

2404

MODEL

Ideal for:

- Carburizing furnaces
- Ceramic glazing kilns

Features:

- Direct connection to most types of Zirconia probes
- Control of Carbon potential, % Oxygen or Dewpoint
- CO or H₂ compensation input
- PID control — PID on/off
- Valve positioning control
- Sooting and probe health alarms
- Probe clean output
- Retransmission output
- Profibus®-DP or Modbus® communications
- Two point calibration of probe EMF, probe temp and calculated PV



Model 2404
1/4 DIN (96 x 96mm)

Furnace & Kiln atmosphere controllers

The 2404 Atmosphere Controllers provide accurate display and control of the carbon level in carburizing furnaces or ceramic glazing kilns.

There are three different controllers that connect to a zirconia probe which measures the % oxygen in the furnace. The carbon level is calculated from the % oxygen and temperature measured by the probe. An optional third analog input can accept the output signal from a CO or H₂ analyzer thus providing a more precise carbon or dewpoint measurement.

The controllers are compatible with probes from the following manufacturers:

- Drayton
- Accucarb
- AACC/MSI
- SSI
- Macdui/Barber-Colman
- Bosch Lambda

In addition to carbon level the controllers can be configured to measure and control either:

- % oxygen or log oxygen
- Dewpoint in °C or °F
- Probe millivolts

Advanced control algorithms ensure accurate, stable control.

A range of plug-in modules are used to provide control, retransmission and alarm outputs. The control outputs can be mA or volts; time proportioning relay, logic or triac; or raise/lower outputs to a motorized valve and slide wire.

A **probe clean output** is available to force compressed air through the probe at regular intervals to burn-off soot deposits.

A **sooting alarm** will warn if carbon deposits build up to a level that can cause false readings.

Probe health is monitored by measuring the time it takes the probe MV reading to recover from a self-clean operation.

High speed Modbus® or Profibus® communications, allow supervision by a computer or easy integration into Programmable Control Systems. (PLC's)



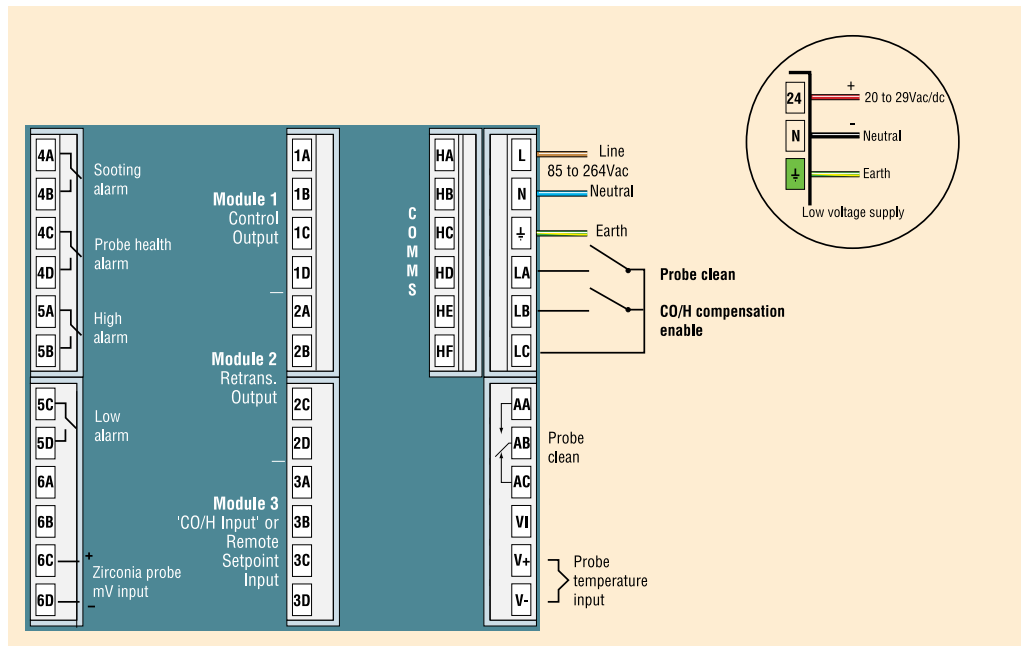
EUROTHERM
CONTROLS

Connections

Three versions of the controller are available:

Version ESO278

Version ESO278 offers PID or Motorized Valve control, five standard relay outputs, optional Modbus® or Profibus® communications and an optional CO input for continuous correction of the carbon potential calculation.

