Fe *e-Front runners*

# FC SERIES COMPACT CONTROLLER S (STEP OUTPUT TYPE)

DATA SHEET   PNC1

Compact controller S (fixed function type) is a compact single-loop controller using a microprocessor.

It accepts uniform signals, and signals from a thermocouple and resistance bulbs as input, and includes sufficient control and computation functions which permit composition of a flexible system for PID control, square-root extraction, non-linear control, etc.
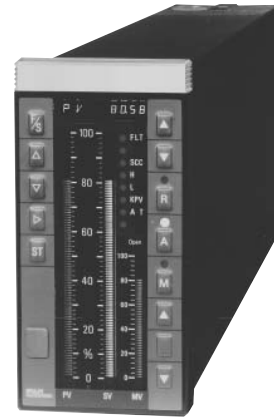
FEATURES

1. **PID auto turing function**
   Optimum PID parameter can be obtained for processing.
2. **High reliability**
   LED's (red and green) are used for the bar graph indicator and for parameter indication (red). A non-volatile memory retains the control and computation parameters even if power should be interrupted.
3. **All operations are performed from the front of the panel**
   Operations such as parameter setting, auto/manual changeover are performed from the front of the panel.
4. **Transmission function**
   Incorporation of transmission function permits setting of concentrated monitoring data at the host system.

FUNCTIONAL DIAGRAM

Fuji Electric Systems Co., Ltd.

EDS11-101e	
Date	Jan. 27, 1999
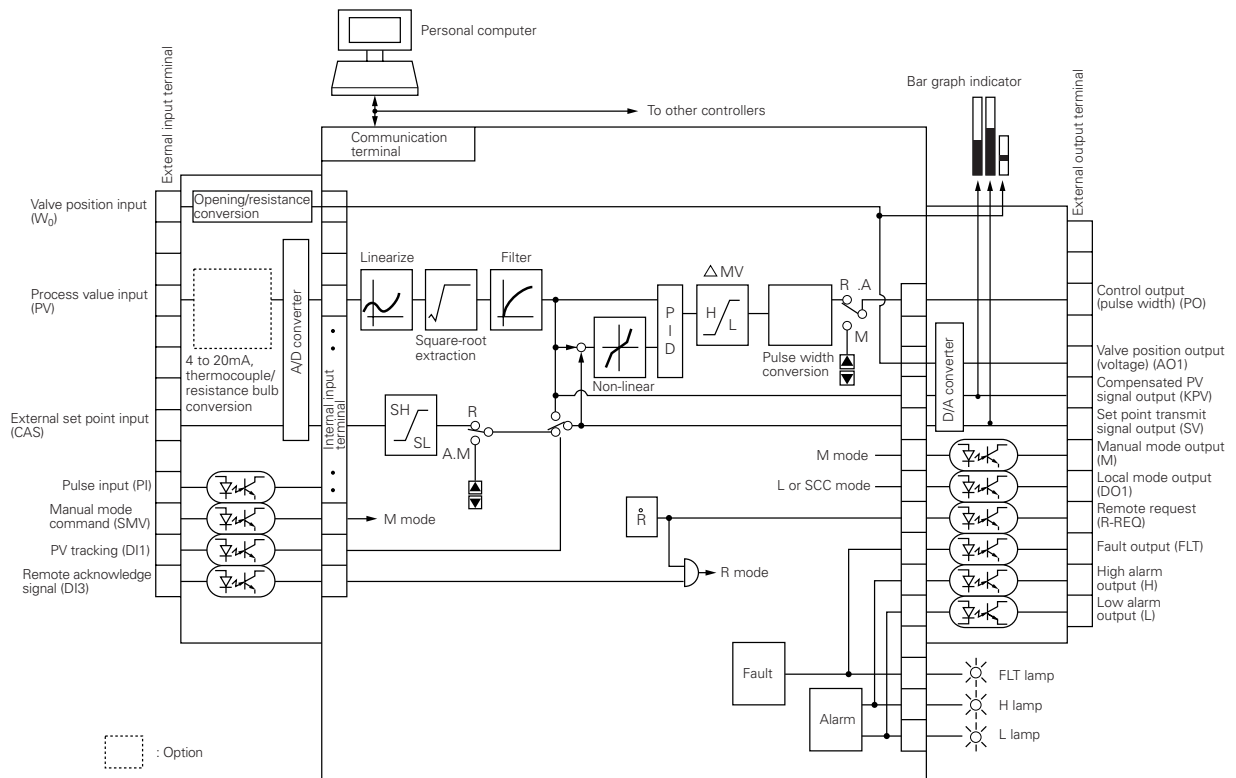
SPECIFICATIONS

