

OMC System Software
High-performanceHMI
VFFBDBuilder
User Manual
IM41S59-E

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Symbol Definition	
	WARNING: Indicates information that a potentially hazardous situation which, if not avoided, could result in serious injury or death.
	RISK OF ELECTRICAL SHOCK: Indicates information that Potential shock hazard where HAZARDOUS LIVE voltages greater than 30V RMS, 42.4V peak, or 60V DC may be accessible.
	ESD HAZARD: Indicates information that Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advice or hints for the user.

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VFFBDBuilder

Section 1 Overview

VFFBDBuilder is one of the most important control strategy configuration tools in control system. It provides functions of FBD programming and debug.

1.1 Software Features

Control software conforms to IEC61131-3 standard. By combining with function block library, it provides powerful functions of FBD user program editing and debug, and supports single program compiling and online download.

FBD software supports configuration of the initial values of function block parameters, online parameter download and editing, displayed or non-displayed input/output pin settings, function block parameter settings as displayed input/out pin, user-defined function block execution order, debug technology based on truncated information flow, activation and close down.

1.2 Function Features

- Initial values of function block parameters can be configured;
- The input/ output pin of function block can be set to displayed or invisible; function block parameters can be displayed as input/ output pins;
- The execution sequence of function block can be determined by users;
- Implement the redundancy and multicast of function block data automatically;
- Support online modification of function block data in user program;
- Provide online debugging and support activation and close down of function block's input and output;
- The HMI properties (display decimal digits, etc.) of function block's tag can be configured.
- Modify the basic properties (description, tag level and tag group) of function block tag in batch.

Section 2 Configuration Steps

Configuration steps are as follows:

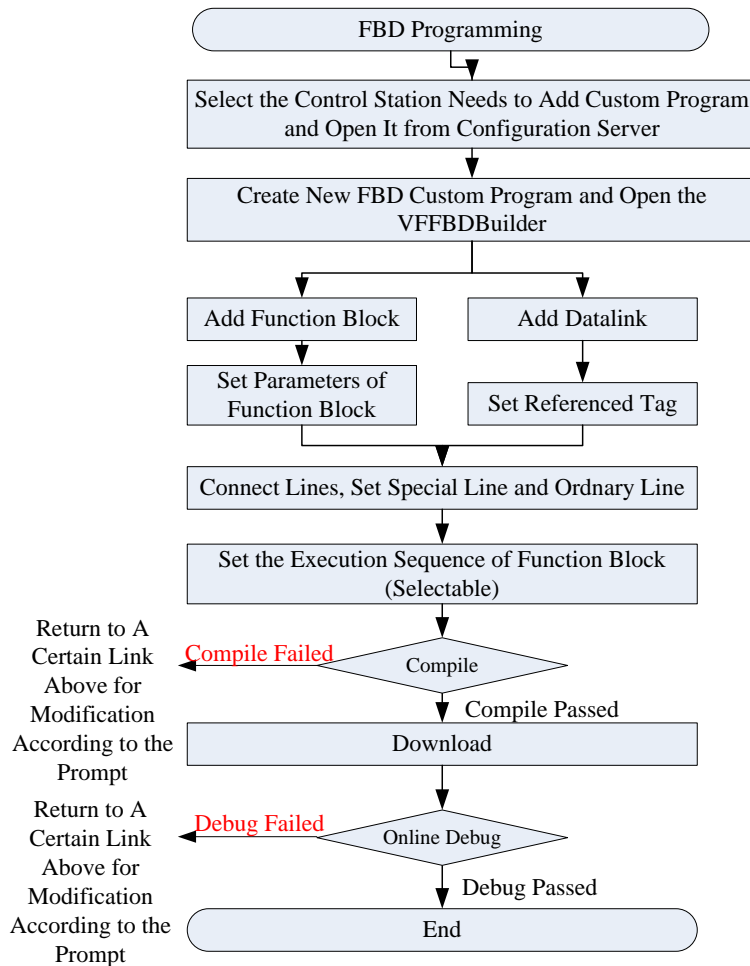



Figure 2-1 Graphics of FBD Custom Program

Section 3 Create/ Import a New FBD Program

User can create a new FBD program in VFExplorer, or import one as CSV file. Different controller types support different number of programs. FCU711-S and FCU712-S controllers support up to 200 pages of user programs, and FCU713-S controller supports up to 500 pages of user programs, and FCU714-S controller supports up to 1000 pages of user programs.

3.1 Create a New FBD Program

Open the Configuration Management Software. Select corresponding controller in the configuration tree on the left of interface. Click “Open” from menu of “Control Scheme”, or click button  on the tool bar, a dialog box “New Custom Program” pops up, as shown in Figure 3-1.

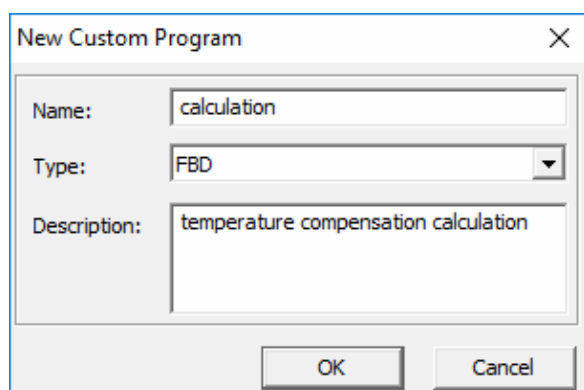


Figure 3-1 Dialog box of “New Custom Program”

Click “OK” after input the name and descriptions to create a new FBD custom program, as shown in Figure 3-1.

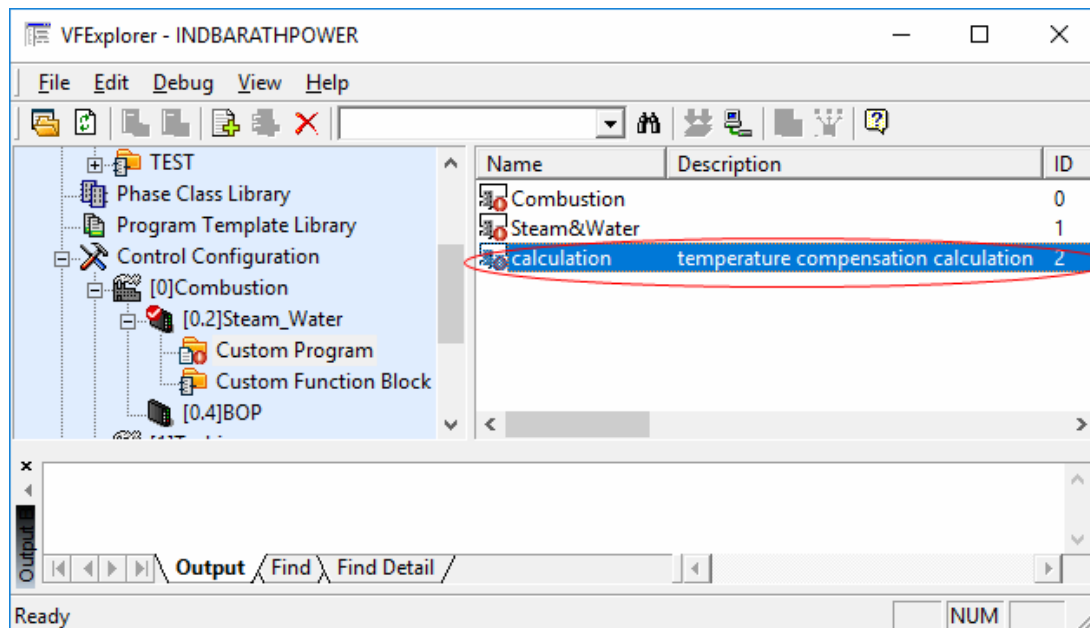


Figure 3-2 Interface of Configuration Management Software

Double click the new program to open editing interface.

3.2 Configure FBD Program Properties

3.2.1 Set FBD Program Properties

Users can set the phase and period of FBD program. Phase and period will affect the running time of the custom program.

1) Select any program and then right click it, select “Property” and the custom program property dialog box pops up as shown in the figure below.

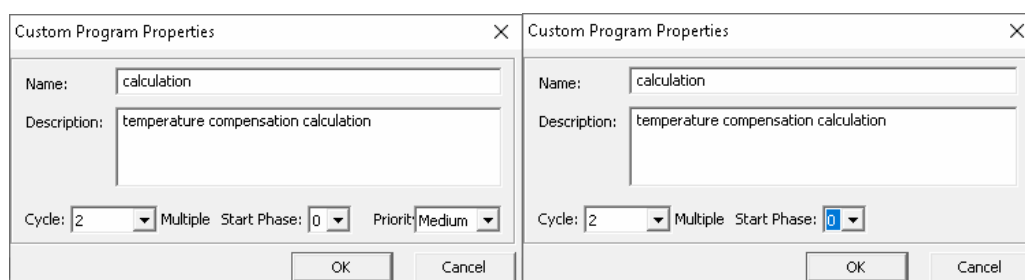


Figure 3-3 Dialog box of program property setting (the left graph shows FCU712-S and the right graph shows FCU711-S)

1. Configure the basic properties according to the table below.

Configuration Item	Configuration Description
Name	A string of no more than 64 English characters or 32 Chinese characters, only begin with a letter and be letters, numbers and underscores, it cannot be duplicated (the system also cannot be duplicated function blocks) .

Configuration Item	Configuration Description
Description	A string of no more than 128 English characters or 64 Chinese characters.
Cycle	FCU711-S、FCU712-S、FCU713-S 和 FCU714-S supports fast cycle, 1 times, 2 times, 5 times and 10 times. FCU811-S supports fast cycle and 1 times. When the cycle of the user program is “fast cycle”, the fast scan cycle of the controller is used to execute the user program, and the phase configuration is not supported.
Starting phase	Setting the starting phase is a function set for distributing the program running load of the controller in each phase. After downloading, each program cyclically runs according to the set initial phase. FCU711-S、FCU712-S、FCU713-S 和 FCU714-S supports the option of 0~9 as the initial phase. FCU811-S only support 0 as the initial phase.
Priority	When the user programs have the same starting phase, the controller will determine the user program to be executed first according to the priority.

3.2.2 Set FBD Program Password

Follow steps below to set password for FBD program:

1. Right-click an FBD program, and select “New Password” and the dialog below pops up.

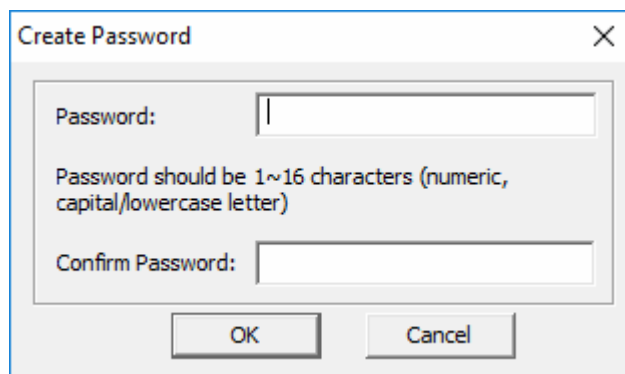



Figure 3-4 Create Password

2. Input the password and confirm it in boxes “Password” and “Confirm Password”.
3. Click “OK” to save the password of FBD program.

The icon of FBD program with password will be , and pop up the following dialog when opening FBD program.

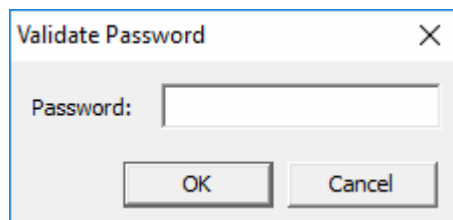


Figure 3-5 Validate Password

3.3 Import FBD Program as CSV File

The folder “data\FBDTemplate” in installation directory includes 2 FBD program module as CSV files.

- CSV file with the postfix “loop” is single loop or cascade loop FBD program applying PID and PIDEX function blocks.
- CSV file with the postfix “motor” is valve FBD program applying DIO21V, DIO01V, DIO11V, DIO22V, DIO11M, DIO21M, Motor, Valve function blocks.

3.3.1 Operation Steps

Operation steps to import CSV file:

1. Right “Custom Program” and select “Generate Program in Batch”.
2. In the “Open” dialog, select a CSV file and set "Csv Files For FBDImportTemplate (*.csv)" as the "files of type" and click “Open”.

FBD program will be created automatically in the right pane after importing FBD program successfully, as shown below. The top 2 are FBD programs created by CSV file with the postfix “motor”.

Name	Description	ID	Last Modified Time	Priority	Cycle(Speed)	Phase	Multicast Data(byte)	Redundancy Data(byte)	Code Size(byte)
SR101 Filter Group A Valve	SR101 Filter Group A Valve	0	2023-03-06 17:36:41	Medium	2	0,2,4,6,8	0	0	4K
SR101 Filter Group B Valve	SR101 Filter Group B Valve	1	2023-03-06 17:36:48	Medium	2	1,3,5,7,9	0	0	4K

Figure 3-6 FBD programs created after importing CSV file

3.3.2 CSV File

This part takes “FBDImportTemplate_loop.csv” as an example to introduce the contents in CSV file.

FBDIMPORTTYPE	PROGRAMNAME	PROGRAMDESC	LOOPTYPE	TYPE	NAME	DESC	INPUT	OUTPUT	TAGGROU	SVSCL	SVSCH	SVEU	MVL	MVH	SVL	SVH	MVSL	MVSCH	MVEU
Single Loop (Temperature)	Single Loop (Temperature)	Single Loop (Temperature)	LOOP	pidex	550TCL0801	550-E-102 Reaction Input Material	550TI_10801	550TV_10801	0	0	750 .degree.C	0	100	0	100	0	100	0	100 %
Single Loop (Temperature)	Single Loop (Temperature)	Single Loop (Temperature)	LOOP	pidex	550TCL12101A	Two-phase Flow Heat Exchanger Thermoregulation	550TI_12101A	550TV_12101A	0	0	200 .degree.C	0	100	0	100	0	100	0	100 %
Single Loop (Temperature)	Single Loop (Temperature)	Single Loop (Temperature)	LOOP	pidex	550TCL12101B	Two-phase Flow Heat Exchanger Thermoregulation	550TI_12101B	550TV_12101B	0	0	200 .degree.C	0	100	0	100	0	100	0	100 %
Single Loop (Temperature)	Single Loop (Temperature)	Single Loop (Temperature)	LOOP	pidex	550TCL12101C	Two-phase Flow Heat Exchanger Thermoregulation	550TI_12101C	550TV_12101C	0	0	200 .degree.C	0	100	0	100	0	100	0	100 %
Single Loop (Pressure)	Single Loop (Pressure)	Single Loop (Pressure)	LOOP	pidex	550PCL1301	desc	550PI_11301	558PV_11301	0	0	4 MPa	0	100	0	100	0	100	0	100 %
Single Loop (Pressure)	Single Loop (Pressure)	Single Loop (Pressure)	LOOP	pidex	550PCL10102	3 Sets Heavy Wax Oil Adjust from Outside of Device	550PI_10102	558PV_10102	0	0	1 MPa	0	100	0	100	0	100	0	100 %
Single Loop (Pressure)	Single Loop (Pressure)	Single Loop (Pressure)	LOOP	pidex	550PCL10211	desc	550POI_10211	558POV_10211	0	0	0.3 MPa	0	100	0	100	0	100	0	100 %
Single Loop (Pressure)	Single Loop (Pressure)	Single Loop (Pressure)	LOOP	pidex	550PCL12002	Air Blower Exit Air	550PI_12002	558POV_12002	0	0	1500 Pa	0	100	0	100	0	100	0	100 %
Cascade Loop 1	Cascade Loop 1	Cascade Loop 1	LOOP	pidex	550TCL0504A	desc	550TI_10504A		0	0	800 .degree.C	0	100	0	100	0	100	0	0.4 MPa
Cascade Loop 1	Cascade Loop 1	Cascade Loop 1	LOOP	pidex	550TCL0504B	desc	550TI_10504B		0	0	800 .degree.C	0	100	0	100	0	100	0	0.4 MPa
Cascade Loop 2	Cascade Loop 2	Cascade Loop 2	LOOP	pidex	550LCL10401	550-V-106 Water Injection Tank Level Adjust	550LI_10401		0	0	100 %	0	100	0	100	0	100	0	32 t/h

Figure 3-7 Example of CSV file

As shown in the figure above, CSV file includes 4 FBD programs, “Single Loop (1)”, “Single Loop (2)”, “Cascade Loop (1)” and “Cascade Loop (2)”.

Meanings of each field in CSV file are shown in Table 3-1.

Table 3-1 Instruction for FBD program imported file as CSV

Field	Instruction
FBDIMPORTTYPE	Refer to that the table is FBD import program
PROGRAMNAME	Program name, correspond to the created FBD custom program
PROGRAMDESC	Program description
LOOPTYPE	Loop type
TYPE	Function block type

Field	Instruction
NAME	Function block tag name
DESC	Function block description
INPUT	Input pin of function block
OUTPUT	Output pin of function block
TAGGROUP	Tag group of function block
SVSCL~SWPN	Pin information of function block



Tip:

For the detailed configuration, please refer to “Function Block”.

3.3.3 Notes

Notes when importing FBD custom program as CSV:

- If importing the custom program has already existed in configuration, and prompt of program name repeat will show in output bar, and prompt whether to continue. Click “Yes” to skip importing the repeat program and continue to import other programs. Detail import information will be shown in output bar. Select “No” to not import.
- After importing CSV file, the FBD program created doesn't be compiled automatically.
- If the tag configured in archive doesn't exist when importing, or is configuration parameter, create undefined data to connect normally. An error prompt will pop up for undefined data connection when compiling, which can pass until specify the data connection.
- The template contents will be checked first before importing CSV file, import can be performed only after checking successfully. If failed, the import of the program will be skipped and go to check and import next program directly.

Section 4 Introductions to Edit Interface

4.1 Main Interface

Double-click existed FBD program in configuration management interface, FBD programming software interface will pop up, as shown in Figure 4-1.

