

FC SERIES SELF-BALANCING RECORDER

DATA SHEET

PFA

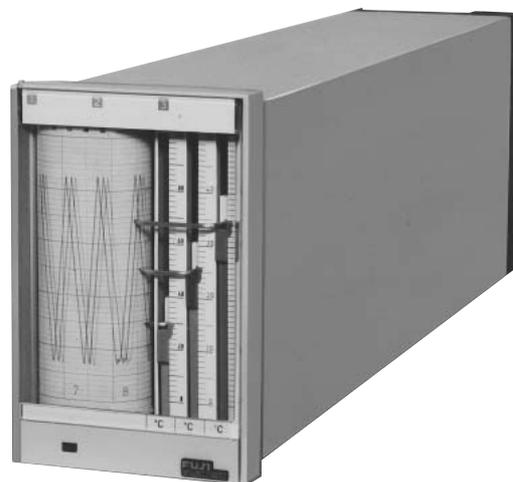
The FC SERIES self-balancing recorder is capable of continuously recording up to three types of inputs like process signal, DC voltage, current, thermocouple signal, resistance bulb signal, etc. Alarm units for the individual pens, external chart speed selector convenient for plant instrumentation, marking pen and many other optional accessories are prepared inside the self-balancing recorder. It is also usable as a trend recorder for 18 input points when combined with input selector (Type: PFC).

FEATURES

1. Compact design measuring 96 mm wide by 144 mm high (front panel) by 400 mm deep (casing).
2. The recorder uses a folding type chart, of which one stack allows continuous recording for a month at a standard chart speed of 20 mm/h.
3. Data are indicated in bargraphs with color ribbon.
4. The servo-mechanism consists of a contactless induction potentiometer and a powerful coreless-motor, thereby assuring high reliability.
5. Chart speed is set accurately and can be switched easily by a combination of a clock circuit comprising a crystal oscillator and a pulse-motor.
6. The recorder can operate within a wide DC voltage range of 20 to 30V, or commonly at 50 and 60 Hz with an AC power supply.
7. The recording pen is a cartridge type felt-tip pen requiring a minimum of maintenance.

SPECIFICATIONS

Input signal: Process signal;
 1 to 5V DC, 4 to 20mA DC
 DC voltage; 4mV span or more
 (30V max.)
 DC current; 100 μ A span or more
 (200mA max.)
 Thermocouple; 4mV span or more
 (Cold junction compensation, linearizer and burnout circuit built in.)
 Resistance bulb; Pt100
 50°C span or more, 3-wire system
 (linearizer built in)
 JPt100 in accordance with JIS C 1604-1981,



50°C span or more, 3-wire system (linearizer built in)

Slide rheostat; 10-100-10 Ω ,

3-wire system

Input resistance and allowable signal source resistance:

See page 3

Allowance: $\pm 0.5\%$ of input span or $\pm 40 \mu\text{V}$, whichever is larger

Dead band: 0.2% of input span or $16 \mu\text{V}$, whichever is larger

Response time: Approx. 5 sec (variable within a range of approx. 2 to 20 sec)

Number of recording points:

1, 2 or 3 pens

Recording pens: Cartridge type felt-tip pen

Pen No. 1 ... red, pen No. 2 ... green, pen No. 3 ... blue

Scale length: 100mm (recording width)

Chart length: 15m (continuous recording for 31 days at 20mm/h)

Chart feed system:

Pulse-motor type (driving pulse generator circuit built in)

Chart storage system:

Folding system

Chart speed: 20mm/h basic

(10, 30, 40, 60 and 120mm/h also selectable)

Chart speed accuracy:

$\pm 0.1\%$ as measured on time axis on the chart

Power supply: 24V (20 to 30V) DC or
100V ± 10%, 50/60Hz AC

Power indicator lamp:
Rectangular green LED

Power consumption:
Approx. 5.5W (24V DC) or approx.
8VA (100V AC) for 1-pen type
Approx. 8W (24V DC) or approx.
12VA (100V AC) for 2-pen type
Approx. 10W (24V DC) or approx.
15VA (100V AC) for 3-pen type

