REX-G9

General Description

Model REX-G9 is an advanced digital controller for process control applications.

The REX-G9 has many standard and optional features, including user friendly operations with a LCD interactive operation display. One of the greatest features of REX-G9 is the use of new PID control called "Brilliant PID" which offers superb control results. Autotuning has also been enhanced to suppress overshoot during autotuning (Enhanced AT).

Features

☆ User-friendly LCD interactive operation display
☆ Brilliant PID and enhanced autotuning
☆ Various field reconfigurable functions
☆ Sampling cycle of 100 milliseconds
☆ Reference accuracy of 0.1%
☆ Multi-memory area : Up to 8 sets of SVs

### Interactive liquid crystal display

The REX-G9's interactive liquid crystal display makes the setting of parameters simple and straightforward. Simply touch two of the front panel keys to change the operation mode and display the appropriate menu on the LCD.

The messages on the menus then prompt the user to enable PID control, reconfigure the specifications, and set parameters. The LCD displays messages with up to 16 characters on both lines.

```
→PARA GROUP=00 ?
(SV,ALM1,2,3   )
```

Brilliant PID

Brilliant PID combines stable control with quick response. On the conventional PID control, there is a conflict between control stability and quick response; response to set value change might be compromised when stability is improved, and stability might be compromised when quick response to SV change is achieved The Brilliant PID retains optimum PID values for stability while you can choose control response types among "Fast", "Medium", and "Slow". Please set "Fast" response type when quick response is necessary. "Slow" type is appropriate to avoid overshooting.

Response to the SV change
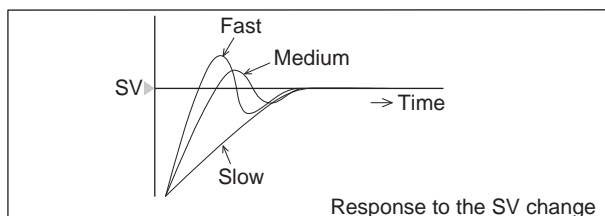
Enhanced autotuning

Enhanced autotuning settles PID values without overshooting. It seeks for PID values by making oscillation artificially below the set value when AT bias is set up.

[Conventional Autotuning]
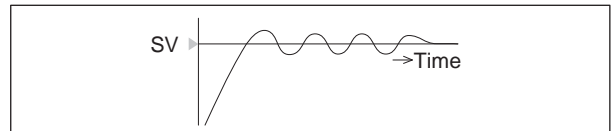
[Enhanced Autotuning]
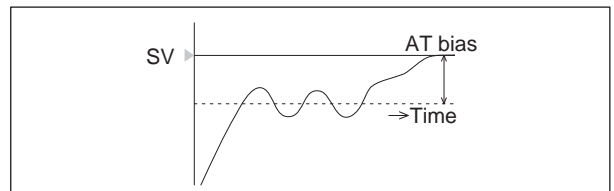
Multi-memory area

The REX-G9 has 8 memory areas. Each memory area can store the set value, proportional band, integral time, derivative time, response parameter, and alarm set value. With multi-memory area function, you can change all of these values at one time by digital communication, digital input or AREA key on the front panel.

Standard features

The REX-G9's standard functions include: PV bias, PV digital filter, PV moving average, PV low level cutoff, preset manual, set point rate limit, bar graph mode change, output limiter, output rate limiter, program menu lock, HOT/COLD start, ON/OFF action hysteresis, square root extraction, automatic/manual transfer and storage of eight sets of SVs and other PID parameters.

Optional features

Optional features of the REX-G9 are: programmable alarm, remote set point, RS ratio, RS bias, RS digital filter, RS moving average, autotuning, AT bias, alarm differential gap, analog output, SV tracking and serial communications.
Communications are RS-422A or RS-232C.

Process Controller REX-G9

Specifications

Inputs

Input
  a) Thermocouple input group
     K, J, R, S, B, E, T, N (JIS/IEC), PLII (NBS), W5Re/W26Re (ASTM), U, L (DIN)
     • Influence of external resistance : Approx. 0.3μV/Ω
     • Input break action : Up-scale
  b) RTD input group
     Pt100 (JIS/IEC), JPt100 (JIS)
     • Influence of input lead resistance : Approx. less than 10Ω
                                          • Up to 10Ω per wire
     • Input break action : Up-scale
  c) DC low voltage input group
     0 to 10mV, -10 to 10mV, 0 to 100mV, -100 to 100mV, 0 to 1V, -1 to 1V, 0 to 5V, 1 to 5V
     • Input break action : Down-scale
  d) DC high voltage input group
     0 to 10V
     • Input break action : Down-scale
  e) DC current input group
     0 to 20mA, 4 to 20mA
     • Input break action : Down-scale

Sampling time
  0.1 sec

PV bias
  -5.00 to 5.00% of span

Performance

Measuring accuracy
  ± (0.1% of span + 1 digit)
  Cold junction temperature compensation error
     Within ±0.5℃ (between 0 and 50℃ [32 and 122°F])
  • Accuracy is not guaranteed between 0 and 399℃ (0 and 750°F) for type B thermocouple input.

