It also includes the text, symbol and link for the «Help» button.



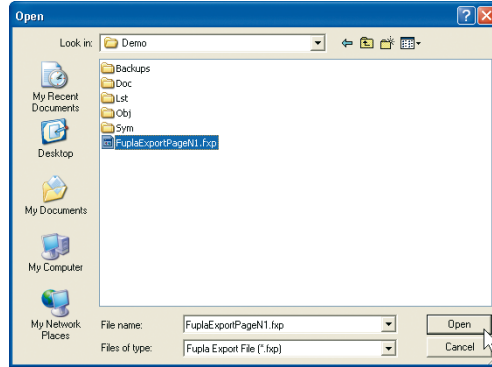
Ergebnisse der Hilfefunktion



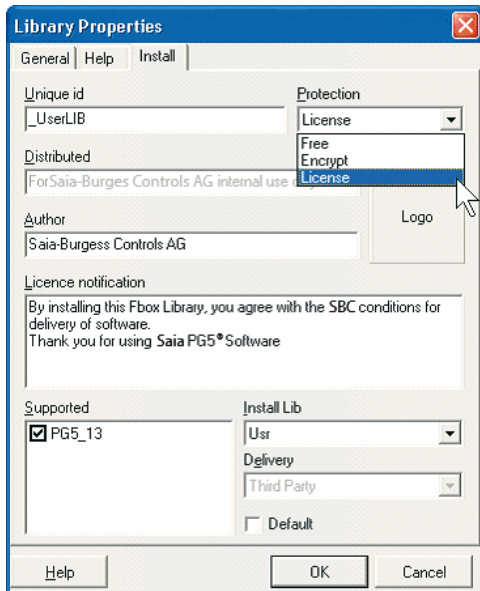
FBox development with zip function

Test the library by building the FBox and copying it to Fupla directory «USR»:

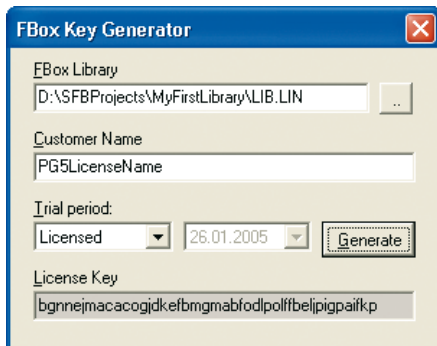
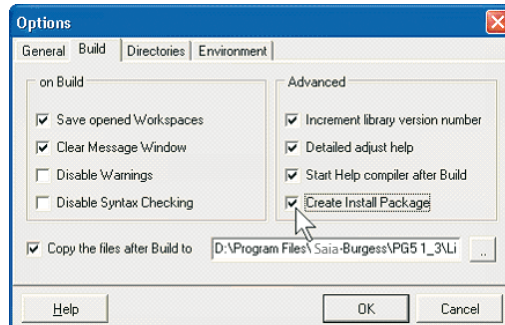
In the «Options» dialog box, select «Copy the files after Build to» and «Start Help compiler after build». This will ensure that all the necessary files are copied to the right directories. Finally, open Fupla and create a small test program with the new FBox to check it works.



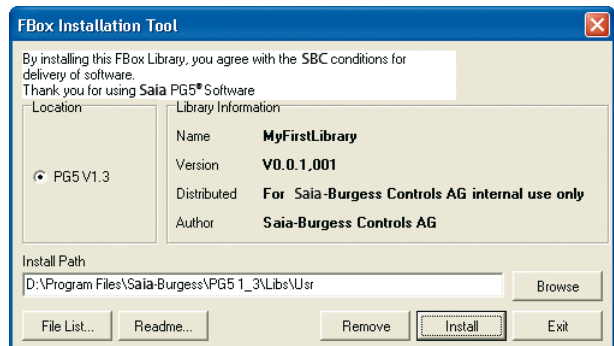
Deployment of the Library :



If you check the option «Create Install Package», after a successful build an «EXE» file will be created. This file is created based on the Library Information you gave in the «Library properties» dialog in the Builder. This exe will simply copy the FBox files in the chosen directory.

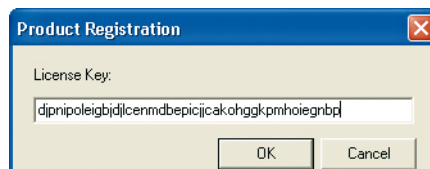


View of the Key Generator



The FBox Key generator creates the licence key automatically, depending on the library and customer name. Without a valid licence key, use of the FBox Library by anybody else will be denied.

This licence key will be requested during FBox Library installation.



