

Chapter 3. BUFFER MEMORY CONFIGURATION AND FUNCTIONS

The RTD input module a PLC CPU and buffer memories for data communications.

3.1 Buffer Memory Configuration

The followings describe buffer memory configuration.

3.1.1 K7F-RD3A Buffer Memory

Address (Decimal)	Function	Descriptions	Default Setting	Read / Write
0	Channel enable/disable specification	Bit On(1):enable, Bit Off(0):disable	disable	R/W
1	Channel 0 Specifying RTD type	0 : Pt 100 1: JPt 100	"0" (Pt 100)	"
2	Channel 1 Specifying RTD type			"
3	Channel 2 Specifying RTD type			"
4	Channel 3 Specifying RTD type			"
5	Channel 4 Specifying RTD type			"
6	Channel 5 Specifying RTD type			"
7	Channel 6 Specifying RTD type			"
8	Channel 7 Specifying RTD type			"
9	Detected temp. value of channel 0	Detected temperature value : A value of 10 times of the real temperature is read. Digital conversion value : (Detected temperature value + 2000) X 2 When the detected value of temp. is used as the current value, the value means the converted value, which is equal to the input range of the current value from 0 to 16,000. Error code value 16: A disconnection detected 17: B disconnection detected 18: b disconnection detected, A and B disconnection Simultaneously detected. 19: Indicates that the detected temperature is outside the input range(-200~600.0℃) of the RTD.	-	Read only
10	Digital conversion value of channel 0			"
11	Error code of channel 0			"
12	Detected temp. value of channel 1			"
13	Digital conversion value of channel 1			"
14	Error code of channel 1			"
15	Detected temp. value of channel 2			"
16	Digital conversion value of channel 2			"
17	Error code of channel 2			"
18	Detected temp. value of channel 3			"
19	Digital conversion value of channel 3			"
20	Error code of channel 3			"
21	Detected temp. value of channel 4			"
22	Digital conversion value of channel 4			"
23	Error code of channel 4			"
24	Detected temp. value of channel 5			"
25	Digital conversion value of channel 5			"
26	Error code of channel 5			"
27	Detected temp. value of channel 6			"
28	Digital conversion value of channel 6			"
29	Error code of channel 6			"
30	Detected temp. value of channel 7			"
31	Digital conversion value of channel 7			"
32	Error code of channel 7			"
33	SET data enable/disable specification	Bit On(1) : The contents at address 0~8 are changed with new values. Bit Off(0): The contents at address 0~8 remains with the previous value.	No setting values	R/W
34	Channel run information	Bit On(1):Run, Bit Off(0): Stop	-	Read only
35	Error information specifying RTD type	Bit On(1):Outside the setting range Bit Off(0): Normal	-	"

3.1.2 K4F-RD2A Buffer Memory

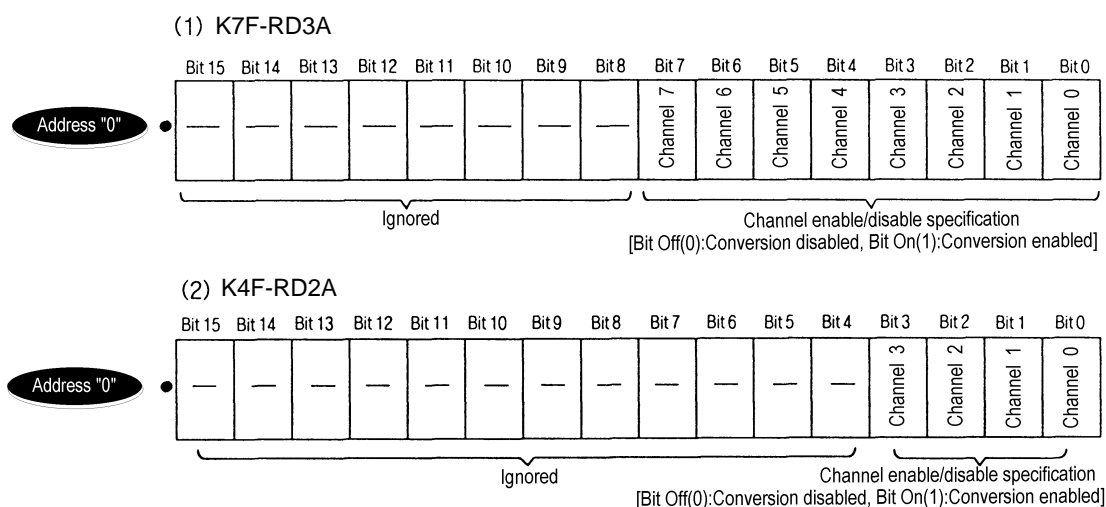
Address (Decimal)	Function	Description	Default Setting	Read / Write
0	Channel enable/disable specification	Bit On(1):enable, Bit Off(0):disable	disable	R/W
1	Channel 0 Specifying RTD type	0 : Pt 100 1: JPt 100	"0" (Pt 100)	"
2	Channel 1 Specifying RTD type			"
3	Channel 2 Specifying RTD type			"
4	Channel 3 Specifying RTD type			"
5	Detected temp. value of channel 0	<p>Detected temperature value : A value of 10 times of the real temperature is read.</p> <p>Digital conversion value : (Detected temperature value + 2000) X 2</p> <p>When the detected value of temp. is used as the current value, the value means the converted value, which is equal to the input range of the current value from 0 to 16,000.</p> <p>Error code value 16: A disconnection detected 17: B disconnection detected 18: b disconnection detected, A and B disconnection simultaneously detected. 19: Indicates that the detected temperature is outside the input range(-200~600.0℃) of the RTD.</p>	-	Read only
6	Digital conversion value of channel 0			"
7	Error code of channel 0			"
8	Detected temp. value of channel 1			"
9	Digital conversion value of channel 1			"
10	Error code of channel 1			"
11	Detected temp. value of channel 2			"
12	Digital conversion value of channel 2			"
13	Error code of channel 2			"
14	Detected temp. value of channel 3			"
15	Digital conversion value of channel 3			"
16	Error code of channel 3			"
17	SET data enable/disable specification	<p>Bit On(1) : The contents at address 0~4 are changed with new values.</p> <p>Bit Off(0): The contents at address 0~4 remains with the previous value.</p>	No setting values	R/W
18	Channel run information	Bit On(1):Run, Bit Off(0): Stop	-	Read only
19	Error information specifying RTD type	<p>Bit On(1):Outside the setting range</p> <p>Bit Off(0): Normal</p>	-	"

3.2 Functions of Buffer Memory

- ▶ Each address in the internal 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.

3.2.1 Specifying Channel Enable/Disable (K7F-RD3A : Address 0, K4F-RD2A : Address 0)

- 1) RTD conversion enable/disable specification is available on each channel.
- 2) Unused channels can be disabled to shorten the sampling cycle.
- 3) All channels will be disabled if no enable/disable specification is applied.
- 4) The following show the temperature conversion enable/disable of the RTD input module.



3.2.2 Specifying the Type of the RTD (K7F-RD3A : Addresses 1~8, K4F-RD2A : Addresses 1~4)

- 1) Each type of the RTD connected to each channel of the RTD input module can be specified at each channel.
- 2) A channel without its specification of the type of the RTD is specified to Pt 100 as its default.
- 3) The method of the type specification is same on every channel and the following shows it.

K7F-RD3A			K4F-RD2A		
Address (Decimal)	Corresponding Channel	Setting Value	Address (Decimal)	Corresponding channel	Setting Value
1	0	0 : Pt100 1 : JPt100	1	0	0 : Pt100 1 : JPt100
2	1		2	1	
3	2	If a value other than 0 and 1 is specified, then error is indicated at address 35 and Pt100 is specified	3	2	If a value other than 0 and 1 is specified, then error is indicated at address 19 and Pt100 is specified
4	3		4	3	
5	4				
6	5				
7	6				
8	7				

