

FDC-C22



FDC-C62



FDC-C82



FDC-C83



## High Performance Process & Temperature Controllers

FDC-R22



FDC-C42



# Features

01. Multi Color LCD Display	02. High Accuracy 18 Bit A-D Input and 15 Bit D-A Output
03. 200 msec sample rate for Analog & Event inputs	04. Universal Inputs Thermocouple, RTD, mA, mV, & VDC
05. Fuzzy + PID Control and Auto Tuning	06. Bumpless Transfer (Auto/Manual)
07. RS-485 and Analog Retransmission	08. Soft-Start Function
09. CT Inputs for Heater-Break Detection	10. Ramp/Soak 1, 2 or 4 programs w/16, 8 or 4 segments
11. Remote Setpoint and Up to 6 Event Inputs	12. Bidirectional Menu Navigation (ease of use)
13. Lockout Protection (Security) and Up to 6 Event Inputs	14. Approvals: UL, cUL, CE, RoHS, REACH

# Specifications



Power Supply	90 to 250VAC, 47–63Hz ; 11 to 40VDC / 20 to 28 VAC, 47– 63 Hz			
Power Consumption	C22 / R22 : 8VA, 4W maximum, C62 : 10VA, 5W maximum, C82/C83/C42 : 12VA, 6W maximum			
<b>Signal Input</b>				
Type	Thermocouple (J, K, T, E, B, R, S, N, L, U, P, C, D), RTD (PT100 (DIN), PT100 (JIS)), Current (mA), Voltage (Volts)			
Resolution	18 Bits			
Sampling Rate	5 Times / Second (200 msec)			
Maximum Rating	-2VDC minimum, 12VDC maximum			
Input Characteristics	<b>Type</b>	<b>Range</b>	<b>Accuracy @ 25°C</b>	<b>Input Impedance</b>
	J	-120 °C to 1,000.0 °C (-184 °F to 1,832 °F)	±2 °C	2.2 MΩ
	K	-200 °C to 1,370.0 °C (-328 °F to 2,498 °F)	±2 °C	2.2 MΩ
	T	-250 °C to 400.0 °C (-418 °F to 752 °F)	±2 °C	2.2 MΩ
	E	-100 °C to 900.0 °C (-148 °F to 1,652 °F)	±2 °C	2.2 MΩ
	B	0 °C to 1,820.0 °C ( 32 °F to 3,308 °F)	±2 °C (200 °C to 1,800 °C)	2.2 MΩ
	R	0 °C to 1,767.8 °C ( 32 °F to 3,214 °F)	±2 °C	2.2 MΩ
	S	0 °C to 1,767.8 °C ( 32 °F to 3,214 °F)	±2 °C	2.2 MΩ
	N	-250 °C to 1,300.0 °C (-418 °F to 2,372 °F)	±2 °C	2.2 MΩ
	L	-200 °C to 900.0 °C (-328 °F to 1,652 °F)	±2 °C	2.2 MΩ
	U	-200 °C to 600.0 °C (-328 °F to 1,112 °F)	±2 °C	2.2 MΩ
	P	0 °C to 1,395.0 °C ( 32 °F to 2,543 °F)	±2 °C	2.2 MΩ
	C	0 °C to 2,300.0 °C ( 32 °F to 4,172 °F)	±2 °C	2.2 MΩ
	D	0 °C to 2,300.0 °C ( 32 °F to 4,172 °F)	±2 °C	2.2 MΩ
	PT100 (DIN)	-200 °C to 850.0 °C (-328 °F to 1,562 °F)	±0.4 °C	1.3 KΩ
	PT100 (JIS)	-200 °C to 600.0 °C (-328 °F to 1,112 °F)	±0.4 °C	1.3 KΩ
mA	-3mA to 27 mA	±0.05%	2.5 Ω	
VDC	-1.3VDC to 11.5VDC	±0.05%	1.5 MΩ	
Temperature Effect	1.5 μV/°C for all inputs except mA input, 3.0 μV/°C for mA			
Sensor Lead Resistance Effect	Thermocouple : 0.2 μV/Ω ; 3-wire RTD : 2.6°C/Ω of Difference of Resistance of two leads ; 2-wire RTD : 2.6°C/Ω of Sum of Resistance of two leads			
Burn-out Current	200 nA			
Common Mode Rejection Ratio (CMRR)	120 dB			
Normal Mode Rejection Ratio (NMRR)	55 dB			
Sensor Break Detection	Sensor open for Thermocouple and RTD inputs, sensor short for RTD input, below 1 mA for 4–20 mA input, below 0.25 VDC for 1–5 VDC input, not available for other inputs			
Sensor Break Responding Time	Within 4 seconds for Thermocouple and RTD inputs, 0.1 second for 4–20 mA and 1–5 VDC inputs			

## Model



**C22**



**C62**



**C82**



**C83**



**C42**



**R22**

Remote Set Point Input							
Type	Linear Current, Linear Voltage						
Range	-3 mA to 27 mA, -1.3 VDC to 11.5 VDC						
Accuracy	±0.05%						
Remote Set Point Option	Not Available	Not Available	Available	Available	Available	Available	Not Available
Input Impedance	Current : 2.5 Ω, Voltage : 1.5 MΩ						
Resolution	18 Bits						
Sampling Rate	1.66 Times/Second						
Maximum Rating	280 mA maximum for Current Input, 12 VDC maximum for Voltage Input						
Temperature Effect	±1.5 μV/°C for Voltage Input, ±3.0 μV/°C for Current Input						
Sensor Break Detection	Below 1 mA for 4–20 mA input, below 0.25 VDC for 1–5 VDC input, not available for other inputs						
Sensor Break Responding Time	0.1 Seconds						
Event Input							
Number of Event Input	1	2	6	6	2	6	2
Logic Low	-10 VDC minimum, 0.8 VDC maximum						
Logic High	2 VDC minimum, 10 VDC maximum						
Function	Refer to user manual						
CT Input							
CT Type	CT98-1						
Accuracy	±2% of Full Scale Reading, ±1 digit maximum						
Input Impedance	294 Ω						
Measurement Range	0 to 50 A VAC						
Output of CT	0 to 5 VDC						
Sampling Rate	1 Time/Second						
Output 1/Output 2							
Type	Relay, Pulsed Voltage, Linear Voltage and Linear Current						
Relay Rating	2A, 240 VAC, 200,000 Life Cycles for Resistive Load						
Pulsed Voltage	Source Voltage 5 VDC, Current Limiting Resistance 66 Ω						
Linear Output Resolution	15 Bits						
Linear Output Regulation	0.02% for full load change						
Linear Output Settling Time	0.1 Second (Stable to 99.9%)						
Isolation Breakdown Voltage	1,000 VAC						
Temperature Effect	±0.01% of Span/°C						
Load Capacity of Linear Output	Linear Current : 500 Ω maximum, Linear Voltage : 10 KΩ minimum						
Alarm							
Relay Type	Form A						
Maximum Rating	2A, 240 VAC, 200,000 Life Cycles for Resistive Load						
Alarm Function	Dwell Timer, Deviation Low, Deviation High, Deviation Band Low, Deviation Band High, Process High, Process Low, Range Low, Range High, Range High Low, Heater Break, Heater Short, Profile End, Profile Holdback						
Alarm Mode	Latching, Holding, Normal, Latching / Holding, Set Point Holding						
Dwell Timer	0.1 to 4,553.6 Minutes						
Data Communication							
Interface	RS-485						
Protocol	Modbus RTU (Slave Mode)						
Address	1 to 247						
Baud Rate	2.8 KBPS to 38.4 KBPS						
Parity Bit	None, Even or Odd						
Stop Bit	1 or 2 Bits						
Data Length	7 or 8 Bits						
Communication Buffer	160 Bytes						
Analog Retransmission							
Output Signal	4–20 mA, 0–20 mA, 0–10 VDC						
Resolution	15 Bits						
Accuracy	±0.05% of Span ±0.0025%/°C						
Load Resistance	0 to 500 Ω for Current Output, 10 KΩ minimum for Voltage Output						
Output Regulation	0.01% for full load change						
Output Settling Time	0.1 Second (Stable to 99.9%)						
Isolation Breakdown	1,000 VAC minimum						
Integral Linearity Error	±0.005% of Span						