Saia PG5® FBox Builder – advanced version

FBox development with editor function

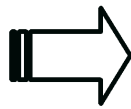
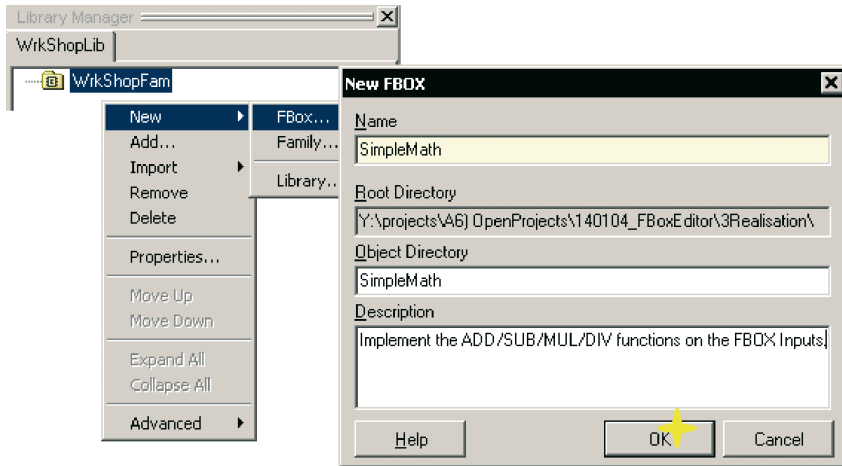
In addition to the ZIP function, IL programmers can import existing FBoxes, existing code, or create new FBoxes from scratch.

FBox IL source editor and parameter editor (advanced version only)

The FBox Builder advanced version is needed if the user wishes to integrate existing IL functions, or modify existing FBoxes, or even create completely new FBoxes. This version, with its comprehensive functions (import PB-FB, import FBox,

new FBox), intended for experienced Saia PG5.IL programmers who have attended a workshop – and who have purchased the licence.

The following pages show an example of the «new FBox» development process:



Define the FBox interface:

«Input», «Output», «Constant», «Dynamic», «Static» and «Adjust».

All these variables are defined in the «Parameter Editor» when a new FBox is built from scratch (this can also be done in the

FB source file). In all cases, however, the «Parameter Editor» is very useful for this kind of work.

Definition of inputs :

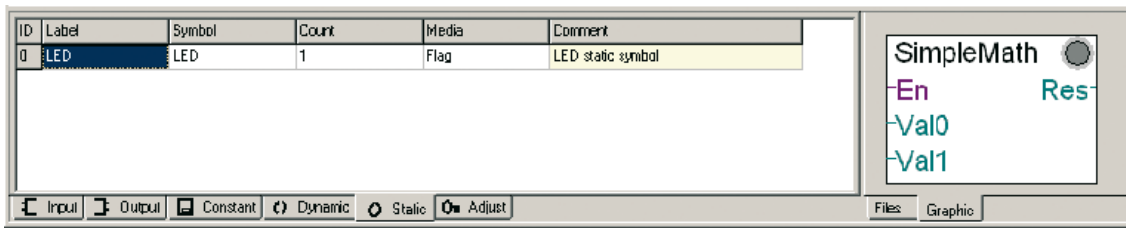
ID	Label	Symbol	Edge Triggered	Indexed	Type	Comment
0	En	in_Enable	No	No	Binary	Enable the Math operation.
1	Val	in_Value	No	Yes	Integer	Input values for the math operation.

Definition of outputs :

ID	Label	Symbol	Static	Indexed	Type	Comment
0	Res	out_Result	None	No	Integer	Result of the Math operation