1. Control functions

PID control: Proportional band (P); 1.0 to 3276.7%
Integration time (I); 0.1 to 3276.7 sec
Derivative time (D); 0.0 to 900.0 sec
PID auto tuning function

Additional function:

Segmented line approximation; 15 segmented lines
Square-root extraction; with low input cut function
Filter; filter time constant 0.0 to 900.0 sec
Non-linear control
Output change rate limiter; 0.0 to 100.0%

Alarm functions:

PV high/low limit alarm	Select any 1 of 3 types at left
PV change rate alarm	Front panel LED (H, L) ON,
DV high/low limit alarm	digital output (H, L) "ON"

Control cycle: 0.1 sec

2. Input signal

(1) PV input signal:

One point select from the following inputs.

Voltage input signal		1 to 5V DC	Input resistance, 1MΩ or more Allow. error, ±0.2%/FS
Current input signal		4 to 20mA DC	24V DC power is supplied to transmitter with AC power used. Allow. error, ±0.2%/FS
Thermocouple input	I_+ I_0 I_-	Type J:0 to 600°C K:0 to 1200°C E:0 to 800°C R:0 to 1600°C	10mV DC span, or more Self-contained basic contact compensating function Allow. error ±0.5%/FS
Resistance bulb input		JPt100/Pt100 –50 to 500°C	50°C span or more Allow. error ±0.5%F/S

(2) Analog input signal: 1 point

External set point	CAS	1 to 5V DC	Input resistance, 1MΩ or more Allow. error ± 0.2%/FS

(3) Digital input signal: 3 points

Manual mode command	SMV	Contact input (photo-coupler insulation)	ON/0V, OFF/24V (input current, approx. 11mA/24V DC)
PV tracking command	DI1		
Remote acknowledge signal	DI3		

(4) Pulse width or pulse number input signal: any 1 set

Pulse width input signal	PI_+, PI_-	Contact input (photo-coupler insulation)	ON/0V, OFF/24V (input current, approx. 11mA/24V DC)
Pulse number input signal			ON/0V, OFF/24V (approx. 11mA/24V DC), max. input frequency 500Hz

(5) Valve position input

Voltage input signal	W_0	1 to 5V DC	Input resistance, 1MΩ or more Allow. error, ± 0.5%/FS
Resistance input signal	W_+ W_0 W_-	50 to 1000Ω width (Note 2)	3-wire system Potentiometer Allow. error, ±0.5%/FS

Notes: (1) FS: Full scale
(2) Basic value is 10 to 100 to 10Ω. Others should be specified.

3. Output signal

(1) Control output signal: 1 set

Pulse width	PO_+ PO_-	Open-collector output (photo-coupler insulation)	Output rating, 30V x 0.1A DC max.

(2) Analog output signal: 3 points

Compensated PV value signal	KPV	1 to 5V DC	Output resistance, 1Ω or less Allow. error, ±0.2%/FS
Set point transmission signal	SV		
Value position (voltage)	AO1		

(3) Digital output signal: 6 points

Fault output	FLT	Open-collector output (photo-coupler insulation)	Output rating, 30V x 0.1A DC, max.
Manual mode output	M		
High alarm output	H		
Low alarm output	L		
Local mode output	DO1		
Remote request signal	DO2		

4. Indication, setting and operating functions

(1) Bar graph indication

Indication system	PV indicator	SV indicator	MV indicator
Indication	LED (red)	LED (green)	LED (red)
Indication segment	101 + 2	101 + 2	51 + 2
Indication range	0 to 100% linear	0 to 100% linear	0 to 100%, linear
Indication resolution	1 %/FS	1 %/FS	2%/FS
Scale length	100mm	100mm	50mm
Indication mode	0 to 100% bar graph indication, 0 to 100% reverse bar graph indication, dot indication, –50 to +50% deviation indication		

(2) Operation mode indication

Indication method:

LED (red and green)
Red: M, SCC
Green: A, R

(3) Numerical indication, setting

Indication method:

LED (red), name in 3 digits + number in 5 digits (Negative sign included)

Indication contents:

Process variable (engineering unit), set point (engineering unit), alarm high/low values, PID parameters, etc.
Indication contents are select by using F/S, △, ▽, keys

Setting method: By using of F/S, △, ▽, ▷, ST keys on front panel

(4) SV setting function

Fixed value setting method:

By using △ , ▽ pushbuttons on front panel
Setting speed, about 40 sec/FS

Remote setting method:

By external set point signal (voltage or pulse width input)

(5) MV operating function

Manual operating method:

By using △, ▽ buttons on front of the panel

(6) Operation mode changeover

By using R/A/M button on front panel

R → A changeover		Balanceless bumpless
A → R changeover	Voltage signal	Balance bumpless
	Pulse width input	Balanceless bumpless
A or R ⇄ M changeover		Balanceless bumpless

5. Power failure processing functions

Power failure detection:

Control stoppage at power failure detection

During power failure:

Operating parameters backed up by capacitor when power faulure occurs wthin 5 minutes

Initial set point and manipulated output values, PID parameters, etc. are stored in nonvolatile memory (lasts for 10 years or longer at ambient temperature of 50°C or less).

Power failure recovery time:

Initial or continuous start set for power failure within 5 minutes.

Recovery from power failure lasting longer than 5 minutes is done by initial.

* Operation mode at initial set.
  M: Manual mode
  A: Auto mode
  R: Remote mode
  SCC: SCC mode

6. Self-diagnosis function

Computation/control circuit abnormality:

FLT indicator lights, FLT contact output turns "ON", and computation and control stop.

Manipulated output can be controlled manually at FLT (soft manual).

Input/output signal abnormality, manipulated output disconnection: FLT indicator lights, control stops and manipulated output is held. Computation processing and output processing other than for manipulated output continue.

Fault contents indication:

Cause of fault is indicated numerically on numerical indicator on front of the panel.

7. Transmission functions

(1) Transmission items

Supervisory items:

From PNC to host

Process variable, set point, manipulated output, deviation, operation mode, alarm information, PID parameters, various limiter values, constants, segmented line, analog input/output, digital input/output, etc.

Setting operation items:

From host to PNC

Set point, manipulated output, operation mode, PID parameters, various limiter values, constants, segmented line, etc.

(2) Transmission setting inhibit:

Parameter setting enable/inhibit can be designated by transmission from the host. Designation is made by using F/S, $\triangle$, $\triangledown$, $\triangleright$, ST keys on the front of the panel.

(3) Transmission interface:

CC data line or RS422 interface select

1) CC data line: Connected with transmission controller (PMN)

  Interface: PMN and PNA; CC data line (PMN and host RS-232C)

Transmission speed:

19.2 KBPS

No. of units to be connected:

15 max.

Transmission distance:

500m max.

Transmission form:

Multi-drop

Code format:

12 bit binary

2) RS-422: Universal interface

Transmission speed:

2400, 4800, 9600, 19200BPS, selectable

No. of units connectable:

31 max.

