

# SERIES 2000

2000  
2000



**EUROTHERM  
CONTROLS**

**SELECTION  
GUIDE**

**Industrial  
Temperature  
and Process  
Controllers**



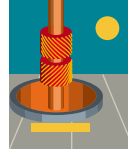
**invensys**  
An Invensys company

# ONE RANGE — ALL SOLUTIONS

*Representing over 30 years of advanced design and applications experience in industrial temperature and process control, Series 2000 is the most complete family available today.*

*It includes a full range of temperature controllers, process controllers, indicators and alarm units. Series 2000 is available in a wide range of sizes with features designed to provide accurate, trouble-free performance well into the future.*

## HEAT TREATMENT



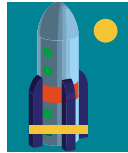
- Ovens
- Furnaces

## PLASTICS AND RUBBER



- Extrusion
- Injection molding

## AEROSPACE AND AUTOMOTIVE



- Carburizing furnaces • Tensile testing furnaces
- Creep testing furnaces • Environmental chambers
- Autoclaves • Stress relieving • Hot presses
- Engine Test Beds • Infra-red paint drying

## BRICKS AND CERAMICS



- Driers
- Firing kilns

## FOOD, BREWING



- Blending
- Baking
- Refrigeration
- Fermentation, Pasteurization

## GLASS



- Melting furnaces
- Forehearths
- Lehrs

## SEMICONDUCTOR



- Crystal growing
- Diffusion
- Molecular beam epitaxy

## CHEMICAL, PHARMACEUTICAL



- Reaction vessels
- Fermenters
- Pressure, flow, level, Ph

## UTILITIES, HEATING AND VENTILATION



- Gas burners and boiler control
- Trace heating
- Pressure reduction stations

# 2100

## Controller



**2132**

1.89inx0.94in (48x24mm)



**2116**

1.89inx1.89in (48x48mm)

Input		
General	Range	-12 to +80mV
Sample rate		5Hz
Calibration accuracy		0.25% of reading ± 1 LSD or ± 1°C/F
Resolution		< 2µV
Linearization accuracy		< 0.1% of reading
Input filter		1.0 to 999.9secs
Zero offset		User adjustable over the full display range
Thermocouple Types		J,K,T,L,N,C,R,S,B,Platinell II (using ITS 90 temperature scale)
Cold junction compensation		Automatic compensation typically >15 to 1 rejection of ambient temperature change External references: 32, 113, and 122°F (0, 45, and 50 °C)
RTD Type		2-wire, Pt100 DIN43760
Process Range		-12 to +80mV or 0 to 20mA (Configurable between limits)
Supply voltage Standard		85 to 264Vac -15%, +10%, 48 to 62Hz
Low voltage		20 to 29 Vac/dc

Outputs		
Relay	Rating: 2-pin relay Application	Min: 12V, 100mA dc. Max: 2A, 264Vac resistive Heating, cooling or alarm
Logic	Rating Application	9Vdc, 18mA, non-isolated Heating, cooling, alarms or PDSIO® mode 1: logic heating with load failure alarms

Communications (not available on these units)		

Control Functions		
Control	Modes	PID or PI with overshoot inhibition, PD, P only, or On/Off Heating, cooling or heating plus cooling
	Setpoint rate limit	0.01 to 99.99 degrees or display units per minute
	Cooling algorithms	Linear only
Tuning	One-shot tune	One-shot calculation of PID and overshoot inhibition parameters
	Auto. droop compensation	Automatic calculation of manual reset value when using PD control
Alarms	Types	Full scale high or low, deviation high, low, or band
	Modes	Latching or non-latching with normal or blocking action Up to three process alarms can be combined onto a single output

# 2200e

- **Controller**
- **Motorized Valve Controller**



**2216e**

1.89inx1.89in (48x48mm)



**2208e**

1.89inx3.78in (48x96mm)



**2204e**

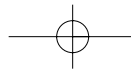
3.78inx3.78in (96x96mm)

Inputs		
General	Range	± 100mV and 0 to 10Vdc (auto ranging)
	Sample rate	9Hz (110mS)
	Calibration accuracy	0.25% of reading, ± 1 LSD or ± 1°C/F
	Resolution	<1µV for ± 100mV range, < 0.2mV for 10Vdc range
	Linearization accuracy	< 0.1% of reading
Input filter		1.0 to 999.9secs
	Zero offset	User adjustable over full range
Thermocouple	Types	J,K,T,L,N,C,R,S,B,Platinell II (using ITS 90 temperature scale)
	Cold junction compensation	Automatic compensation typically >30 to 1 rejection of ambient temperature change External references 32, 113 and 122°F (0, 45, and 50 °C)
RTD	Type	3-wire, Pt100 DIN43760
Process	Range	± 100mV, 0 to 20mA or 0 to 10Vdc (All configurable between limits)
	Type	Linear
	Application	Process value
Digital	Type	Contact closure or 24Vdc logic input
	Application	Manual select, 2nd setpoint, keylock, setpoint rate limit enable PDSIO® Mode 5
Supply voltage		85 to 264Vac, 48 to 62Hz

Outputs		
Relay	Rating: 2-pin relays	Min: 12V, 100mA dc. Max: 2A, 264Vac resistive
	Rating: change-over relay	Min: 6V, 1mA dc. Max: 2A, 264Vac resistive
	Application	Heating, cooling or alarms
Logic	Rating	18Vdc at 24mA (non-isolated)
	Application	Heating, cooling, alarms or PDSIO® mode 1: logic heating with load failure alarm PDSIO® mode 2: Logic heating with load/SSC failure alarm and load current display
Triac	Rating	1A, 30 to 264Vac resistive
	Application	Heating or cooling
Analog	Heating or cooling	Isolated 0 to 20mA or 4 to 20mA into 600Ω max

Communications		
Digital	Transmission standard	EIA-485 at 1200, 2400, 4800, 9600 or 19,200 baud
	Protocol	EI Bisynch, Modbus®, DeviceNet™
PDSIO™	Setpoint input	Setpoint input from master PDSIO® controller. Holdback to master controller

Control Functions		
Control	Modes	PID or PI with overshoot inhibition, PD, P only or On/Off Heating, cooling, heating plus cooling
	Auto/manual	Bumpless transfer
	Setpoint rate limit	0.01 to 99.99 degrees or display units per second, minute or hour
	Cooling algorithms	Linear, water (evaporative), fan, oil, proportional only
Tuning	One-shot tune	One-shot calculation of PID and overshoot inhibition parameters
	Auto. droop compensation	Automatic calculation of manual reset value when using PD control
Alarms	Types	Full scale high or low. Deviation high, low, or band
	Modes	Latching or non-latching with normal or blocking action
		Up to four process alarms can be combined onto a single output



# 2400

- **Controller**
- **Setpoint Programmer**
- **Motorized Valve Controller**



**2416**  
1.89inx1.89in (48x48mm)



**2408**  
1.89inx3.78in (48x96mm)



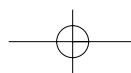
**2404**  
3.78inx3.78in (96x96mm)