## Model



**C22**



**C62**



**C82**



**C83**



**C42**



**R22**

### Analog Retransmission

Temperature Effect	$\pm 0.0025\%$ of Span/ $^{\circ}\text{C}$
Saturation Low	0 mA or 0 VDC
Saturation High	22.2 mA or 5.55 VDC, 11.1 VDC minimum
Linear Output Range	0–22.2 mA (0–20 mA / 4–20 mA), 0–5.55 VDC (0–5 VDC / 1–5 VDC), 0–11.1 VDC (0–10 VDC)

### User Interface

Keypad	4 Keys							
Display Type	4 Digit LCD Display							
Number of Display	2	2	3	3	3	3	3	2
Upper Display Size	0.4" (10 mm)	0.58" (15 mm)	0.7" (17.7 mm)	0.7" (17.7 mm)	0.58" (15 mm)	0.98" (25 mm)	0.31" (8 mm)	
Lower Display Size	0.19" (4.8 mm)	0.3" (7.8 mm)	0.4" (11.2 mm)	0.4" (11.2 mm)	0.32" (8.3 mm)	0.55" (14 mm)	0.25" (6.5 mm)	

### Programming Port

Interface	Micro USB
PC Communication Function	Parameter Configuration and Firmware Upgrade

### Control Mode

Output 1	Reverse (Heating) or Direct (Cooling) Action
Output 2	PID cooling control, Cooling P band 50~300% of PB, Dead band -36.0~36.0% of PB
ON-OFF	0.1~50.0 $^{\circ}\text{C}$ (0.1~90.0 $^{\circ}\text{F}$ ) hysteresis control (P band = 0)
P or PD	0~100.0% offset adjustment
PID	Fuzzy logic modified Proportional band 0.1~500.0 $^{\circ}\text{C}$ (0.1~900.0 $^{\circ}\text{F}$ ), Integral time 0 – 3600 Secs, Derivative Time 0 – 360.0 Secs
Cycle Time	0.1 to 90.0 Seconds
Manual Control	Heat (MV1) and Cool (MV2)
Auto-tuning	Cold Start and Warm Start
Failure Mode	Auto transfer to manual mode while sensor break or A–D Converter damage
Ramping Control	0 to 500.0 $^{\circ}\text{C}$ (0 to 900.0 $^{\circ}\text{F}$ ) / Minute or 0 to 500.0 $^{\circ}\text{C}$ (0 to 900.0 $^{\circ}\text{F}$ ) / Hour Ramp Rate

### Digital Filter

Function	First Order
Time Constant	0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60 Seconds Programmable

### Profiler

Availability	No	No	Option	Option	Option	Option	No
No of Programs	N/A	N/A	4 / 2 / 1	4 / 2 / 1	4 / 2 / 1	4 / 2 / 1	N/A
Number of Segment	N/A	N/A	4 / 8 / 16	4 / 8 / 16	4 / 8 / 16	4 / 8 / 16	N/A