LCD display
  LCD message display unit. (16 characters by 2 lines)

Insulation resistance
  More than 20MΩ (500V DC) between measured and ground terminals.
  More than 20MΩ (500V DC) between power and ground terminals.

Dielectric strength
  1000V AC for one minute between measured and ground terminals.
  1500V AC for one minute between power and ground terminals.

Control

Control method
  a) ON/OFF control
  b) Brilliant PID control
  c) Brilliant PID control with enhanced autotuning
  d) Position proportioning control

Memory area
  8 areas

Major setting range
  Setting range :   Same as input range
  Proportional band :   0.1 to 1000.0% of span
                              (Zero is not settable)
  Integral time :   1 to 3600sec. (Zero is not settable)
  Derivative time :   0 to 3600sec. (PI action when D=0)
  Control response :   Slow, medium and fast (Programmable)
  Digital filter :   0 to 100 sec.
  Derivative calculation cycle : 0.1 to 1.0 sec.
  Proportional cycle :   1 to 100 sec.
  Output limiter high :   -5.0 - +105.0%
  Output limiter low :   -5.0 - +105.0%
  Output changing rate limiter : 0.1 to 100.0%/sec (OFF by setting zero)

Control output
  Relay contact output :   Form C contact, 250V AC 3A (resistive load)
  Voltage pulse output :   0/12V DC
                              (Load resistance : More than 800Ω)
  Current output :   0 to 20mA, 4 to 20mA DC
                              (Load resistance : Less than 600Ω)
  Continuous voltage output : 0 to 10mV, 0 to 100mV DC
                              (Load resistance : More than 20kΩ)
                              0 to 1V, 0 to 5V, 0 to 10V, 1 to 5V DC
                              (Load resistance : More than 1kW)
  Triac trigger output :   Zero-cross method. Effective ON current
                              50mA (at 50℃), 100mA (at 25℃)

Motor valve control (position proportioning type only)
  Input resistance (feedback resistance) : 135Ω as standard.
  (Other feedback : 100, 200, 500, 1k, 10kΩ)
  POS sampling time : 0.4 sec.
  Neutral band :   0.1 to 10.0% (output), resolution 0.1%
  Output :   Relay output, 250V AC 3A (resistive load)
                          Form A contact.
  Motor rotating speed : Suitable for 20 to 240 sec. (full open to full close)

Alarms   (Optional)

Alarm function (Optional)
  a) Number of alarms :   3 points (independently programmable)
  b) Alarm action :   Programmable (process, deviation, FAIL)
  c) Alarm differential gap : 0.00 to 10.00% of span

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

Options

Remote set point function
  a) Remote set point signal (RS input)
     DC voltage (Low) :   0 to 10mV, 0 to 100mV, 0 to 1V, 0 to 5V,
                          1 to 5V DC
     DC voltage (High) : 0 to 10V DC
     DC current :   0 to 20mA, 4 to 20mA DC
  b) Sampling time : 0.2 sec.
   • PV input and RS input are not isolated from each other.

External contact input
  a) Memory area :   3 points(BCD), Mode change 1 point
  b) Mode change :   4 points

Analog output
  a) Number of outputs :   2 points (1 point in case that you specify con-
                            tinuous output for control output)
  b) Output signal :   0 to 10mV, 0 to 100mV DC
                            (Load resistance : More than 20kΩ)
                            0 to 1V, 0 to 5V, 0 to 10V, 1 to 5V DC
                            (Load resistance : More than 1kΩ)
                            0 to 20mA, 4 to 20mA DC
                            (Load resistance : Less than 600Ω)
  • Output data can be configured. PV for process value, DEV for devia-
  tion, SV (L) for local set point, SV (R) for remote set point, MV for ma-
  nipulated output value, POS for motor valve position.

Digital communications
  a) Communication method : RS-422A (2 or 4-wire, MAX : 16 units)
                              RS-232C (3-wire)
  b) Communication speed :   1200, 2400, 4800, 9600 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)
  96 x 96 x 150mm

Supply voltage
  90 to 264V AC (Including supply voltage variation)
  [Rating : 100 to 240V AC] (50/60Hz programmable)

Power consumption
  16VA or less (at 264V AC)
  10VA or less (at 100V AC)

Effect by power failure
  HOT or COLD start selectable.
  Power failure less than approximately 3 seconds   : Hot start 1
  Power failure more than approximately 3 seconds : Hot start 1, Hot start 2
                                                     or Cold start (selectable)

Operating environments : 0 to 50℃ [32 to 122°F] , 20 to 80% RH

Memory backup : RAM is backed up by lithium battery.

Data retaining period : Approx 10 years (depends on storage and operat-
                          ing conditions.)