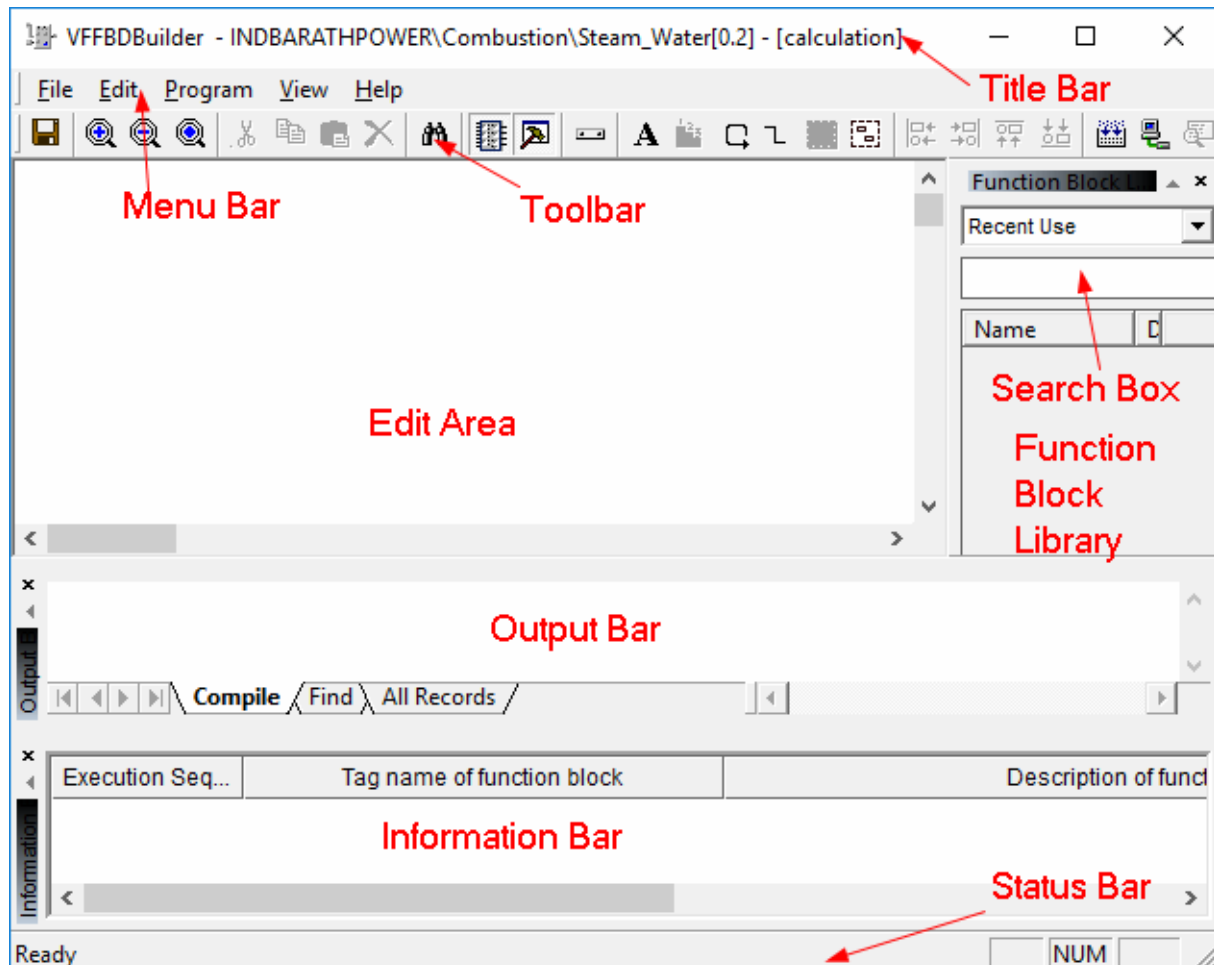


Figure 4-1 FBD programming builder












- Title Bar---display program title.
- Menu Bar---include five menus of file, edit, program, view and help, and each menu contains several submenus.
- Toolbar--- lists frequently used menu function in the form of icon, making it convenient for users to operate. Click the menu **View/Tool bar** to decide whether to show the bar or not.
- Edit Area---work area for program editing.
- Function Block Library---display function blocks supported by current system,

including system function blocks, industry function blocks and user-defined function blocks.

- Search Box--- Input the name of function block, then press “Enter”, the function block will be searched for.
- Output Bar---display the information of compile, find and procedure record, users can get access to different information by selecting different label pages. “procedure records” displays all the operation information in editing area. Location by double click is supported.
- Information Bar---display all function block information in editing area, and editing operation can be carried out to function blocks. Click “View” and select “Information Bar” to show/hide it.
- Status Bar--- prompt user the function of the button when the mouse is on a menu command or an icon button in toolbar. Click “View” and select “Status Bar” to show/hide it.

4.2 Introductions to Menu Bar& Toolbar

Table 4-1 Instructions to menu function and toolbar

Menu	Submenu	Icon	Function
File	<u>S</u> ave Ctrl+S		Save current configuration
	E <u>x</u> it		Exit software
	I <u>m</u> port		Import control configuration
	E <u>x</u> port		Export control configuration
	<u>P</u> rint Ctrl+P		Print active document
	P <u>r</u> int Page Footer Settings		Set print footers
	P <u>r</u> int <u>P</u> review		Display full page
	<u>P</u> rint Settings		Change printer or print settings
	D <u>i</u> agram Settings		Change the diagram settings and print effect.
Edit	<u>C</u> opy Ctrl+C		Copy selected function block or connection line
	C <u>u</u> t Ctrl+X		Cut selected function block or connection line
	<u>P</u> aste Ctrl+V		Paste function block or connection copied or cut to edit area
	<u>D</u> elete		Delete selected function block or connection line
	<u>F</u> ind/ Replace Ctrl+F		Find/ Replace current function block by name sequence
	Datalink		Selectively quote a tag or variable
	ISCP datalink		Link other station variables
	S <u>e</u> lect <u>A</u> ll Ctrl+A		Select all objects
Program	Compile(<u>B</u>) F7		Compile programs
	Online(<u>C</u>) F5		Connect to controller
	Function Block Debug		Display/ Hide window of function block parameter debug
	Variable Debug		Display/ Hide window of variable debug
	Add to Debug List		Add tag to debug list

Menu	Submenu	Icon	Function
	Save the Real-time Value of Function Block		Save the real-time value of function block parameter
	Activate All Input Parameters		Activate all input parameters
	Activate All Output Parameters		Activate all output parameters
	Function Block Auto Queue		Function block auto queue
View	Function Block Library		Display/ Hide window of function block library
	Output Bar		Display/ Hide Information Bar
	Toolbar		Display/ Hide toolbar
	Status Bar		Display/ Hide status bar
	Information Bar		Display/ Hide function block information bar
	Show/Hide Selected Frame		Show/Hide selected frame of logic diagram
	Tag Descriptions		Display/ Hide descriptions of all tags.
	Tag Hardware Addresses		Display/ Hide addresses of all tags. Only when the tag is the channel tag, the address can be displayed.
	Initial Value of Function Block's Input Parameter		Display/ Hide default value when the input pin of function block is not connected
	Function Block's Config Parameter Initial Value		Display/ Hide part of pins or parameters of function block
Help	About		Display software information, version and copyright
/	/		Zoom In. Zoom in current program view
	/		Zoom Out. Zoom out current program view
	/		Normal. Revert current program view to original view
	/		Annotation. Make editing in annotation status
	/		Adjust Block Running Sequence. Adjust execution sequence
			Special Line. Set the specified line as Special Line in brown. Eliminate the circle.
			Normal Wire. Set the specified line as Ordinary Line, and it will included in auto queue
			Logic Diagram Select Frame. Select and drag to create a logic diagram select frame.
	/		Align Left. Align selected objects to the left
	/		Align Right. Align selected objects to the right
	/		Align Up. Align selected objects to the top
	/		Align Down. Align selected objects to the bottom
	/		Display currently quoted data of function block

4.3 Introductions to Information Bar

Information of all function blocks in current program is arrayed in execution sequence in information bar, making it convenient for users to quickly locate the function block for operation.

Specific instructions to function of information bar are shown in Table 4-2.

Table 4-2 Instructions to function of information bar

Operation item	Function
Double-click certain function block information	Select corresponding function block and center it
Right-click menu/ Modify function block	Pop up corresponding property setting window of the function block
Right-click menu/ Shift up/ Shift down	Fine adjustment of the execution sequence. The corresponding function block shift step -1/ +1
Ctrl+↑	Same as “Shift up”
Ctrl+↓	Same as “Shift down”

4.4 Introductions to Right-click Menu of Function Block/Tag

Select a function block/tag in the work area and right-click it; a shortcut menu will pop up, varying according to selected objects. Specific instructions are shown in Table 4-3.

Table 4-3 Instructions to right-click menu command of function block

Menu item	Function
Basic Properties	Properties settings for function block
Parameter Settings	Basic Parameter settings
Copy	Copy currently selected object
Paste	Copy object copied or cut to work area
Delete	Delete currently selected object
Activate Input	Activate current input
Activate Output	Activate current output
View Logic	View the logic of global function block
Debug Logic	Debug the logic of global function block
Assign FF Tag	Assign FF tag for current function block.
Unassign	Unassign FF tag

Table 4-4 Instructions to right-click command of tag

Menu item	Function
Select tag	Select a tag
Copy	Copy currently selected object
Paste	Copy object example copied or cut to work area: <ul style="list-style-type: none"> ● Reserve tag name of function block when cutting. ● Remove tag name of function block when copying.
Delete	Delete currently selected object
Display descriptions	Display tag descriptions
Display address	Display tag address

Section 5 Programming Instructions

5.1 Data Type

Table 5-1 System data type list

Symbol	Length (bit)	Instructions
BOOL	8	ON, OFF
SINT	8	-128 ~ 127
USINT	8	0~ 255
INT	16	-32768 ~ 32767
UINT	16	0~65535
DINT	32	-2147483648~2147483647
UDINT	32	0~4294967295
REAL	32	Float value
LREAL	64	Double-precision floating-point value ^{Note 1}

Note1: only controller FCU811-S supports LREAL.

5.2 Basic Program Elements

5.2.1 Datalink

Datalink is used to connect data variables in FBD program. By selecting data type of the variable via datalink function and editing the quoted variable, it can be made in accordance with specific tag in tag configuration software. Datalink block in editing area is shown in Figure 5-1.

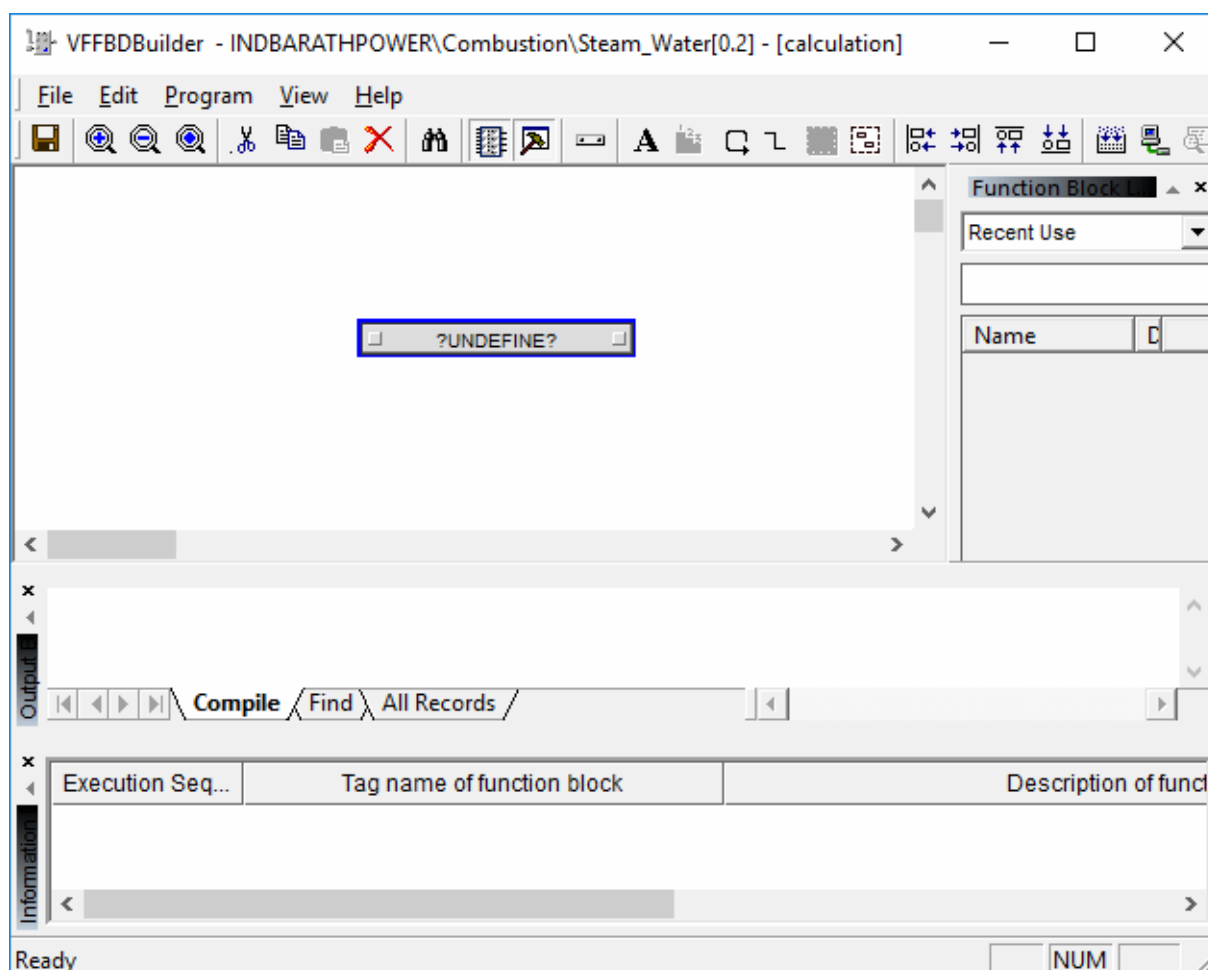


Figure 5-1 Datalink

- Double-click “Datalink” or right-click “Datalink” and select “Tag Selection” in the pop-up right-click menu, pop up a dialog box of “CS Tag Selecting”.
- After achieving tag reference, description display and hardware address display are available via “Display Description” & “Display Hardware Address” of the pop-up right-click menu, as shown in Figure 5-2.

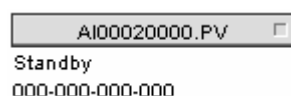


Figure 5-2 Display Description and Hardware Address

5.2.2 General Function Block

Function block is used to perform certain specific calculation function. In FBD program, function blocks can be classified into the following categories: control function block, logic control function block, analog processing function block, selection operation function block, arithmetic operation function block, logic operation function block, communication assistant function block, communication between stations function block, sequence control function block, industry function block, IO special processing function block, comparison function block, custom function block, etc. Function blocks of different types are separately stored in different function block libraries. Please refer to *Function Block Manual* for specific functions of each function block.

Function block example in editing area is shown in Figure 5-3.

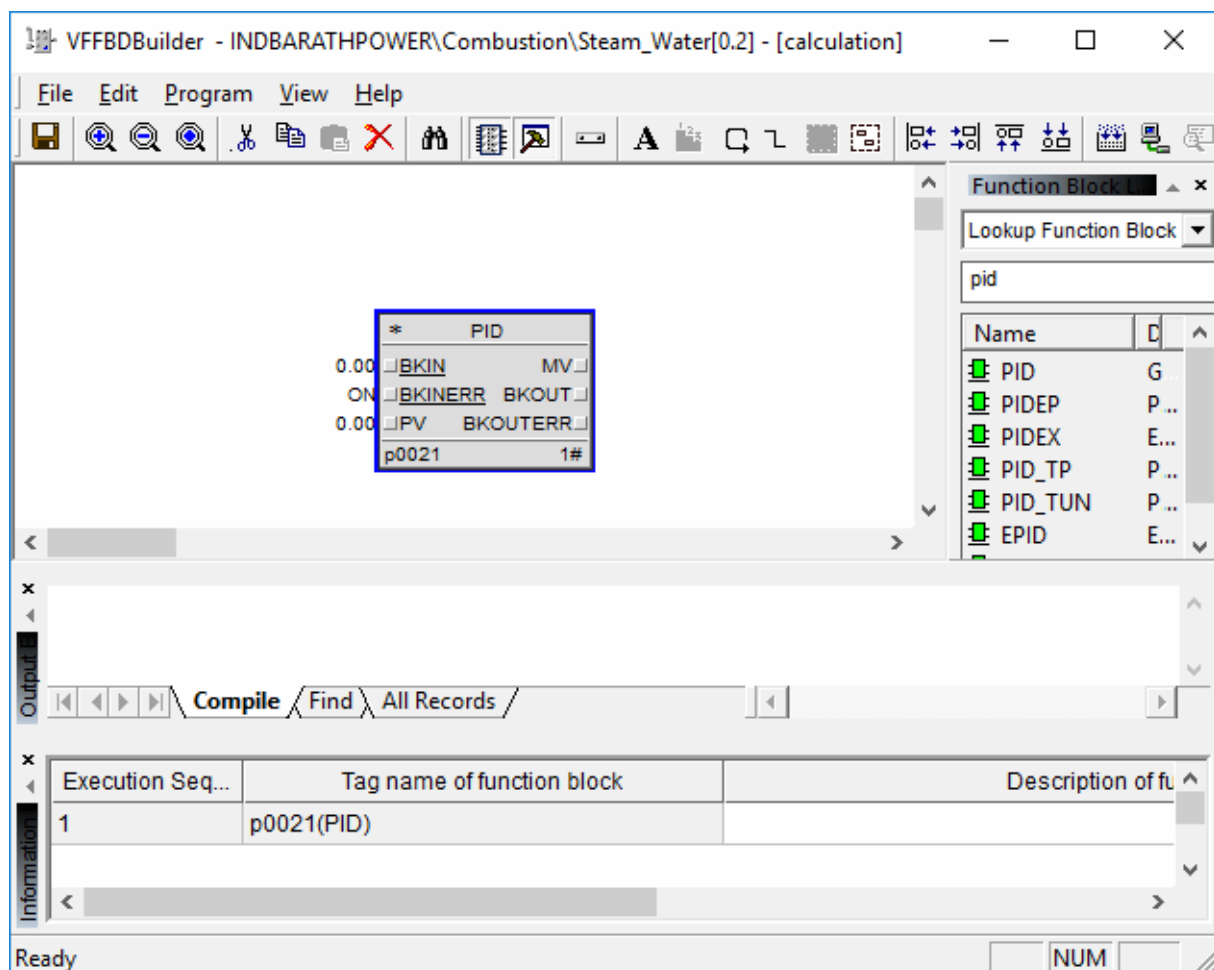


Figure 5-3 General Function block diagram example

5.2.3 Global Function Block

Global function block can be referenced in program of any control station. Please refer to the *Config Explorer User Manual* for details of global function block and how to create.

The global function block created can be applied in VFFBDBuilder. Figure 5-4 shows the example of referencing global function block "G_AAA" in the custom program.

