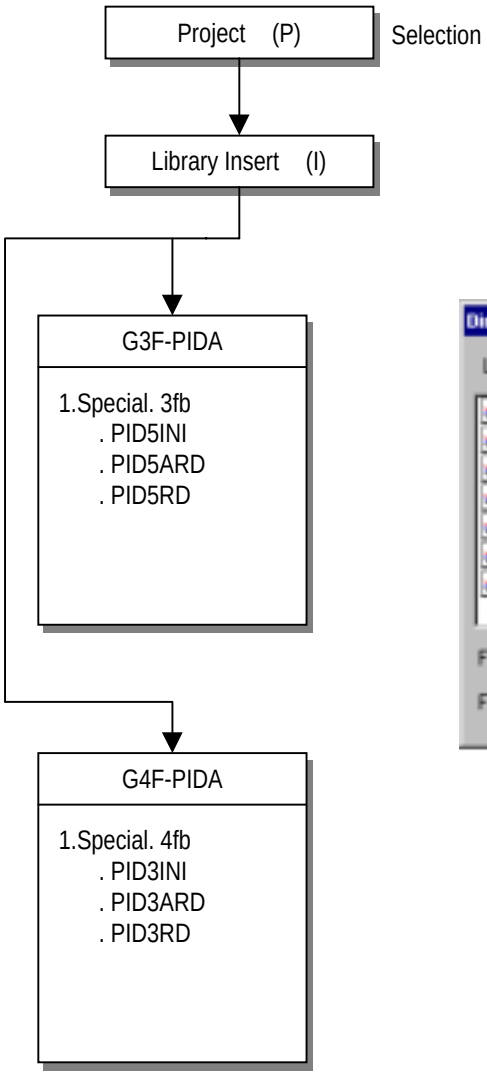
Chapter 6. FUNCTION BLOCKS

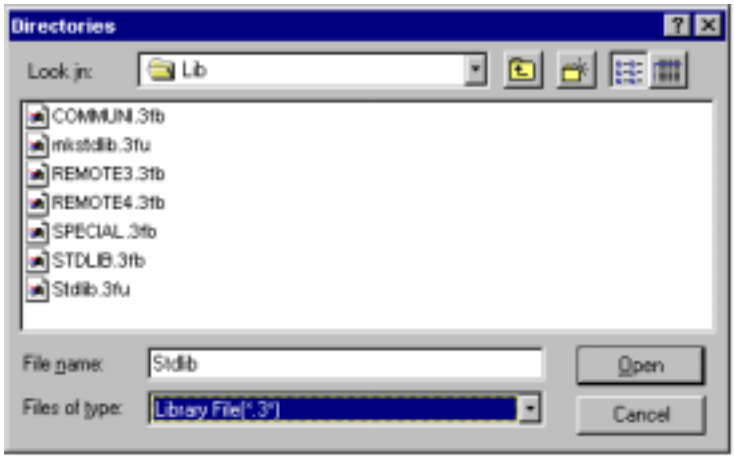
The followings explain the function blocks for the PID control module used on the GMWIN
The types of function block are given here.

No.	G3F-PIDA	G4F-PIDA	Function
1	PID5INI	PID3NI	Module Initialization
2	PID5ARD	PID3ARD	Reading the Manipulated Value (Array type)
3	PID5RD	PID3RD	Reading the Manipulated Value (Single type)

6.1 Insertion of the Function Blocks for the PID Control Module on the GMWIN.

Function blocks can be inserted with the following procedures while the GMWIN is running.
Inserting a function block is only possible when a project is open.

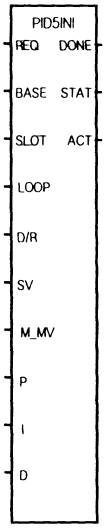
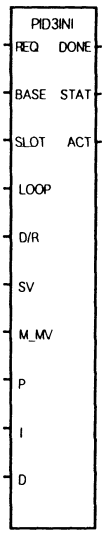




6.2 Function Blocks

6.2.1 Module Initialization (G3F-PIDA: PID5INI, G4F-PIDA:PID3INI)

Module initialization function block specifies PID control module base location, slot location, run loop enable/disable and forward/reverse action, and sets MV, M_MV and P.I.D constants for use in program.

