



REX-F400 REX-F700 REX-F900



General Description

The F Series controllers combine precise control with easy-to-use operation. The unique bar graph display provides at-a-glance monitoring of output and process status. Programming functions are easily accomplished through the front panel. F Series controllers feature Brilliant PID, enhanced autotuning with AT bias, programmable inputs, self-diagnosis functions, FAIL output and eight separate memory areas. The F Series, with its accurate and fast response, is an excellent choice for temperature and process control applications that require extremely tight tolerances.

Features

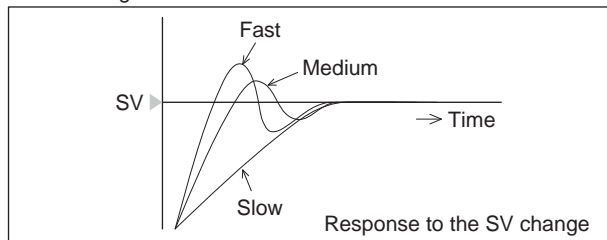
- ☆ High accuracy with short sampling time
- ☆ Brilliant PID
- ☆ Enhanced autotuning
- ☆ Multi-memory area

High Accuracy

The F Series controllers provide precise control with accuracy of 0.1% full scale and a short sampling time of 0.25 second. Optionally, the F400 offers a display resolution of 0.01°C.

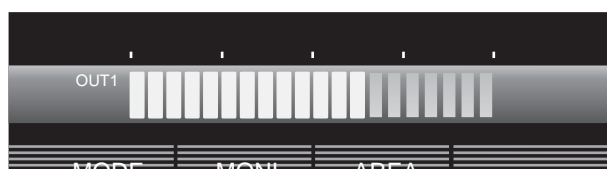
Brilliant PID

The Brilliant PID combines stable control with quick response. With conventional PID control, there is a conflict between control stability and quick response time. Response to set point changes may be compromised when stability is improved; conversely, stability may be compromised when quick response to SV change is achieved. Brilliant PID retains optimum PID values for stability, while offering the flexibility to choose the control response type that is needed such as Fast, Medium and Slow. Select the Fast response type when quick response is required or the Slow response to avoid overshooting.



Bar Graph Display

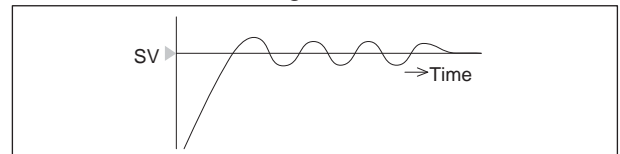
The two 7-segment LED readouts display process data while the output and deviation status are displayed on the bar graph. The REX-F900 bar graph display resolution is 20 LED segments and there are 10 LED segments for the REX-F400/700.



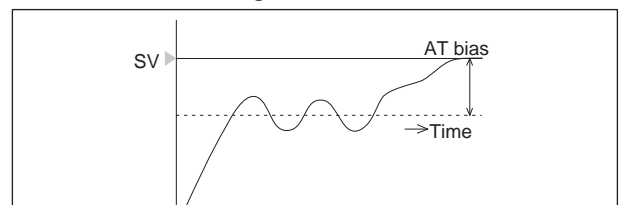
Enhanced Autotuning

Enhanced autotuning determines PID values without over-shooting. PID values are achieved by performing autotuning above or below the set point using the AT Bias function.

Conventional Autotuning



Enhanced Autotuning



Multi-Memory Area

The REX-F900/F700 has eight separate memory areas. Each memory area can store the set value, proportional band, integral time, derivative time, response parameter, and alarm set value.

All of these values can be changed at one time through the AREA key on the front panel or with optional digital communications.

- REX-F400 has two separate memory areas.

Memory Area 1

SV = 50%, P = 10%, I = 240sec, D = 60sec, Slow, AL1= 5°C, AL2 = 5°C

↓ Memory area change

Memory Area 2

SV = 80%, P = 20%, I = 360sec, D = 90sec, Slow, AL1= 10°C, AL2 = 20°C

REX-F400 with a eight separate memory area function is available. This special type incorporates eight memory areas against two in the standard type. This function can be used for easy change of various parameters changes.