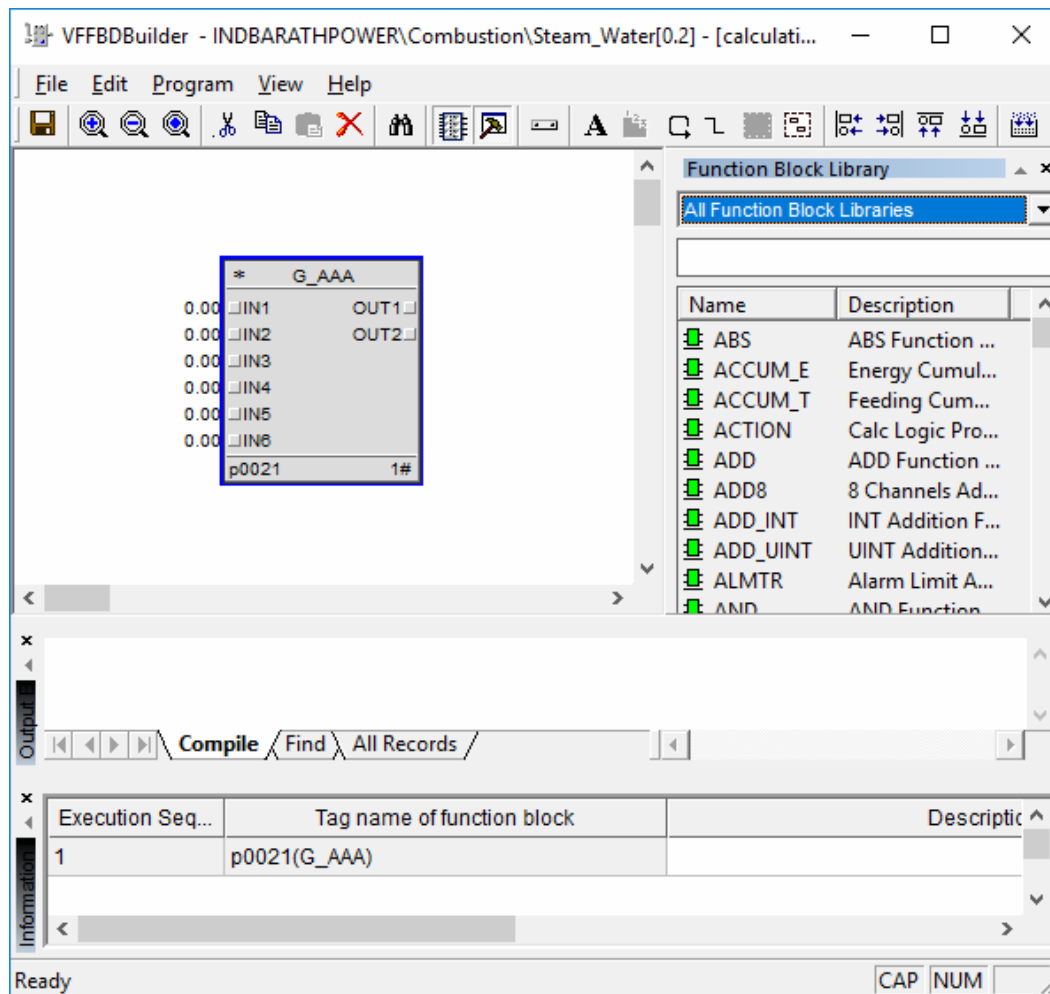


Figure 5-4 Example of global function block

Section 6 FBD Programming

6.1 Datalink

In the FBD program, you can add IO tag, custom variables and other datalinks, and you can also add array-type parameters of user function block.

6.1.1 Add a Datalink

When the controller is FCU711-S, FCU712-S, FCU713-S or FCU731-S, the FBD program in the controller can reads, writes and judges the tag in the control station through datalink. In the High-performanceHMI software, the datalink in the FBD supports hardware channel tag, custom tag and communication tag in the current control station.

1) Select Tag

Double-click Datalink or right click Datalink and select "Select Tag" in the right-click menu, select the tag to be added to Datalink in pop-up dialog box of control station tag selection, as shown in Figure 6-1

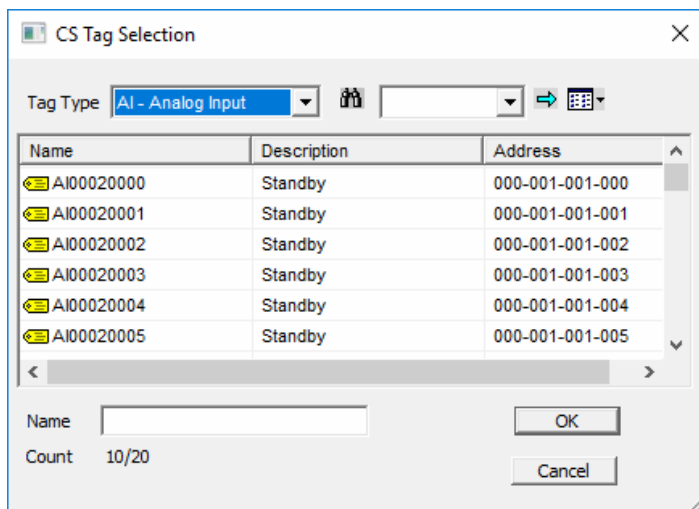



Figure 6-1 Interface "control station tag selection"

2) Select tag field.

- Select by R/W property.

When selecting a specific tag in tag selection box, users can have access to advanced parameter setting by clicking "View Parameter" button  of this tag. In the "Properties" column, "READONLY" means it cannot be accessed.

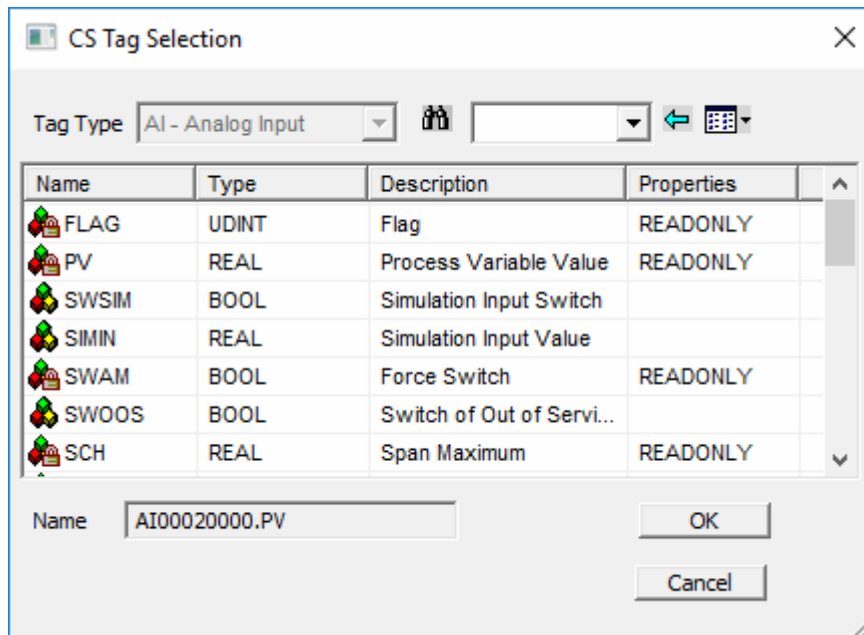


Figure 6-2 Tag parameter list

- Select array-type parameter.

When selecting array-type parameter, select the tag parameter (such as OUT1), and define its Index1 and Index2.

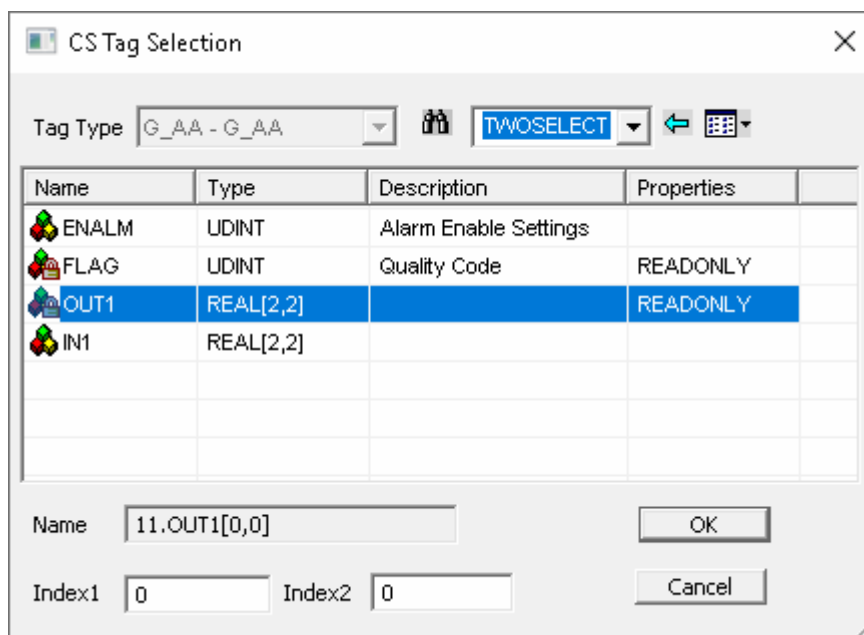


Figure 6-3 Array-type parameter selection

- 3) Click "OK" to finish adding, then the array parameter is displayed in the program in the format of "tag name.parameter name[index1, index2]".

11.OUT1[0,0]

Figure 6-4 Array parameter displayed in user program

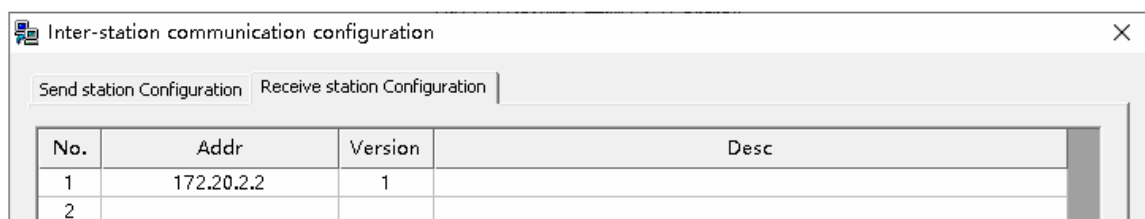
6.1.2 Add Cross-Station Datalink

For control stations with FCU714-S controllers, the user program supports the tags in the current control station as well as other FCU714-S control stations. The available address types include hardware channel addresses and custom addresses.

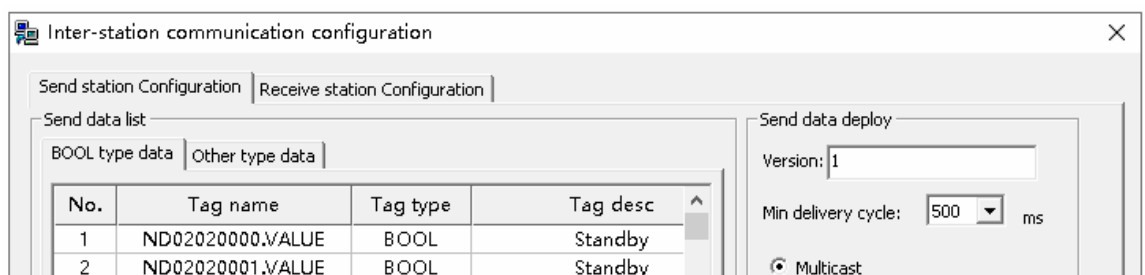
Prerequisites

When a control station needs to reference data from other stations, the current station should be configured as the data receiver, while the data source station acts as the data sender:

- In VFExplorer, select the current control station in the navigation tree and double click "Cross-system Station Communication" in the right area. Then add the address of the data source station in the dialog box that appears.



- In the control station configuration of the data source station, select "Inter-system Station Communication" and add the data that can be sent from the data source station in the dialog box that appears, as shown in the diagram below.



Tip:

For detail configuration of Cross-System Station Communication , please refer to *Config Explorer User Manual*.

Steps

- 1) Select "Edit > Datalink" in the menu bar, click the programming area after the shape of the mouse changed to add datatlink to the program.
- 2) Double click the datalink to bring up the "Tag Selection" dialog box as shown as below.

Tag Select

Tag Reference | Addr Reference

Control: Control:

Tag Type:

Name	Description	Address
AI02020000	Standby	000-000-000-000
AI02020001	Standby	000-000-000-001
AI02020002	Standby	000-000-000-002
AI02020003	Standby	000-000-000-003
AI02020004	Standby	000-000-000-004
AI02020005	Standby	000-000-000-005
AI02020006	Standby	000-000-000-006
AI02020007	Standby	000-000-000-007

Name:

Station communicational 4/8000

Figure 6-5 DataLink Supported Cross-Station Configure Example1

3) Configure the datalink

- On the "Tag Reference" tab, select the control domain, control station, and tag type where the tag is located. From the tag list, choose the desired tag. If the tag is within the current station, it is a local tag and it will be shown as . If the tag is a cross-station tag, it is a remote tag and it will be shown as .
- Select "Addr Reference," which displays the address configuration as shown in the diagram below. In the "Reference > Name" or "Reference > Alias" text box, configure the content of the address reference.

The name is used to specify the data type, station address, and domain address of the inter-station communication variable, in the format of "data type + index@station address.domain address." For example, in the control station shown in Figure [2.2], if a BOOL-type inter-station communication variable "ND02020000.VALUE" is added as a cross-station data reference to the user program, its reference name would be configured as "BOOL1@2.2". After adding it to the user program, the data reference is

displayed as shown .

The alias is used to specify the name by which the cross-station communication variable

is displayed in the user program. Aliases within the same control station cannot have the same name as other tags or aliases.

Tag Select

Tag Reference | Addr Reference

Reference

Name: Alias:

Filter

IP Addr: DataType:

Name Alias Filter:

Receive

Tag Name	Alias Name	Tag Desc.
BOOL1@2.2	BOOL1@2.2	

Figure 6-6 DataLink Supported Cross-Station Configure Example2

6.1.3 Add ISCP Datalink

When the controller type is FCU811-S, the FBD user program in the control station supports reading the tag information of other stations communicating with the current control station through ISCP (Inter-Station Communication Protocol) datalink.

Prerequisites

Before adding the ISCP datalink, you need to configure the ISCP tag of the current control station. For details, please refer to *VFConBuilder Software User Manual*.

Steps

- 4) Select "Edit > ISCP Datalink" in the menu bar.
- 5) Switch the shape of the mouse and click the programming area to bring up the "Tag Selection" dialog box.

- 6) According to the following table, configure the property of ISCP datalink.
 - Name shows the data type, station address and domain address of the inter-station communication variables, so its form should be "data type + serial number @ station address. domain address". As shown in the figure below, the BOOL-type inter-station communication variable "DI_SE0002000.PV" in the [0.2] control station is used as the ISCP data linked to the user program, and its reference name is "BOOL1@1.2".
 - Alias is the name of inter-station communication variable displayed in the user program. Aliases in the same control station cannot overlap with other tags or other aliases.
- 7) Click "Add", the configured ISCP will be added to the list below, where all configured aliases of interstation tags are listed.
- 8) Select the interstation communication tag and click "OK", the alias referenced by ISCP data will be displayed in the user program.

6.1.4 Delete Datalink

1. Click Delete in toolbar after selecting a single or several Datalinks in editing area;
2. Click delete command in edit menu after selecting a single or several datalinks in editing area;
3. Select delete command in the right-click menu after selecting single or several datalinks in editing area;
4. Click Delete key after selecting a single or several datalinks in editing area;

Methods above will all pop up confirmation box of delete and selected tag can be deleted after clicking "Yes".

6.1.5 Tag Update Prompt

Relevant descriptions and address information of reference tag will be re-read when starting or compiling the program.

If name or descriptions of reference tag are modified, update prompt will pop up when compiling or restarting the program, as shown in *Figure 6-7*.

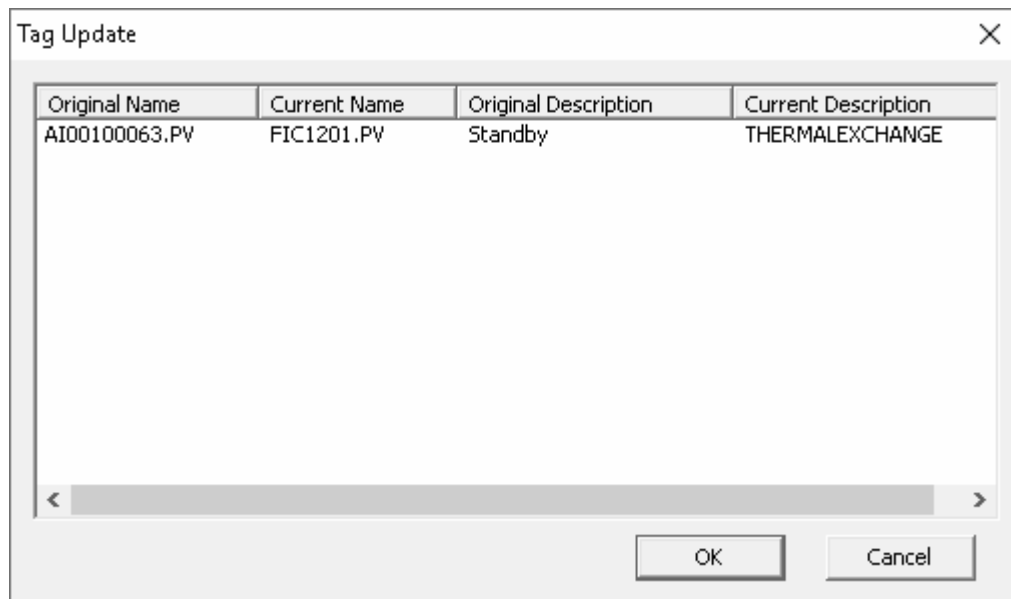


Figure 6-7 Tag update prompt

If the tag does not exist, tag update prompt will pop up to prompt user that the tag is not found, as shown in *Figure 6-8*

