

2404

MODEL



Setpoint Programming Controller

- High stability control
- Up to four programs
- 16 ramp/dwell segments
- Up to 8 event outputs
- PDSIO® master setpoint retransmission
- Heating and cooling
- Customized operator interface
- Heater current display
- Load diagnostics
- Multiple alarms on a single output
- One-shot tuner with overshoot inhibition
- Adaptive tuning
- Auto/manual button
- EIA-485 communications
- Plug-in from front
- IP 65 panel sealing
- Compliant with European EMC and low voltage safety directives

The 2404 is an advanced setpoint programming temperature or process controller, with self and adaptive tuning, in a 1/4 DIN size [3.78x3.78x5.91in (96x96x150mm)]. It will store one or four programs of 16 segments each. Up to eight programmable outputs can be set in each segment to trigger external events. Two digital inputs are included as standard and can be used to run, hold and reset the program. Parallel operation of several programmers can be performed with synchronization chosen at the end of any desired segments. The 2404 has a modular hardware construction which will accept up to three plug-in I/O modules, a fixed alarm relay and two communications modules. The outputs can be configured for heating, cooling, alarms or motorized valve control. It is fully configurable on-site.

PDSIO® master setpoint transmission

PDSIO® can be used to digitally transmit the setpoint profile to a number of slave Series 2000 controllers. If any slave zone departs from the required setpoint by more than a pre-settable amount, a signal from any slave can be transmitted back to the master causing the program to freeze until the error is corrected. Digital accuracy is preserved using PDSIO®.

Precise control

An advanced PID control algorithm gives stable 'Straight-line' control of the process. A one-shot tuner is provided to set up the initial PID values and to calculate the overshoot inhibition parameters. In addition an adaptive tuner will handle processes with continually changing characteristics. Power feedback employs power control techniques which stabilize the controlled temperature against supply voltage fluctuations on electrically heated loads. Dedicated cooling algorithms ensure optimum control on fan, water and oil cooled systems.

Universal input

A universal input circuit with an advanced analog to digital convertor samples the input at 9Hz and continuously corrects it for drift. This gives high stability and rapid response to process changes. High noise immunity is achieved by rejection of 50/60Hz pick-up and other sources of noise. Sensor diagnostics are also provided. The input covers all thermocouple types, Pt100 RTD and linear millivolts or milliamps. Input filtering from 1.0 to 999.9 seconds is included.



EUROTHERM CONTROLS



Customized operation

Custom LEDs provide a bright, clear display of the process value and setpoint. Tactile push buttons ensure positive operation. Access to other parameters is simple and easy to understand and can be customized to present only those parameters that need to be viewed or adjusted. All other parameters are locked away under password protection. Front panel auto/manual and run/hold buttons are provided.

PDSIO® Load diagnostics

PDSIO® (Pulse Density Signaling Input/Output) is a major innovation in the 2404. When used in combination with a Eurotherm TE10S solid state contactor (SSC), it allows the logic output of a 2404 to transmit the power demand signal and simultaneously read back load fault alarms on the same pair of wires. These alarms will flash as messages on the controller front panel and can trip the alarm relay. Two alarm conditions will be detected: one, an SSC failure, indicating an open or short circuit condition in the SSC; two, a heater circuit failure, indicating either fuse failure, heater open circuit or line supply absent.