* Please specify Z-163 at the end of the model code to order REX-F400 with eight memory area functions.



Eight Memory Area Type
REX-F400
Z-163

Process/Temperature Controller F Series



Specifications

Input

Input

- a) Temperature input group (Field-programmable)
Thermocouple : K, J, R, S, B, E, T, N (JIS/IEC), PLII (NBS)
W5Re/W26Re (ASTM), U, L (DIN)
Influence of external resistance : Approx. 20 μ V/ Ω
Input break action : Up-scale
RTD : Pt100 (JIS/IEC), JPt100 (JIS)
Influence of input lead resistance : Approx. less than 20 Ω
Input break action : Up-scale
- b) DC voltage input group (Field-programmable)
0 to 10mV, 0 to 100mV, 0 to 1V, 0 to 5V, 1 to 5V, 0 to 10V
Input break action : Down-scale (value around zero)
- c) DC current input group (Field-programmable)
0 to 20mA, 4 to 20mA
Input break action : Down-scale (value around zero)

Sampling Time

0.25 sec

PV Bias

-5.00 to 5.00% of span

Performance

Measuring Accuracy

- \pm (0.1% of span + 1 digit)
Cold-junction temperature compensation error
Within \pm 1.0°C (between 0 and 50°C [32 and 122°F])
•Accuracy is not guaranteed between 0 and 399°C (0 and 800°F) for type B input.

Bar Graph Display

- REX-F900 : 20-dot green LED
REX-F400, F700 : 10-dot green LED
•MV, deviation or POS (valve position) is displayed.

Insulation Resistance

- More than 20M Ω (500V DC) between input terminals and ground terminals.
More than 20M Ω (500V DC) between power terminals and ground terminals.

Dielectric Strength

- 1000V AC for one minute between input terminals and ground terminals.
1500V AC for one minute between power terminals and ground terminals.

Control

Control Method

- a) ON/OFF control.
b) Brilliant PID control with enhanced autotuning.
c) Brilliant PID control (Heat/Cool type)
(Dedicated autotuning function for extruders is available)
d) Position proportioning control.

Memory Area

- F900, F700 : 8 areas
F400 : 2 areas (8 areas if Z-163 is specified)

Major Setting Range

- Setting range : Same as input range.
Heat-side proportional band : 0.1 to 999.9% of span
(Zero is not settable)
Cool-side proportional band : 0.1 to 999.9% of span
(Zero is not settable)
Integral time : 1 to 3600sec. (Zero is not settable)
Derivative time : 0 to 3600sec. (P + I action when D is 0.)
Deadband/Overlap : -10.0 to 10.0% of span
Control response : Slow, Medium, Fast
Proportional cycle time : 1 to 100 sec.
Output limiter High : -5.0 to +105.0%
Output limiter Low : -5.0 to +105.0%
Output change rate limiter : 0.1 to 100.0%/sec (OFF by setting zero)

Control Output

- Relay output (OUT1) : Form C contact, 250V AC 3A (resistive load)
Relay output (OUT2) : Form A contact, 250V AC 3A (resistive load)
Voltage pulse output : 0/12V DC
(Load resistance : More than 600 Ω)
Current output : 0 to 20mA, 4 to 20mA DC
(Load resistance : Less than 600 Ω)
Continuous voltage output : 0 to 5V, 0 to 10V, 1 to 5V DC
(Load resistance : More than 1k Ω)
Triac trigger output : Zero-cross method. Effective ON current
50mA (at 50C), 70mA (at 25C)
• Triac trigger output is not available on OUT2 of Heat/Cool and position proportioning types.