Ambient temperature: 0 to 45°C

Ambient humidity: 30 to 90% RH

Note: Temperature [°C]
x humidity [% RH]
≤3000

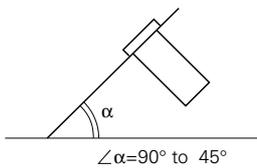
Housing: Steel case

External dimensions (HxWxD):
144x96x400mm (casing)
+ terminal board

Mass{weight}{(approx):}
1-pen type; 5 kg
2-pen type; 5.5 kg
3-pen type; 6 kg

Finish color: Munsell 7Y 7.3/1.4 (Case, front frame)

Mounting: Panel flush-mounting



Scope of delivery: Recorder, mounting bracket and standard accessories (see page 3)

Specifications for optional units

Alarm unit: Type; Comparator circuit type
Upper limit + lower limit, two upper limits or two lower limits (for each pen)

Setting accuracy;
±1% of input span

Hysteresis width;
Approx. 0.4% of input span

Output contacts;
N.O (1a) contacts for upper limit and lower limit (excited at alarm condition)

Contact capacity;
Maximum voltage 125V AC/30V DC
Current (breaking)
Resistance load: 0.3A or less
Relay load: 0.2A or less
Note: Alarm output stabilized several seconds after turning ON power switch. If necessary, the user is to provide an external sequence such as a timer for cutting off output at start time.

Chart speed selector:
Selector; Internal switch or external sequence for selecting a preset low or high speed

Low speed; 10, 20, 30, 40, 60, 120 mm/h

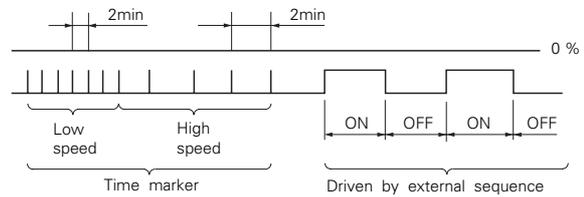
High speed; 120, 300, 600, 1200, 3000, 6000, 12000mm/h

External selecting signal;
Terminals F—F
High speed selected by short circuited
(Contact capacity; 5V, 10mA)

Marking unit: Time marker; Recording of impulselike spike on lower end of chart at definite time intervals
(2 min basic)

Externally controlled marker;
Operating only while terminals M—M are short circuited in external sequence.
Contact capacity:
24V, 50mA

Marking pen; Cartridge type felt-tip pen (blue)



Indication pause: Indicator (recorder pen) is paused by short circuited terminals PS — PS via external sequence.
(Contact capacity; 20V, 50mA)

Note: Alarm device continues monitoring even while the indication is paused.

Input resistance and allowable signal source resistance

Es (Is) indicates input span (unit: mV or mA)

Voltage input			Current input	
Input	Input resistance	Allowable signal source resistance	Input	Input resistance
$4 \leq E_s \leq 200\text{mV}$	100k Ω or more	100 Ω	$0.1 \leq I_s \leq 10\text{mA}$	50/ I_s Ω
$0.2 < E_s \leq 1\text{V}$	Approx. 100k Ω	100 Ω	—	—
$1 < E_s < 4\text{V}$	Approx. 470k Ω	470 Ω	$10 < I_s \leq 200\text{mA}$	5 Ω
$4 \leq E_s \leq 30\text{V}$	1 M Ω	1 k Ω	—	—
Process signal 1 to 5V	1 M Ω	1 k Ω	Process signal 4 to 20mA	250 Ω
$4 \leq E_s \leq 40\text{mV}$ with burnout circuit	$E_s/4 \times 10^4 \Omega$	$E_s/0.4 \Omega$	10 to 50mA	100 Ω
$40 < E_s \leq 80\text{mV}$ with burnout circuit	$E_s/8 \times 10^4 \Omega$	$E_s/0.8 \Omega$	—	—

Note: Wiring resistance: 6 Ω or less per wire (each wire resistance should be equal value)

Standard accessories

	PFA1	PFA2	PFA3
Chart	3	3	3
Recording pen	Red	2	2
	Green	—	2
	Blue	—	2
Oil	1	1	1
Marker pen	3 (only when marker equipped)		