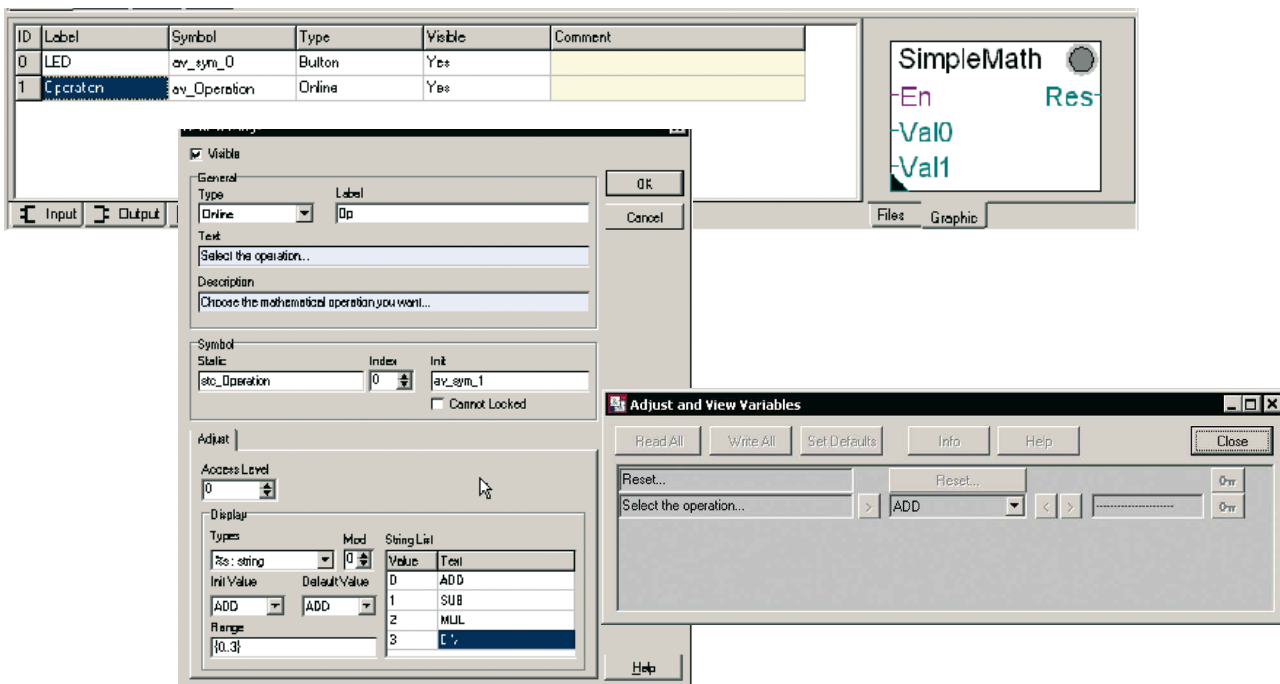
FBox development with editor function

Static variables :



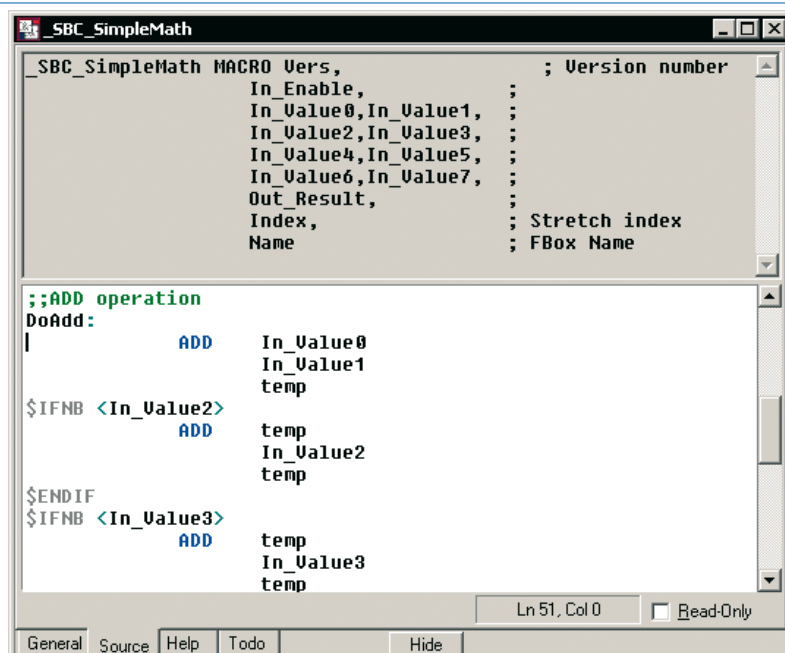
Adjust dialog (window):

- ▶ online/offline parameters –adjust/view values
- ▶ comments



Write the code of the FBox:

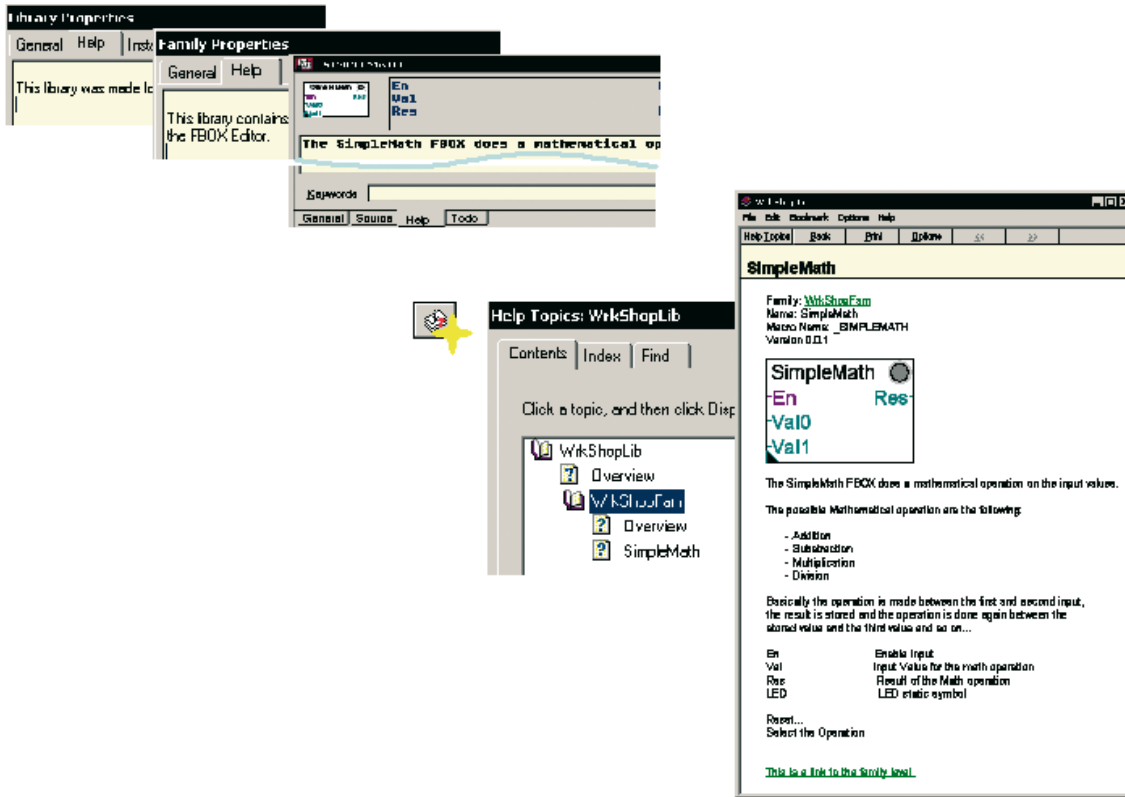
This can be done in IL code using the FBox Builder's «Source Editor», or with the text editor of your choice, or with Fupla.