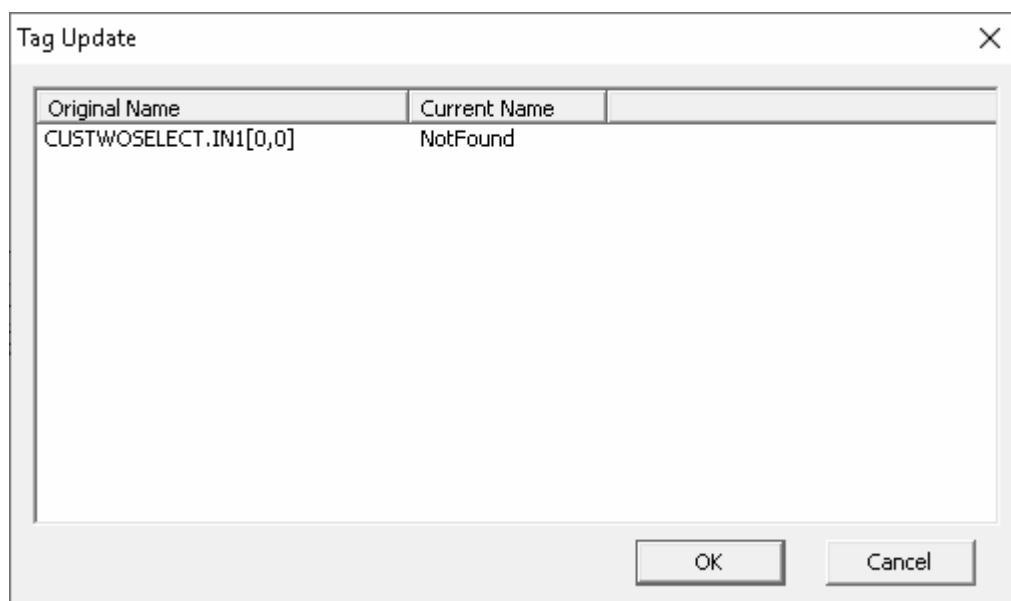


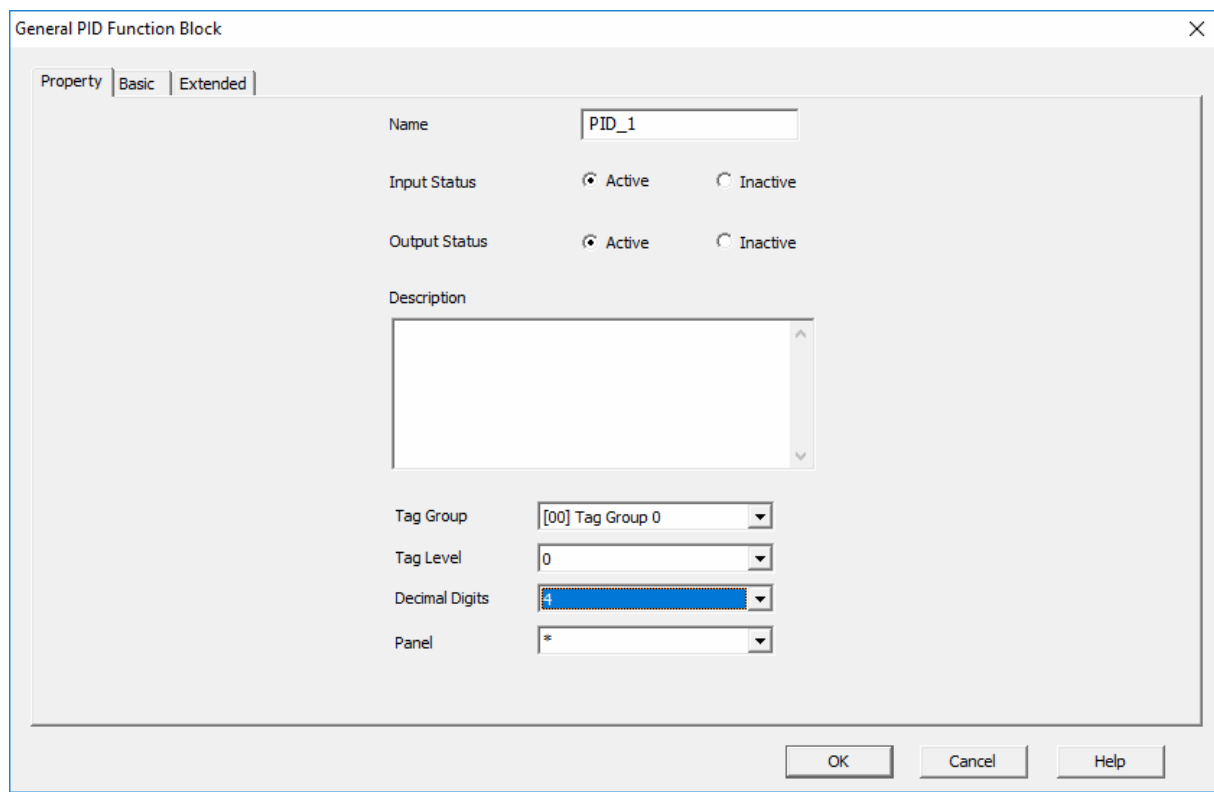
Figure 6-8 Prompt of tag not found

6.2 Function Block

6.2.1 Data Preparing

The function of naming the advanced function block is set to read its parameter information in Supervision conveniently. The named function block example can be displayed in the VFTAGBuilder by function block tag, as well as read in Supervision.

Name of function block tag cannot contain blank space. It can consist of letter, number, “_” and “-”. The tag name can contain 24 characters at most, and the description can contain 64 bytes at most.



General PID Function Block

Property Basic Extended

Name: PID_1

Input Status: ☒ Active ☐ Inactive

Output Status: ☒ Active ☐ Inactive

Description:

Tag Group: [00] Tag Group 0

Tag Level: 0

Decimal Digits:

Panel: *

OK Cancel Help

Figure 6-9 Naming the Function Block Example



Tip:

The name of function block must start with number or letter, and consist of letter, number, “_” and “-”.

6.2.2 Add a function block

Select the needed function block in function block library and move the mouse to editing area, click the mouse to create a function block example. The location of function block example can be adjusted by dragging it with mouse. Right click it in editing area to cancel the selected function block.

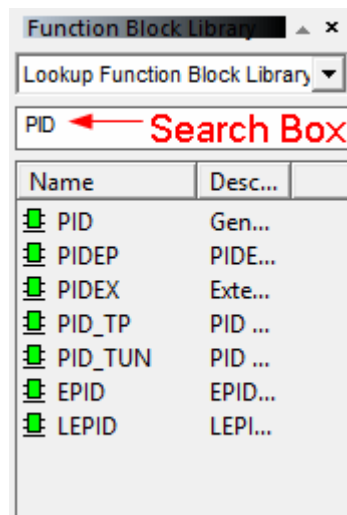


Figure 6-10 Function block library



Tips:

- Within a control station, only one type of SFC custom function blocks or Phase class function blocks is supported. If SFC custom function blocks are added, Phase class function blocks cannot be added. Similarly, if Phase class function blocks are added, SFC custom function blocks cannot be added again.
- The maximal capacity of one FBD program and the maximal data are limited by the capabilities of each controller. Please plan accordingly based on the capabilities of the controllers. When FBD program is overrun it will prompt “Program capacity overrun”, and when data is overrun it will prompt “function block memory limit”.
- To the new added or modified function block, the left of its type name will added symbol “*”.
- The function block can be searched by inputting the keyword in the “Search Box”. The keyword can be part of the function block name or the description of the function block.

6.2.3 Basic Property Settings of Function Block

Right-click function block and select item “Basic Properties” in the pop-up right-click menu, the dialog box of function block property setting will pop up.

Function blocks are classified into advanced function blocks and simple function blocks. Advanced function block with the function of naming the function block tag can be read in Real-time Supervision Software via function block tag name, meanwhile, it has instrument panel and tuning panel; simple function block without the function of naming the function block tag doesn't have instrument panel or tuning panel, and can't be read in Real-time Supervision Software.

Advanced function block

The basic properties settings of advanced function block are shown in Figure 6-11.

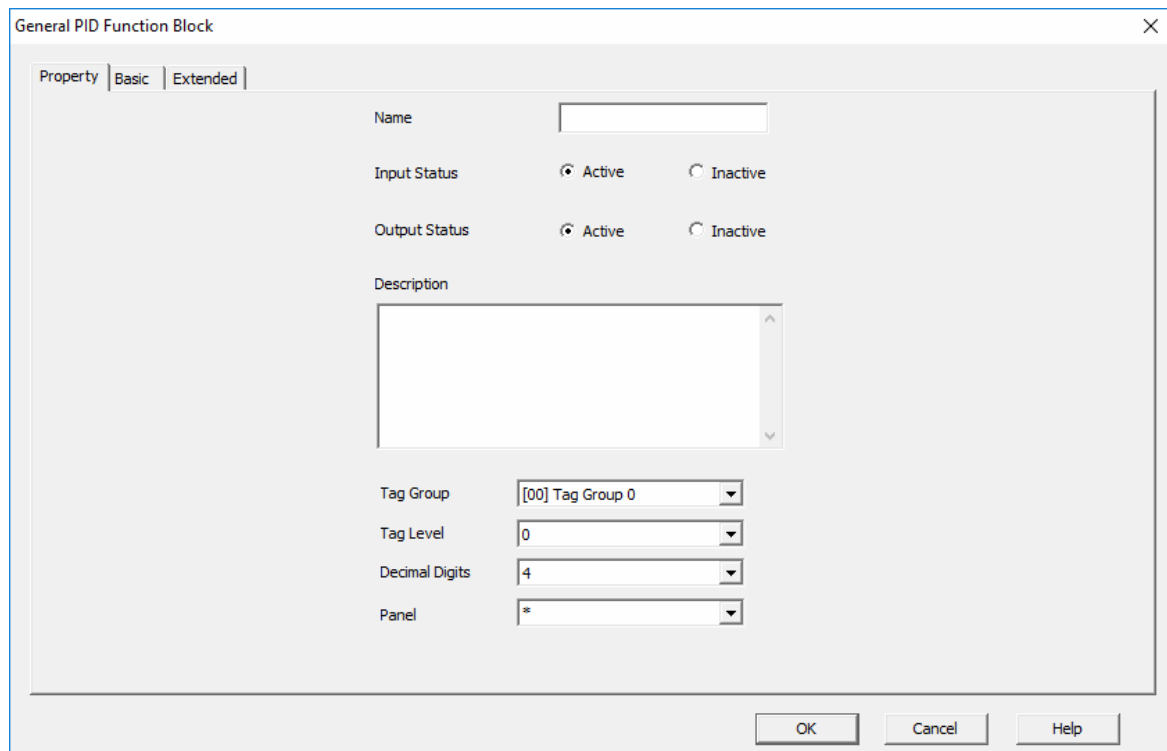


Figure 6-11 Advanced function block properties settings

- Set the tag name of function block

Make sure that each tag has a unique name in the whole project and each function block example name has a unique name in the program. If there are function blocks having the same name in the program, a prompt box “There is function block named “XXX” in this program”.

If there are function blocks have the same tag name within one control station, a prompt will pop up when being saved, as shown in Figure 6-12.

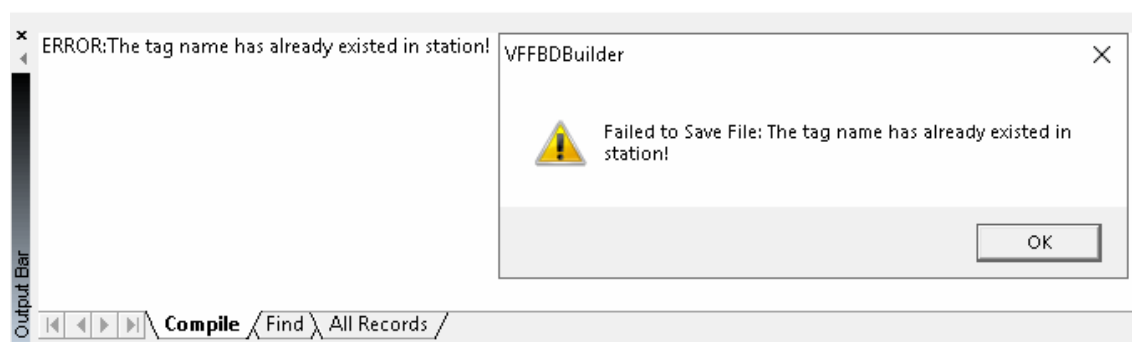


Figure 6-12 Prompt “Tag name repeated in the station”

If there are function blocks have the same tag name among the control stations, a prompt will pop up when being saved, as shown in Figure 6-13.

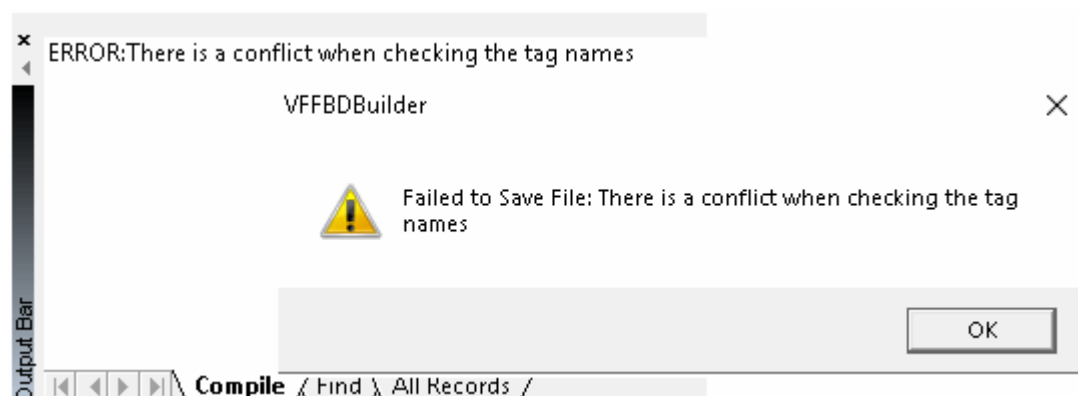


Figure 6-13 Prompt “There is a conflict when checking the tag names”

- Set the input or output active/ inactive status

Such as the status selected in Figure 6-11.

When input and output are inactive, function block will do nothing to the sign of Inactive which instead will be responded by FBD program. When the input of a function block is inactive, all inputs remain the value of last period (namely, no input update); when the output of a function block is inactive, the function block will be executed normally and output, but its output won't be sent to the input of its downstream function block (i.e., the input of downstream function block remains the value of last period). When in input and output are active, function block will be executed normally and output, and its output will be sent to the input of its downstream function block.

Active/ Inactive statuses of function block input and output are shown in Figure 6-14, when input and output are inactive, each pin will be red in online debug status.

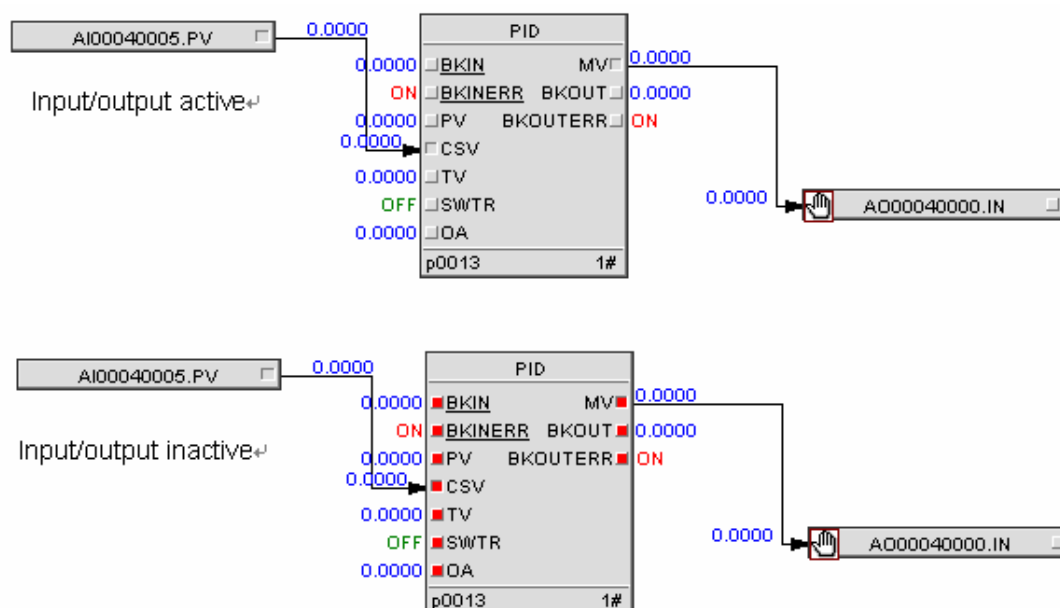


Figure 6-14 Active and Inactive status

**Attention:**

After function block is downloaded to main controller, its input and output can be forced to be in Inactive status by debug software. On this condition, users can set the forced value of function block's input, debug its logic to make sure the correctness of its function. It should be used cautiously because it may do damage to current process status, and switch Inactive to Active may produce interference to output. Debug engineer should grasp the best time for switch.

- Set the tag group

Tags are divided into groups from 0 to 31. Select tag group from pull-down box, as shown in Figure 6-15.

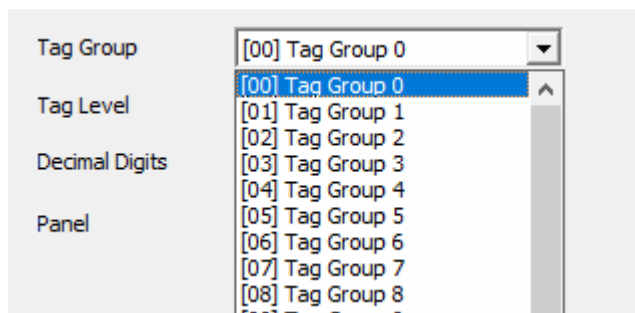


Figure 6-15 Select tag group

- Set the tag level

Tag degree has levels of 0~9 (level 0 is the highest and level 9 the lowest), select tag level from pull-down box, as shown in Figure 6-16.

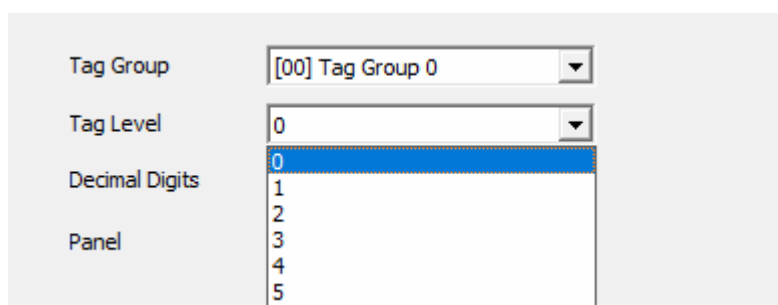


Figure 6-16 Tag level setting

Tag level is used for distinguishing whether to pop up reconfirmation dialog box in supervision when the tag value is modified. Users can set a level for some important tags, then set this level as the one which needs reconfirmation in "Security" ("Need Confirm") in System Builder Software.

- Set the decimal digits

Decimal digits can be chosen from 1 to 7, select decimal digits from pull-down box, as shown in Figure 6-17.

Figure 6-17 Decimal digits setting



Tips:

By default, function block has the same number of decimal places as the global default configuration.

During the operation of copy and paste, function block has the same number of decimal places as the number of decimal places configured in the instance of original function block.

- Set the panel

Select the panel type, which is created when editing global function block and system function block, from the pull-down menu of “Panel”.

Creating of the global function block and system function block refers to *Config Explorer User Manual*.

Figure 6-18 Panel setting

Simple function block

The basic properties settings of simple function block are shown in Figure 6-19.