Code format: Stop bit .... 1 or 2 bit
Parity bit ... Even, odd or none

8. Other functions

Data protection function by use of pass code

9. Operating conditions

Power supply: Select from the following 3 types
24V DC (20 to 30V)
100V AC (85 to 132V/47 to 63Hz AC)
200V AC (187 to 264V/47 to 63Hz AC)

Power consumption:

Approx. 12W (DC)
Approx. 20VA (AC)

Dielectric strength:

1500V AC, 1 min.

Insulation resistance:

500V DC, 100MΩ or more

Ambient temperature:

0 to 50°C

Ambient humidity:

90% RH or less

Enclosure: Steel case

Enclosure class: Front IP65 (IEC 529)

Name plate: 100 (H) x 70 (W), white acryl

Dimensions: 144 (H) x 72 (W) x 391 (D) mm, IEC (DIN) standards

Mass {weight}: Approx. 2.9kg

Mounting method:

Flush on indoor panel, vertical mounting is standard practice.
Mounting on tilted surface possible (angle α)

α=0°to 90°
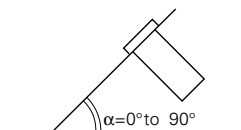
Finish color: Munsell N1.5 for the both of front and case.

Range of delivery: Controller and mounting bracket

Items prepared separately:

Transmission cable (Type PNZ)