Saia PG5® FBox Builder – advanced version

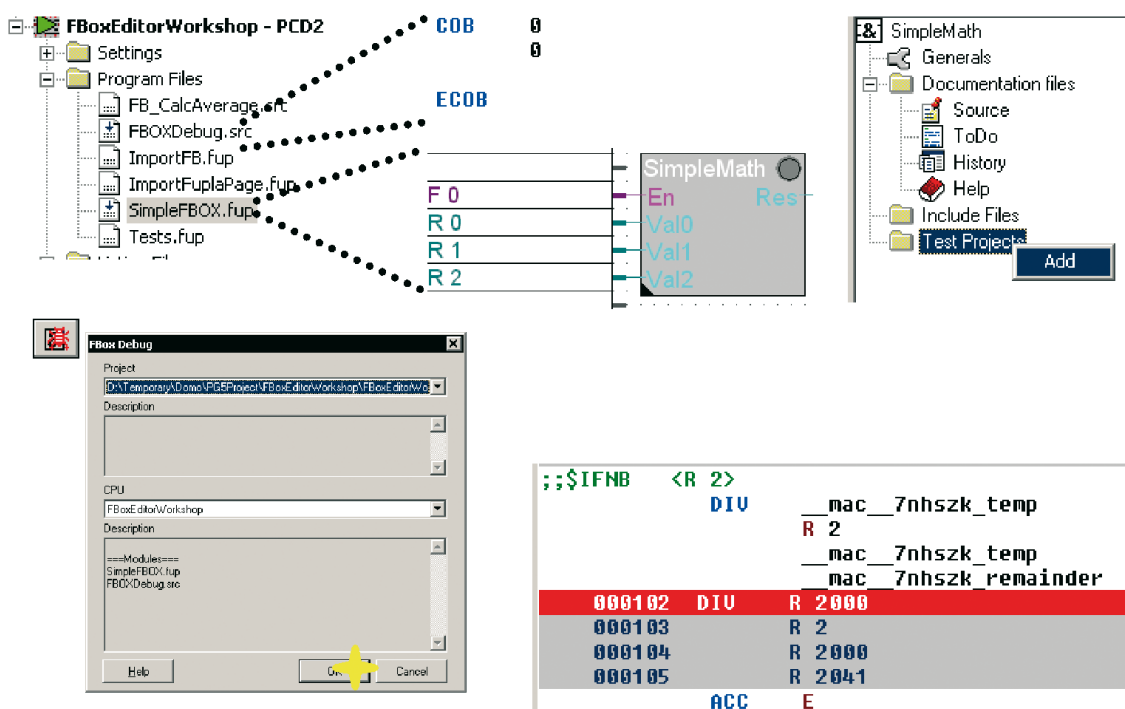
FBox development with editor function

Help generator:



Debug FBox:

FBox code can be debugged using the Saia PG5.IL Editor: SEdit.

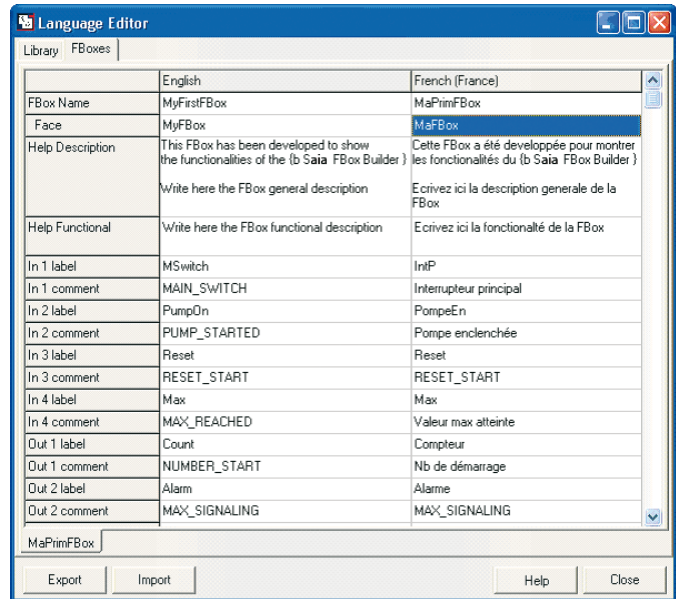


Advanced features for the development

Saia PG5® FBox Builder: the truly professional software tool

Multi-language handling:

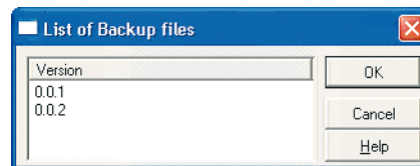
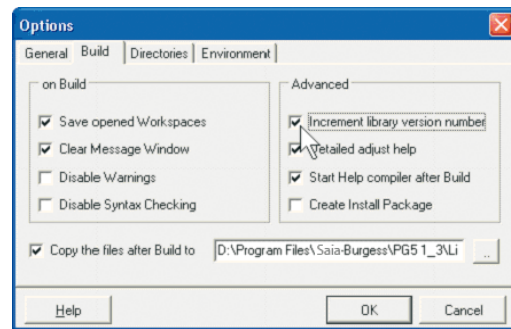
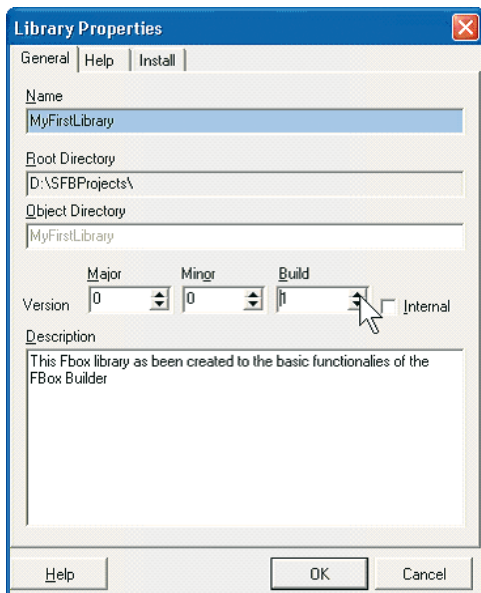
At some time, an FBox Library that you distribute might have to support more than one language. The Saia PG5 FBox Builder «Language Editor» helps you handle multi-language library development. For translation purposes, export and import functionalities have been implemented.



Backup/Restore Mechanism:

When you distribute your FBox-Libraries, you will have to manage several versions. The FBox Builder Backup/Restore feature helps you manage not only library versions, but also family versions and individual FBox versions.

This mechanism works at every level and is very simple to use. Check the advanced build option if you want an automatically incremented library version.

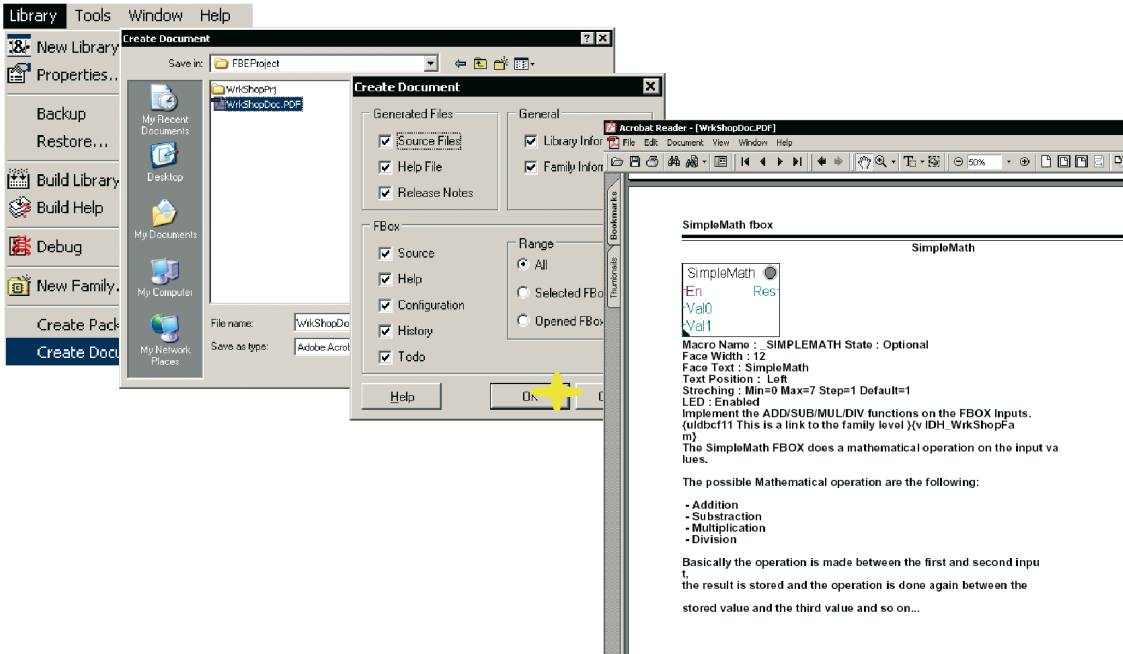


Choose the backup-version you want to restore.