Motor Valve Control (position proportioning control type only)

- Input resistance (feedback resistance) : 135 Ω as standard.
(Other feedback : 100, 200, 500, 1k, 10k Ω)
POS sampling cycle : 1 sec.
Neutral zone : 0.1 to 10.0% (output), resolution 0.1%
Output : Relay output, 250V AC 3A (resistive load)
Form C contact for OPEN and Form A contact for CLOSE.
Motor rotating speed : Suitable for 20 to 240 sec. (full open to full close)

Alarms

(Optional)

Temperature Alarm

- a) Number of alarms : 2 points
b) Alarm action : Programmable (process, deviation, FAIL)
c) Alarm delay time : 0 to 600 sec.
d) Alarm differential gap : 0.00 to 10.00% of span

Heater Break Alarm

- a) Number of inputs : 1 point. (For single-phase heater)
b) CT type : CTL-6-P-N(30A), CTL-12-S56-10L-N(100A)
c) Display range : 0.0 to 100.0A
d) Accuracy : \pm 5% of input value or 2A
(whichever is larger)
e) Sampling time : 0.5 sec.
• PV input and CT input are not isolated from each other.
• When heater break alarm (HBA) function is used, remote set point function is not available.
• When control output type is current output or continuous voltage, heater break alarm is not available.

Alarm Output

- Relay output, Form A contact 250V AC 1A (resistive load)

Options

Remote Set Value Function

- a) Remote set value signal (RS input)
DC voltage (Low) : 0 to 10mV, 0 to 100mV, 0 to 1V DC
DC voltage (High) : 0 to 5V, 1 to 5V, 0 to 10V DC
DC current : 0 to 20mA, 4 to 20mA DC
b) Sampling time : 0.5 sec.
• PV input and RS input are not isolated from each other.

External Contact Input

- F900, F700 : 4 points
a) Memory area change : 3 points
b) Mode change : 1 point
F400 : 1 point (memory area or mode change)

Retransmission Output (Only for REX-F700 and REX-F900)

- a) Number of outputs : 1 point
b) Output signal : 0 to 10mV, 0 to 100mV DC
(Load resistance : More than 20k Ω)
0 to 1V, 0 to 5V, 0 to 10V, 1 to 5V DC
(Load resistance : More than 1k Ω)
0 to 20mA, 4 to 20mA DC
(Load resistance : Less than 600 Ω)
• Output data can be selected among process value, deviation, local set value, SV remote set value, manipulated output value.

Digital Communications

- a) Communication method : RS-422A (4-wire), RS-485 (2-wire)
RS-232C (3-wire)
- b) Communication speed : 1200, 2400, 4800, 9600, 19200 BPS
- c) Bit format
 - Start bit : 1
 - Data bit : 7 or 8
 - Parity bit : Without, Odd or Even
 - Stop bit : 1 or 2
- d) Communication code : ASCII(JIS) 7-bit code

General Specifications

External Dimensions (W x H x D)

- F400 : 48 x 96 x 100mm
- F700 : 72 x 72 x 100mm
- F900 : 96 x 96 x 100mm

Self-Diagnostic Function

ROM • RAM check, input value check, CPU power supply monitor, and watchdog timer.

Supply Voltage

- a) 90 to 264V AC (Including supply voltage variation)
[Rating : 100 to 240V AC] (50/60Hz common use)
- b) 21.6 to 26.4V AC (Including supply voltage variation)
[Rating : 24V AC] (50/60Hz common use)
- c) 21.6 to 26.4V DC (Ripple rate 10% p-p or less)
[Rating : 24V DC]

Power Consumption

- F400 : Less than 12VA (at 264V AC)
- F700 : Less than 13VA (at 264V AC)
- F900 : Less than 15VA (at 264V AC)
- At 24V AC : Less than 8.0VA
- At 24V DC : Less than 350mA

Power Failure Effect

A power failure of 50 msec or less will not affect the control action.
If power failure of more than 50 msec occurs, controller will restart.
HOT or COLD start is selectable.

Operating Environments

0 to 50°C [32 to 122°F], 45 to 85% RH

Memory Backup

RAM is backed up by a lithium battery.

Data Retaining Period

Approx. 10 years (depends on storage and operating conditions.)