### Environmental and Physical Specifications

Operating Temperature	-10 $^{\circ}\text{C}$ to 50 $^{\circ}\text{C}$							
Storage Temperature	-40 $^{\circ}\text{C}$ to 60 $^{\circ}\text{C}$							
Humidity	0 to 90% RH (Non-Condensing)							
Altitude	2,000 Meters maximum							
Pollution	Degree II							
Insulation Resistance	20 M $\Omega$ minimum (@ 500 VDC)							
Dielectric Strength	2,000 VAC, 50/60 Hz for 1 Minute							
Vibration Resistance	10 to 55 Hz, 10 m/s <sup>2</sup> for 2 Hours							
Shock Resistance	200 m/s <sup>2</sup> (20g)							
Molding	Flame Retardant Polycarbonate							
Mounting	Panel	Panel	Panel	Panel	Panel	Panel	DIN Rail	
DIN Size	1/32	1/16	1/8	1/8	9/64	1/4		
Dimensions (W*H*D) (mm)	48*24*92	48*48*59	48*96*59	96*48*59	72*72*59	96*96*59	22.5*96*83	
Depth Behind Panel (mm)	84	50	50	50	50	50	-	
Cut Out Dimensions (mm)	45*22.2	45*45	45*92	92*45	68*68	92*92	-	
Weight (grams)	120	160	220	220	190	290	160	

### Approval Standards

Safety	UL61010-1, CSA 22.2 No.61010-1-12, EN61010-1(IEC1010-1), RoHS, REACH
Protective Class	IP65 for panel (in process), IP20 for terminals and housing, all indoor use
EMC	EN61326

# Ordering Code

**C22** –

**R22** –

## Power Input

- 4 : 90 to 250 VAC, 47–63Hz
- 5 : 11 to 40 VDC / 20 to 28 VAC, 47–63Hz

## Output 1

- 1 : Form A Relay
- 2 : SSRD, 5VDC / 30 mA
- 3 : Isolated 4–20mA / 0–20mA (OM98-3)
- 5 : Isolated 0–10VDC (OM98-5)
- C : SSRD, 14VDC / 40 mA (OM94-7)

## Output 2/Alarm 1

- 0 : None
- 1 : Form A Relay
- 2 : SSRD, 5VDC / 30 mA
- 3 : Isolated 4–20mA / 0–20mA (OM98-3)
- 5 : Isolated 0–10VDC (OM98-5)
- C : SSRD, 14VDC / 40 mA (OM94-7)

## Option 1

- 0 : None
- 1 : RS-485
- 2 : 1 Event Input (EI1)
- 3 : 1 CT Input (CT1)

## Option 2

- 0 : None
- 1 : Retransmit 4–20mA / 0–20mA (OM98-3)
- 2 : Retransmit 0–10VDC (OM98-5)
- 3 : Alarm 2 (Form A relay)
- 4 : 1 Event Input (EI2 only for R22)
- 5 : 1 CT Input (CT2 only for R22)

## Special

- 00 : None

## Accessories for All Models

- OM94-7=14 VDC / 40mA SSR Drive Module
- OM98-3=Isolated 4–20mA / 0–20mA Analog Output Module
- OM98-5=Isolated 0–10VDC Analog Output Module
- CM98-3=Isolated 4–20mA / 0–20mA Retransmission Module for all models except C22 & R22
- CM98-5=Isolated 0–10VDC Retransmission Module for all models except C22 & R22
- CT98-1=Current Transformer 0-50A
- PA98-1=USB Programming Adaptor
- CC98-1=Programming Port Cable (1.5M)
- FDC-SET=FDC Configuration Software

## Related Products

- SNA10A = Smart Network Adaptor for third party software, which converts 255 channels of RS-485 or RS-422 to RS-232 Network



**Power Input**

- 4 : 90 to 250 VAC, 47–63Hz
- 5 : 11 to 40 VDC / 20 to 28 VAC, 47–63Hz

**Output 1**

- 1 : Form A Relay
- 2 : SSRD, 5VDC / 30mA
- 3 : Isolated 4–20 mA / 0–20 mA (OM98-3)
- 5 : Isolated 0–10 VDC (OM98-5)
- C : SSRD, 14 VDC / 40mA (OM94-7)