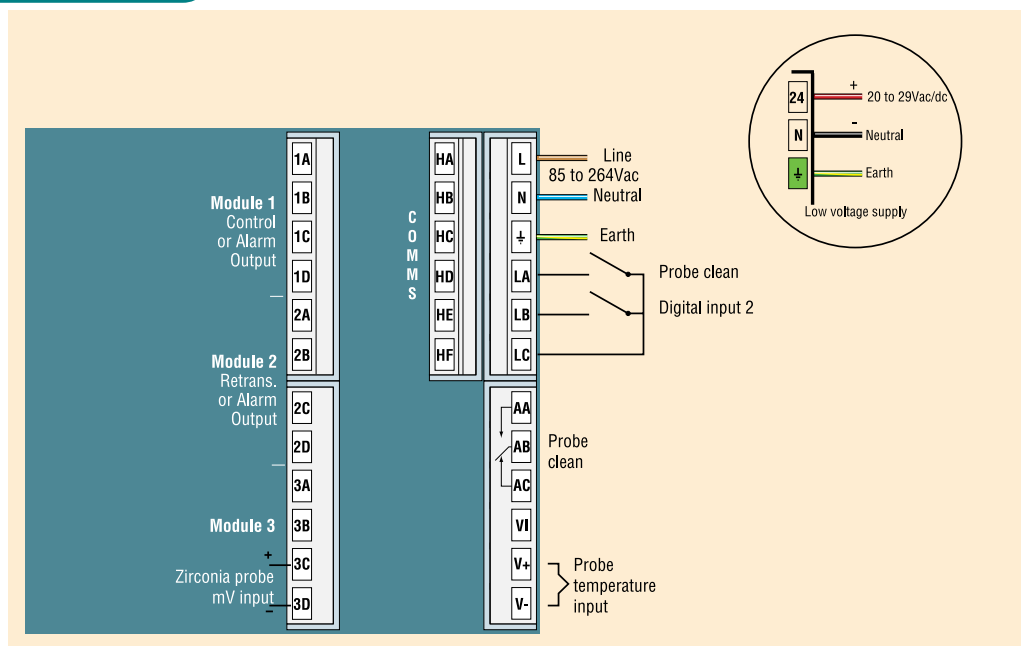


Note: All inputs and outputs are provided as standard except Modules 1, 2, 3 and the communications module which must be specified in the ordering code.

Version ESO209 and ESO288

Version ESO209 offers PID control*, two module slots and optional Modbus® or Bisync communications. (* For Motorized Valve control select model ESO278).

Version ESO288 has the same features as ESO209 with the option of Profibus® communications instead of Bisync.



Note: Modules 1, 2 and the communications module are optional and must be specified in the ordering code.

Ordering code

Model Number	Function	Supply Voltage	Module 1	Module 2	Module 3	Alarm Relay	10amp Output	Comms 1	Comms 2	Manual	Version
						RF	XX		XX		

Model Number
2404 1/4DIN version ES0209 Profibus units
2404f 1/4DIN version ES0278
2404f 1/4DIN version ES0288

Function
ES0278 options*
CC PID Controller
NF On/Off Controller
VC Valve Positioner
ES0209 and ES0288 options*
CC PID Controller
NF On/Off Controller
P4 PID controller with 4x16 segment program
N4 On/Off Controller with 4x16 segment program

* Must be consistent with selection in "Version" field.

Supply Voltage
VH 85-264Vac
VL 20-29Vac/dc

Module 1
XX Not fitted
Relay, Logic or triac control modules
RH Relay enrich output
LH Logic enrich output
TH Triac enrich output
Change over relay module
YH Enrich output
FH Full scale high alarm
FL Full scale low alarm
DB Deviation band alarm
DL Deviation low alarm
DH Deviation high alarm
DC Control module
H1 0-20mA
H2 4-20mA
H3 0-5V
H4 1-5V
H5 0-10V
Dual relay module
RD Enrich + dilute outputs
RM Valve raise and lower outputs
Dual triac module
TD Enrich + dilute outputs
TM Valve raise and lower outputs

Module 2
XX Not fitted
Relay, Logic or triac control modules
RC Relay dilute output
LC Logic dilute output
TC Triac dilute output
Change over relay module
YC Dilute output
FH Full scale high alarm
FL Full scale low alarm
DB Deviation band alarm
DL Deviation low alarm
DH Deviation high alarm
PO Program event 1
PE Program end output
DC Retrans module
<i>First character</i>
V- PV retransmission
S- Setpoint retrans.
Z- Error retransmission
<i>Second character</i>
-1 0-20mA
-2 4-20mA
-3 0-5V
-4 1-5V
-5 0-10V
Position feedback module
VS Potentiometer valve position feedback