The screenshot shows a dialog box titled "ADD Function Block" with a close button (X) in the top right corner. The dialog has three tabs: "Property", "Basic", and "Extended". The "Basic" tab is selected. Inside the "Basic" tab, there are several fields and controls:

- Name:** A text input field.
- Input Status:** Two radio buttons, "Active" (selected) and "Inactive".
- Output Status:** Two radio buttons, "Active" (selected) and "Inactive".
- Description:** A large text area with a vertical scrollbar.
- Tag Group:** A dropdown menu.
- Tag Level:** A dropdown menu.
- Decimal Digits:** A dropdown menu with a blue highlight.
- Panel:** A dropdown menu.

At the bottom right of the dialog, there are three buttons: "OK", "Cancel", and "Help".

Figure 6-19 Interface of “Add Function Block Properties Settings”

Only input and output status of function block can be set in “Function Block Properties” page, and specific setting procedure is the same as that of advanced function block.

Global function block

Properties settings dialog box of global function block is shown below.

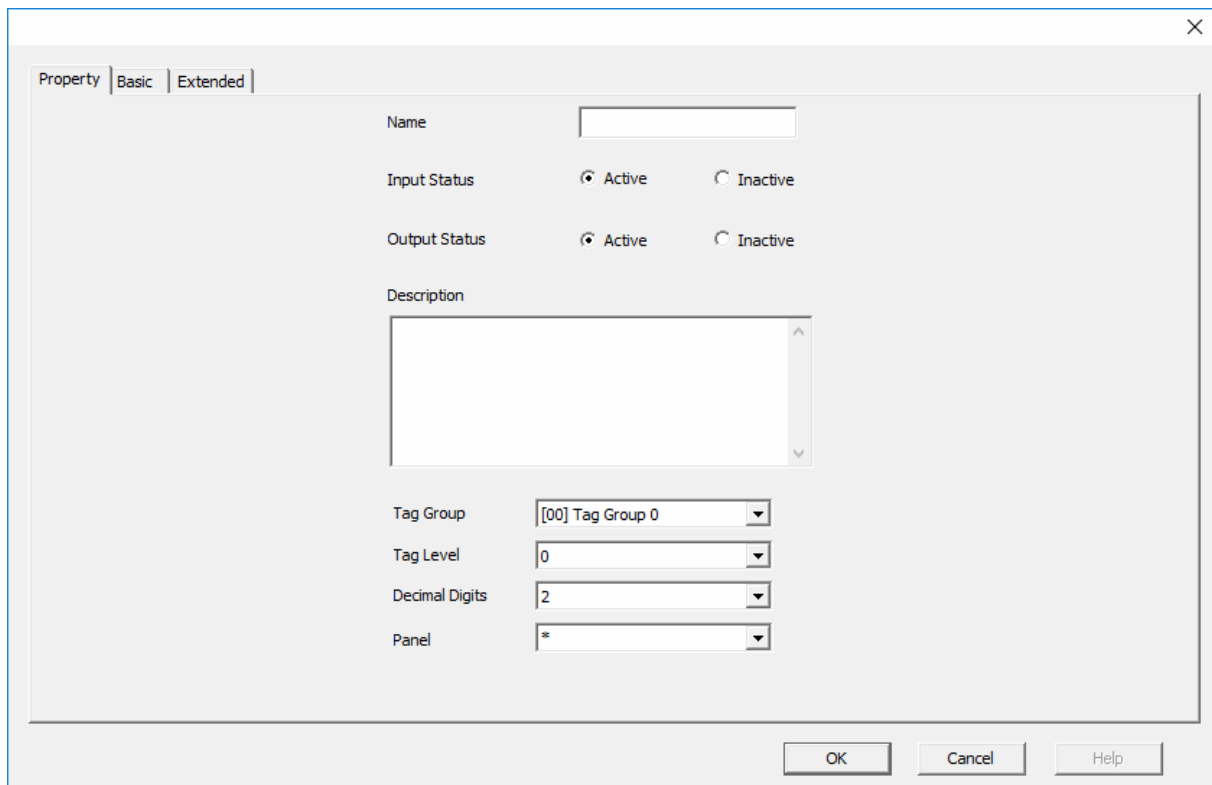
The image shows a software dialog box titled "Basic Properties Settings Dialog Box of Global Function Block". It has a tabbed interface with "Property", "Basic", and "Extended" tabs. The "Basic" tab is selected. The dialog contains several fields: a "Name" text box, "Input Status" and "Output Status" each with "Active" (selected) and "Inactive" radio buttons, a "Description" text area, and four dropdown menus for "Tag Group" (showing "[00] Tag Group 0"), "Tag Level" (showing "0"), "Decimal Digits" (showing "2"), and "Panel" (showing "*"). At the bottom right are "OK", "Cancel", and "Help" buttons.

Figure 6-20 Basic Properties Settings Dialog Box of Global Function Block

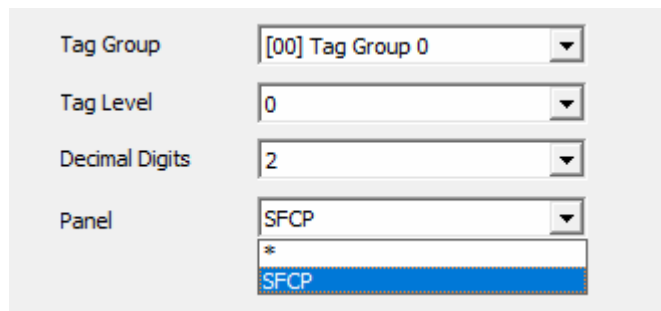
Users can configure contents as below.

- Name
- Input Status/ Output Status
- Description
- Tag Group
- Alarm
- Tag Level
- Decimal
- Panel

The configuration method is just like advanced function block.

Besides, users can also set Panel and Macro.

Panel setting of global function block is shown below. Users can select panel type for Custom Program in the pull-down menu. Panel types in the pull-down menu are the global function block panels created in VFExplorer.



Tag Group [00] Tag Group 0

Tag Level 0

Decimal Digits 2

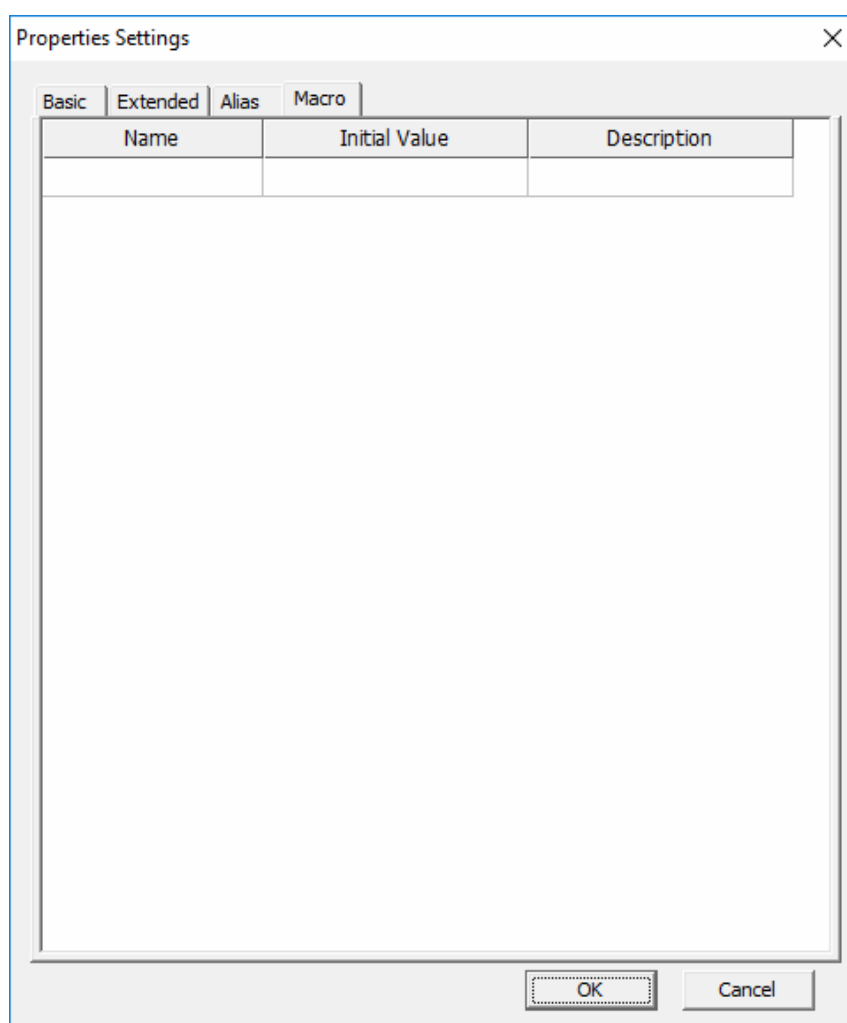
Panel SFCP

*

SFCP

Figure 6-21 Basic Properties Settings Dialog Box of Global Function Block (Panel Setting)

Macro setting of global function block is shown below. Select “Macro” in the Properties Settings dialog box.



Properties Settings

Basic Extended Alias Macro

Name	Initial Value	Description

OK Cancel

Figure 6-22 Global Function Block Macro Settings Dialog Box

Setting methods of panel and macro refer to Config Explorer User Manual 3.2.3 Configure Properties of Global Function Block.

6.2.4 Parameter Settings

Parameters are classified into basic parameter and extended parameter; they can be set in

window of “Function Block Properties Settings” and displayed in tree structure.

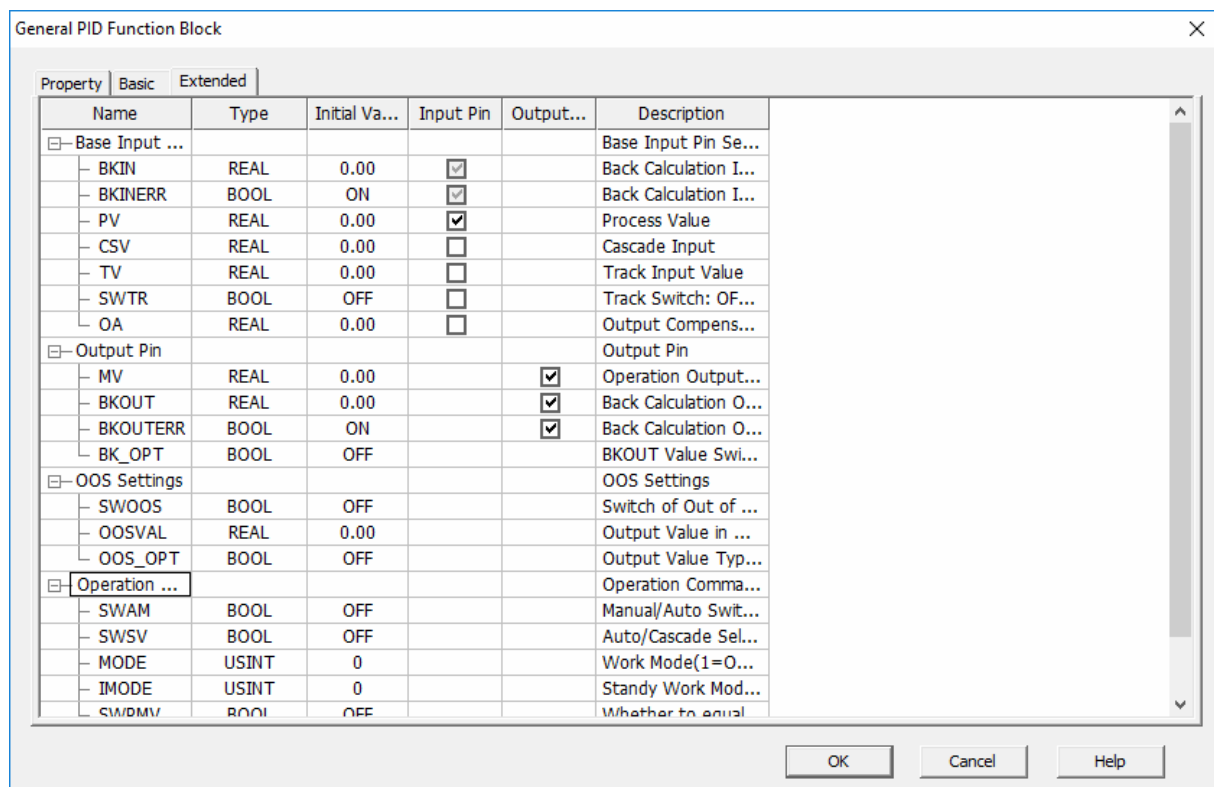


Figure 6-23 General PID Function Block Properties Settings Dialog

Initial Values and Pins

- Initial values of function block parameters can be set on the basis of default values. As shown in the “Extended” tab in Figure 6-24. The initial value in the list means the value of each parameter when it is downloaded for the first time.

In the figure below, when the parameter is of array type. Click "Settings" button in the "Initial Value" column. Configure the initial values in the pop-up window.

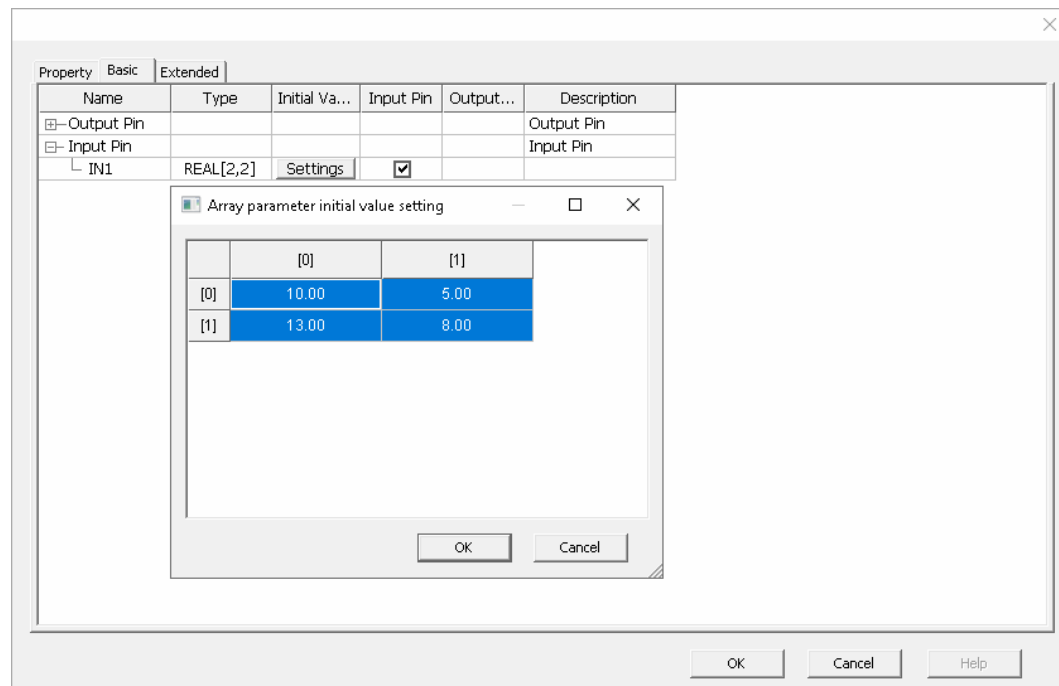


Figure 6-24 Array parameter initial value setting

- Selected parameters will be displayed as the input/output pin in the FBD program.

Alarm parameter setting

There is an “Alarm Enable Settings” in the basic parameter settings of some function blocks, click “Settings” button in the “Initial Value” column, a dialog box of “Alarm Enable Settings” will pop up, as shown in Figure 6-25.

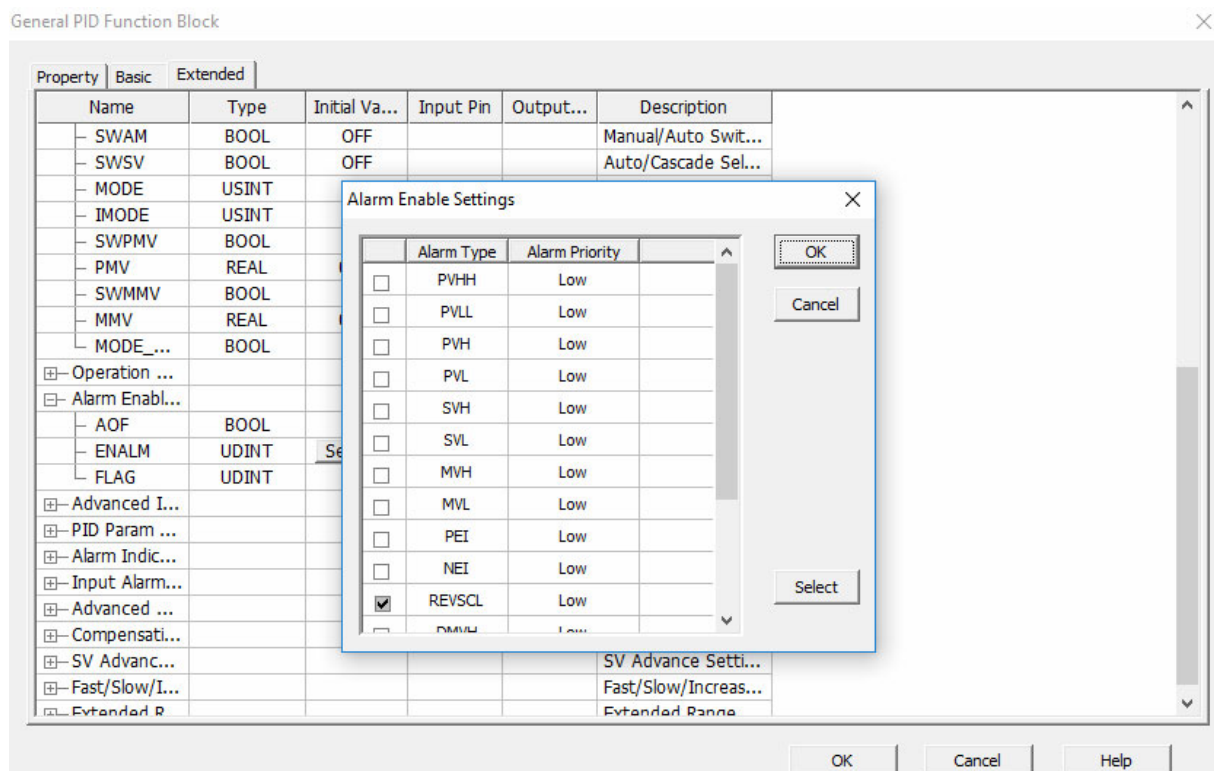


Figure 6-25 Alarm enable settings

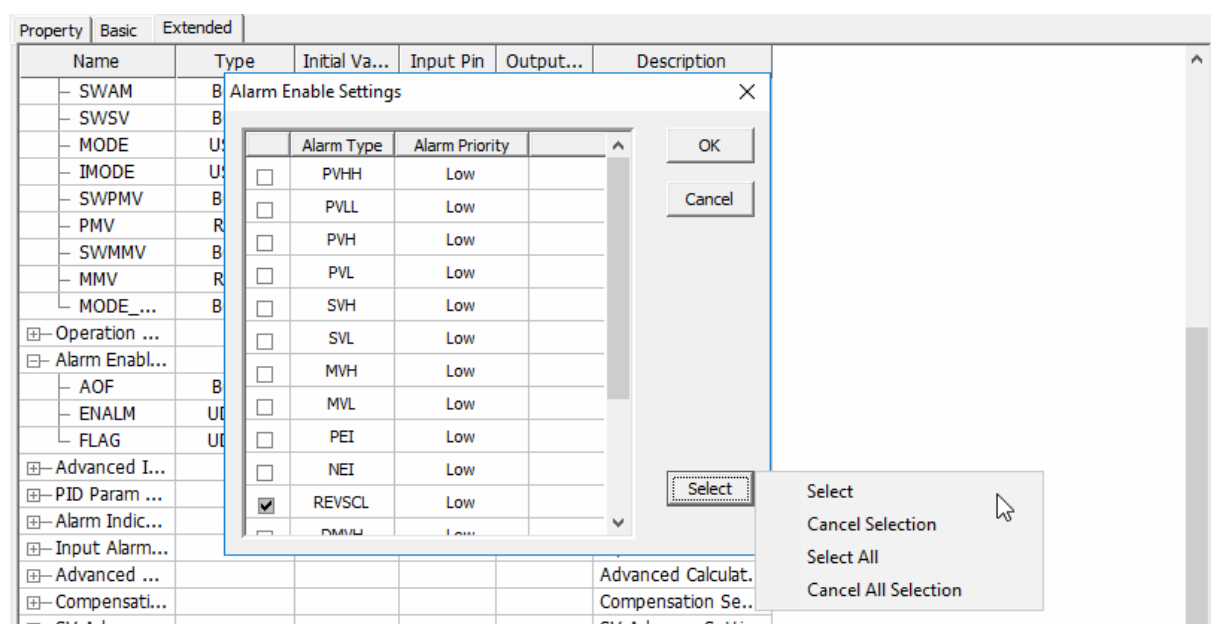
Enable the alarm parameter and configure alarm priority in “Alarm Enable Settings” dialog, operation steps are shown below:

1. Enable Alarm

Select the check box of “Alarm Type” to enable. Select to enable and unselect to disable.