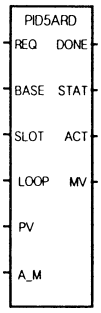
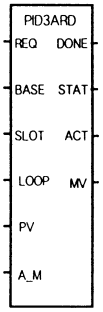
Function Block	I/O	Variable	Data Type	Descriptions
G3F – PIDA  G4F – PIDA  	In Put	REQ	BOOL	Function block execution request area - Used to request an execution of the initialization function block - If the conditions connected with this area are established while program is running and “0” changes into “1”, the initialization function block is executed
		BASE	USINT	Base location No. - Used to write the base No. where the PID control module is mounted. - Setting range: GM1 series(0~31), GM2 series(0~7), GM3/4 series(0-3)
		SLOT	USINT	Slot location No. - Used to write slot No. where the PID control module is mounted. - Setting range: 0~7
		LOOP	BOOL [Array] *Note 1	Run loop enable/disable specification - Used to enable or disable a loop for run. - Specify “1” for enabling, and “0” for disabling
		D/R	BOOL [Array] *Note 1	Forward/Reverse action specification for a run loop. - Specify “0” for forward action and “1” for reverse action.
		SV	BOOL [Array] *Note 1	Setting a SV for a run loop - Setting range: 0~16000
		M_MV	INT [Array] *Note 1	Setting a M_MV for a run loop - Setting range: 0 ~ 16000
		P	UINT [Array] *Note 1	Setting a proportional constant (0.01 ~ 100.00) for a run loop - Setting range: 0~10000 - The initialization function block not executed if the proportional constant is set to “0”, whether or not the constant is initialized in the function block.
		I	UINT [Array] *Note 1	Setting an integral constant (0.0 ~3000.0 sec) for a run loop - Setting range: 0~30000 - Integral action not executed if the integral constant is set to ‘0’.
		D	UINT [Array] *Note 1	Setting a derivative constant (0.0 ~3000.0 sec) for a run loop - Setting range: 0~30000 - Derivative action not executed if the derivative constant is set to ‘0’.
	Out Put	DONE	BOOL	Function block finished execution status - “1” is output when the initialization function block is finished with no error and “1” remains until next execution. If an error occur, ‘0’ is displayed and the operation enters into the stop state.
		STAT	USINT	Error status indication area - Used to output the number of an error when it occurs during initialization function block execution. - For description of errors, see GM Section 6.3
		ACT	BOOL [Array] *Note 1	Run loop status indication area - After the initialization function block is finished with no error, “1” is output if the loop is in normal state. But “0” is output for the disabled loops.

REMARK

* Note 1: The numbers of Array are 32 in G3F-PIDA, 8 in G4F-PIDA.

6.2.2 Manipulated Value(MV) Reading (Array type) : (G3F-PIDA:PID5ARD, G4F-PIDA:PID3ARD)

The Array type MV Reading function block execute all loops of the PID control module in a batch processing and can display the MV for run loops which is output with auto/manual run specification and a PV input.

