

## Chapter 4. BUFFER MEMORY CONFIGURATION AND FUNCTIONS

The PID control module has the PLC CPU and the buffer memories for communications.

### 4.1 Buffer memory Configuration

The followings describe buffer memory configuration.

#### 4.1.1 K7F-PIDA Buffer Memory

Address (Decimal)	Function	Descriptions	Default Setting	Read / Write
0	Loop enable/disable Specification area (loop 0 to 15)	Bit On(1): Enabled Bit Off(0): Disabled	Disabled	R/W
1	Loop enable/disable Specification area (loop 16 to 31)			
2	Auto/Manual operation Specification area (loop 0 to 15)	Bit On(1): Auto Bit Off(0): Manual	Auto	R/W
3	Auto/Manual operation Specification area (loop 16 to 31))			
4	Forward/Reverse action Specification area (loop 0 to 15)	Bit On(1): Reverse Bit Off(0): Forward	Forward	R/W
5	Forward/Reverse action Specification area (loop 16 to 31)			
6	Set data enable/disable Specification area (loop 0 to 15)	Bit On(1) : Set each content of address 0, 1, 4, 5, 10 to 41, and 74 to 201 to a new setting. Bit Off(0) : The previous values of address 0, 1, 4, 5, 10 to 41, and 74 to 201 remains without change.	No Setting Values	R/W
7	Set data enable/disable Specification area (loop 16 to 31)			
8	Loop run information (loop 0 to 15)	Bit On(1) : Run Bit Off(0) : Stop	—	Read Only
9	Loop run information (loop 16 to 31)			
10 to 41	SV of each loop	Setting range : 0 to 16000	"0"	R/W
42 to 73	PV of each loop	Input range : 0 to 16000	"0"	R/W
74 to 105	M-MV of each loop	Setting range : 0 to 16000	"0"	R/W
106 to 137	P of each loop	Setting range : 0 to 10000	"500"	R/W
138 to 169	I of each loop	Setting range : 0 to 30000	"1000"	R/W
170 to 201	D of each loop	Setting range : 0 to 30000	"0"	R/W
202 to 233	MV of each loop	Output range : 0 to 16000	—	Read
234 to 265	Error information of each loop	Bit 0 On(1) : out-of-range SV Bit 1 On(1) : out-of-range PV Bit 2 On(1) : out-of-range M_MV Bit 3 On(1) : out-of-range P Bit 4 On(1) : out-of-range I Bit 5 On(1) : out-of-range D	—	Read Only

### 4.1.2 K4F-PIDA Buffer Memory

Address (Decimal)	Function	Descriptions	Default Setting	Read / Write
0	Loop enable/disable Specification area	Bit On(1): Enabled Bit Off(0): Disabled	Disabled	R/W
1	Auto/Manual operation Specification area	Bit On(1): Auto Bit Off(0): Manual	Auto	R/W
2	Forward/Reverse action Specification area	Bit On(1): Reverse Bit Off(0): Forward	Forward	R/W
3	SET data enable/disable Specification area	Bit On(1) : Set each content of address 0, 2, 5 to 12, and 21 to 52 to a new setting. Bit Off(0) : The previous values of address 0, 2, 5 to 12, and 21 to 52 remains without change.	No Setting Values	R/W
4	Loop run information	Bit On(1) : Run Bit Off(0) : Stop	—	Read Only
5 to 12	SV of each loop	Setting range : 0 to 16000	"0"	R/W
13 to 20	PV of each loop	Input range : 0 to 16000	"0"	R/W
21 to 28	M_MV of each loop	Setting range : 0 to 16000	"0"	R/W
29 to 36	P of each loop	Setting range : 0 to 10000	"500"	R/W
37 to 44	I of each loop	Setting range : 0 to 30000	"1000"	R/W
45 to 52	D of each loop	Setting range : 0 to 30000	"0"	R/W
53 to 60	MV of each loop	Output range : 0 to 16000	—	Read
61 to 68	Error information of each loop	Bit 0 On(1) : out-of-range SV Bit 1 On(1) : out-of-range PV Bit 2 On(1) : out-of-range M_MV Bit 3 On(1) : out-of-range P Bit 4 On(1) : out-of-range I Bit 5 On(1) : out-of-range D	—	Read Only

## 4.2 Functions of Buffer Memory

Each address in the buffer memory occupies one word and it is represented with 16 bits.  
In the 16 bits which compose an address, every bit can be set to either "1" when it should be turned On or "0" when Off in order to implement the function of each bit.

### 4.2.1 Specifying Loop Enable/Disable (K7F-PIDA : Addresses 0, 1, K4F-PIDA : Address 0)

- 1) Loop enable/disable specification is possible on every channel.
- 2) Disabled loops will not be used in processing.
- 3) The followings show the bit corresponding to each loop.