Net Weight

- F400 : Approx. 310g
- F700 : Approx. 350g
- F900 : Approx. 450g

Compliance with Standards

- CE Mark
- UL/cUL Recognized



Process/Temperature Controller F Series

Model and Suffix Code

Specifications	Model and Suffix Code										
Size	F400 (1/8 DIN) F700 (3/16 DIN) F900 (1/4 DIN)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Control method	ON/OFF control PID control with AT Heat/Cool PID control Heat/Cool PID control with AT for extruder (Air cooling type) Heat/Cool PID control with AT for extruder (Water cooling type) Position proportional PID	A	F	V	B	W	Y				
Input type ¹	See Input Range Code Table	<input type="checkbox"/>									
Scale range	See Input Range Code Table	<input type="checkbox"/>									
Control output (OUT1)	Relay output Voltage pulse Triac trigger DC mA, V (Output Signal Code 4-8)			M	V	G					
Control output (OUT2)	Control method code A, F, Y Relay output Voltage pulse Triac trigger DC mA, V (See Output Signal Code Table.)						No code				
Alarm 1	No alarm See Alarm Code Table						N				
Alarm 2 ²	No alarm See Alarm Code Table							N			
Remote set value ³	Not supplied See Signal Code Table								N		
Contact input	Not supplied Memory area change Auto/Manual selection Remote/Local selection Computer/Local selection (only for F700/F900) Memory area + Auto/Manual (only for F700/F900) Memory area + Remote/Local (only for F700/F900) Memory area + Computer/Local (only for F900)								N	1	2
Analog output	Not supplied See signal code table										N
Digital communications	Not supplied RS-232C RS-422A (4-wire system) RS-485 (2-wire system)										N
Front panel color	Blue (standard) Black										N
											A

Table 1. Control Action and Output Combinations

Output	M	V	G	4 - 8
Action	Relay output	Voltage pulse	Triac trigger	DC mA, V
ON/OFF control	YES	YES	YES	NO
PID control with AT	YES	YES	YES	YES
OUT(1) of Heat/Cool PID	YES	YES	YES	YES
OUT(2) of Heat/Cool PID	YES	YES	NO	YES
Position proportional PID	YES	NO	NO	NO

YES : Available, NO : Not available

Table 2. Model Type and Option Combinations

	F900	F700	F400
Contact input (Memory area)	YES	See note	YES
Analog output	YES	YES	NO
Computer interface	YES	See note	See note
Position proportional PID	YES	YES	YES

YES : Available, NO : Not available

Note: Other options are not selectable if this item is specified.

Output Signal Code Table

4	0 - 5V DC	5	0 - 10V DC	6	1 - 5V DC	7	0 - 20mA DC	8	4 - 20mA DC
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Alarm Code Table

A	Deviation High	B	Deviation Low	C	Deviation High/Low	D	Deviation band
E	Deviation High (with alarm hold)	F	Deviation Low (with alarm hold)	G	Deviation High/Low (with alarm hold)	H	Process High
J	Process Low	K	Process High (with alarm hold)	L	Process Low (with alarm hold)	M	FAIL
P	HBA (CTL-6-P-N) 30A	S	HBA (CTL-12-S56-10L-N) 100A				

Note :

- Auto/Manual is not available on thermocouple and RTD inputs, only available with position proportional PID - Code Y.
- Use Alarm 2 for heater break alarm (HBA).
- Heater break alarm and remote set point cannot be specified on the same hardware.

Safety Standards for F400/900:

When specifying models with CE Mark and UL/cUL recognition add "/CE" to the model code.