Remarks: Chart to be supplied as standard accessory should in principle be selected from among the standard charts)

List of chart Nos. (standard charts)

Type	Graduation numeral	Number of sections	Chart No.
Equal graduations (without graduation numerals)	—	40	FL-4000-S
	—	50	FL-5000-S
	—	60	FL-6000-S
	—	70	FL-7000-S
	—	75	FL-7500-S
	—	80	FL-8000-S
Equal graduations (with graduation numerals)	0 to 40, 0 to 200 200 to 400	40	FL-4001-S
	0 to 25, 50, 100	50	FL-5001-S
	0 to 30, 60, 120	60	FL-6001-S
	0 to 14, 0 to 70 700 to 1400	70	FL-7001-S
	0 to 150, 50 to 200 100 to 250	75	FL-7501-S
	0 to 80, 0 to 1600 800 to 1600	80	FL-8001-S

Remarks: (1) Standard chart speed 20mm/h. Different chart speeds available for non-standard specifications.

(2) The symbol added to the end of chart Nos. Denotes chart speed.

S: 20mm/h (basic)

L: 10mm/h, X: 60mm/h, Y: 120mm/h

Z: Graduation in length (same graduations are repeated at every 1m ℓ g.).

(3) The non-standard chart should be ordered as a set of 24.