#### (1) K7F-PIDA

	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Address "0"</b>	loop 15	loop 14	loop 13	loop 12	loop 11	loop 10	loop 9	loop 8	loop 7	loop 6	loop 5	loop 4	loop 3	loop 2	loop 1	loop 0
<b>Address "1"</b>	loop 31	loop 30	loop 29	loop 28	loop 27	loop 26	loop 25	loop 24	loop 23	loop 22	loop 21	loop 20	loop 19	loop 18	loop 17	loop 16

Loop enable/disable specification [ Bit On(1): Enabled, Bit Off(0): Disabled]

#### (2) K4F-PIDA

	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Address "0"</b>	—	—	—	—	—	—	—	—	loop 7	loop 6	loop 5	loop 4	loop 3	loop 2	loop 1	loop 0

Ignored
 Loop enable/disable specification  
 [ Bit On(1): Enabled, Bit Off(0): Disabled]

### 4.2.2 Specifying Auto/Manual Processing (K7F-PIDA : Addresses 2, 3, K4F-PIDA : Address 1)

- 1) Turn the corresponding bit Off(0) if a loop runs with auto processing. Turn the corresponding bit On if a loop runs with M\_MV set before by the user.
- 2) Default is auto processing.
- 3) The followings show the bit corresponding to each loop.

#### (1) K7F-PIDA

	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Address "2"</b>	loop 15	loop 14	loop 13	loop 12	loop 11	loop 10	loop 9	loop 8	loop 7	loop 6	loop 5	loop 4	loop 3	loop 2	loop 1	loop 0
<b>Address "3"</b>	loop 31	loop 30	loop 29	loop 28	loop 27	loop 26	loop 25	loop 24	loop 23	loop 22	loop 21	loop 20	loop 19	loop 18	loop 17	loop 16

Auto/manual processing specification [ Bit On(1): Manual, Bit Off(0): Auto]

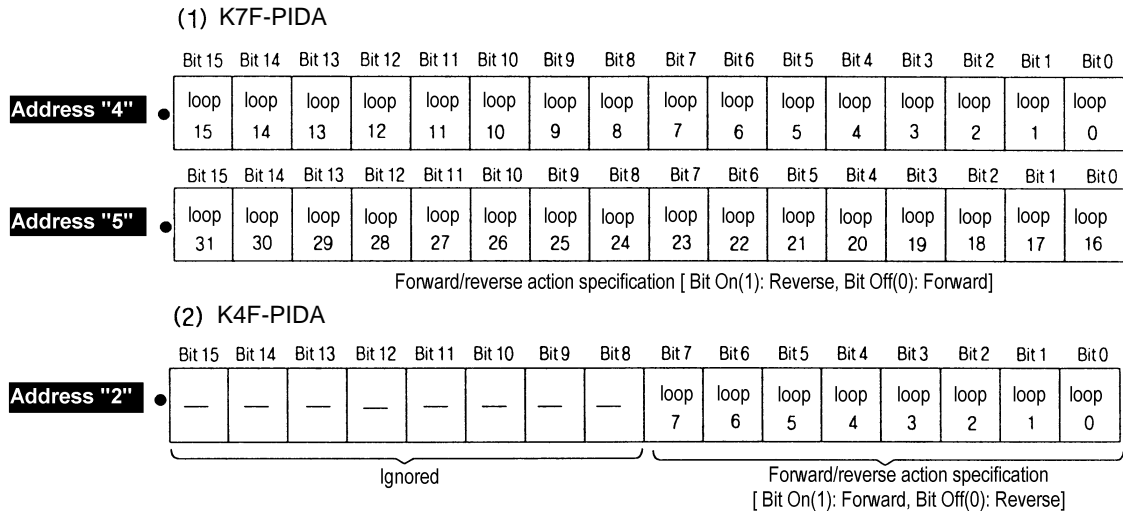
#### (2) K4F-PIDA

	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Address "1"</b>	—	—	—	—	—	—	—	—	loop 7	loop 6	loop 5	loop 4	loop 3	loop 2	loop 1	loop 0

Ignored
 Auto/manual processing specification  
 [ Bit On(1): Manual, Bit Off(0): Auto]