Alarms

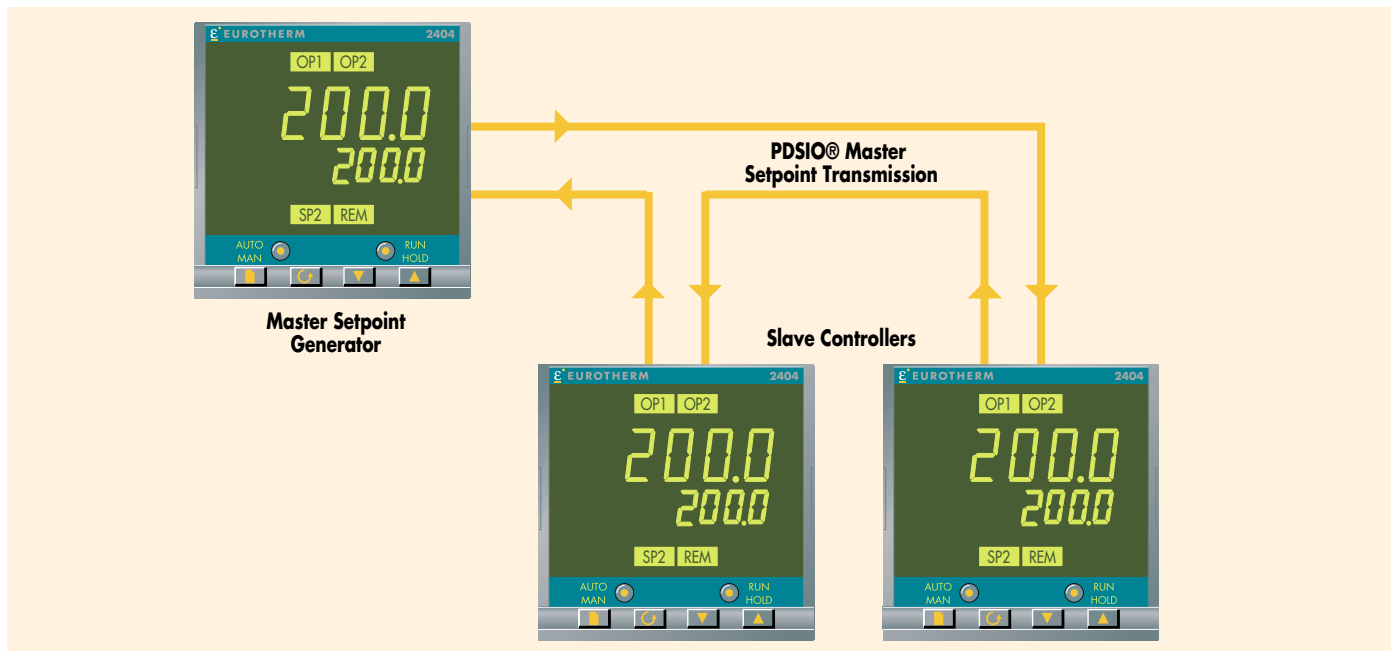
Up to four process alarms can be combined onto a single output. They can be full scale high or low, deviation from setpoint, rate of change or load failure alarms. Alarm messages are flashed on the main display. Alarms can be configured as latching or non-latching and also as 'blocking' type alarms which means they will become active only after entering a safe state.

Digital communications

EIA-485 serial communications is available with industry-standard protocols including: Modbus®, Eurotherm Bisynch, and SPI*.

**Please consult factory for availability.*

PDSIO® Setpoint Transmission



Sensor inputs and display ranges (Temperature scales conform to the ITS90 standard)

Standard Sensor Inputs	Celsius		Fahrenheit	
	Min	Max	Min	Max
J thermocouple	-210	1200	-350	2192
K thermocouple	-200	1372	-325	2500
T thermocouple	-200	400	-325	750
L thermocouple	-200	900	-325	1650
N thermocouple	-250	1300	-420	2370
C thermocouple - W5%Re/W26%Re (Hoskins)	0	2319	32	4200
R thermocouple	-50	1768	-60	3200
S thermocouple	-50	1768	-60	3200
B thermocouple	0	1820	32	3310
Platinell II thermocouple	0	1369	32	2500
RTD/PT100DIN 43760	-200	850	-325	1560
Custom Sensor Inputs (Replaces type C thermocouple)				
E thermocouple	-270	1000	-450	1830
Ni/Ni18%Mo thermocouple	0	1100	32	2012
Pt10%Rh/Pt40%Rh thermocouple	200	1800	392	3272
Pt20%Rh/Pt40%Rh thermocouple	0	2000	32	3632
W/W26%Re (Englehard) thermocouple	0	2000	32	3632
W/W26%Re (Hoskins) thermocouple	0	2010	32	3650
W5%Re/W26%Re (Englehard) thermocouple	10	2300	50	4172
W5%Re/W26%Re (Bucose) thermocouple	0	2000	32	3632
D thermocouple - W3%Re/W25%Re	0	2400	32	4352
Linear Inputs	-999	9999		

2404 TECHNICAL SPECIFICATION

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 temperature	< 0.1µV per °C for ±100mV range, 0.1mV per °C on 10Vdc range
	Gain drift with ambient temperature	< 0.004% of reading per °C
	Input filter	1.0 to 999.9secs
	Zero and span offset	User adjustable over the fully display range
	Thermocouple	Types
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/PT100	Type	3-wire, Pt100 DIN43760
	Bulb current	0.2mA
	Lead compensation	No error for 22 ohms in all 3 leads
Process	Range	±100mV, 0 to 20mA or 0 to 10Vdc (All configurable between limits)
	Type	Linear, Square root or custom 8 point
	Application	Process value, remote setpoint, setpoint trim, power limit. Value pos. slidewire 100 to 1000Ω
Digital	Type	Single and triple input: Contact closure or 24Vdc logic input
	Application	Manual select, 2nd setpoint, 2nd PID, keylock, setpoint rate limit enable, Program run, hold, reset, synchronization and fast run