Alarm can be enabled by batch enable and single enable:

- Select the check box of “Alarm Type” to change it as enabled ☒. Otherwise, it is disabled.
- Click “Select” and select “Select All” in the pop up menu, to complete the batch settings for alarm parameter.

**Figure 6-26 Alarm Enable Settings**

2. Configure Alarm priority

Select the alarm priority from drop-down menu of “Alarm priority”.

3. Click “OK” to go back, and complete the alarm parameter settings of function block tag.



Tip:

Please make sure the alarm priority of HHH alarm is higher than HH alarm when configuring tag alarm value, otherwise compiling error will pop up. It is similar with alarm configuration and has same requirements.

Basic parameter settings for other types

The initial values of some parameters can be inputted manually, or selected in pull-down menu by clicking the pull-down button. For example, the selection of project unit, users can select needed

unit on pull-down menu by clicking the pull-down button in the initial value column, as shown in Figure 6-27.

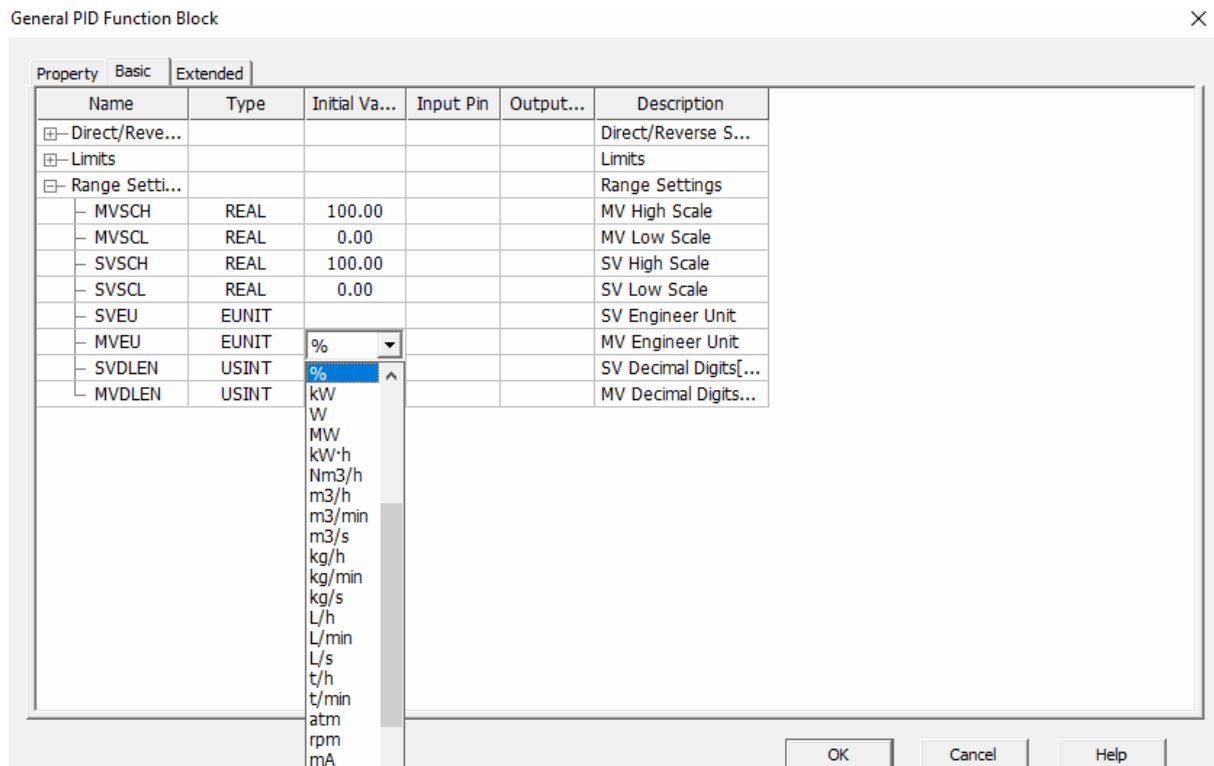


Figure 6-27 Project Unit Setting



Tip:

Initial value of function block example parameter is used as download initial value.

Modified initial values can also serve as a basis for function block's on-line download, and all parameter modifications will be recorded.

Engineers can set basic parameter and extended parameter according to different requirements.

6.2.5 Copy/ Paste Function Block and Wiring

Edit can be easier by copying/ pasting function block and wiring. Effect of copy/ paste:

- Paste the function block and wiring according to the copy source, the lines are totally same.
- Create a new function block of "Copy Source Tag Name_ copy No." (No. increases from 1 according to the copy source, make sure there is no repeated tag name in project. As shown below, the copy source tag name is "gg", and the pasted tag name is "gg_copy1".

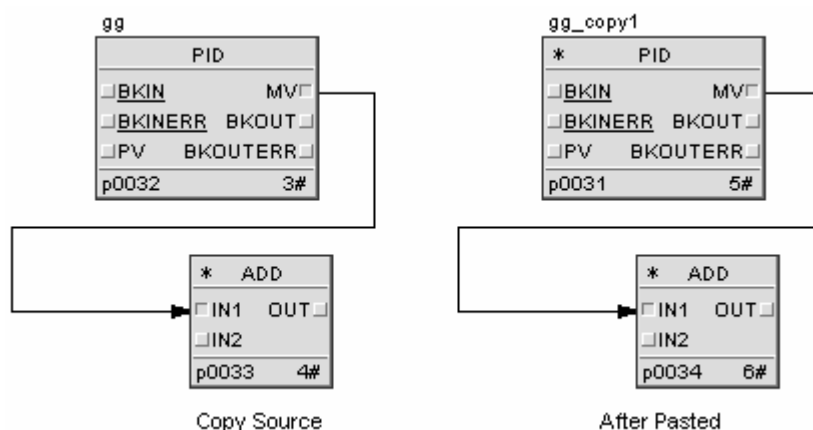


Figure 6-28 Copy and paste function block and wiring

6.2.6 Set the Execution Sequence of Function Block

Auto queue

Users can order the function block execution sequence according to the data flow by auto queue, to ensure the execution sequence with logic correctness.

The method of executing auto queue is clicking “Program” and selecting “Function Block Auto Queue” in “Menu Bar”. An ordinal number displayed in the bottom right corner, as shown below.

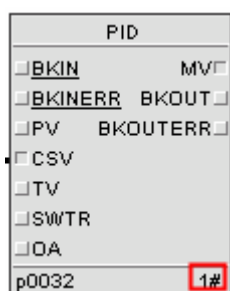



Figure 6-29 Auto Queue

There must have no loop in a paragraph in the Auto Queue mode. A loop refers to a function block can find itself through its output pin connection line. User can delete a certain connection line causing loop or set it as special line.

Method of setting special line refers to “6.3.2 Set Special Line”.

Manual queue

Click “Program” and unselect “Function Block Auto Queue”, or click the icon  in Toolbar to activate the sequence setting. Then the serial number in the lower right corner will turn into blue, as shown below. Users can click function blocks one by one to change the execution sequence (after sequence rearrangement, click one function block and it get the greatest serial number, other function blocks get serial numbers less than it one by one). The function block execution sequence is set according to the sequence of creating function block examples in default.

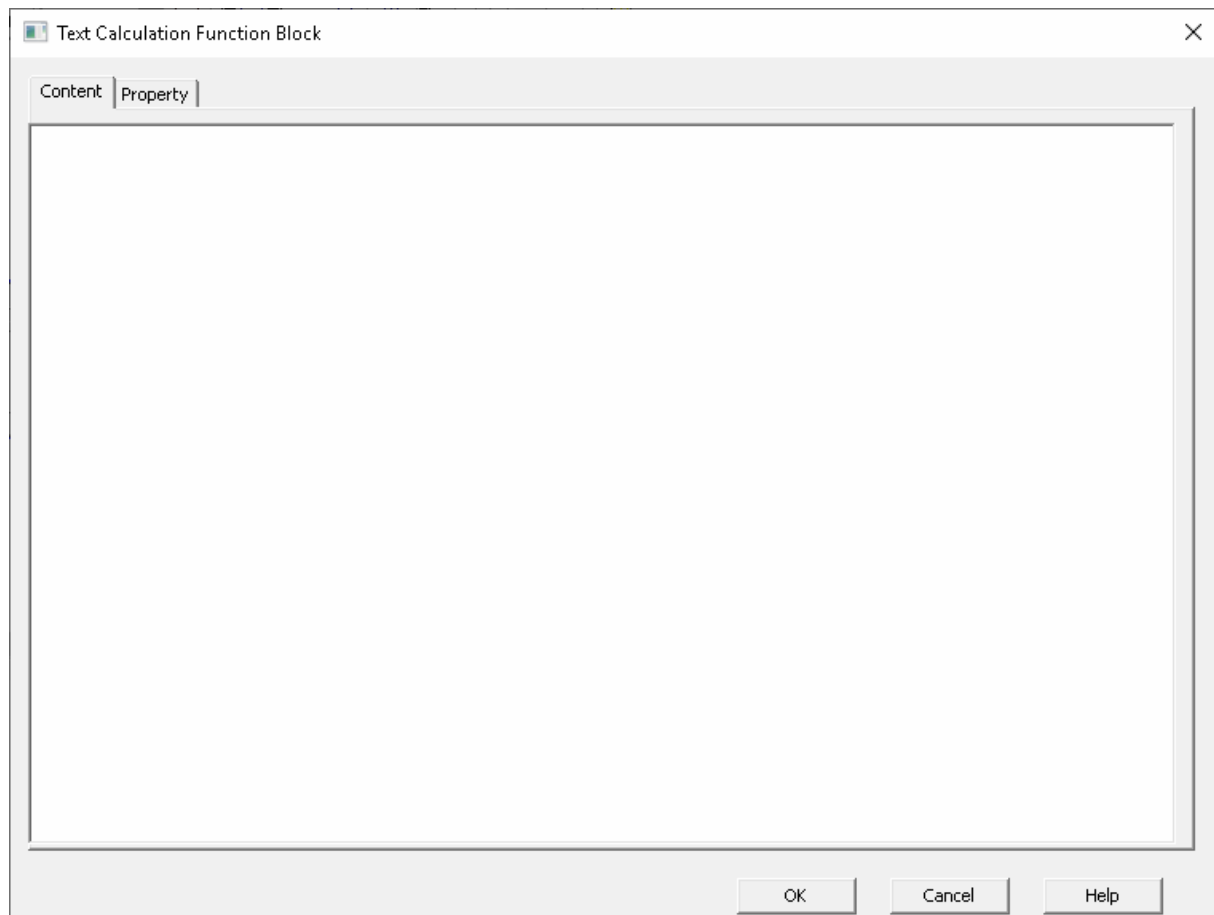


Figure 6-31 Content

CALC function block contains 4 REAL input and 1 REAL output by default, and can be extended to 16 input pins including 8 REAL, 4 BOOL and 4 INT, and 13 output pins including 5 REAL, 4 BOOL and 4 INT, as shown in Figure 6-32.

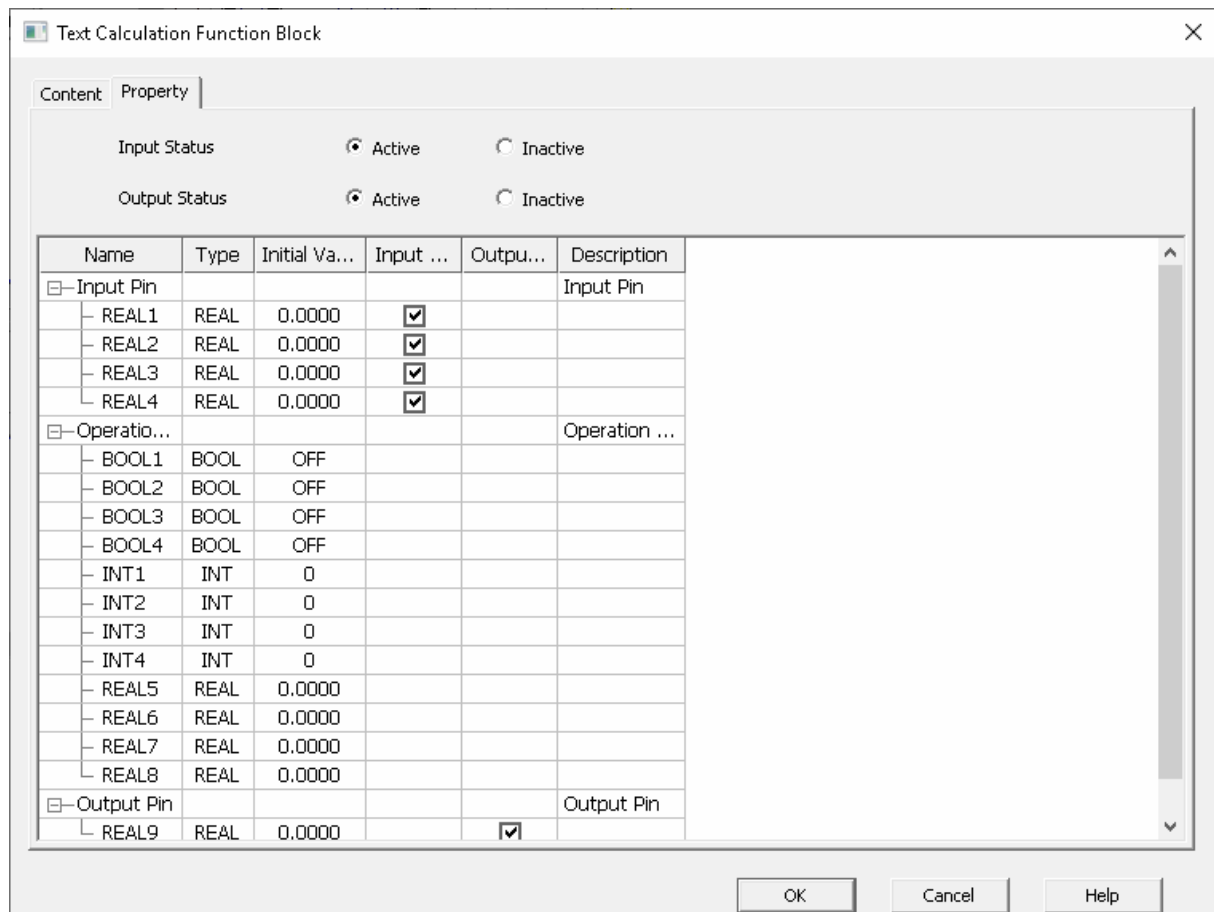


Figure 6-32 CALC Function Block parameter

When programming ST logic in CALC, users can only use these determinate input/ output pins instead of using tags and function blocks in system directly.

Please refer to FBD Builder Software on ST language programming rule.

For example, select REAL1 (input pin), REAL2 (input pin), BOOL1 (input pin), BOOL2 (input pin), REAL9 (output pin), and then input the logic shown in *Figure 6-33*, which relates each input/output pin to the practical tag. When the relevant tags of BOOL1 and BOOL2 are all on, the relevant tag of REAL9 equals that of REAL1, otherwise, it equals that of REAL2.