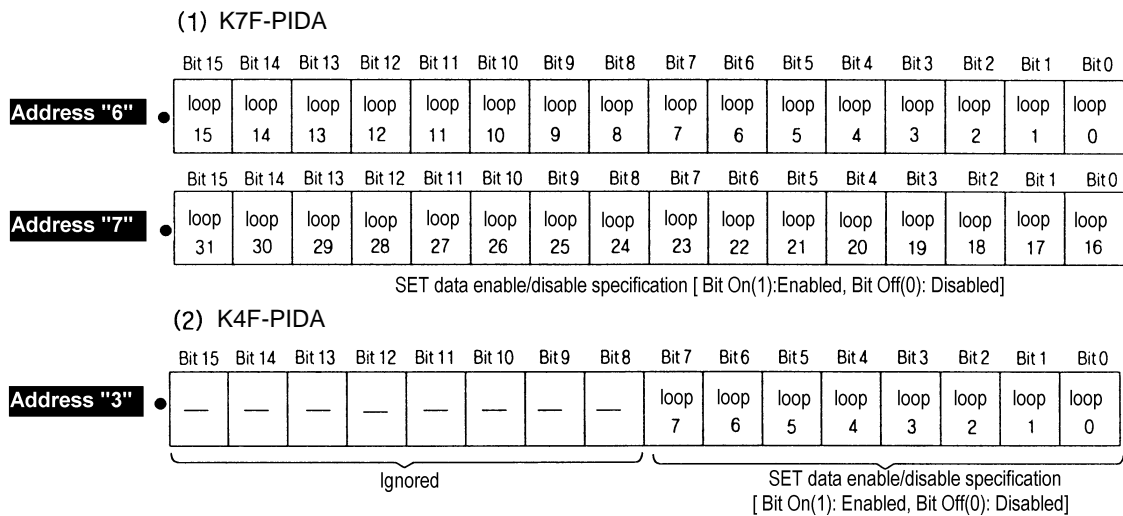
#### 4.2.3 Specifying Forward/Reverse Action (K7F-PIDA : Addresses 4, 5, K4F-PIDA : Address 2)

- 1) Turns the corresponding bit Off(0) for forward action processing and On (1) for reverse action processing.
- 2) Default is forward action.
- 3) The following show the bit corresponding to each loop.



#### 4.2.4 Specifying SET Data Enable/Disable (K7F-PIDA : Addresses 6, 7, K4F-PIDA : Address 3)

- 1) If a bit, corresponding to each loop, in Set Data specification area is turned On(1), then the PID processing is executed with new user-defined data due to loop enable/disable specification, forward/reverse action specification, setting SV, setting M\_MV, and change of P.I.D constants.
- 2) If the bit corresponding to each loop is not turned On(1), then the PID processing is executed not with the new user-defined data but with the previous Setting range.
- 3) The followings show the bit corresponding to each loop.



## 8.2.5 Loop Run Information (K7F-PIDA : Addresses 8, 9, K4F-PIDA : Address 4)

1) This area stores information on run status of each loop.

### (1) K7F-PIDA

	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address "8"	loop 15	loop 14	loop 13	loop 12	loop 11	loop 10	loop 9	loop 8	loop 7	loop 6	loop 5	loop 4	loop 3	loop 2	loop 1	loop 0
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address "9"	loop 31	loop 30	loop 29	loop 28	loop 27	loop 26	loop 25	loop 24	loop 23	loop 22	loop 21	loop 20	loop 19	loop 18	loop 17	loop 16

Loop Run Information [ Bit On(1):Run state, Bit Off(0): Stop state]

### (2) K4F-PIDA

	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address "4"	—	—	—	—	—	—	—	—	loop 7	loop 6	loop 5	loop 4	loop 3	loop 2	loop 1	loop 0

Ignored

Loop Run Information [ Bit On(1): Run state, Bit Off(0): Stop state]

## 8.2.6 Setting PID Control Data

1) The addresses for PID control data and their setting range are given as follows.

Address (10 decimal)		Item	Setting range	Default
K7F-PIDA	K4F-PIDA			
10~41	5~12	SV	0 ~ 16000	"0"
42~73	13~20	PV		
74~105	21~28	M_MV		
106~137	29~36	P constant ( $K_p$ )	1 ~ 10000	"500"
138~169	37~44	I constant ( $K_i$ )	0 ~ 30000	"1000"
170~201	45~52	D constant ( $K_d$ )	0 ~ 30000	"0"

- If PID control data is outside the range, the execution continues with the setting range of the previous processing.
- If PID control data is outside its setting range, error information appear on the setting error information area.

4.2.7 Outputting Manipulated Value (K7F-PIDA : Addresses 202 to 233, K4F-PIDA : Addresses 53 to 60)

- 1) This area stores the MV of each loop.
- 2) The MV output range is 0 to 16000.

4.2.8 Setting Error Information (K7F-PIDA : Addresses 234 to 265, K4F-PIDA : Addresses 61 to 68)

- 1) When setting the control data for each loop, if any setting exceeds its range the error information is indicated on this area.
- 2) Bit 0 to 5 are used to indicate error information for each loop. The following shows the error information indicated by each bit when it turns On(1).