Outputs

Relay	Rating: 2-pin relay	Min: 12V, 100mA dc Max: 2A, 264Vac resistive (single and dual modules are available)
	Rating: change-over, alarm relays	Min: 6V, 1mA dc Max: 2A, 264Vac resistive
	Application	Heating, cooling, alarms or program event
Logic	Rating	18Vdc at 24mA (isolated and non-isolated versions are available)
	Application	Heating, cooling, alarms or program event PDSIO® mode 1: Logic heating with load failure alarm PDSIO® mode 2: Logic heating with load/SSC failure alarm and load current display
	Rating	1A, 30 to 264Vac resistive (single and dual modules are available)
High Current	Rating	10amp, 264Vac resistive
	Application	Heating
Analog	Range	0 to 20mA (into 600Ω max) or 0 to 10Vdc (Isolated and non-isolated versions are available)
	Application	Heating or cooling or process output. PV retransmission or setpoint retransmission
Transmitter supply	Rating	24Vdc at 20mA
Strain gauge supply		10Vdc Minimum bridge resistance: 300Ω

Communications

Digital	Transmission standard	EIA-485 at 1200, 2400, 4800, 9600, 19,200 baud
	Protocols	Modbus® or Eurotherm Bisynch
PDSIO®	Setpoint input	Setpoint input from master PDSIO® controller. Holdback to master controller
	Setpoint output	Master setpoint retransmission to slave PDSIO® controllers

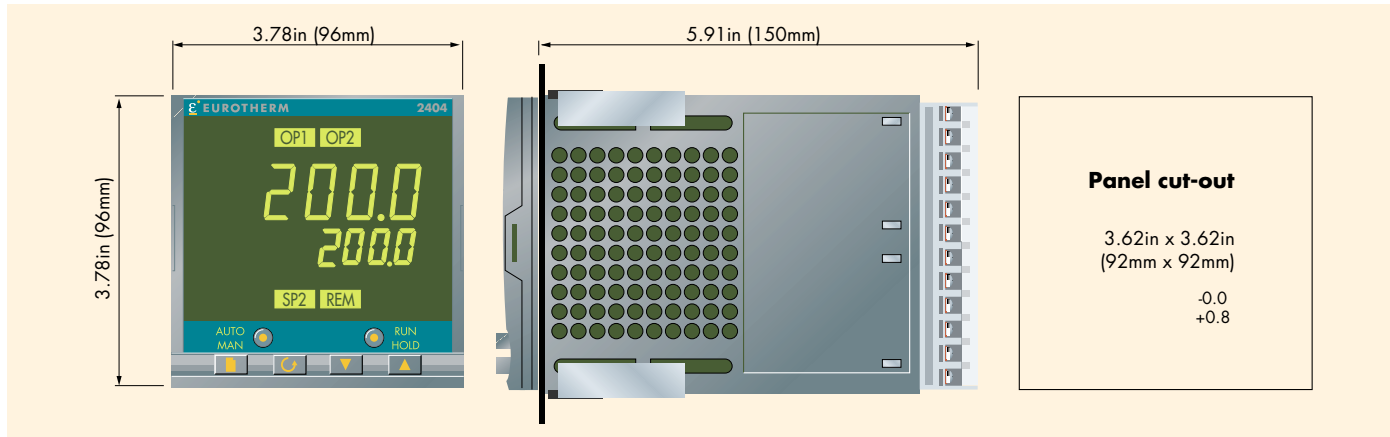
Control functions

Control	Modes	PID or PI with overshoot inhibition, PD, P only or On/Off
	Application	Heating, cooling or process output
	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 (non-linear); Fan (minimum on time), water and oil cooled systems, proportional only
Tuning	One-shot tune	Automatic calculation of PID and overshoot inhibition parameters
	Adaptive Tune	Continuous assessment of the PID values
	Automatic 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. Normal or blocking action Up to four process alarms can be combined onto a single output
Setpoint programming	Program size	One, four, or 20 programs of 16 segments each
	Event outputs	Up to eight – relay, logic or triac

