

Chapter 2. SPECIFICATIONS

2.1 General Specifications

Table 2.1 shows general specifications of the MASTER-K series.

No	Item	Specifications					Reference specification
1	Operating ambient temperature	0 ~ 55 °C					
2	Storage ambient temperature	-25 ~ +70 °C					
3	Operating humidity	5 ~ 95%RH, non-condensing.					
4	Storage humidity	5 ~ 95%RH, non-condensing.					
5	Vibration	Occasional vibration					IEC 1131-2
		Frequency	Acceleration	Amplitude	Sweep Count	10 times in each direction for X,Y,Z	
		10≤f<57 Hz	-	0.075 mm			
		57≤f≤150 Hz	9.8 m/s ² {1 G}	-			
		Continuous vibration					
		Frequency	Acceleration	Amplitude			
		10≤f <57 Hz	-	0.035 mm			
		57≤f≤150 Hz	4.9 m/s ² {0.5G}	-			
6	Shocks	<ul style="list-style-type: none">Maximum shock acceleration: 147 m/s²{15G}Duration time : 11msPulse wave: half sine pulse (3 times in each of X, Y and Z directions)					IEC 1131-2
7	Noise Immunity	Square wave impulse noise	± 1,500 V				
		Electrostatic discharge	Voltage : 4 kV (contact discharge)				IEC 1131-2, IEC 801-2
		Radiated electromagnetic field	27 ~ 500 MHz, 10 V/m				IEC 1131-2, IEC 801-3
		Fast transient/burst noise	Severity Level	All Power modules	Digital I/Os (Ue > 24 V)	Digital I/Os (Ue < 24 V) Analog I/Os interface communication I/Os	IEC 1131-2, IEC 801-4
			Voltage	2 kV	1 kV	0.25 kV	
8	Operating Atmosphere	Free from corrosive gases and excessive dust.					
9	Operation Altitude	Up to 2,000m					
10	Pollution degree	2					
11	Cooling method	Self-cooling					

[Table 2.1] General Specifications

REMARK

- 1) IEC(International Electromechanical Commission) : The international civilian organization which produces standards for electrical and electronic industry.
- 2) Pollution degree : It indicates a standard of operating ambient pollution level The pollution degree 2 means the condition in which normally, only con-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation shall be expected.

2.2 Performance Specifications

Table 2.2 shows performance specifications of the RTD input module.

Item	Specifications	
	K7F-RD3A	K4F-RD2A
Connectable RTD	Pt 100 (JIS C1640-1989, DIN 43760-1980) JPt100 (KS C1603-1991, JIS C1604-1981)	
Temperature input range	Pt100 : -200.0°C to 600°C (18.48 to 313.59Ω) JPt100 : -200.0°C to 600°C (17.14 to 317.28Ω)	
Digital output	Digital conversion value : 0 to 16,000 Detected temperature value : -2000 to 6000 (one digit after point $\times 10$)	
Buffer memory	Each of three wires at every channel has detection function.	
Accuracy	± 0.5 %(full scale)	
Maximum conversion speed	50ms per channel	
Number of temperature input device points	8 channels per module	4 channels per module
Insulation method	Photo-coupler insulation between the input terminal and the PLC power supply (non-insulation between channels)	
Connection terminal block	38-point terminal block	20-point terminal block
Internal current consumption	0.5 A	0.45A
Weight	630 g	350 g

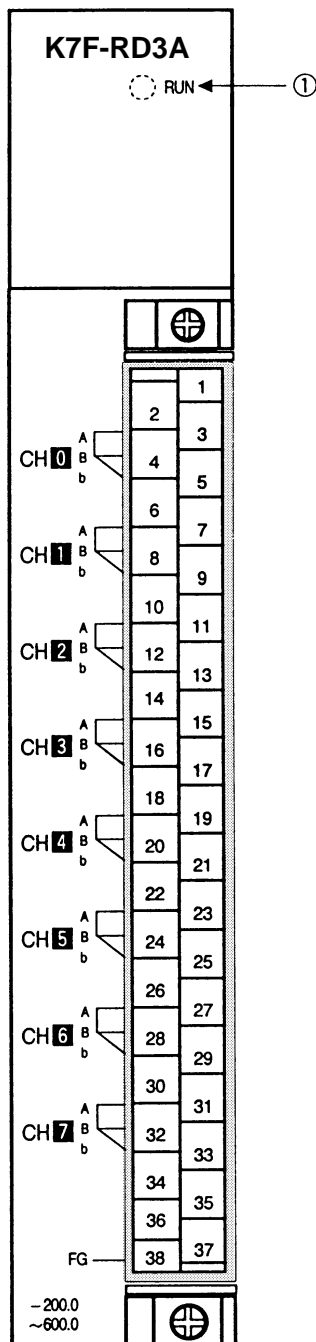
[Table. 2.2 Performance Specifications]

2.3 Names of Parts and Functions

The following gives names of parts.