CODE SYMBOLS

```
1 2 3 4 5 6 7 8   9 10 11 12
P N C 1       5 -       0 A
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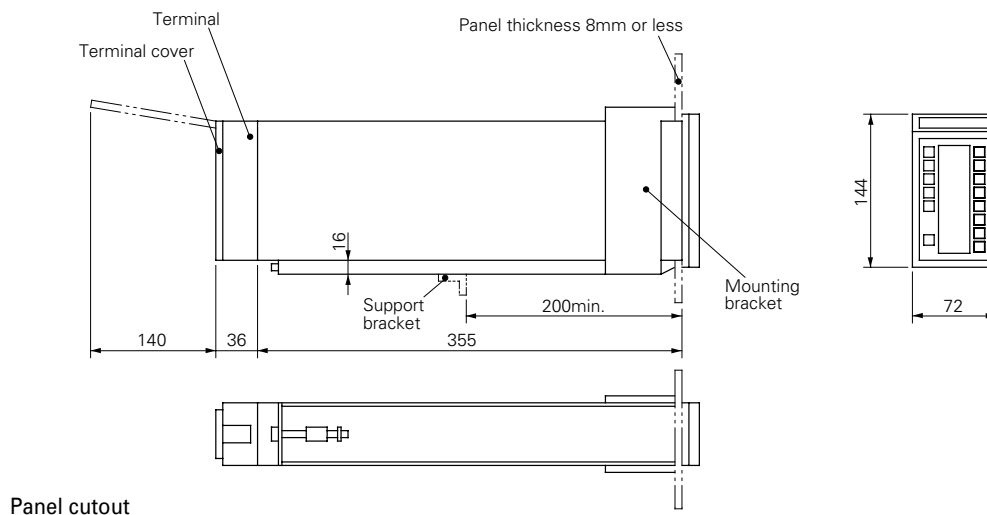
	Description
	Process variable input signal
A	1 to 5V DC
B	4 to 20mA DC
C	J thermocouple ⎫ 10mV DC span or
D	K thermocouple ⎬ more, with basic
E	E thermocouple ⎭ Junction compensat-
F	R thermocouple ing function
G	Resistance bulb, JPt100, 3-wire system, 50°C span or more
W	Resistance bulb, Pt100, 3-wire system, 50°C span or more
	Setting method
A	A-M type
B	R-A-M type
	Power supply
1	24V DC (20 to 30V DC)
2	100V AC (85 to 132V/47 to 63Hz AC)
3	200V AC (187 to 264V/47 to 63Hz AC)
	Valve position input
1	Voltage input (1 to 5V DC)
2	Resistance input (50 to 1000Ω span) (Note 1)
	Transmission function
R	RS-422
C	CC data line (communication controller required)
	PID auto turing function
A	Provided

Notes: (1) Standard resistance is 10 to 100 to 10Ω. Others should be specified.
(2) Symbols of resistance bulbs are as follows.
JPt100 ..... JIS C 1604-1981
Pt100 .... IEC Pub751-1983
(JPt/Pt changeover is possible with front key.)

OUTLINE DIAGRAM (Unit:mm)

Terminal cover
Terminal
Panel thickness 8mm or less
Mounting bracket
Support bracket
200min.
16
140
36
355
144
72

Panel cutout

When mounting one unit

200min.
138^{+1}_{0}
$68^{+0.7}_{0}$

When mounting "n" units

250min.
138^{+1}_{0}
No. of units $n \geqq 2$
$(72.2n - 4)^{+1}_{0}$

4
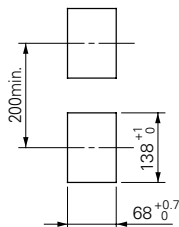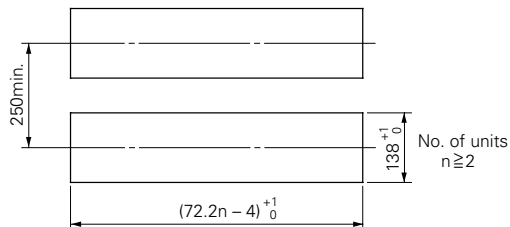
CONNECTION DIAGRAM

Block terminals (M4 screws)

AI
(Process value input)

I +
(PV) — 11

I –
(SC) — 12

M — 13
DO (Manual mode)

DO 1 — 14
DO (Local mode)

SMV — 15
DO (Manual mode command)

AC — 16

31 — I₀

32 — PI+ ⎫
33 — PI– ⎬ PI (Pulse width input or pulse number input)

34 — FLT — DO (FLT output)

35 — AC

Power supply (AC)

AO (Compensated process value signal output) — KPV | 51
AO (Set point transmit signal) — SV | 52
AO (Valve position output signal) — AO 1 | 53
W₀ (Valve position input) — W₀ | 54