Advanced features for the development

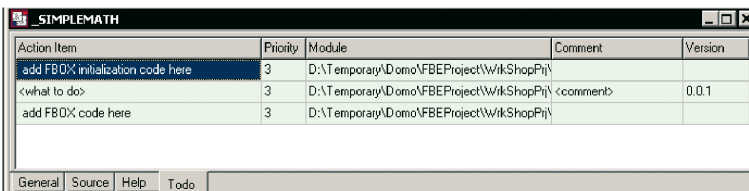
Developers documentation can be automatically generated.

Based on the project settings, properties and the information of the help files a project documentation is created (*.doc or *.pdf):

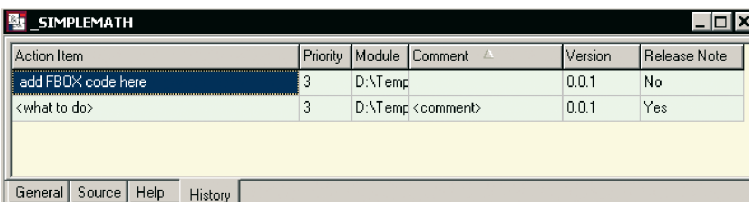


And all this great functions are supported by the **ToDo List and History List Editor:**

The ToDo list will show tasks to be done (e.g. necessary initialisation of values, debugging etc.).



If the ToDo list is edited while creating an FBox, the tasks done will be listed in the FBox history of the documentation.



Case studies – machine control

Automation applications today, are heavily dependent on FBoxes. We cannot afford to do without them!

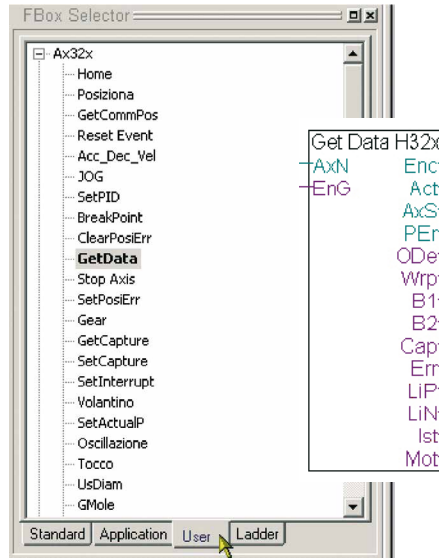
Motion Library – Idea (I):



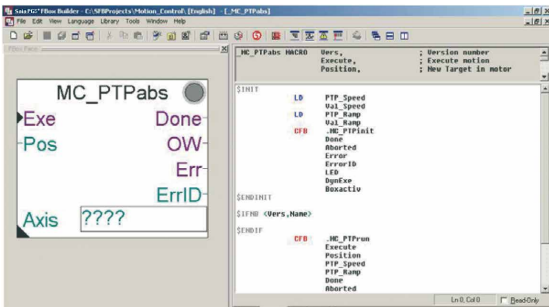
The «Mythos» stamp press is a VOLUMETRIC COLDPRESS. More than 10 motion axes are controlled by one PCD2 controller with synchronized PCD2.H32x motion interfaces.

Motion control is programmed with FBoxes in Fupla – created by the client.

Thanks to FBox Builder, the client’s development know-how has been protected and the whole application made easier to commission and service.

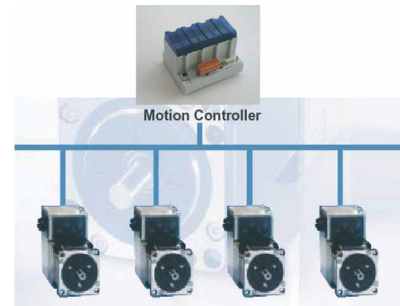


Bus based motion control:



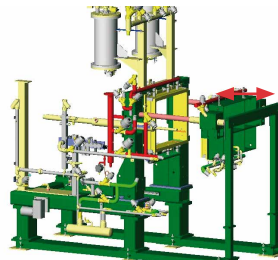
Motors with integral intelligent drives are controlled by bus communication. Motion services and basic communications are programmed, tested, and then packaged into Saia PG5® Fupla FBoxes, which are easy and safe to use when developing

graphical applications within the PG5 Controls Suite. FBoxes are designed in accordance with the standardized motion control profile DS 402 from PLC Open Organisation. Machine logic is therefore easy to understand and service.

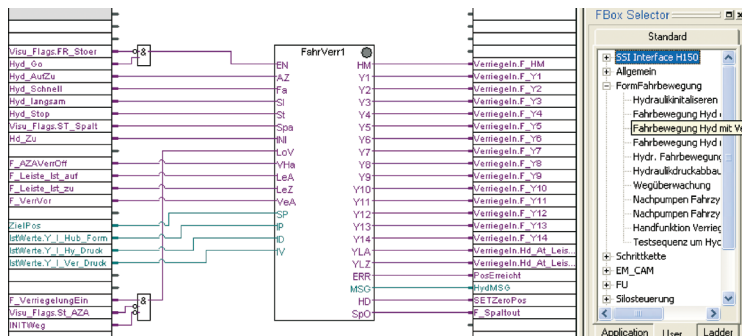


Polystyrene (EPS) machines:

A major German machine manufacturer encapsulated key know-how and critical processes within its own FBox library. Thanks to the easy graphical programming environment provided by Saia PG5®, the same service personnel who install the machines can now also carry out basic modifications and adaptations to machine logic. Service personnel also use the Saia PG5® for commissioning and fine tuning the machine.