3.2.3 Detected Temperature Value

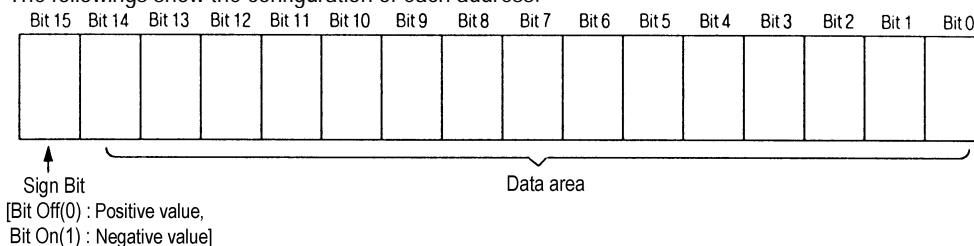
(K7F-RD2A : Addresses 9, 12, 15, 18, 24, 27 and 30, K4F-RD2A : Addresses 5, 8, 11 and 14)

- 1) This area performs sampling processing of the temperature value that is input through the RTD connected to the terminal block of a channel and stores the value of 10 times of the real temperature value.

REMARK

If a real temperature is 123.4°C the stored value is 1234. But, 123.4 is displayed on the K7F-RD3A LED display

- 2) The followings show the configuration of each address.



- 3) If the temperature conversion specification of a channel is changed from enable into disable the detected temperature value before the change remains.

3.2.4 Digital Conversion Value

(K7F-RD3A : Address 10, 13, 16, 19, 22, 25, 28 and 31, K4F-RD2A : Address 6, 9, 12 and 15)

- 1) A temperature value that is input through the RTD connected to the terminal block of a channel is represented as a value between -2000 to 6000 and then the converted value is stored. The converted value stored is called digital conversion value.
- 2) A digital conversion value that has been converted into a value between 0 to 16000 can be directly used as a process value of the PID control module.
- 3) The digital conversion value and the detected temperature value have the following arithmetic relation.

$$\text{Digital conversion value} = (\text{Detected temperature value} + 2000) \times 2$$

REMARK

If a real temperature is 123.4°C, then the detected temperature value is 1234 and the digital conversion value is 6468 since the item of the detected temperature value in the expression $(\text{Detected temperature value} + 2000) \times 2$ should be replaced with 1234.

- 4) If the temperature conversion specification of a channel is changed from enable into disable the digital conversion value before the change remains.

3.2.5 Error Code

(K7F-RD3A : Addresses 11,14, 17, 20, 23, 26, 29 and 32, K4F-RD2A : Addresses 7, 10, 13 and 16)

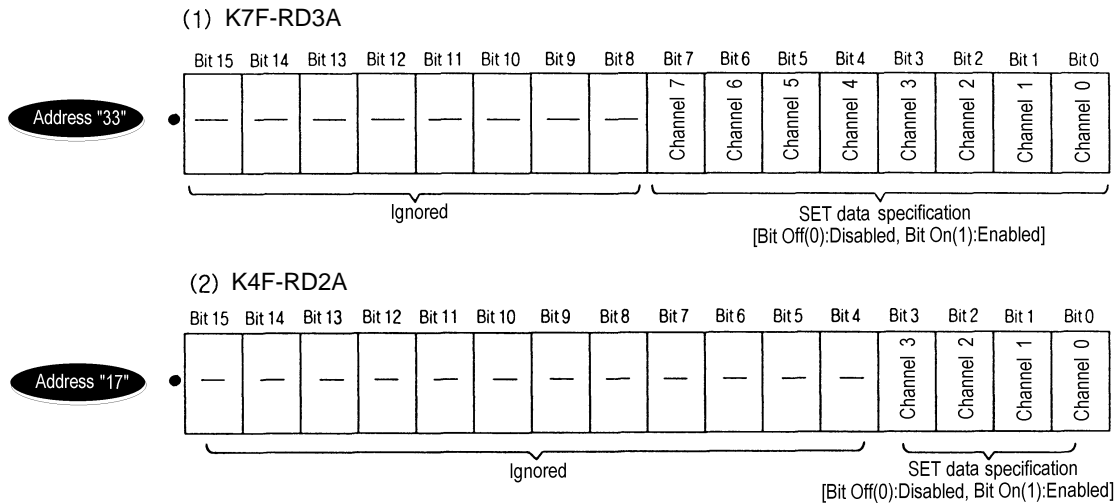
- 1) Disconnection that can occur between the RTD and the RTD input module is detected by its type, and also error information is stored when the detected temperature is outside range(-200.0 to 600.0°C)
- 2) The following shows the types of error code.