Net weight
  Approx. 800g

Model and Suffix Code

Specifications		Model and Suffix Code
Model	REX-G9	□ □ □−□ * □ □ □−□ □−□/A
Control method	ON/OFF control　　*1 PID control PID control with AT Position proportioning PID　　*1	A H F Y
Alarm	No alarm With alarm (3 points)	N T
Input type	Thermocouple input RTD input DC low voltage input DC high voltage input (0 to 10V DC) DC current input	C R V E I
Control output	Relay contact output Voltage pulse output Triac trigger DC voltage　　　　*2 DC current　　　*2	M V G E R
Remote set point	Not supplied DC low voltage input DC high voltage input (0 to 10V DC) DC current input	N V E I
Digital input function 1 (DI1)	Not supplied Memory area Mode selection (Auto/Manual, Remote/Local, Computer/Local, Run/Stop)　*3	N 1 M
Digital input function 2 (DI2)	Not supplied Auto/Manual selection Remote/Local selection Computer/Local selection Run/Stop selection	N A R C S
Analog output (AO1)	Not supplied See output signal code table	N □
Analog output (AO2)	Not supplied See output signal code table	N □
Digital communications	Not supplied RS-232C RS-422A (2-wire system) RS-422A (4-wire system)	N 1 2 4

*1 : Control output is relay contact only.
*2 : Please specify output signal code of Analog output 1 (AO1).
*3 : Always specify "N" at DI2, when you specify "M" at DI1.

Specification code
Scale range : Please specify scale and input.
Power frequency code : Power supply frequency (50 or 60Hz) must be specified when ordering.

Range and input table

Thermocouple input

Input	Range
K	-200.0 － 200.0℃ 0.0 － 400.0℃ 0.0 －1300.0℃ 0.0 － 800.0℉ 0.0 －2400.0℉
J	-200.0 － 200.0℃ 0.0 － 400.0℃ 0.0 － 800.0℃ 0.0 －1200.0℃ 0.0 －1600.0℉ 0.0 －2100.0℉
R	0.0 －1700.0℃ 0.0 －3200.0℉
S	0.0 －1700.0℃ 0.0 －3200.0℉
B	0.0 －1400.0℃ 0.0 －1800.0℃ 0.0 －2500.0℉ 0.0 －3300.0℉
E	-200.0 － 200.0℃ 0.0 －1000.0℃ 0.0 －1800.0℉

Input	Range
T	-200.0 － 200.0℃ -200.0 － 400.0℃ 0.0 － 400.0℃ -300.0 － 400.0℉ -300.0 － 700.0℉ 0.0 － 700.0℉
N	0.0 －1300.0℃ 0.0 －2300.0℉
PLII	0.0 －1300.0℃ 0.0 －2300.0℉
W5Re /W26Re	0.0 －1200.0℃ 0.0 －2300.0℃ 0.0 －2200.0℉ 0.0 －4200.0℉
U	-200.0 － 200.0℃ 0.0 － 600.0℃ -300.0 － 400.0℉ 0.0 －1100.0℉
L	-200.0 － 200.0℃ 0.0 － 900.0℃ -300.0 － 400.0℉ 0.0 －1600.0℉

RTD input

Input	Range
JPt100	-50.00 －150.00℃ -200.0 － 600.0℃ 0.00 －300.00℉ -300.0 －1200.0℉
Pt100	-50.00 －150.00℃ -200.0 － 600.0℃ 0.00 －300.00℉ -300.0 －1100.0℉

Voltage and current input

Input	Range
mV, V DC	0 － 10mV -10 － 10mV 0 －100mV -100 －100mV 0 － 1V -1 － 1V 0 － 5V 1 － 5V
V DC	0 － 10V
mA DC	0 － 20mV 4 － 20mV

Output signal code

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

Process Controller REX-G9

External Dimensions and Rear Terminals

Unit : mm

96 | 96

12 | 150 | 91 (100)

Panel cutout

$92^{+0.8}_{0}$

$92^{+0.8}_{0}$ | 25

30

1	30	20	11
2	31	21	12
3	32	22	13
4	33	23	14
5	34	24	15
6	35	25	16
7	36	26	17
8	37	27	☐☐☐
9	38	28	18
10	39	29	19

No.	Description	
1		Ground
2	AC 100 to 240V	Power supply
3		
4	FAIL	FAIL output Relay contact output
5		
6	(A,F,H type) (Y type) (1) CLOSE (1) OPEN (1) C (3) T2 NO (2) + T1 NC G	Control output (1) Relay contact output (2) Voltage/current (3) Triac trigger output
7		
8		
9		
10		

No.	Description	
30	+ AO1	Analog output 1
31		
32	+ AO2	Analog output 2
33		
34		
35		
36		Alarm output Relay contact output
37	NO Alarm 1	
38	NO Alarm 2	
39	NO Alarm 3	

No.	Description			
	RS-422A (4-wire)	RS-422A (2-wire)	RS-232C	
20	SG	SG	SG	Communications
21	T(A)	T/R(A)	SD	
22	T(B)	T/R(B)	RD	
23	R(A)			
24	R(B)			
	COM (-)		COM (-)	Contact input
25				
26	1 (+)		AUTO/MAN (+)	
27	2 (+)		REM/LOC (+)	
28	4 (+)		COMP/LOC (+)	
29	DI (+)		RUN/STOP (+)	

No.	Description	
11	O W C	Feedback resistance input
12		
13		
14	+ RS	Remote setting input
15		
16		
17	B B A (1) (2) (3) +	Sensor input (1) TC input (2) RTD input (3) Current/voltage
18		
19		