FC SERIES COMPACT CONTROLLER E (STEP OUTPUT)

■ DATA SHEET ■ PMC

The Compact Controller E constitutes, together with Compact Controller F, the main component of the FC series control system, and is equipped with selective control and computing functions in contrast to the Compact Controller F having programmable control and computing functions.

The Compact Controller E is applicable in various modes including data transmission to a host computer system since it permits various modes of high level control such as square root extraction, non-linear control and ratio control.

FEATURES

1. **Various modes of control available**
   The instrument permits selecting various high level control modes such as square root extraction, non-linear control, ratio control and intermittent control. Further, the function for communication with a host computer system enables setting parameters for PI control and others.

2. **High reliability**
   The instrument adopts plasma display allowing highly accurate monitoring and LED indicators, thus having few mechanically moving parts. In addition, custom LSIs are used to assure high reliability.

3. **Application of international standards**
   The instrument is designed compact; the external dimensions comply with the IEC standards. The power supply and signal also comply with the IEC standards (24V DC and 1 to 5V DC).

4. **Full variety of related devices**
   In the FC series, there are a Compact Controller F which performs advanced programmable single loop DDC and an economical type Compact Controller E having selective functions; each is available in a continuous output type and a step output type for choice according to the final control elements.
   Included in the family are a full variety of related devices such as manual loaders and setters.
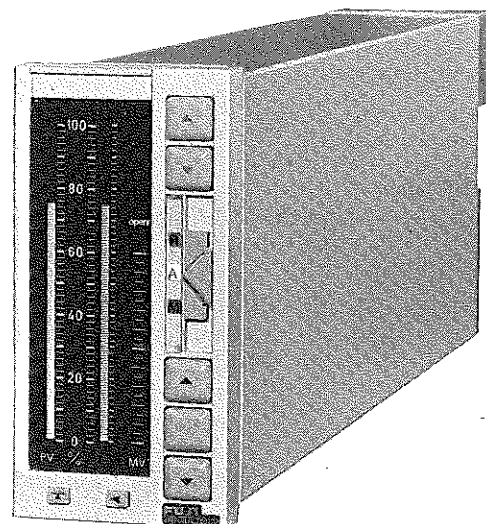
SPECIFICATIONS

1. Control functions

(1) **PI control** (non-linear control and intermittent control equipped as standard)
   Proportional band (P):
   1.0 to 655.3%
   Reset time (I): 0.2 to 3276.6 sec
   Control cycle: 0.2 sec standard
(2) **Expansion control function**
   a) Ratio control
(3) **Computing function**
   a) Square root extraction
(4) **Basic cycle:** 0.2 sec

■ Fuji Electric Co.,Ltd. ■

EDS11-35e	
Date	Dec. 15, 1991

2. Input Signal

(1) Analog voltage signal
Standardized voltage signal:
      1 to 5V DC/input resistance at least
      1 MΩ (15kΩ outside of range)
Number of inputs:
      3 ┬---- PV   Process variable
       ├---- CAS External set point vari-
       │   able
       └---- AI 1 Process variable of ratio
               (PVr)
Valve position signal:
      10—100—10Ω potentiometer or 1 to
      5V DC/input resistance at least 1MΩ
      (15kΩ outside of range)

(2) Digital signal
Signal: Signal ON at 0V, signal OFF at 24V DC
               (Input current approx. 13mA/24V DC)
Number of inputs:
      4 ┬---- SMV
       │   Manual mode command
       ├---- R-ACK
       │   Remote mode acknowledge
       │   command
       ├---- DI 1 (PV-Track)
       │   PV tracking command
       └---- DI 2
             (Spare)

(3) Pulse width signal
Signal :   Signal ON at 0V, signal OFF at 24V DC
               (Input current approx. 13mA/24V DC)
Number of inputs:
      1 set ---------------------------- PI (PI+, PI–)
Response speed: 30 sec/full scale

3. Output Signal

(1) Analog voltage signal
Standardized voltage signal:
      1 to 5V DC/output resistance of 0.5Ω
      or less
Number of outputs:
      3 ┬---- KPV Compensated process
       │   variable signal
       ├---- SV   Set point transmit
       │   signal
       └---- AO 1 Output signal in for-
               mat specified by
               customer

(2) Control output signal:
      Pulse width
Signal: Open collector output,
               Output rating for 30V DC x 0.1A
Actuator speed: 10, 30 or 60 sec/full stroke

(3) Digital signal
Signal: Open collector output
               Output rating 30V DC x 0.1A
Number of outputs:
      6 ┬---- FLT   Fault output
       ├---- M   Manual mode output
       ├---- R-REQ Remote mode re-
       │   quest output
       ├---- LS   Local mode output
       ├---- H   Upper alarm output
       │   (output signal in
       │   format specified by
       │   the customer)
       └---- L   Lower alarm output
               (output signal in
               format specified by
               the customer)

4. Indicating Functions

(1) Process variable (PV) and set point variable (SV) indicators
Indicating method:
      Plasma display (orange)
Number of indicating segments:
      201
Indication range:
      0 to 100% linear
Indication resolution:
      0.5% of full scale
Scale length: 100 mm

(2) Valve position (MV) indicator
Indicating method:
      LED (red)
Number of indicating segments:
      23
Indication range:
      0 to 100% , linear
Indication resolution:
      2.5% of full scale
Scale length: 60 mm

(3) Operating mode indicators
Indicating method:
      LEDs (red and green)
      Red: M, SCC
      Green: A, R

(4) Alarm indicators:
      LED (red), H (▲), L (▼)
      Indication of process variable or
      deviation alarm

(5) Numerical indication:
      Data Entry Unit (option)
Indicating method:
      7-segment LEDs (red and green)
      Red: Data in 5 digits
      Green: Channel in 3 digits

5. Setting functions

(1) Local setting

Setting method:

Manual setting by front panel pushbutton system $\boxed{\blacktriangle}$ $\boxed{\blacktriangledown}$, (travelling time approx. 40s/full scale) or Data Entry Unit (digital setting).

Settable mode: Local (Auto (A) or manual (M) mode)

(2) Remote setting

Remote (R) setting:

External set point (voltage or pulse width input) signal. In the remote mode, the local set point follows the external set point signal within a range set by setting limiters.

Setting limiters:

Upper and lower limits
Settable range; 0 to 100%

Local (A)—remote (R) changeover:

Lever on front panel

In case of voltage setting

a) R→A: Balanceless bumpless (In the remote mode, the local set point follows external set point signal.)

b) R←A: Balanceless bumpless changeover possible by having the remote set point follow the local set point signal.

In case of pulse width setting

R⇌A: Balanceless bumpless

(3) Ratio computation setting mode (Ratio control)

Ratio computation setting (R mode):

Ratio computation output. In ratio computation setting mode, the local set point follows the ratio computation output signal within a range set by setting limiters.

Setting limiters:

Upper and lower limits
Settable range; 0 to 100%

Local (A)—remote (R) changeover:

Lever on front panel

a) R→A: Balanceless bumpless In the remote mode, the local set point follows the ratio computation output signal.

b) R←A: The remote set point can follow ratio computation output signal from the local set point in ramp mode.

(4) Transmission setting mode

Transmission (SCC) setting:

In the transmission setting mode, the local set point follows transmission set point signal within a range set by the setting limiters. Transmission setting mode is established by turning on SCC "SCC" on the Switch Unit.
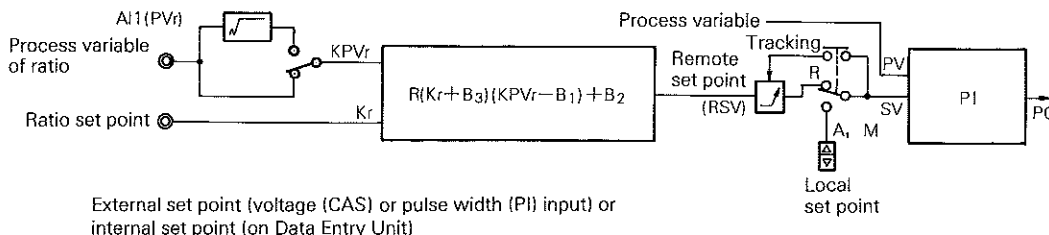
Setting limiters:

Upper and lower limits
Settable range; 0 to 100%

Local (A)—transmission (SCC) changeover:

A⇌SCC; Balanceless bumpless

Remote (R)—transmission (SCC) changeover:

R→SCC; Balanceless bumpless

External set point (voltage (CAS) or pulse width (PI) input) or internal set point (on Data Entry Unit)

Diagram equation: $R(Kr + B_3)(KPV_r - B_1) + B_2$

Local set point

6. Control output

Output mode: Auto (A), (R), manual (M)

Manual (M) operation:
Front panel push button method

Auto (A), (R) — manual (M) changeover:
Front panel lever or manual (M) mode command signal (SMV), balanceless bumpless in both directions

7. Additional functions (option)

(1) Data Entry Unit (OPC)
(2) Transmitting device (XMT):
To be connected to CC data line

8. Operating conditions

Power supply: 24V DC (20 to 30V DC)

Power consumption:
Approx. 9W

Dielectric strength:
500V AC for one minute

Insulation resistance:
More than 100MΩ at 500V DC

Ambient temperature:
0 to 45°C

Ambient humidity:
90% RH max.