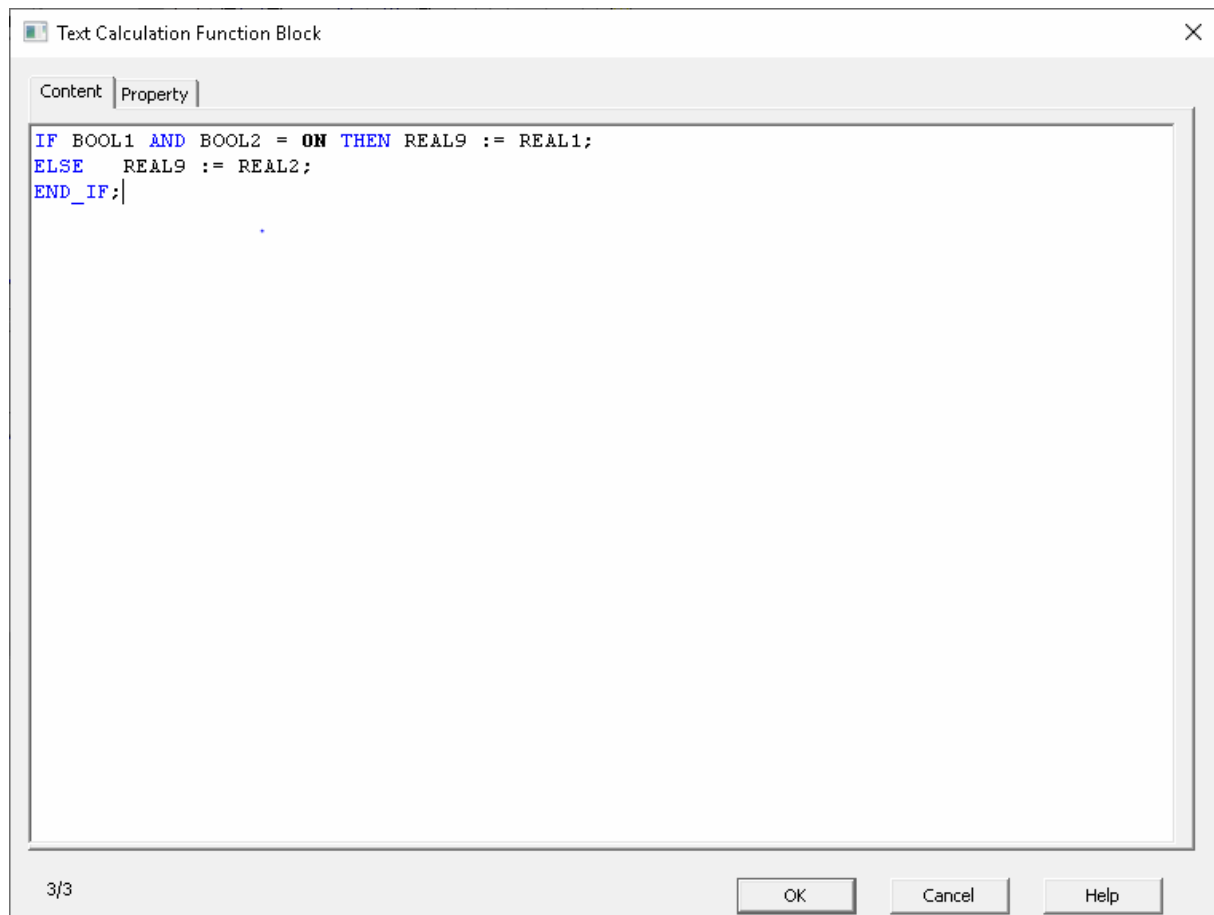


Figure 6-33 Text calculate function block

6.2.8 Alias Parameters Settings of Function Block (Optional)

When users need several custom function blocks with the same inner logic and different reference parameters (tags) not used as the parameters of input/output pins, then these parameters can be set as “alias variable”. The custom function block with alias variable needs to define tag example to alias variable in FBD Programming Software.

To build the association between alias variable and actual tags.

1. Select a custom function block with alias variable, open the dialog box of function block property setting and switch to “alias list” tab.
2. Double click alias parameter editing box, users can define tag example to alias parameter by the pop-up tag selector, as shown in *Figure 6-34*.
 - Only alias parameters can be edited and modified. The selected actual tags’ data type must be consistent with alias variable of function blocks. When the alias type of function block is array, the actual tags of array type should be selected.
 - Custom function block with alias (variable) must correspond to the actual tags, otherwise, it cannot be compiled.

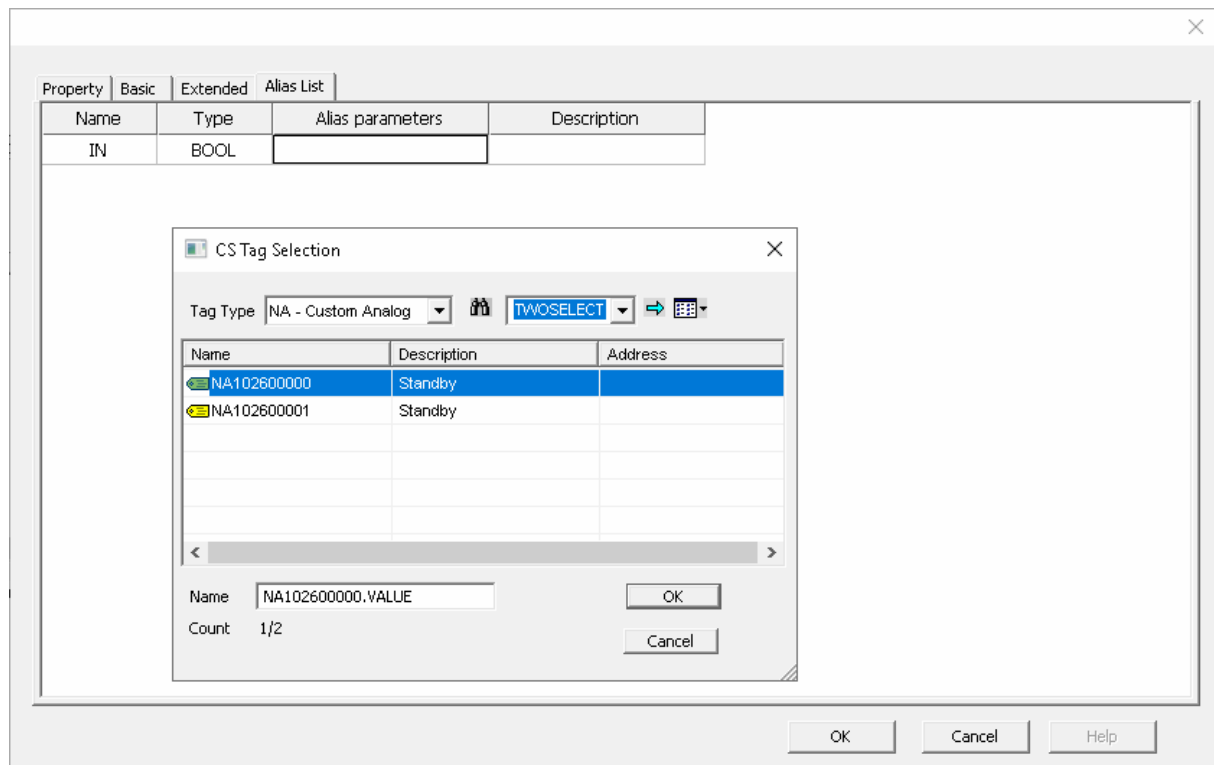


Figure 6-34 Editing interface of alias parameter of alias function block

6.2.9 Invalid Function Block and Its Auto Upgrade (Optional)

Invalid Function Block Introduction

When starting the program, function block in current archive will be compared to configuration file of the function block, and if the version of the function block is obsolete (the function has already been upgraded), the function block will be displayed in yellow indicating this function block is invalid.

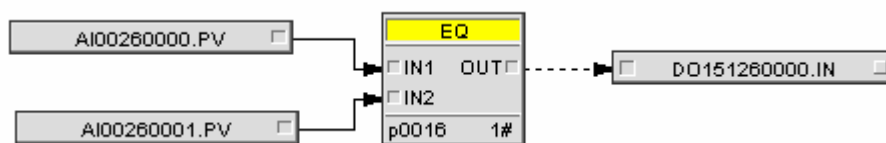


Figure 6-35 Invalid function block diagram



Tip:

System prescribes that when invalid function block exists in current program, adding of function block examples won't be allowed, and compile won't pass.

Auto Upgrade of Invalid Function Block

When starting the program, dialog box of “Invalid Function Block Auto-upgrade” will pop up if invalid function block exists in current program, and current invalid function block will be upgraded automatically after clicking “Yes”. If click “Cancel” now, users can also upgrade function block latter by “Auto Update” command in the right-click menu in editing area. The invalid function block can be auto updated while compiling in Configuration Explorer Software.



Tips:


- When upgrading function block, if pin parameter does not exist or parameter is modified (either parameter name or parameter data type), lines corresponding to the parameter will be deleted by system, therefore, program should be re-checked after auto-upgrade to guarantee correct logic.
 - When alias function block becomes non-alias function block, or non-alias function block becomes alias function block by adding an alias to this block, function blocks of this type can't be upgraded automatically.
 - Auto-upgrade may change the address of function block.
 - When it is found by upgrade check that upgrade may cause any item of data area, multicast data area and redundancy data area off limit, upgrade will be unavailable.
-

6.2.10 Set Display Mode of Function Block

The programming software of FBD supports the display mode of function block as needed.

- Display/ hide default values of input parameters
Select **View>Function Block Input Parameter Initial Value** in the menu bar. If this configuration item is checked, the default value when the function block input pin is not connected is displayed.
- Display/ hide some pins or parameters
Select **View>Function Block Configuration Parameter Initial Value** in the menu bar. If the configuration item is checked, some pins or parameters of the function block are displayed. If the item is not checked, some pins or parameters of the function block will be hided.

6.2.11 Create and Configure Logic Diagram

Click the icon  “Logic Diagram Select Frame” in toolbar, press the left key of mouse and drag into a frame, in which the graphics will be generated automatically.

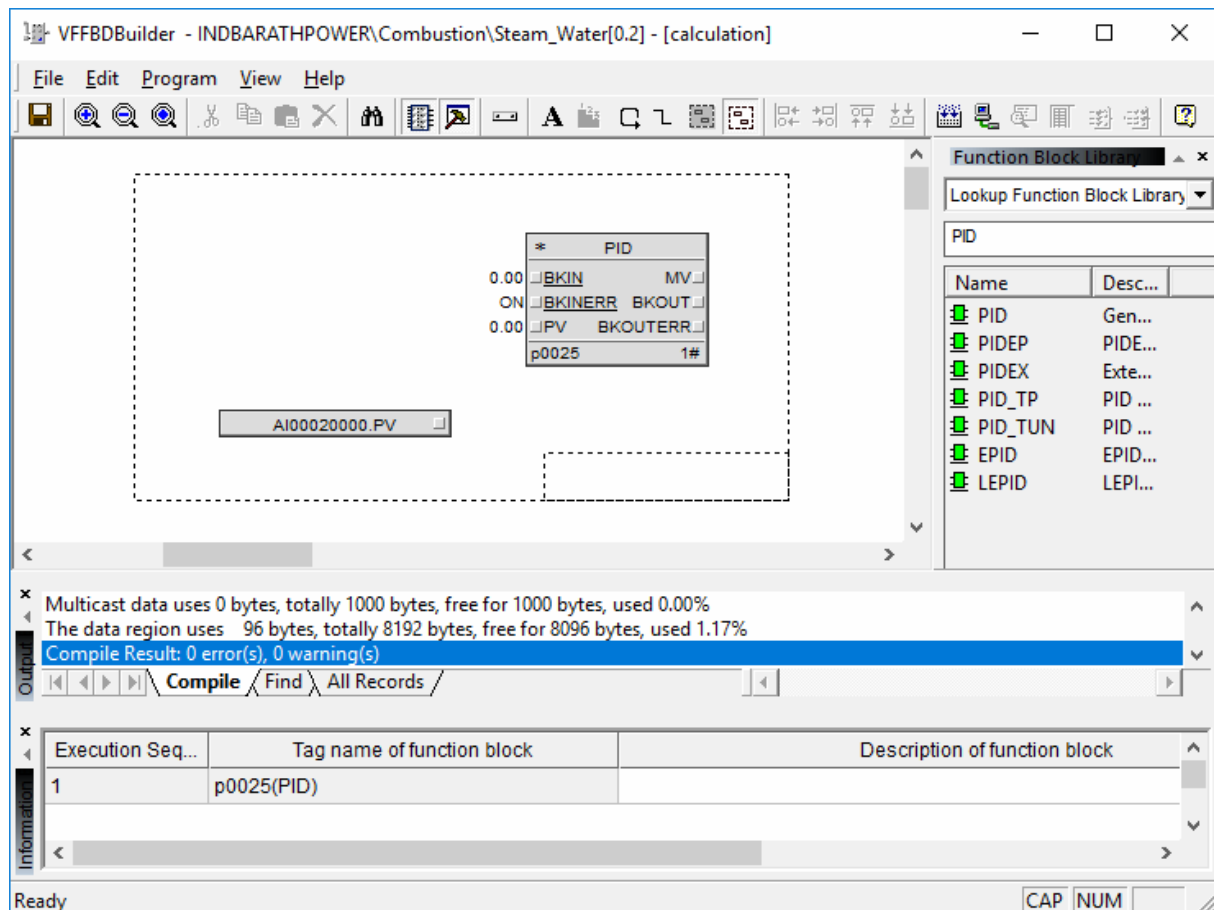


Figure 6-36 Logic Diagram Select Frame

1. Several graph objects can be put in an FBD program. VFFBDBuilder can generate several logic diagrams according to the frame graph objects.
2. The "Edit" box is in the lower right corner of frame. The name cannot be empty (and should conform to the naming rules of graphics), Frame names in the program page cannot repeat, cannot contain characters "\V:*?\"<>|!@#\$\$%^&=,.;[]+-~(){}`". The length cannot exceed 24 characters.
3. The graph object can be moved by selecting. User can select copy, paste, delete and properties settings by right-clicking the frame. The size of frame can be set in properties settings dialog, which cannot be less than pixel 200*400.
4. Click the "Show/Hide Select Frame" button in toolbar to show or hide the select frame. Save the settings, so the select frame will be shown as set when open again.
5. Right-click the select frame and select "Properties Settings" and the dialog below pops up.

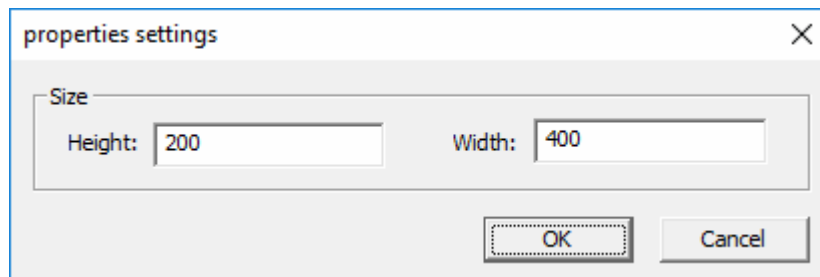


Figure 6-37 Properties Settings

Select a function block “PIDEP” in select frame, as shown below.

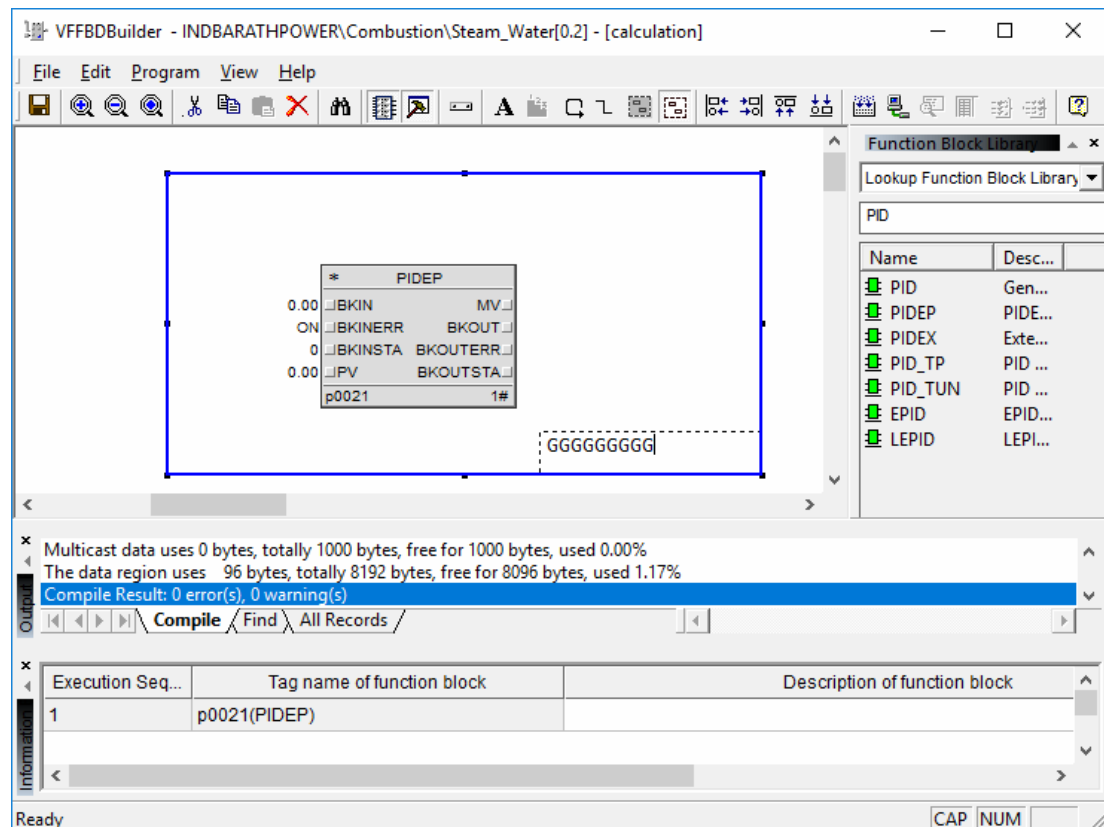


Figure 6-38 Draw select frame

In the real-time monitor, users can open this function block, click “Pop-up logic” button to view the logic shown in the selection box. If the logic contains data reference, it displays the real-time data according to the type of data reference.

- If the data reference is normal tags, it normally displays the real-time value of tags.
- If the data reference is data tags, it only displays the real-time values of array tags in this local control domain. The real-time values of array tags in the reference domain doesn't be displayed.


6.3 Connection line

6.3.1 Connect Function Blocks

Lines between function blocks should come from output to input, users should first select the output of a function block (a blue box will appear around the output when it is selected) and keep the mouse button pressed until it is dragged to the input of another function block, and in this way, the line between output and input is created.

6.3.2 Set Special Line

Connection line can be set as special line in the mode of Auto Queue to eliminate the circle. When Auto Queue is executed, the special line will be ignored by the program.

The method of setting special line: select the specified connection line and click the icon  in the Toolbar. The selected line will be brown (the line has been brown will not change), which means the line has been turned into special line.

6.3.3 Set Ordinary Line

Special line can be restored as ordinary line in the mode of Auto Queue, and then it will be included by the program when Auto Queue is executed.

Special line can be restored to the ordinary line by the buttons in toolbar. Select the special line (displayed as brown) and select to restore it the ordinary line (displayed as black) .



Tip:

- Only the lines from output pin of upstream function block to input pin of downstream function block are allowed.
 - Software will check the consistency of data types of objects connected by the line automatically, and connection will not be allowed if data types are not consistent (line will become red in this case, normally it is blue).
 - When the line connected the BOOL data, the line will be the broken black line.
 - One output pin of function block can be connected to several input pins of other function blocks, but one input pin of function block can only be connected to one output pin of another function block.
-

6.4 Compile



Tip:

Users can debug the function blocks with simulation controller when real controller is

absent or concerning of security.

Compilation is used to check whether the reference tag exists, whether tag name conflicts exist on program page, and the compilation result will be displayed on output bar.

A completed FBD program should be saved, compiled and downloaded before online debug. If the program passed compilation, but hasn't been downloaded, prompt box will pop up after clicking "online" to prompt "Program need download".




If the compilation is not passed, the program can be saved, but cannot be downloaded.

6.5 Online Debug

After the compilation and download of FBD, click "Online" button in the toolbar for online debug, and "Program Debug", "Function Block Debug", "Variable Debug" and "Save the Real-time Value of Function Block" keys become enabled, in addition, option "activate all input parameters" and "activate all output parameters" will be enabled.

Instructions to function keys are shown in Table 6-1.

Table 6-1 Instruction list of function keys

	Online
	Program Debug
	Function Block Debug



Tip:

Users can set input and output to Active or Inactive according to requirements when debugging. Users can select "Activate All Input Parameters" and "Activate All Output Parameters" in "Program".

6.5.1 Program Debug

Click "Program Debug" button and the real-time value of each function block pin in program area will be displayed. If the user function block or global function block in the program area contains array parameters, the array parameters do not display real-time values.

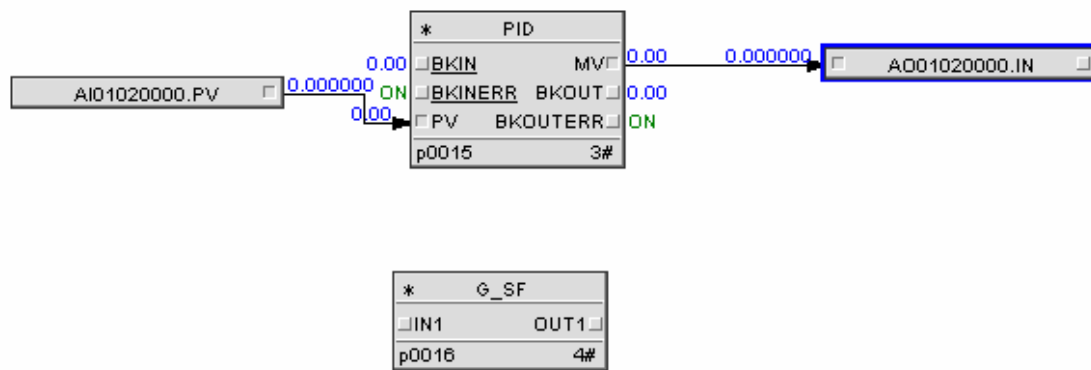


Figure 6-39 Real-time value of function block pin

As shown in the figure above, the real-time value of each pin of the PID function block is displayed in the program area. IN1 and OUT1 in G_SF are array-type parameters, so their real-time value is not displayed. If you need to view the real-time value of the parameter of this type of function block, you can click the “Set” button in the parameter real-time value column in the function block parameter debugging interface, and the real-time value of the array member will be displayed in the pop-up interface.

In the debugging process, if the program didn’t run or the result wasn’t correct, the possible cause is the program has been shielded. You should check the status of the program for confirming whether or not it is shielded. For details, refer to “Online” section in *VFExplorer User Manual*.

6.5.2 Function Block Debug

Click “Function Block Debug” button, interface of function block parameter debug will pop up. Select any function block and the real-time data of all parameters of the function block will be displayed in debug bar, and modification on-line is allowed (except for configuration parameter).

Function Block Parameters		Alias List	
Name	Type	Real-ti...	Description
[-] Base Input...			Base Input Pin Settings
[-] BKIN	REAL	0.00	Back Calculation Input
[-] BKINERR	BOOL	ON	Back Calculation Input ...
[-] PV	REAL	0.00	Process Value
[-] BKINSTA	USINT	0	Multimode Feedbac In...
[-] OA	REAL	0.00	Output Compensation ...
[-] SV	REAL	0.00	SV
[-] Output Pin			Output Pin
[-] MV	REAL	0.00	Operation Output Value
[-] BKOUT	REAL	0.00	Back Calculation Output
[-] BKOUT...	BOOL	ON	Back Calculation Outpu...
[-] BKOUT...	USINT	252	Multimode Feedbac Ou...
[-] BK_OPT	BOOL	OFF	BKOUT Value Switch(O...
[-] OOS Setti...			OOS Settings
[-] SWOOS	BOOL	OFF	Switch of Out of Servic...
[-] OOSVAL	REAL	0.00	Output Value in OOS S...
[-] OOS_O...	BOOL	OFF	Output Value Type in ...
[-] Deviation I...			Deviation Indication
[-] EI	REAL	0.00	Deviation
[-] Alarm Ena...			Alarm Enabled and Sup...
[-] AOF	BOOL	OFF	Suppress Alarm
[-] ENALM	UDINT	Settings	Alarm Enable Settings
[-] FLAG	UDINT	2	Flag

Figure 6-40 Function block parameter debug

If the control scheme would be changed if a parameter is modified in real-time status, the parameter is called configuration parameter. For example, Direct/Reverse action selection switch (SWPN), control output type (OUT_OPT) in PID function block, etc.



Tips:

For FF function block, parameter values in different status are in different colors.

- Blue question mark refers to that the parameter status is uncertain.
- Red cross refers to that the parameter status is bad.
- Black refers to that the parameter status is good.

6.5.3 Variable Debug

Click “Variable Debug” button, variable debug column will pop up, as shown in Figure 6-41.

[illegible]

Figure 6-41 Variable debug bar

Double click reference tags connected to each function block pin in debug status, the real-time value of corresponding tag will be displayed in variable debug column (as shown in Figure 6-42, double click reference tag AI00100001 connected to CSV pin in function block PID, and the real-time value of the reference tag is displayed in variable debug column).

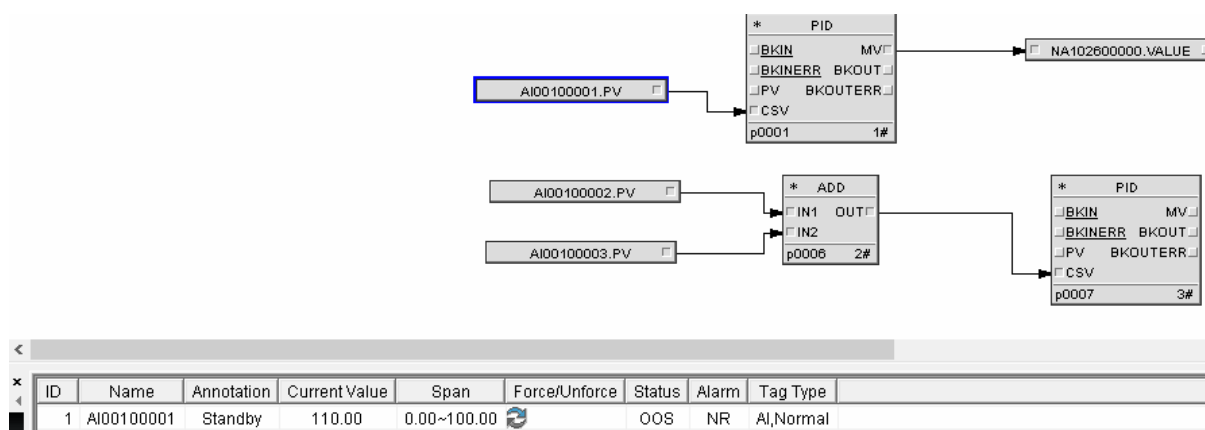


Figure 6-42 Variable debug bar displays real-time value



6.5.4 Save the Real-Time Value of Function Block

Select any function block and click “Save the Real-time Value of Function Block” button, dialog box for saving parameter will pop up. The real-time value of function block can be saved by this function, making it convenient for parameter upload. When uploading real-time data of function blocks, software record closes data at the point where data is uploaded and then upload them.

[illegible]

Figure 6-43 Parameter save

As shown above, the change status of tag is shown in the first column of the parameter list.

-  shows the parameter real-time value has changed.
-  shows the parameter real-time value has not changed.



Tips:

- In debug state, Input/ Output of function block can be activated by right-click menu of the function block.
 - Parameters that can't be modified in debug state can only be adjusted in function block parameter column in function block properties settings interface.
-

Section 7 Other Operations and Prompts

7.1 Show Associated Program

When editing the program, you can view the linked programs of tags to avoid duplicate tag assignment and other operations. The tag includes the datalink or instantiated function block tag in the program.

- 1) Select the tag

Select the tag in the programming area and select "Show Associated Program" in the right-click menu.

- 2) View the result

If the tag has associated programs, the "List of Associated Programs" will pop up, as shown in the figure below.

Where, the data link is displayed as "Assignment"; the function block instance is displayed as "Instance"; the alias tag is displayed as "Alias".

Click the program page on the list to open the associated program.

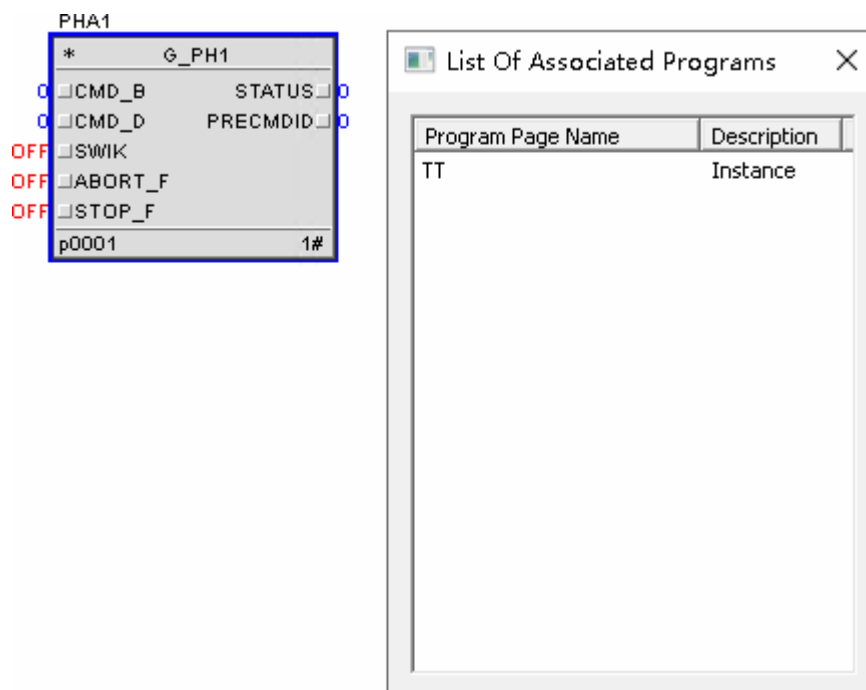


Figure 7-1 Example of associated programs

**Tip:**

If the configuration version of the program does not support "Show associated program" function, you need to select the user program in the navigation tree of VFExplorer and right-click "Update Tag Usage".

7.2 Find and Replace

VFFBDBuilder supports finding and replacing tag in the datalink or instantiated function block of current program, and the operation are describes as following.

- 1) Select "Edit > Find/Replace" to popup dialog shown as below.

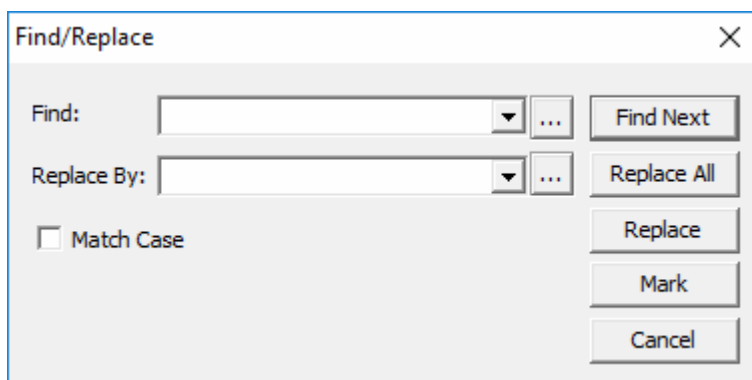



Figure 7-1 "Find/Replace" Dialog Box

- 2) Configure the tag to be found and replaced in "Find" and "Replace".
Operation of configuring "Find" and "Replace" is:
Input in the textbox or click  to select tag in the popup "CS Tag Selection" dialog box.
- 3) Check "Match Case" by requirement.
Check, the configured tags must match the tags in program with case matched.
Otherwise, the tags can match without case matched.
- 4) After configured "Find" and "Replace", select operation button by requirement:
 - Find Next, tag will be found in program one by one, and click "Replace" to replace its content.
 - Replace All, all tags match the condition in the program will be replace in a batch.
 - Mark, the operation result will be shown in the output bar.

**Tips:**

If the content found and replaced are both correct, the operation of “Replacing All” will be succeeded. Otherwise, the operation of “Replacing All” will be failed.

7.3 Modify Basic Properties in Batch

User can modify the description, tag group and tag level of complex function block in batch via the information bar.

Steps to modify basic properties of function block in batch:

- 1) Select the function block whose basic properties should be modified in batch in the edit area.
- 2) Select **View/ Information Bar** in menu bar to pop up the “Information Bar” below.

Execution Seq...	Tag name of function block	Description of function block	Tag Group	Tag Level
1	p0021(PID)		Tag Group 0	0
2	p0024(ADD)			

Figure 7-2 Modify function block properties in batch in information bar

- 3) User can modify function block properties in batch in “Information Bar”:
 - After cancel the “Auto Sorting for Function Block”, user can right-click to change its execution sequence.
 - Right-click to pop up the function block properties dialog, in which user can change the function block properties.
 - Support copy and paste.
 - Support pasting contents in Excel for description, tag group and tag level of function block: normal format of tag group is “Tag Group N”. There is a space between “N” and “Tag Group”. Description of custom tag group should conform to this rule too.

**Tips:**

- Execution sequence and tag name of function block don’t support modification in batch.
- Basic properties are unnecessary for normal function block. As the function block ADD shown in the figure above. So it is not editable.

7.4 Object Movement and Object Zoom

7.4.1 Object movement

FBD programming software supports dragging function blocks, users can click the selected

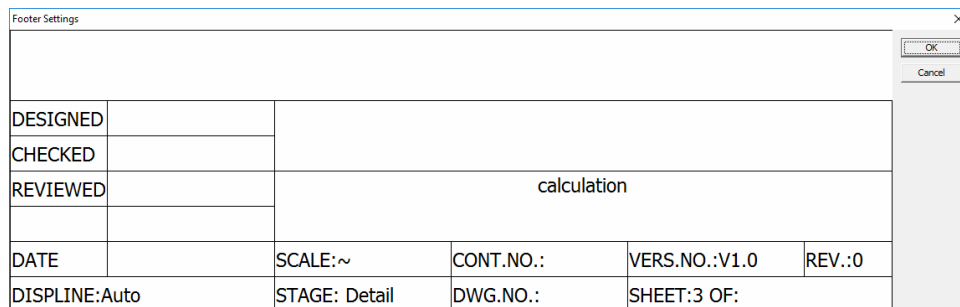
function block with the mouse button pressed, release the mouse until it is dragged to required location, and the line is moved correspondingly.

7.4.2 Object Zoom

All diagram objects can be zoomed, and the zoom rate is 0.6~1.5, users can implement operation of Zoom in, Zoom out and recover to function blocks in work area by clicking corresponding icons in toolbar, please refer to *Introductions to Toolbar Icon Functions* for specific information.

7.5 Print Properties settings

FBD programming software supports the general functions of Print, Print preview, and page layout setting. In addition, print information of footers can also be set. Click the item of “Print page footer setting” in “file”, window of footer setting will pop up, as shown in Figure 7-3.



DESIGNED					
CHECKED					
REVIEWED		calculation			
DATE		SCALE:~	CONT.NO.:	VERS.NO.:V1.0	REV.:0
DISPLINE:Auto		STAGE: Detail	DWG.NO.:	SHEET:3 OF:	

Figure 7-3 Footer Setting

Some specific information of configuration program (i.e. program function name, Designed, Reviewed, version and other information) can be set. Click the place corresponding to a certain item to implement setting, and select “Yes” to complete the setting. The printed footer is same as set.

7.6 Diagram Settings

The software can execute Diagram Settings. Select “File” and click “Page Settings” to pop up the following dialog.

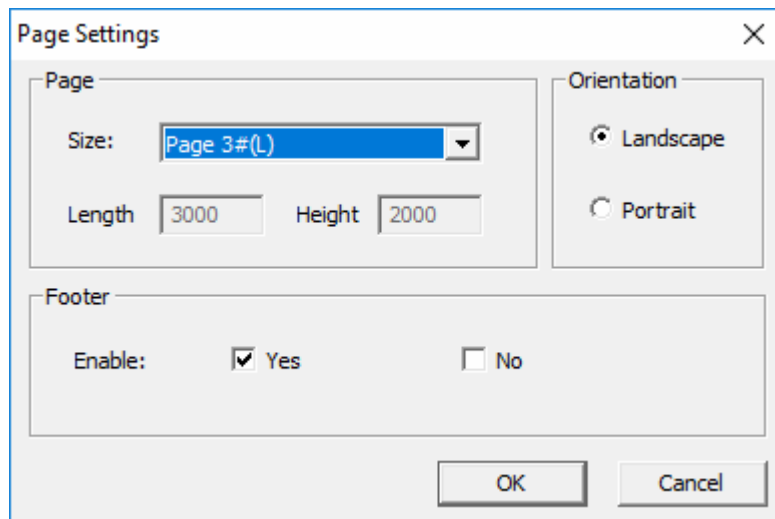


Figure 7-4 Diagram Settings

- Diagram: select the diagram size, Diagram 1#(S), Diagram 2#(M) or Diagram 3#(L) from the pull-down menu.
- Orientation: select the diagram orientation, landscape or portrait.
- Footer: select whether to enable the footer.

The diagram setting will change the print effect. Different diagram settings will result in different print effects.

7.7 View the Logic of Global Function Block

Users can view the logic of global function block conveniently after invoking global function block. The view steps are:

1. Select the global function block to be viewed in the edit area, right-click it and select "View Logic".
2. Pop up VFSTModule software, in which the global function block is shown.

7.8 Import/ Export

The import or export functions of FBD program can be achieved by this operation.

Click **File/ Export**, dialog box of **Save As** will pop up, select save path and click **Yes** to save current FBD program (save in .fbdi form).

Click **File/ Import**, dialog box of **Open** will pop up, select needed file (in .fbdi form) to import program saved in the file.

7.9 Supervision Parameter of Function Block Example Update

When some parameter data of current advanced function block example is modified, users should save configuration to configuration server in configuration management software so that information of local configuration can be uploaded to server completely.

Supervision parameter of function block example update includes: add function block tag, update supervision parameter of function block, etc.

7.10 Delete

All delete confirmation in FBD is No by default.

7.11 Alarm Priority Setting

The priority of alarm is arrayed at tag (or function block) level, the priorities of all alarm items within one tag or function block is consistent. Users can modify the priority of tag or function block, but can't configure the priority of each alarm item of a tag or function block.

Section 8 Revision

Table 8-1 Retrofit list of the version

Document version	Applicable software version	Remarks
V1.0 (20230301)	OMC High-performanceHMI V4.70.00.00	First release
V1.1 (20230830)	OMC High-performanceHMI V5.10.00.00-M	Added illustration of "show associated program" function, cross-station datalink and ISCP datalink.