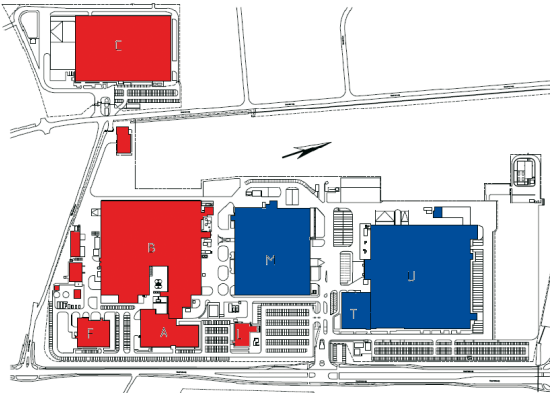


A PLC programmer is no longer required to travel on site to make changes to the machine logic. The system is so efficient and attractive that the company changed completely from Siemens Step®7 to Saia PG5®.



Case studies – infrastructure

XEROX Manufacturing Europe:



XEROX had to renew the heating, air-conditioning and ventilation automation of half its facility in the Netherlands. XEROX' own maintenance and engineering team decided to realize the project themselves. In 2004 they ordered Saia PCD® controllers for almost 100 kEuro. The Saia PG5® Fupla tool and the Saia PG5® FBox-Library were used to realize the project. The project was finished successfully for XEROX as the engineering and commissioning time was only 50% compared to the other half of the facility (realised with another control system). There were no technical hitches and the project was completed on schedule. This project is typical for HeaVAC applications, no single line of PLC code had to be written to realize the project. All the necessary logic is in graphical FBoxes. If the project has a special requirement, the «speciality» is packed in an FBox, ready to be used by project engineers. In this

way, Saia PCD® system-integrators create their own libraries of know-how, which makes them highly flexible and efficient in fulfilling any customer requirement. Almost 100% of all HeaVAC projects are realized without writing PLC code. Usually the project engineer or system integrator is using the standard Saia PG5® HeaVAC library.

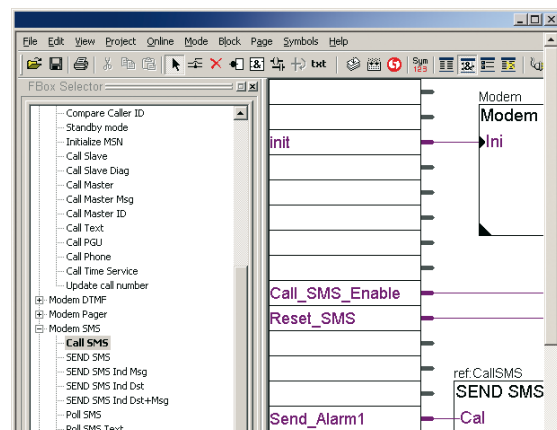
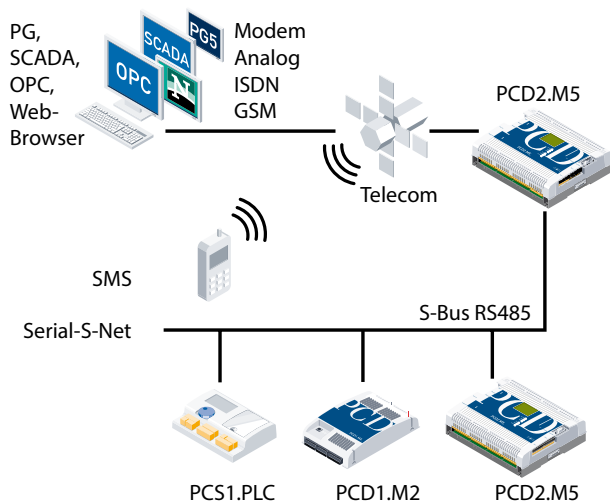


Part of the DDC-Suite Library

Remote control / telecom library:

Using the standard modem library is the fastest way to create communication program parts. All complex functionalities are integrated into easy-to-use FBoxes. There is no need to redevelop previously tested appli-