Module 3
Version ES0278
XX Module not fitted
D5 CO input
W2 4-20mA remote setpoint input
W5 0-10Vdc remote setpoint input
Version ES0209 & ES0288
D5 Probe mV input

Comms
XX Not fitted
Modbus* protocol
AM RS232
FM RS485/422 4-wire
YM RS485 2-wire
Profibus* comms (ver ES0278 & ES0288)
PB RS485
Bisync protocol (version ES0209 only)
AE RS232
FE RS485/422 4-wire
YE RS485 2-wire

Manual
XXX No manual
GER German
ENG English
FRA French
NED Dutch
SPA Spanish
SWE Swedish
ITA Italian

Version	
ES0278	1/4DIN unit with extended I/O and profibus comms
ES0209 and ES0288	1/8 or 1/4DIN unit with two module slots

Technical Specification

Process value display

No. of digits	Four with up to 2 decimal places
Process value	Configurable as Carbon potential, % oxygen, Log oxygen, Dewpoint in °C or °F, or Probe mV
Sample rate	9Hz
PV filtering	0-99.9 seconds
User calibration	Zero offset and gain adjustment can be applied

Analog inputs

Zirconia probe input	-200 to +1800mV, >100MΩ input impedance
Probe types	Drayton, Accucarb, AACC, SSI, Macdui and Bosch, MSI, & Barber-Colman
Probe temp. input	Thermocouple types J, K, T, L, N, R, S, B and Platinel II Automatic CJC compensation or external 0°C or 50°C reference CJC rejection ratio: typically >30 to 1 rejection of ambient temperature change
CO/H₂ input	Configurable between 0-20mA and 0-10Vdc

Digital output ratings

Relay	2A, 264Vac resistive. Minimum operating current and volts: 100mA, 12Vdc
Triac	1A, 264Vac resistive
SSR (Logic) drive	20mA @ 18Vdc

Analog outputs

Range	Isolated, 0-20mA (into 600Ω max) or 0-10Vdc
Resolution	1 part in 7,000 for both control and retransmission outputs

Digital inputs

Rating	Contact closure or open collector input Switching current and voltage 10mA, 24Vdc
Input functions	Probe clean initiate. Auto/manual select. Setpoint rate limit enable. External gas correction enable.

Control

Version ES0209 and ES0288	On/Off or PID or PI or PD control
Version ES0278	On/Off or PID or PI or PD or motorized valve control. (Available with or without potentiometer position feedback)
Auto/manual	Bumpless transfer or forced output
Tuning	One-shot and adaptive tuning available
Gain scheduling	Two sets of PID values can be selected on PV

Alarms

Max. number	Four
Alarm types	Software configurable: Full scale high and low Deviation high, low and band One rate of change alarm Sooting and Probe health alarms
Alarm modes	Software configurable: Latching, non-latching, blocking Energized or de-energized in alarm

Communications

Profibus-DP	RS485 2-wire, (version ES0278 and ES0288)
Modbus	RS232, RS422/485 4-wire, RS485 2-wire
EI Bisync	RS232, RS422/485 4-wire, RS485 2-wire, (version ES0209 only)
Baud rates	Modbus® or Bisync 1200, 2400, 4800, 9600, 19,200 Profibus®, up to 1.5Mbps/second

General

Supply	85-264Vac, 48-62Hz or 20-29Vac/dc
Power	15watts max
Panel sealing	IP54
Temperature	Operating 0-55°C, storage -10 to +70°C
Humidity	Operating and storage 5-95% non-condensing
Dimensions	1/4DIN controller 96W x 96H x 152D mm
Weight	600g max.
Safety standard	Meets EN61010, installation category 2
EMC standards	Meets generic emissions standard EN50081-2 and immunity standard EN50082-2 for industrial environments
Atmosphere	This product is not suitable for use above 2000m and in corrosive or explosive atmospheres

EUROTHERM CONTROLS INC

11485 Sunset Hills Road
Reston, Virginia 20190-5286
Phone: 703-471-4870
Fax: 703-787-3436
Fax-On-Demand Service: 703-787-3441
WWW: <http://www.eurotherm.com>

Series 2000™ and INSTANT ACCURACY™ (US Patent 5,484,206) are trademarks of Eurotherm. © Copyright Eurotherm Controls Limited 1999. All rights strictly reserved. No part of this document may be stored in a retrieval system, or any form or by any means without prior written permission from Eurotherm Controls Inc. Every effort has been taken to ensure the accuracy of this specification. However in order to maintain our technological lead we are continuously improving our products which could, without notice, result in amendments or omissions to this specification. We cannot accept responsibility for damage, injury, loss or expenses resulting therefrom.

For more information contact your local representative: