

APB Product Overview

APB: Graphical Application Design Tool

- Off-line application design and construction
- Extended configuration test and debug facilities
- User interface simulation
- Free format report generator
- Application up/down load
- On-line help and documentation
- Parameter control
- Alarm and event groups
- Multi level security

Introduction

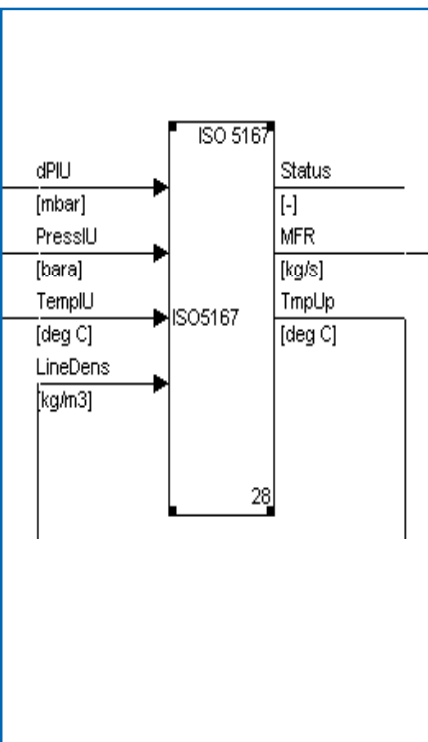
Application Builder [APB] is a windows-based tool to develop software for a Flow Computer on a PC. On-screen, the flow computer application software looks like a block-diagram. All such diagrams, with all definitions and configuration data is stored on the PC's hard disk, permitting subsequent maintenance of several applications. A finished application is downloaded onto a flow computer, together with its parameters. In the application-diagram, specific flow computer tasks such as measurement of analog inputs, dP-selection logic or an ISO-5167 Mass Flow Rate calculation, are implemented via function-blocks. Each function-block handles a specific task, and communicates with other blocks through links.

A link can be considered as a wire, which interconnects, for example an analog input block to a calculation block. Output links from certain blocks can be fed to input links to other blocks, e.g. a dP-selection logic block output is fed as an input to an ISO-5167 calculation block.

The application programmer graphically configures the flow computer application-diagram by selecting a required block from a menu, placing the block on the required position on the diagram, and interconnecting the links to other, previously drawn blocks. A newly inserted block must be configured when placed in the diagram, e.g. an Analog Input Block has a Channel number, engineering units, and display format, etc.

The Application Builder is a tool to:

- Build a new application or modify an existing application, offline
- Extensive configuration integrity test facilities
- Edit constant data for an application, off-line
- Monitor an existing application, currently running in a FC-5x
- Flow Computer, on-line
- Download current constant data, on-line
- Download or Upload an application
- Download, Upload or Modify constants and parameters



Configuration

The application builder generates a limited set of text-files with the following information:

- Block- and Link-configuration
- Display and menu layouts
- Constants and parameters
- Report definitions and layouts
- Event and Alarm Logger configuration
- Serial communication
- Miscellaneous system configuration information (hardware configuration, memory etc.)

The application diagram enables the programmer to create a highly structured, efficient and user-friendly flow computer application.

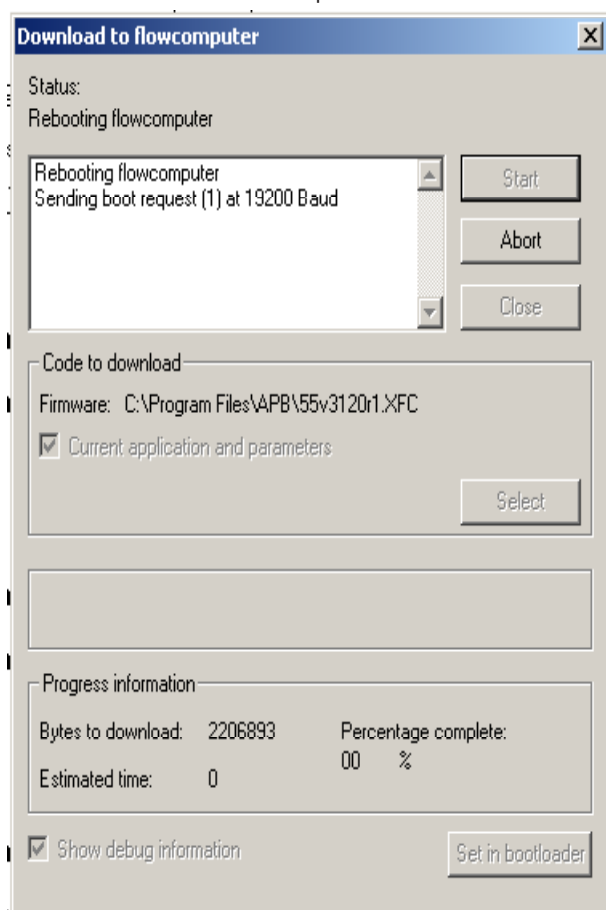
Standard Applications

The FC-5x Flow Computer supports a number of standardized base applications such as:

- Single Gas Orifice Metering acc. to ISO-5167
- Multiple Gas Orifice Metering acc. to ISO-5167
- Gas Turbine Metering
- Liquid Turbine Metering, including prover
- Coriolis Metering, Ultrasonic metering
- Station Totalizer
- Prover

Soft Loading Applications

The software environment for the FC-5x series Flow Computer is based on a soft-loaded operating system: the system software itself, application configuration software and parameters & constants can all be downloaded from the host-computer into Flash E-PROM of a flow computer, and vice versa: all software can be



uploaded from a flow computer to a PC.

This software concept / philosophy meets the requirements for both software maintainability and software extendibility. Module signatures are created to verify all configurations and to obtain official approvals.

An uploaded configuration is identical to the previously downloaded application. This feature enables extensive on-site support: an existing, currently running application can be uploaded from the FC-5x to a PC. A run-time version of the application builder is available to only upload, examine, print and download applications into flow computers.

No external floppies, tapes or other configuration files are needed to fully maintain an existing application once it is downloaded into the flow computer. The Application Builder will, of course, provide facilities to copy configurations on an external device, such as a floppy or optical drive. The configuration will provide facilities to record and check the configuration-version information such that alterations to the configuration can not be un-noticed. A hardware lock on the flow computer will prevent any maintenance actions to be taken if desired.

The purpose for this soft-loaded system setup is to maintain a flexible, extendible and verifiable software environment, e.g. all software currently running inside the flow computer is downloaded from a restricted number of configuration files in the host

computer. By maintaining these configuration files by a version control system, a traceable and verifiable system can be created.

Testing

The application diagram can, through Application Builder, be checked, tested and debugged at several levels:

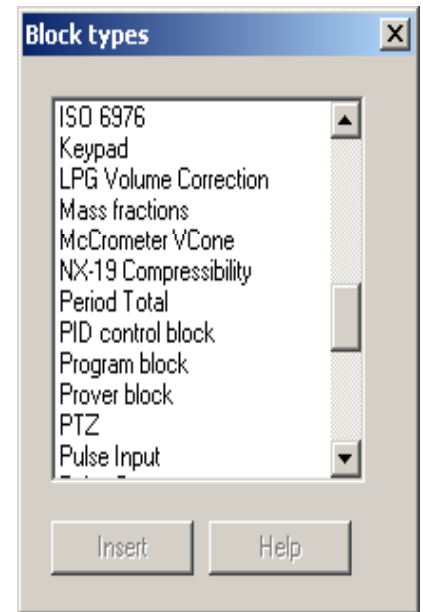
- The application-programmer can visually check the application-program, by viewing the application on the display in Application Builder, or by printing the application diagram on a printer. This printout can be used for documentation purposes as well.
- The block-and link-configuration can be syntactically checked for configuration- or link-errors by the development software, by running a syntax checker in Application Builder.
- The application diagram, display configuration and report layouts can be simulated on the PC for off-line debugging. Simulation data may be applied manually or via links to a spreadsheet, such as Excel. The Application Builder runs a simulation of the FC-5x software and allows at the same time to inspect the inputs and outputs from the various blocks in the application diagram.
- When an application is finally downloaded into the flow computer, real-time and/or snapshot data can be obtained from the flow computer, and presented in the application-diagram, by running the on-line debugger in Application Builder. The facilities provided are more or less the same as with off-line debugging except that real data from the flow computer I/O facilities is used.

Using the latter two facilities, intelligent support for testing and debugging, or even an official Factory Acceptance Test (FAT) is available to thoroughly check the flow computer application configuration. Such test can be fully automated to allow a re-test later.

Application Builder Function Blocks

(selection only)

AGA3	Mass flow rate calculations according to the AGA 3
AGA5	Energy flow calculation according to AGA 5
AGA8	Compressibility calculation according to AGA 8
AIN	Analog input
ALARM	Alarm function
AltosonicIV	KROHNE ultrasonic gas flow meter
AOUT	Analogue output
API2540	Temperature and pressure corrections according to API2540
AVERAGE	Running average calculation
CALC	Spreadsheet-like expression Calculations
Conversion	Convert engineering units
DanielSeniorSonic	Daniel ultrasonic gas flow meter incl. Diagnostic and Frequency Interface (DFI)
DeltaP	dP selection for multiple dP cells
DensitySarasota	Density for Sarasota density transducers
DensitySolartron	Density for a Solartron density transducer
Deviation	Deviation between two input values during a period
DIN	Digital input
DOUT	Digital output
FSIN	Fast status input
GC_ABB	Gas composition input for an ABB gas chromatograph
GC_DANIEL	Gas composition input for a Daniel gas chromatograph
GC_SIEMENS	Gas composition input for a Siemens gas chromatograph
GCSync	GC Pay and Check synchronization
HART	HART / SMART transducers
Interpolation	Interpolation table, linear interpolation or by means of specific curve-fitting logic
ISO5167	ISO 5167 Calculation
ISO6976	ISO6976 Calculation
NX19	NX19 Calculation
PeriodTotal	Periodic totalizer
PIN	Pulse input
POUT	Pulse output
PTZ	PTZ Calculation
Qsonic	Instromet Q.Sonic Ultra-sonic meter serial input
RD	Relative density calculation
Scale	Scaling with an offset and multiplication factor to a output value
Select	Select out of max 10 inputs, depending on a selector-switch
SGERG	SGERG Calculation
System	System wide settings
Totalize	Totalization of input
TPIN	Time period input
Turbine	Single or Dual pulse turbine input
UnitConversion	Universal engineering unit conversion functionality



Application Wizard

Some users may like to start configuration from a (base) application or to extend to a proven application. Therefore standard applications can be configured using Application Wizard, a software tool, that automatically guides a user through menu's with parameters en options, while suggesting the most common options as default values. Application Wizard is a selectable option in Application builder.