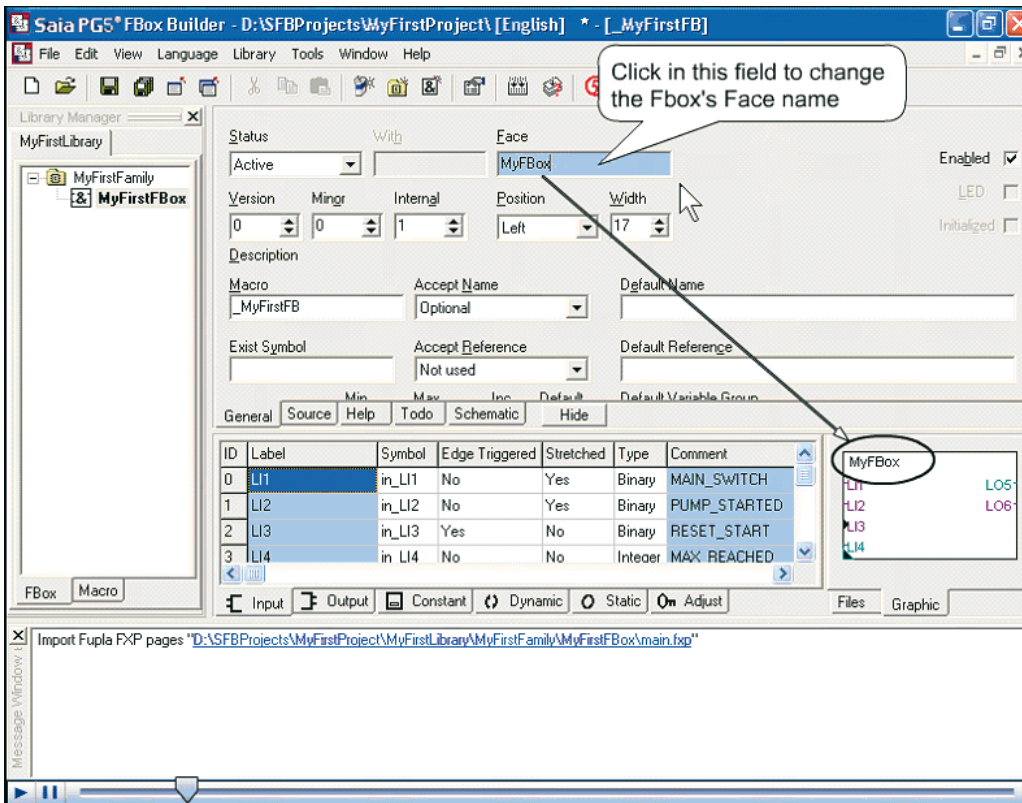
cation modules. Programming errors are therefore avoided. Thanks to communication FBoxes, all programming is simplified.



Getting started

Tutorials:

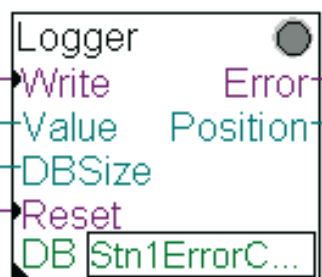
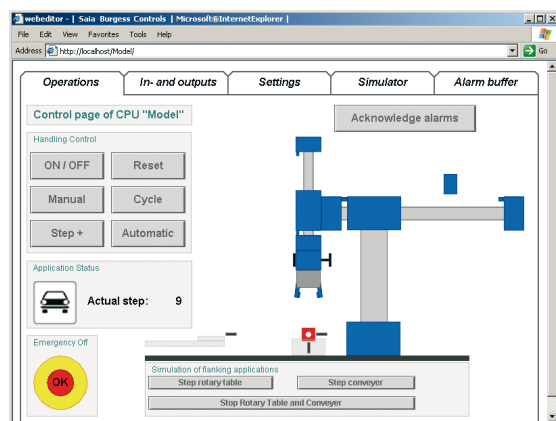
Each development step is described with a video. It teaches all the functionalities of the FBox Builder. Please refer to the support web-site: www.sbc-support.com



Example: How to work with the Parameter Editor

SBC training example: ORI Automation AG (CH)

This classic training example describes an automated industrial installation and can be used as a model for bigger projects. The example illustrates the correct choice of programming language and corresponding editors, and shows a meaningful structure for the project. The «Logger» FBox has been created to store 10 alarms. More alarms can be logged by using multiple instances of the FBox. It is also possible to store the alarm date and time. This FBox was created with the Zip function of the FBox Builder, to show how easy it is to work with.



Ordering information | Saia PG5® Controls Suite

Saia PG5® programming tool

PG5 – Demo version with all functions. Runtime limited to 90 days	PG5 – Demo
Saia PG5® Core Package Programming software with editors (IL, Fupla, Graftec), network configurators, standard libraries (Analog, Communication, Arithmetic & Logic), application libraries (Alarming, Blinds-Lighting, E-Mail, Trending [HDLog], Energy Meter, DALI, Modbus, EIB, EnOcean, JCI N2-Bus), Web Editor and FBox Builder (basic version)	PG5 – Core Package
Saia PG5® HVAC Package Same as Saia PG5® Core Package and associated libraries (HVAC, Belimo MP-Bus, LONWORKS, Room controllers and Modem), BACnet	PG5 – HVAC Package
Saia PG5® Extended Package Same as Saia PG5® HVAC Package and associated DDC Suite library	PG5 – Extended Package
Software upgrade Upgrade – according to customer's key	PG5 – Upgrade
End customer license for Saia PG5® End customer license for PG5. The customer is supported by the requisitioner (according to customer's key)	PG5 – End-User License

Saia PG5® options – Add-on tools

PG5 – FBox Builder (“advanced version”) Software package for Saia PG5® FBox Builder. IL knowledge needed and 1 day's training included	PG5 – FBox Builder
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