Error Code (Decimal)	Error Description	Data processing at error occurrence	RUN LED status	LED display (G3F-RD3A only)
16	A disconnection detected	Detected temperature value and digital conversion value before error occurrence remains	Flickering with 0.1 sec.	Err 4
17	B disconnection detected			Err 5
18	B disconnection detected, A and B disconnection simultaneously detected			Err 6
19	Temperature outside range			Err 7

- 3) If two or more disconnection is detected the priority order is 18, 17 or 18, 16. If A disconnection and B disconnection occur simultaneously error code is 18.

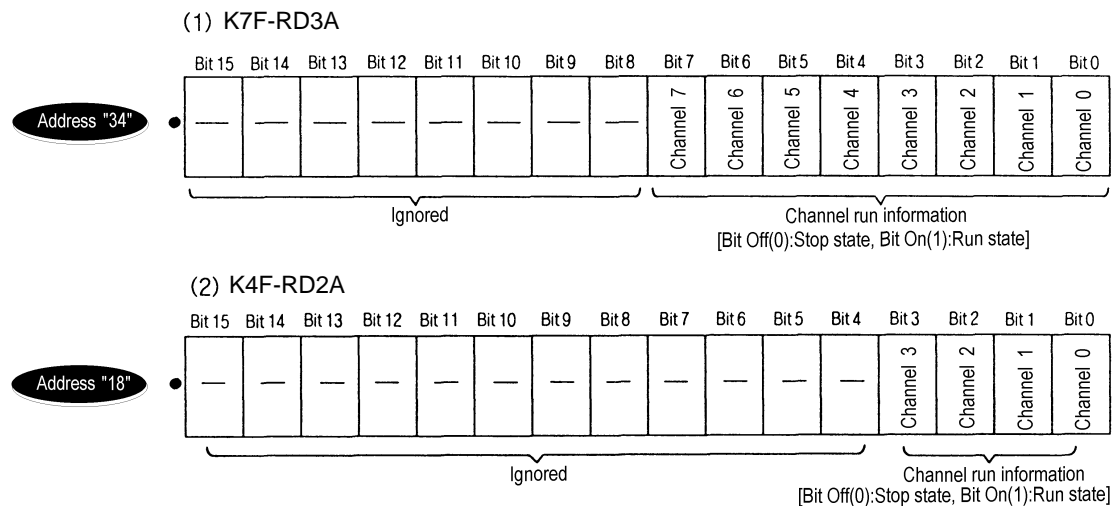
3.2.6 Specifying SET Data (K7F-RD3A : Address 33, K4F-RD2A : Address 17)

- 1) If a bit corresponding to each channel in Set Data specification area is turned On(1), then the RTD input module executes the temperature conversion with user-defined setting data at the address 0 to 8 in the K7F-RD3A and at the address 0 to 4 in the K4F-RD2A.
- 2) If the bit corresponding to each channel is not turned On(1), then the RTD input module executes the temperature conversion not with the new user-defined setting data at the address 0 to 8 in the K7F-RD3A and at the address 0 to 4 in the K4F-RD2A but with the previous setting data.
- 3) The followings show the SET data specification



3.2.7 Information on Run Channel (K7F-RD3A : Address 34, K4F-RD2A : Address 18)

This area stores information on run status of each channel.



3.2.8 Information on RTD Specification Error
(K7F-RD3A : Address 35, K4F-RD2A : Address 19)

- 1) If error occurs in other value than "0" and "1" is set at the addresses (Address 1 to 8 in K7F-RD3A, Address 1 to 4 in K4F-RD2A) used for specifying the type of the RTD which is connected to each channel of the RTD input module
- 2) If error occurs at a channel, then the channel runs with Pt 100 as its type of the RTD.
- 3) The following shows indication of error information