2.3.1 K7F-RD3A

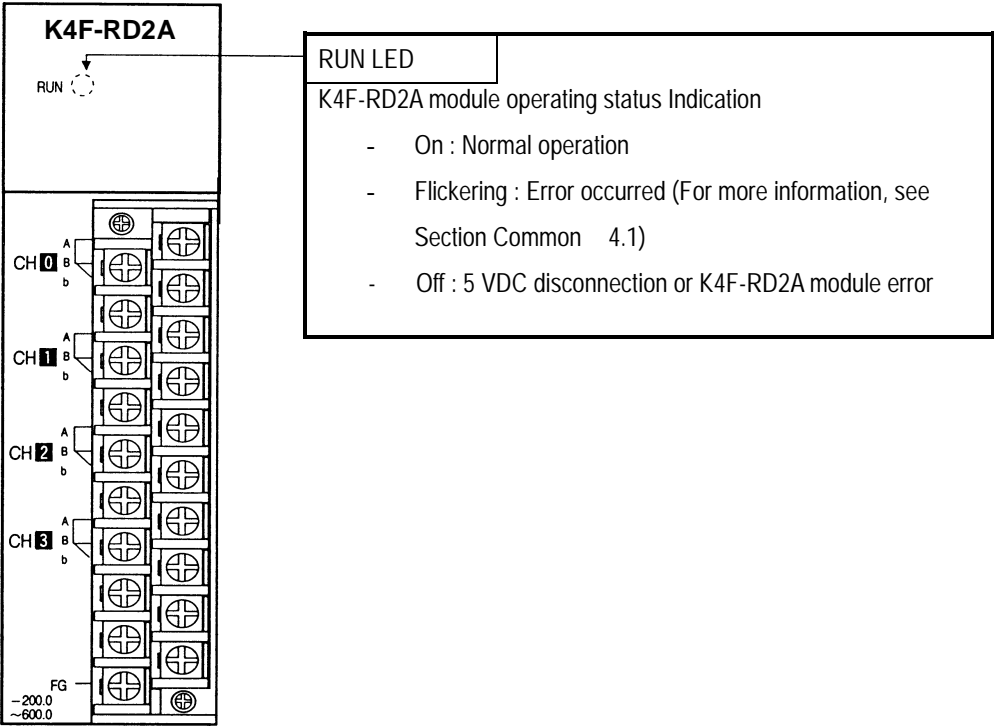
The following gives the names and functions of each part of the K7F-RD3A.



No.	Descriptions
①	<div>RUN LED</div> <div>It displays the operating status of K7F-RD3A module</div> <ul style="list-style-type: none">● On : Normal Operation● Flickering : Error occurred (For more information, see Chapter 4.1)● Off : DC 5V disconnection or the K7F-RD3A module error

2.3.2 K4F-RD2A

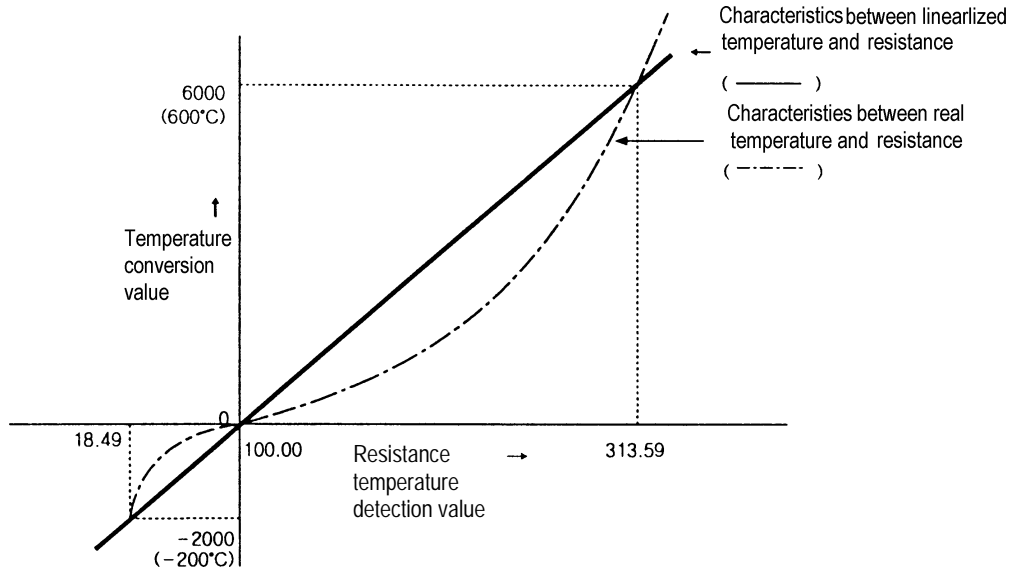
The following gives the names and functions of each part of the K4F-RD2A.



2.4 RTD Input Module Characteristics

2.4.1 Temperature Conversion Characteristics

The RTD input module, as shown in the Fig. 2.1, linearizes the non-linear characteristic resistance input of the RTD.



[Fig. 2.1] Temperature conversion characteristics(Pt100)

2.4.2 Conversion speed

The conversion speed of the RTD input module is 50 ms per channel and its processing is processed sequentially, that is, one channel is processed and then another channel is processed.

Processing time = 50 ms \times the number of the used channels

Example) When three channels are used
Processing time = 50 ms \times 3 = 150 ms

2.4.3 Accuracy

The accuracy of RTD input module is within ± 0.5 % of all of the measurable temperature range.

Example) When the RTD Pt100 is used, the conversion values of -100°C and 400°C are as below.

- Measurable temperature full range : 800°C (-200.0°C to 600.0°C)
- Accuracy : $800 \times (\pm 0.5\%) = 800 \times (\pm 0.005) = \pm 4^{\circ}\text{C}$
- Temperature conversion range : -104°C to -96°C when -100°C
 396°C to 404°C when 400°C

2.4.4 Burn-out Detection Function

The RTD input module has the function of burn-out detection on the Pt100, JPt100 or cable.

- 1) As shown in the Fig. 2.2, if disconnection occurs in the RTD or cable then a voltage outside the measurable range voltage is inputted by the internal burn-out detection circuit and burn-out detection error code is generated.
- 2) The RTD input module can detect disconnection for each channel. But, burn-out detection is possible only in the channels enabled.
- 3) If disconnection is detected in two or more wires, first, disconnection error code is generated by 'b' and then disconnection error code is generated by 'A' or 'b' sequentially. If disconnection is detected simultaneously in 'A' and 'B', only disconnection error code is generated by 'b'.

Connection Method	Connection Example	Burn-out Detection Function	Remark
2-wire type		- When specified as the enabled channel : The burn-out detection function is enabled.	- In 4-wire type, only all wires marked '2' connected to the terminal block A are all detected as disconnection then the A disconnection error can be detected.
3-wire type			
4-wire type		- When not specified as the enabled channel : The burn-out detection function is disabled	
No wiring			*1 : Pt *2: Shield wire

[Fig. 2.2] Burn-out Detection Area

2.5 Connection between a Pt and RTD input module

- Number of method of connection between Pt and RTD input module are three, that is, 2-wired type, 3-wired type and 4-wired type.
- The resistance of the wires used to connect Pt to RTD input module should be $10\ \Omega$ or less per wire. The same wire (in thickness, length, and kind, etc.) should be used for each channel.

REMARK

- * The difference between the resistance values of the wires used should be $1\ \Omega$ or less, or the accuracy shown in the Table 2.2 could not be satisfied.

Connection Method	Connection Example	Wire Conditions
2-wired type		<p>① wire resistance $\leq 10\ \Omega$ ② wire resistance $\leq 10\ \Omega$ ③ wire resistance $\leq 10\ \Omega$</p>
3-wired type		<p>The difference between the resistance values of the wires ① and ② : $1\ \Omega$ or less The difference between the resistance values of the wires ② and ③ : $1\ \Omega$ or less The difference between the resistance values of the wires ③ and ① : $1\ \Omega$ or less</p>
4-wired type		

[Fig. 2.3] Method of Connection between Pt and RTD Input Module

*1: RTD (Pt100 or JPt1000)

*2: Shielded wire

- The shields of the RTD and shields of wire should be connected to the FG of the RTD input module.