Enclosure: Steel case

External dimensions:
144 (H) × 72 (W) × 400 (D) mm in compliance with IEC (DIN) standards

Weight: Approx. 4.5 kg

Finish color: Munsell 7Y 7.3/1.4 (case and front panel)
RAL 7030 (operation mode lever and pushbuttons)

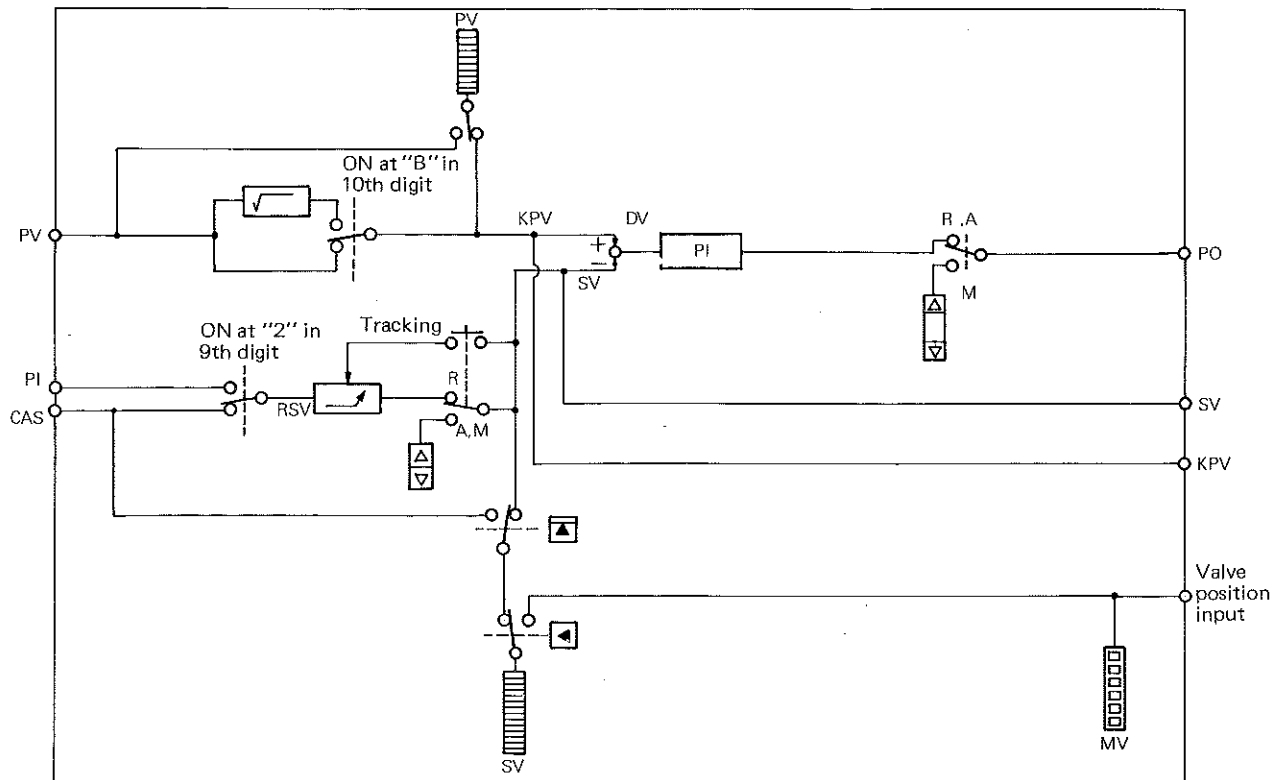**Range of delivery:** Controller and mounting bracket
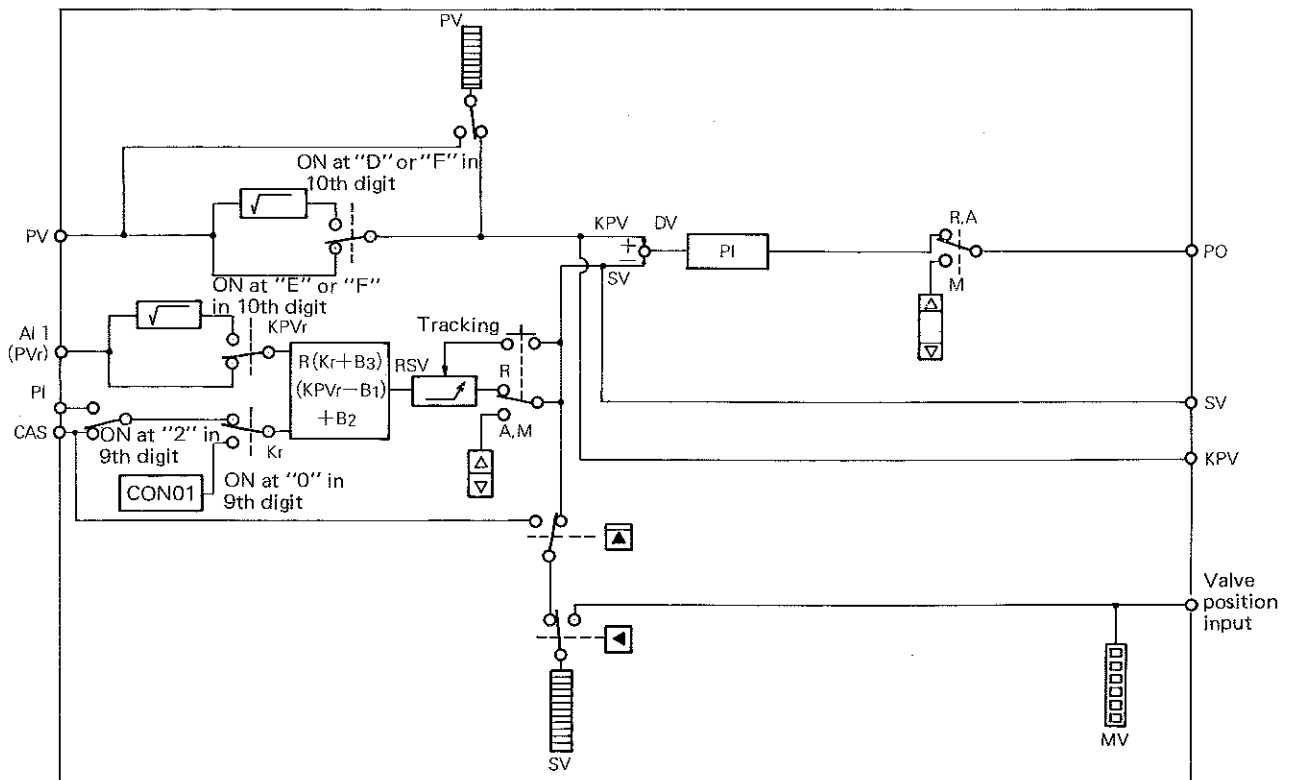
Mounting: Panel flush mounting

CODE SYMBOLS

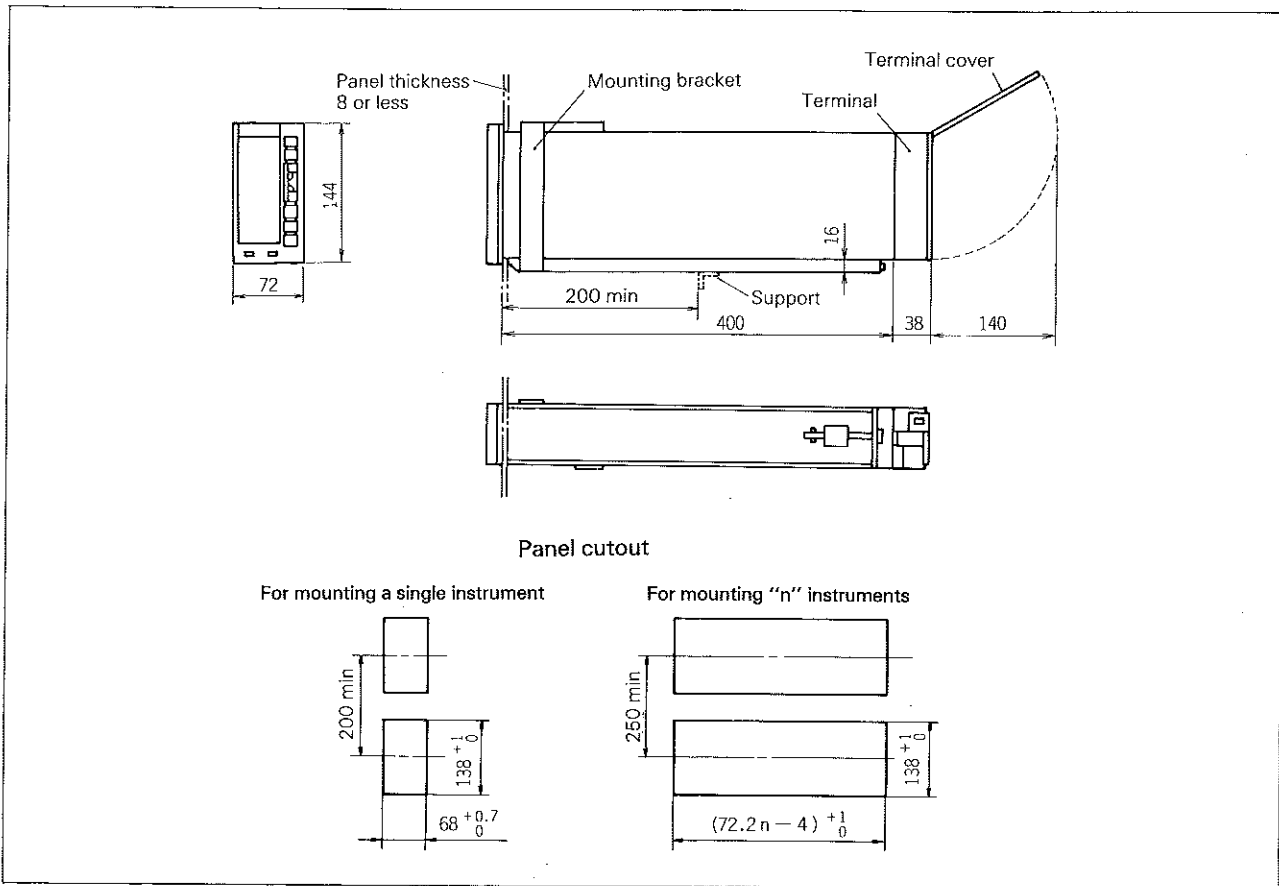| 1 2 3	4	5	6	7 8	9	10	11	12	13	Description
P M C				3 -						
										Setting type
	A									A—M type
	B									R—A—M type
										Data Entry Unit
		A								Equipped
		B								None
										Transmission unit (XMT)
			B							Equipped
			Y							None
										Valve position input signal
				V						1 to 5V DC
				W						10—100—10Ω potentiometer
										Set point (SV) or ratio set point (Kr) by external signal
					0					None (internal setting)
					1					Analog input (CAS) setting
					2					Pulse width input (PI) setting
										Control method + square root extraction of process variable (PV)
						A				Basic control (PI)
						B				Basic control (PI) $+\sqrt{PV}$
						C				Ratio control
						D				Ratio control $+\sqrt{PV}$
						E				Ratio control (with $\sqrt{PVr}$)
						F				Ratio control (with $\sqrt{PVr}$) $+\sqrt{PV}$
										Specification of analog output
							Y			None
							A			External set point (RSV)
							B			Ratio signal (Kr)
							C			Compensated process variable of ratio (KPVr)
										Specification of alarm output
								Y		None
								A		Deviation (DV)
								B		Process variable (KPV)
										Protective treatment
									0	None
									1	Protected (coating)

BASIC PRINCIPLE DIAGRAM

For basic control ("A" or "B" in 10th digit)

For proportional control ("C", "D", "E" or "F" in 10th digit)

OUTLINE DIAGRAM (Unit:mm)

Panel thickness 8 or less
Mounting bracket
Terminal cover
Terminal
144
72
200 min
400
38
140
16
Support

Panel cutout

For mounting a single instrument

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

For mounting "n" instruments

250 min
138^{+1}_{0}
$(72.2n-4)^{+1}_{0}$

TERMINALS ARRANGEMENT

Block terminal

11 M		31
12 LS	PI +	32
13 SMV	PI −	33
	FLT	

51 KPV	71 PV
52 SV	72 CAS
53 AO1	73 AI 1
54 SC	74 W+
55 SC	75 Wo
56 PO+	76 W−
57 PO−	77 R-REQ
58 H	78 R-ACK
59 L	79 DI 1
60 G	80 DI 2
61 PC	81 VP
62 PCD	82 VPD

Transmission connector

5		1	SHLD
6	INH	2	VST
7	RXD2	3	RXD1
8	TXD2	4	TXD1

5		1	SHLD
6	INH	2	VST
7	RXD2	3	RXD1
8	TXD2	4	TXD1

· Asterisked (*) items; Non-standard.

Information in this catalog is subject to change without notice.

Printed in Japan 1991-12/8E