Signal Code Table

1	0 - 10mV DC	2	0 - 100mV DC	3	0 - 1V DC	4	0 - 5V DC	5	0 - 10V DC
6	1 - 5V DC	7	0 - 20mA DC	8	4 - 20mA DC				

Input Range Code Table

Thermocouple (Field-programmable)

Input	Code	Range	Input	Code	Range
K	K 08	-199.9 - 300.0°C	S	S 03	0 - 1700°C
	K 09	0.0 - 400.0°C		S A1	0 - 3200°F
	K 10	0.0 - 800.0°C	B	B 03	0 - 1800°C
	K 11	0 - 1300°C		B A3	0 - 3300°F
	K A4	0.0 - 800.0°F	E	E 03	0.0 - 700.0°C
K A5	0 - 2400°F	E 02		0 - 1000°C	
J	J 07	-199.9 - 300.0°C	E A3	0 - 1800°F	
	J 08	0.0 - 400.0°C	N	N 02	0 - 1300°C
	J 09	0.0 - 800.0°C		N A1	0 - 2300°F
	J 06	0.0 - 1200°F	PLII	A 01	0 - 1300°C
	J A4	0.0 - 700.0°F		A A3	0 - 2300°F
J A5	0 - 2100°F	W5Re	W 03	0 - 2300°C	
T	T 05	-199.9 - 300.0°C	W26Re	W A2	0 - 4200°F
	T 06	0.0 - 400.0°C	U	U 04	0.0 - 600.0°C
	T A6	-199.9 - 400.0°F		U A4	0 - 1100°F
	T A7	0.0 - 700.0°F	L	L 03	0.0 - 400.0°C
R	R 03	0 - 1700°C		L 04	0.0 - 900.0°C
	R A1	0 - 3200°F	L A2	0 - 1600°F	

RTD (Field-programmable)

Input	Code	Range
JPt100	P 04	-100.0 - 100.0°C
	P 11	-199.9 - 500.0°C
	P B1	-150.0 - 200.0°F
	P B2	-199.9 - 900.0°F
Pt100	D 04	-100.0 - 100.0°C
	D 12	-199.9 - 600.0°C
	D B1	-150.0 - 200.0°F
	D B3	-199.9 - 999.9°F

Voltage and Current *

Input	Code	Range
0 - 10mV	1 01	0.0 - 100.0%
0 - 100mV	2 01	0.0 - 100.0%
0 - 1V	3 01	0.0 - 100.0%
0 - 5V	4 01	0.0 - 100.0%
0 - 10V	5 01	0.0 - 100.0%
1 - 5V	6 01	0.0 - 100.0%
0 - 20mA	7 01	0.0 - 100.0%
4 - 20mA	8 01	0.0 - 100.0%

* Field programmable among following input group

- a) 0 - 10mV, 0 - 100mV, 0 - 1V
- b) 0 - 5V, 0 - 10V, 1 - 5V
- c) 0 - 20mA, 4 - 20mA

Supply Voltage

100 - 240V AC

24V AC

24V DC

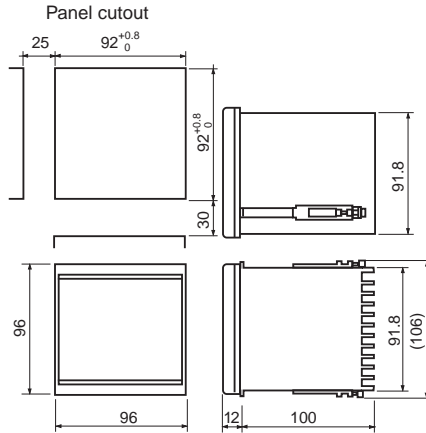
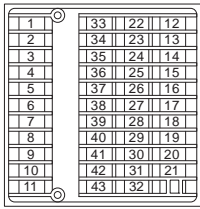
Specify voltage type when ordering.