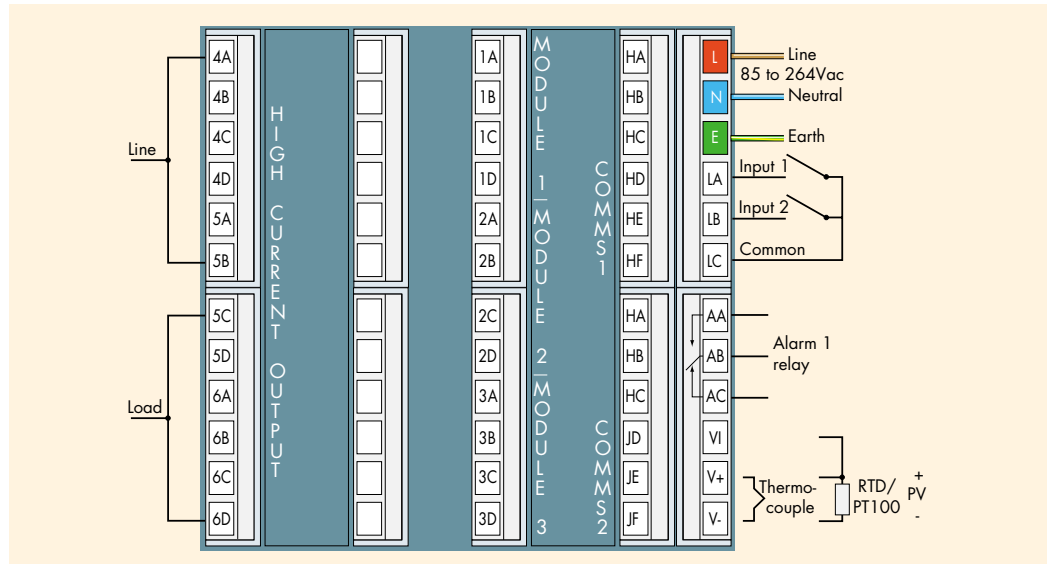
General

General	Display	Dual, 4 digit x 7 segment high intensity LED
	Dimensions and weight	3.78W x 3.78H x 5.91D in (96W x 96H x 150Dmm) 21.16oz (600g)
	Supply	85 to 264Vac, 48 to 62Hz. 10watts max
	Temperature and RH	Operating: 32 to 131°F (0 to 55°C), RH: 5 to 90% non-condensing. Storage: 14 to 158°F (-10 to 70°C)
	Panel sealing	IP 65
	Electromagnetic compatibility	Meets generic emissions standard EN50081-2 for industrial environments Meets general immunity requirements of EN50082-2(95) for industrial environments
	Safety standards	EN61010, installation category 2 (voltage transients must not exceed 2.5kV)
	Atmospheres	Electrically conductive pollution must be excluded from the cabinet in which this controller is mounted. This product is not suitable for use above 6,562ft (2000m) or in corrosive or explosive atmospheres without further protection.

2404 Rear Terminal Connections and Outline Dimensions



Modules 1, 2 and 3 are plug-in modules. They can be any one of the types shown in the ordering code below.



Ordering Code

Basic Product	Function	Supply Voltage	Module 1	Module 2	Module 3	Alarm 1	HI Current	Comms 1*	Comms 2*	Manual
2404	CP Single Programmer	VH 85 - 264 Vac	XX Not used	XX Not used	XX Not used	XX Not used	XX Not used	XX Not used	XX Not used	XXX No Manual
	P4 Four Programs	VL 20 - 29 Vac	R2 Relay: 2-pin	R2 Relay: 2-pin	R2 Relay: 2 pin	RF Relay: change over	R6 High current output	EIA-485:	M6 PDSIO® SP input unconfigured	ENG English
	CM 20 Programs		R4 Relay: change over	R4 Relay: change over	R4 Relay: change over			YM Modbus®	M7 PDSIO® SP retrans. unconfigured	FRA French
	VP Valve Positioner Programmer		L2 Logic: non-isolated	L2 Logic: non-isolated	TK Triple contact input			YE El Bisynch		GDR German
	V4 Valve Positioner Four Programs		T2 Triac	T2 Triac	TL Triple logic input			PDSIO®:		ITA Italian
	VM Valve Positioner 20 Programmers		D4 DC: isolated	D4 DC: isolated	TP Triple logic output			M7 Setpoint Retrans. unconfigured		
			RR Dual (relay+relay)	RR Dual (relay+relay)	RR Dual (relay+relay)			EIA-232:		
			TT Dual (triac+triac)	TK Triple contact input	D5 Remote DC input			AM Modbus®		
			LR Dual (logic+relay)	TL Triple logic input	VS VP slide wire input			AE El Bisynch		
			LT Dual (logic+triac)	TP Triple logic output	D6 DC retransmission			EIA-422:		
			TK Triple contact input	D6 DC retransmission	L2 Logic non-isolated			FM Modbus®		
			TL Triple logic input		T2 Triac			FE El Bisynch		
			TP Triple logic output							

The above ordering code specifies only the hardware build. The input type and output control functions must then be configured on-site to suit a particular application. If preconfiguration is required, ask for details on the full ordering code.

*Please consult factory for availability.

Informações sobre programação
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