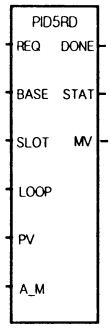
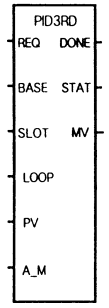
Function Block	I/O	Variable	Data Type	Descriptions
G3F – PIDA  	I	REQ	BOOL	Function block execution request area - Used to request an execution of the MV reading function block - If the conditions connected with this area are established while program is running and “0” changes into “1”, the MV reading function block is executed.
		BASE	USINT	Base location No. - Used to write the base No. where the PID control module is mounted. - Setting range: GM1 series(0~31), GM2 series(0~7), GM3/4 series(0-3)
		SLOT	USINT	Slot location No. - Used to write slot No. where the PID control module is mounted. - Setting range: 0~7
		LOOP	BOOL [Array] *Note 1	Run loop enable/disable specification - Used to enable or disable a loop for run. - Specify “1” for enabling, and “0” for disabling
		PV	INT [Array] *Note 1	Inputting a PV of the control object for a run loop - Setting range: 0~16000
		A/M	BOOL [Array] *Note 1	MV type specification for a run loop - Specify “0” for auto processing (PID processing) MV - Specify “1” for manual processing (forced processing) MV
G4F – PIDA  	O	DONE	BOOL	Function block finished execution status - “1” is output when the initialization function block is finished with no error and “1” remains until next execution. If an error occur, ‘0’ is displayed and the operation enters into the stop state.
		STAT	USINT	Error status indication area - Used to output the number of an error when it occurs during initialization function block execution. - For description of errors, see GM Section 6.3
		ACT	BOOL [Array] *Note 1	Run loop status indication area - After the initialization function block is finished with no error, “1” is output if the loop is in normal state. But “0” is output for the disabled loops.
		MV	INT [Array] *Note 1	MV data for the enabled run loops - MV output range: 0 ~ 16000

REMARK

*Note 1: The numbers of Array are 32 in G3F-PIDA, 8 in G4F-PIDA.

6.2.3 Manipulated Value(MV) Reading (Single type) : (G3F-PIDA:PID5RD, G4F-PIDA:PID3RD)

The single type MV Reading function block processes one loop of the PID control module and can display the MV for run loops which is output with auto/manual run specification and a PV input.

Function Block	I/O	Variable	Data Type	Description
G3F – PIDA  G4F – PIDA  	I	REQ	BOOL	Function block execution request area - Used to request an execution of the MV reading function block - If the conditions connected with this area are established while program is running and “0” changes into “1”, the MV reading function block is executed.
		BASE	USINT	Base location No. - Used to write the base No. where the PID control module is mounted. - Setting range: GM1 series(0~31), GM2 series(0~7), GM3/4 series(0-3)
		SLOT	USINT	Slot location No. - Used to write the slot No. where the PID control module is mounted. - Setting range: 0~7
		LOOP	USINT	Specifying the loop that will read MV - Setting range : G3F-PIDA: 0 to 31, G4F-PIDA: 0 to 7
		PV	INT	Inputting a PV of the control object for a run loop - Setting range: 0~16000
		A/M	BOOL	MV type specification for a run loop - Specify “0” for auto processing (PID processing) MV - Specify “1” for manual processing (forced processing) MV
	O	DONE	BOOL	Function block finished execution status - “1” is output when the initialization function block is finished with no error and “1” remains until next execution. If an error occur, ‘0’ is displayed and the operation enters into the stop state.
		STAT	USINT	Error status indication area - Used to output the number of an error when it occurs during initialization function block execution. - For description of errors, see GM Section 6.3
		MV	INT	MV data for the enabled run loops - MV output range: 0 ~ 16000

6.3 Errors on Function Block

Errors indicated by an output variable STAT and their corrective actions are explained.

STAT No.	Item	Descriptions	Function Block			Corrective Action
			Initilaiza-tion	Reading		
				Array	Single	
0	Local	Normal Run status	O	O	O	—
1		Base location No. outside the setting range	O	O	O	Adjust it within the setting range (See Section GM 6.2)
2		The corresponding base unit hardware defect	O	O	O	Contact a service station
3		Slot location No. outside the setting range	O	O	O	Specify correctly the slot No. where the PID control module is mounted .
4		The specified slot has no PID control module	O	O	O	Mount the PID control module on the specified slot.
5		A module other than the PID control module is loaded on.	O	O	O	Mount the PID control module on the specified slot.
6		Loop No. outside the setting range	—	—	O	Specify correctly the No. of the run loop.
7		PID control Module hardware Defect	O	O	O	Contact a service station.
8		PID control module shared memory defect	O	O	O	Contact a service station.
9		The run loop was not specified in the Initialization function block.	—	O	O	Specify correctly run loops in the initialization function block.
10		Inputs outside the setting range	O	O	O	One or more of SV, M_MV, P, I, D and PV outside the setting range, adjust it/them within its/their setting range.