AI, AO Common bus — SC | 55
PO (Operation output) ⎰ PO₊ | 56
⎱ PO₋ | 57
DO (High alarm output) — H | 58
DO (Low alarm output) — L | 59
Power supply (24V DC, AC power) — PC* | 60
DI, DO 24V power — PCD | 61
Ground — G | 62

71 | CAS — AI (External set point)
72 | AI1 ⎱ Unused
73 | AI2 ⎰
74 | W₊ — W₊ (Valve position input)
75 | W₋ — W₋ (Valve position input)
76 | SC — AI, AO Common bus
77 | DO 2 — DO (Remote request)
78 | DI 3 — DI (Remote acknowledge)
79 | DI 2 — Unused
80 | DI 1 — DI PV tracking command
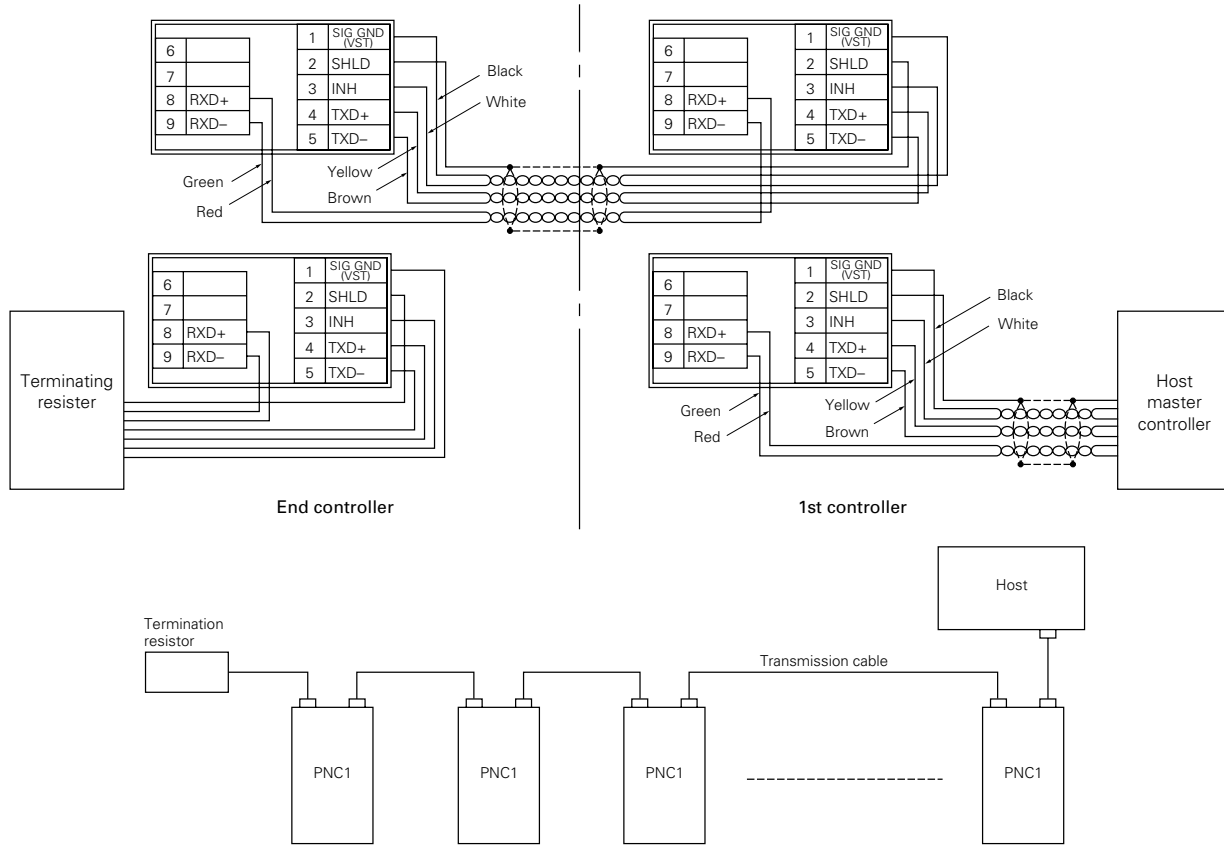81 | VP* — Power supply (24V DC, AC power)
82 | VPD — DI, DO 24V power

Note: * Symbols for AC power supply are VPO, PCO.
Output is 24V DC (0.1A max.) approx.

Process value input terminal connections

1 to 5V DC The 5th digit of code symbols: A	I + — 11 / I – — 12 ; 31 — I₀	Thermocouple The 5th digit of code symbols: C,D,E,F	+ / – ; I + — 11 / I – — 12 ; 31 — I₀
4 to 20mA DC The 5th digit of code symbols: B	+ / – ; I + — 11 / I – — 12 ; 31 — I₀	Resistance bulb The 5th digit of code symbols: G,W	I + — 11 / I – — 12 ; 31 — I₀
4 to 20mA DC power supply The 5th digit of code symbols: B	+ / – ; I + — 11 / I – — 12 ; 31 — I₀ ; PC — 60		

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Transmission connector

6			1	SIG GND (VST)
7			2	SHLD
8	RXD+		3	INH
9	RXD−		4	TXD+
			5	TXD−

Black
White

Green
Red

Yellow
Brown

6			1	SIG GND (VST)
7			2	SHLD
8	RXD+		3	INH
9	RXD−		4	TXD+
			5	TXD−

Terminating resister

6			1	SIG GND (VST)
7			2	SHLD
8	RXD+		3	INH
9	RXD−		4	TXD+
			5	TXD−

End controller

6			1	SIG GND (VST)
7			2	SHLD
8	RXD+		3	INH
9	RXD−		4	TXD+
			5	TXD−

Black
White

Green
Red

Yellow
Brown

Host master controller

1st controller

Host

Termination resistor

Transmission cable

PNC1   PNC1   PNC1   _____   PNC1

⚠ Caution on Safety

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

Information in this catalog is subject to change without notice.

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