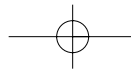
Inputs			
General	Range	± 100mV and 0 to 10Vdc (auto ranging)	
	Sample rate	9Hz (110mS)	
	Calibration accuracy	0.2% of reading, ±1 LSD or ±1°C/F	
	Resolution	<1µV for ± 100mV range, <0.2mV for 10Vdc range	
	Linearization accuracy	No discernable error	
	Zero drift with ambient temp.	<0.1µV per °C for ± 100mV range, <0.1mV per °C on 10Vdc range	
	Gain drift with ambient temp.	<0.004% of reading per °C	
	Input filter	1.0 to 999.9secs	
	Zero and span offset	User adjustable over full display range	
	Thermocouple	Types	J,K,T,L,N,C,R,S,B,Platinell II (using ITS 90 temperature scale)
Cold junction compensation		Automatic compensation typically >30 to 1 rejection of ambient temperature change External references: 32, 113, and 122°F (0, 45, and 50 °C)	
RTD	Type	3-wire, Pt100 DIN43760	
	Range	± 100mV, 0 to 20mA or 0 to 10Vdc (All configurable between limits)	
Process	Type	Linear, square root or custom 8 point	
	Application	Process value	Process value, remote setpoint, setpoint trim, power limit
	Range	100Ω to 1000Ω	
VP slidewire	Range	100Ω to 1000Ω	
	Type	Contact closure or 24Vdc logic input	
Digital	Application	Manual select, 2nd setpoint, 2nd PID, keylock, setpoint rate limit enable (PDSIO® Mode 5)	
	Application	Program run, hold, reset, sync, fast run	
Supply voltage	Standard	85 to 264Vac (code VH), 48 to 62Hz	
	Low voltage	20 to 29 Vac/dc (code VL)	

Outputs			
Relay	Rating: 2-pin relays	Min: 12V, 100mA dc. Max: 2A, 264Vac resistive	Min: 12V, 100mA dc. Max: 2A, 264Vac resistive (single and dual outputs)
	Rating: change-over relay		Min: 6V, 1mA dc. Max: 2A, 264Vac resistive
	Application	Heating, cooling, alarms or program event	
Logic	Rating	18Vdc at 24mA, non-isolated	18Vdc at 24mA. Isolated and non-isolated versions available
	Application	Heating, cooling, alarm, program event, PDSIO® mode 1: Logic heating with load failure alarm	
Triple logic	Rating		Open collector, 50mA, 36Vdc max
	Rating	1A, 30 to 264Vac resistive	1A, 30 to 264Vac resistive. Single and dual outputs
Analog	Application	Heating, cooling or program event	
	Heating or cooling or process output	0 to 20mA into 600Ω max or 0 to 10Vdc non-isolated (Configurable between limits)	0 to 20mA into 600Ω max, 0 to 10Vdc – Isolated (Configurable between limits)
	Retransmission of PV or setpoint Transmitter supply		Isolated 0 to 20mA into 600Ω max, 0 to 10Vdc (Config. between limits) 24Vdc, 20mA max

Communications		
Digital	Transmission standard	EIA-232/422/485 at 1200, 2400, 4800, 9600 or 19,200 baud
	Protocol	Modbus®, Ei Bisynch, ProfiBus® (ProfiBus® only available for 2404 and 2408)
PDSIO®	Setpoint input	Setpoint input from master PDSIO® controller. Holdback to master controller
	Setpoint output	Master setpoint retransmission to slave PDSIO® controllers

Control Functions			
Control	Modes	PID or PI with overshoot inhibition, PD, P only or On/Off Heating, cooling, heating plus cooling, and motorized valve positioning	
	Auto/manual	Bumpless transfer or forced manual output	
	Setpoint rate limit	0.01 to 99.99 degrees or display units per second, minute or hour	
	Cooling algorithms	Linear, water (evaporative), fan, oil, proportional only	
Tuning	One-shot tune	One-shot calculation of PID and overshoot inhibition parameters	
	Adaptive	Continuous assessment of the PID values	
	Auto. droop compensation	Automatic calculation of manual reset value when using PD control	
Alarms	Types	Full scale high or low. Deviation high, low, or band. Rate of change	
	Modes	Latching or non-latching with normal or blocking action Up to four process alarms. Any number of events can be combined onto a single output	
Setpoint	Program size	1 or 4 programs (16 segments)	1, 4, or 20 programs (16 segments)
	Event outputs	Up to two	Up to eight