Process/Temperature Controller F Series

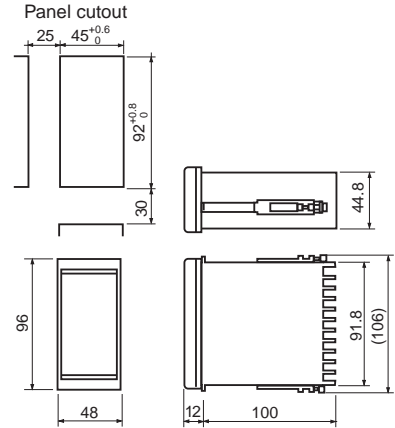
External Dimensions and Rear Terminals

Unit : mm

REX-F900



REX-F400



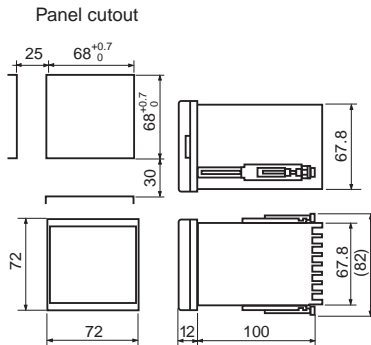
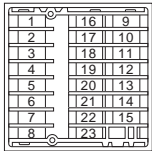
* Terminals 22 to 32 are used only for F900.

No.	Description
1	Ground
2	Power supply (AC 100 to 240V, AC 24V, DC 24V)
3	Power supply
4	Alarm output (Alarm 1)
6	Relay contact output (Alarm 2)
7	Control output (OUT2) (1) Relay contact output (2) Voltage/Current
8	Control output (OUT2) (1) Relay contact output (2) Voltage/Current
9	Control output (OUT1) (1) Relay contact output (2) Voltage/Current (3) Triac trigger output
10	Control output (OUT1) (1) Relay contact output (2) Voltage/Current (3) Triac trigger output
11	Control output (OUT1) (1) Relay contact output (2) Voltage/Current (3) Triac trigger output

No.	Description
22	Contact input (COM (-))
23	Contact input (Area transfer)
24	Contact input (Area transfer)
25	Contact input (Area transfer)
26	Communications (RS-422A SG, RS-485 SG, RS-232C SG)
27	Communications (T(A), T(R(A)), SD)
28	Communications (T(B), T(R(B)), RD)
29	Communications (R(A))
30	Communications (R(B))
31	Analog output (+)
32	Analog output (-)

No.	Description
12	Contact input (RS-422A SG, RS-485 SG, RS-232C SG)
13	Contact input (T(A), T(R(A)), SD)
14	Feedback resistance input (T(B), T(R(B)), RD)
15	Feedback resistance input (R(A))
16	Feedback resistance input (R(B))
17	Current transformer input (CT)
18	Remote setting input (RS)
19	Sensor input (1) TC input (2) RTD input (3) Voltage (Low) input (4) Current/voltage (High) input
20	Sensor input (1) TC input (2) RTD input (3) Voltage (Low) input (4) Current/voltage (High) input
21	Sensor input (1) TC input (2) RTD input (3) Voltage (Low) input (4) Current/voltage (High) input

REX-F700



No.	Description
1	Ground
2	Power supply (AC 100 to 240V, AC 24V, DC 24V)
3	Power supply
4	Control output (OUT2) (1) Relay contact output (2) Voltage/Current
5	Control output (OUT2) (1) Relay contact output (2) Voltage/Current
6	Control output (OUT1) (1) Relay contact output (2) Voltage/Current (3) Triac trigger output
7	Control output (OUT1) (1) Relay contact output (2) Voltage/Current (3) Triac trigger output
8	Control output (OUT1) (1) Relay contact output (2) Voltage/Current (3) Triac trigger output

No.	Description
16	Feedback resistance input (Area transfer)
17	Feedback resistance input (Area transfer)
18	Feedback resistance input (Area transfer)
19	Analog output (+)
20	Analog output (-)
21	Control output (OUT1) (1) Relay contact output (2) Voltage/Current (3) Triac trigger output
22	Alarm output (Alarm 1)
23	Relay contact output (Alarm 2)

No.	Description
9	Contact input (Mode transfer)
10	Contact input (Mode transfer)
11	Analog input (Current transformer input, Remote setting input)
12	Analog input (Current transformer input, Remote setting input)
13	Sensor input (1) TC input (2) RTD input (3) Voltage (Low) input (4) Current/voltage (High) input
14	Sensor input (1) TC input (2) RTD input (3) Voltage (Low) input (4) Current/voltage (High) input
15	Sensor input (1) TC input (2) RTD input (3) Voltage (Low) input (4) Current/voltage (High) input