**Output 2/Alarm 1**

- 0 : None
- 1 : Form A Relay
- 2 : SSRD, 5VDC / 30mA
- 3 : Isolated 4–20 mA / 0–20 mA (OM98-3)
- 5 : Isolated 0–10 VDC (OM98-5)
- C : SSRD, 14 VDC / 40mA (OM94-7)

**Alarm 2**

- 0 : None
- 1 : Form A Relay

**Option 1**

- 0 : None
- 1 : RS-485

**Option 2**

- 0 : None
- 1 : 2 Event Inputs
- 2 : 1 Event Input and 1 CT Input
- 3 : 2 CT Inputs

**Option 3**

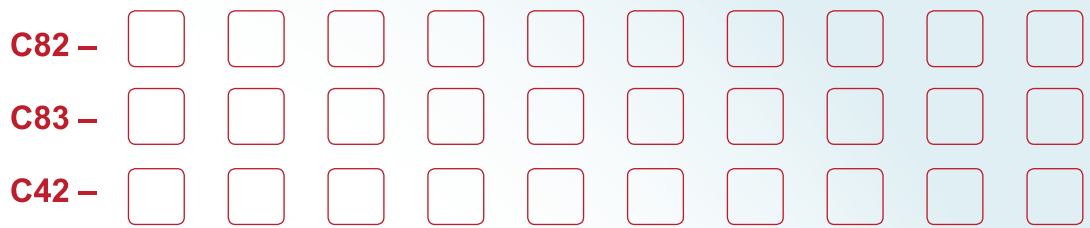
- 0 : None
- 1 : Retransmit 4–20 mA / 0–20 mA (CM98-3)
- 2 : Retransmit 0–10 VDC (CM98-5)
- 3 : Alarm 3 (Form A Relay)

**Option 4**

- 0 : None
- 1 : Terminal Cover

**Special**

- 00 : None



**Power Input**

- 4 : 90 to 250 VAC, 47–63Hz
- 5 : 11 to 40 VDC / 20 to 28 VAC, 47–63Hz

**Output 1**

- 1 : Form A Relay
- 2 : SSRD, 5VDC / 30 mA
- 3 : Isolated 4–20mA / 0–20mA (OM98-3)
- 5 : Isolated 0–10VDC (OM98-5)
- C : SSRD, 14VDC / 40mA (OM94-7)

**Output 2/Alarm 1**

- 0 : None
- 1 : Form A Relay
- 2 : SSRD, 5VDC / 30 mA
- 3 : Isolated 4–20mA / 0–20mA (OM98-3)
- 5 : Isolated 0–10VDC (OM98-5)
- C : SSRD, 14VDC / 40mA (OM94-7)

**Alarm 2 to 3**

- 0 : None
- 1 : Form A Relay on Alarm 2
- 2 : Form A Relay on Alarm 2 to 3

**Event Inputs**

- 0 : None
- 1 : 6 Event Inputs

**Option 1**

- 0 : None
- 1 : RS-485 and Remote Setpoint

**Option 2**

- 0 : None
- 1 : 1 CT Input and Remote Setpoint
- 2 : 2 CT Inputs and Remote Setpoint

**Option 3**

- 0 : None
- 1 : Retransmit 4–20mA / 0–20mA (CM98-3) and Remote Setpoint
- 2 : Retransmit 0–10VDC (CM98-5) and Remote Setpoint
- 3 : Alarm 4 (Form A Relay) and Remote Setpoint
- 4 : Alarm 4 (Form A Relay), Retransmit 4-20mA / 0-20mA (CM98-3) and Remote Setpoint
- 5 : Alarm 4 (Form A Relay), Retransmit 0-10VDC (CM98-5) and Remote Setpoint

**Option 4**

- 0 : None
- 1 : Terminal Cover
- 2 : Ramp & Soak Profiler
- 3 : Terminal cover and Ramp & Soak Profiler

**Special**

- 00 : None



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