**INPUT STAGE**

Thermocouple Types	10	10	10	10	10	10	10	10
Resistance Thermometer (PT100)	■	■	■	■	■	■	■	■
Linear Millivolt / 4 - 20mA Input	■	■	■	■	■	■	■	■
0 - 10Vdc			■	■	■	■	■	■
Custom Non-linear Curves	■	■	■	■	■	■	■	■

**HARDWARE**

**FIXED**

Logic Output	1	1						
Relay Output	1	1	1	2	2		1	1
Logic Input				2	2		2	2

**POWER SUPPLY**

High Voltage Supply	■	■	■			■	■	■
Low Voltage Power Supply	■	■				■	■	■

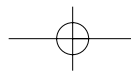
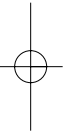
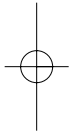
**MODULAR**

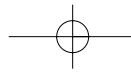
**COMMUNICATIONS MODULES**

PDSIO® Setpoint Input			1	1	1	1	2	2
PDSIO® Setpoint Output						■	■	■
Digital Communications			■	■	■	■	■	■

**CONTROL AND I/O MODULES**

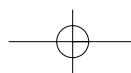
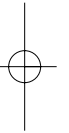
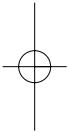
Triac			■	■	■	■	■	■
Relay			■	■	■	■	■	■
Logic			■	■	■	■	■	■
PDSIO® Control Output			■	■	■			
DC Control (Analog Output)			■	■	■	■	■	■
Dual Control - Triac + Triac							■	■
Dual - Relay + Relay							■	■
Transmitter Supply							■	■
Triple Logic/Contact Input							■	■
Triple Logic Output							■	■
Valve Position Slidewire Feedback							■	■
Analog Retransmission/Remote Setpoint			■	■	■		■	■
High Current Switch								■
Second Process Value Input							■	■





**SOFTWARE FEATURES**

	2132	2116	2216e	2208e	2204e	2416	2408	2404	
<b>CONTROL</b>									
	■	■	■	■	■	■	■	■	PID Heat - Cool
	■	■	■	■	■	■	■	■	On/Off Heat - Cool
		■	■	■	■	■	■	■	Valve Positioner
							■	■	Valve Position Slidewire Feedback
	■	■	■	■	■	■	■	■	Self Tuning
						■	■	■	Adaptive Tuning
						■	■	■	Second PID
		■	■	■	■	■	■	■	Power Feedback
		■	■	■	■	■	■	■	Water, Fan and Oil Cooling
	1	2	2	2	2	2	2	2	<b>SETPOINTS</b>
	■	■	■	■	■	■	■	■	Setpoint Rate Limit
		■	■	■	■	■	■	■	Second Setpoint
						■	■	■	16-Setpoint Unit
<b>PROGRAMMER</b>									
						1 or 4	1, 4, 20	1, 4, 20	Number of Programs
						16	16	16	Number of Segments
						2 max	8 max	8 max	Event Outputs
							■	■	Run - Hold - Reset Logic Input
							■	■	BCD Program Select
						■	■	■	Holdback
<b>DIGITAL COMMUNICATIONS</b>									
		■	■	■	■	■	■	■	Modbus®
		■	■	■	■	■	■	■	El Bisynch
		■	■	■					DeviceNet™
							■	■	Profibus®
<b>ALARM TYPES</b>									
	■	■	■	■	■	■	■	■	Full Scale High and Low
	■	■	■	■	■	■	■	■	Deviation High, Low and Band
						■	■	■	Rate of Change
	■	■	■	■	■	■	■	■	Loop Break
	■	■	■	■	■	■	■	■	Blocking Alarms
	■	■	■	■	■	■	■	■	Latching Alarms
<b>PDSIO® FUNCTIONS</b>									
	■	■	■	■	■	■	■	■	SSRx Load Doctor™
		■	■	■	■	■	■	■	SSRx Enhanced Load Doctor™





## INTERNATIONAL DISTRIBUTION

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