CODE SYMBOLS

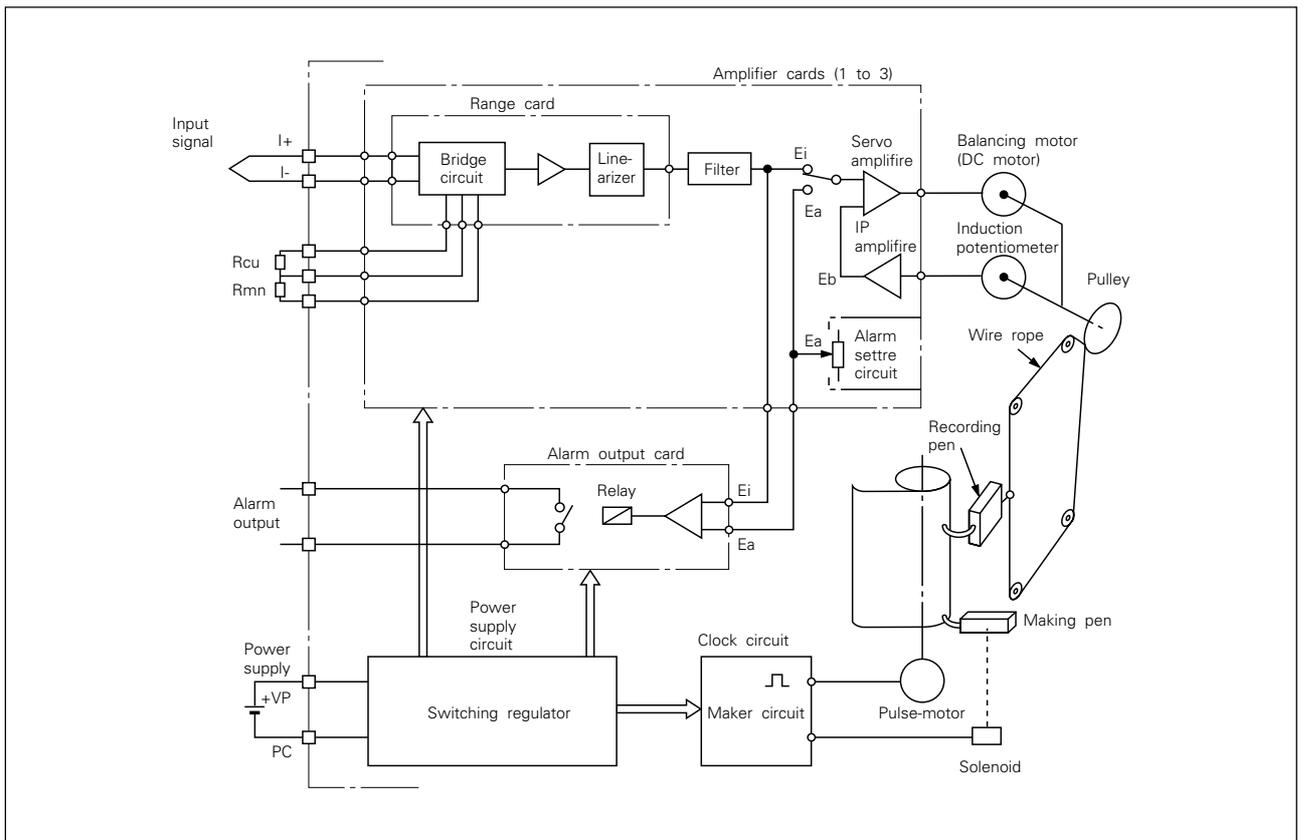
1 2 3 4 5 6 7 8								9 10 11 12 13					Description																
P	F	A					1						Number of recording points																
							1						1-pen																
							2						2-pen																
							3						3-pen																
													Input signal (*4) Pen No. 1, pen No.2, pen No.3																
A													1 to 5V DC																
B													4 to 20mA DC																
E													4mV DC span or more, max. voltage 30V																
D													100µA DC span or more, max. current 200mA																
F													Thermocouple input, 4mV span or more																
T													Same as above, for connecting zener barrier } (*1) (*2)																
H													Resistance bulb JPt 100, 3-wire type, 50 °C span or more																
M													Same as above, for connecting zener barrier																
W													Resistance bulb Pt 100, 3-wire type, 50 °C span or more } (*7)																
N													Same as above, for connecting zener barrier																
J													Slide rheostat, 3-wire type																
Y													None																
													Entries of input codes (⊙ to be filled with input code) (*6)																
													<table border="1"> <thead> <tr> <th></th> <th>5th digit</th> <th>6th digit</th> <th>7th digit</th> </tr> </thead> <tbody> <tr> <td>1-pen</td> <td>⊙</td> <td>Y</td> <td>Y</td> </tr> <tr> <td>2-pen</td> <td>⊙</td> <td>⊙</td> <td>Y</td> </tr> <tr> <td>3-pen</td> <td>⊙</td> <td>⊙</td> <td>⊙</td> </tr> </tbody> </table>		5th digit	6th digit	7th digit	1-pen	⊙	Y	Y	2-pen	⊙	⊙	Y	3-pen	⊙	⊙	⊙
	5th digit	6th digit	7th digit																										
1-pen	⊙	Y	Y																										
2-pen	⊙	⊙	Y																										
3-pen	⊙	⊙	⊙																										
													Power supply																
							1						24V DC																
							2						100V AC																
													Common optional units																
							Y						Without optional units																
							* A						With time marker																
							* B						With externally controlled marker																
							* C						Same as above, for one-shot operation																
							D						Low/high chart speed selection																
							* E						A+D } (*5)																
							* F						B+D } (*5)																
							* G						C+D } (*5)																
													1st pen, optional units																
							Y						Without optional units																
							K						Upper limit + lower limit alarm } (*3)																
							* H						Two upper limits alarm } (*3)																
							* L						Two lower limits alarm } (*3)																
							D						Indication pause } Unusable for thermocouple input																
							E						K + D } Unusable for thermocouple input																
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Notes: * (1) Cold junction compensation and burnout circuit (upscale) are provided with recorder for thermocouple input.
 (2) Minimum temperature range (span) of thermocouple:
 K: 150°C J: 100°C T: 150°C
 E: 100°C R: 500°C
 (3) Alarm units are to be added consecutively from pen No. 1 to pen No. 3.

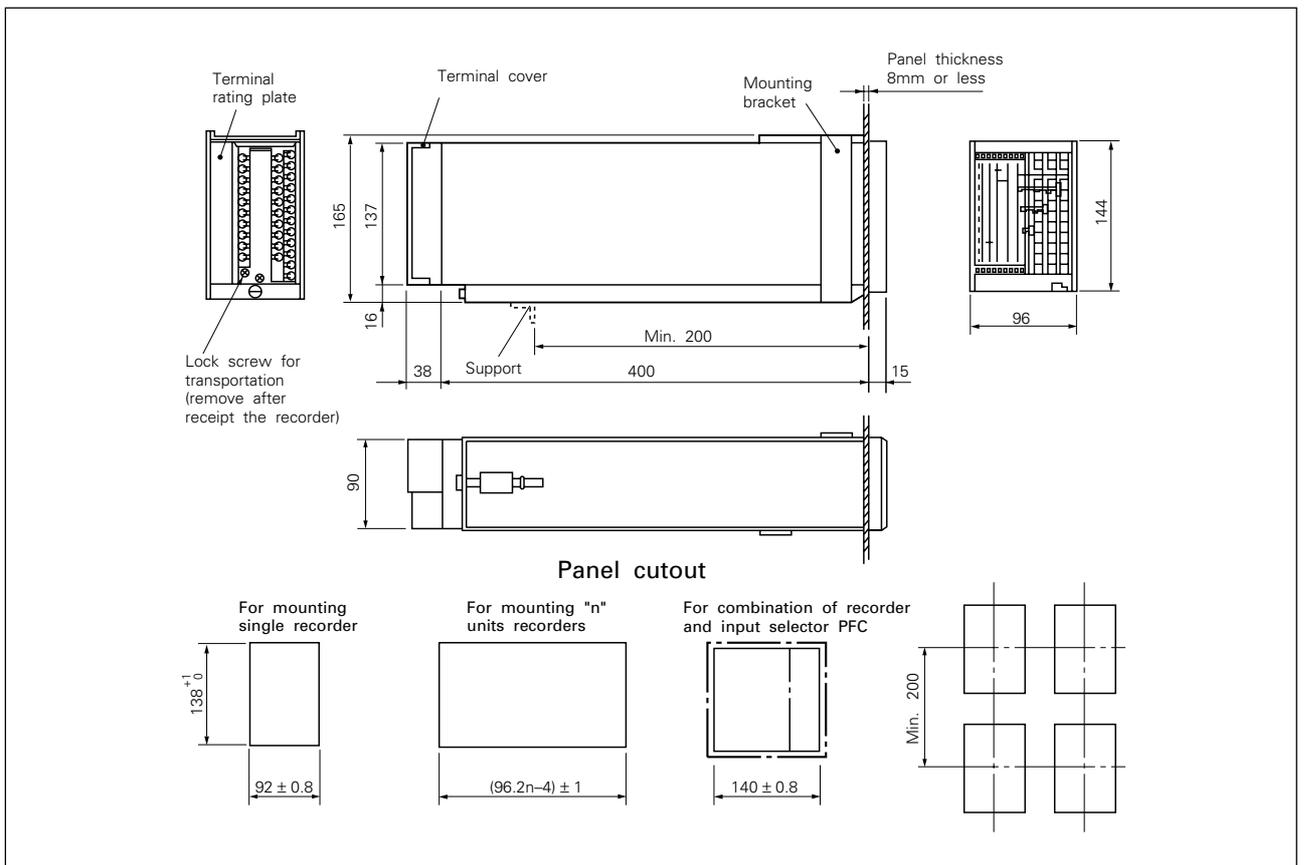
(4) Linearizer is to be provided for direct inputs from thermocouple and resistance bulb.
 (5) When all three pens are recorded thermocouple inputs and are equipped with alarm devices, E, F or G cannot be specified in 10th digit (due to number of terminals).
 (6) Example of instrument code specifications:
 PFA2ABY1-1YKYY
 (7) JPt 100...JIS C 1604-1981
 Pt100...IEC Pub 751-1983

• Asterisked (*) items; Nonstandard.

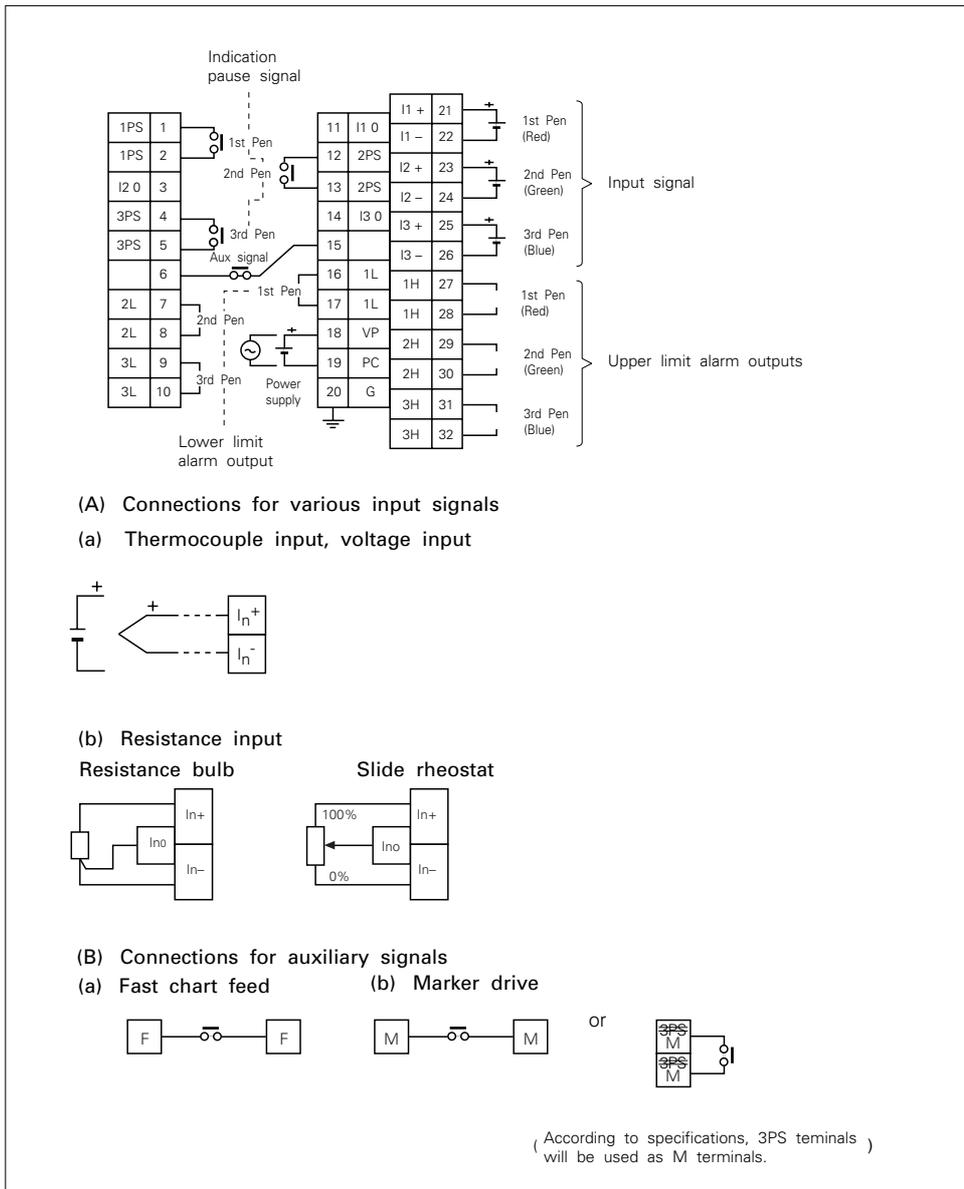
PRINCIPLE OF OPERATION



OUTLINE DIAGRAM (Unit:mm)



EXTERNAL CONNECTION DIAGRAM



RELATED DEVICES

Input selector PFC

ORDERING INFORMATION

1. Name of instrument 2. Type 3. Inputs
4. Scale graduation 5. Optional devices required
6. Power requirements 7. Other remarks

⚠ Caution on Safety

*Before using this product, be sure to read its instruction manual in advance.

Fuji Electric Systems Co., Ltd.

Head Office

6-17, Sanbancho, Chiyoda-ku, Tokyo 102-0075, Japan
<http://www.fesys.co.jp/eng>

Sales Div.

International Sales Dept.

No.1, Fuji-machi, Hino-city, Tokyo, 191-8502 Japan
 Phone: 81-42-585-6201, 6202 Fax: 81-42-585-6187
<http://www.fic-net.jp/eng>