2408f
2404f
MODELS

EUROTHERM CONTROLS

Model 2408f
1/8 DIN (48 x 96mm)

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

Profibus-DP, PID Controllers

Connection to PLCs and PC supervisory packages is made easy with the 2408f and 2404f Profibus-DP controllers. Available in 1/8 DIN and 1/4DIN panel sizes, they provide independent front-end control of temperature and other process variables without any compromise in performance.

Unlike other products, the design is not a gateway, but uses a direct connection to the microprocessor bus of the controller, thereby ensuring the most efficient possible communications.

A Windows configurator sets up the controller parameters that are mapped into the PLC registers. This allows the ladder logic or control program to read and write to the controller as though it were an internally fitted module.

High stability control with an extensive range of control options are the attributes of the 2408f and 2404f One-shot and continuously adaptive tuning optimises control performance without the need for specialist knowledge or training.

A modular build accommodates a range of plug-in I/O modules.

Features include:
· Up to four internally stored setpoint programs
· Analogue retransmission
· Remote setpoint
· Two PV inputs for differential, max, min or transfer control
· Cascade, ratio and feedforward control options.

Ideal for:

• **Plastic extrusion**
• **Wire extrusion**
• **Baking conveyor ovens**
• **Packaging lines**
• **Conveyor furnaces**

Features:

• **Advanced PID control**	Accurate control, independent of PLC scan times
• **Single loop integrity**	Greater fault tolerance. Simple fault finding
• **Physical distribution**	Reduced wiring cost
• **Local operator display**	Operator monitoring and standby control
• **No PID programming in PLC**	Faster, lower cost design, installation and maintenance
• **PID does not consume PLC processing time**	Enhanced system performance
• **Direct interface to temperature sensors**	Less hardware cost. Higher accuracy
• **Plug-in from front**	Rapid replacement - reducing downtime
• **Three year warranty**	Low ownership cost

CE

**Profibus-DP
PID Controllers**

Windows configurator
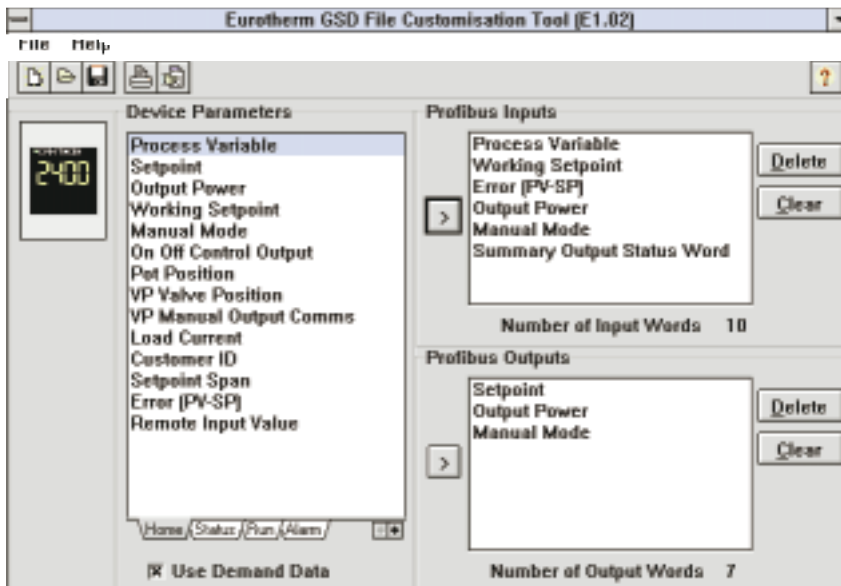
What does it do?
It creates a 'GSD' file which defines the inputs and outputs that the PLC or supervisory package will be able to talk to. The GSD file is imported into a Master Profibus configuration tool which in-turn produces a file that is downloaded into the PLC or supervisory package.

How do I use it?
Click on the tabs at the bottom of the device parameter window to select a parameter page. Then use the mouse to drag a required parameter into either the Profibus input or output lists.
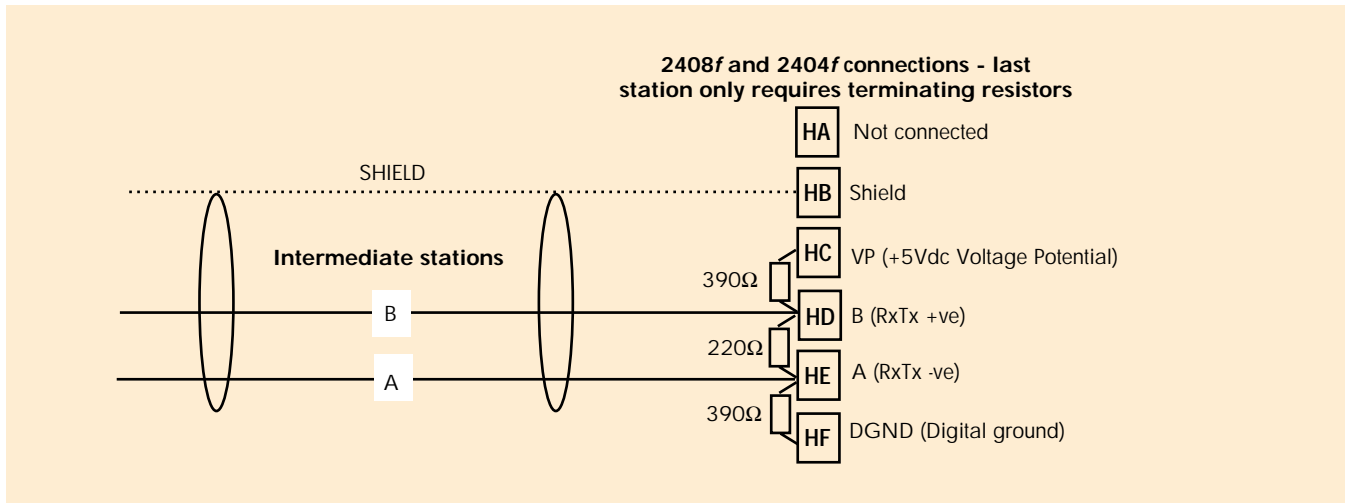
How many parameters can I select?
Up to 117, total of inputs and outputs per controller.

What can I run it on?
Windows 3.1, or Windows 95, or Windows NT.

Wiring

2408*f* and 2404*f* connections - last station only requires terminating resistors

HA	Not connected
HB	Shield
HC	VP (+5Vdc Voltage Potential)
HD	B (RxTx +ve)
HE	A (RxTx -ve)
HF	DGND (Digital ground)

SHIELD

Intermediate stations

B

A

390Ω

220Ω

390Ω

Key technical features

Physical medium: 2-wire, RS485
Network Topology: Linear bus, with active bus termination on both ends
                      Stub lines permitted if <6.6m in length
Protocol: Profibus-DP intelligent slave
Baud rate: Up to 1.5Mb/s
Number of stations: 32 per network segment. Up to 127 with repeaters

Baud rate: Kbits/sec	9.6	19.2	93.75	187.5	500	1500
Distance (m):	1200	1200	1200	1000	400	200
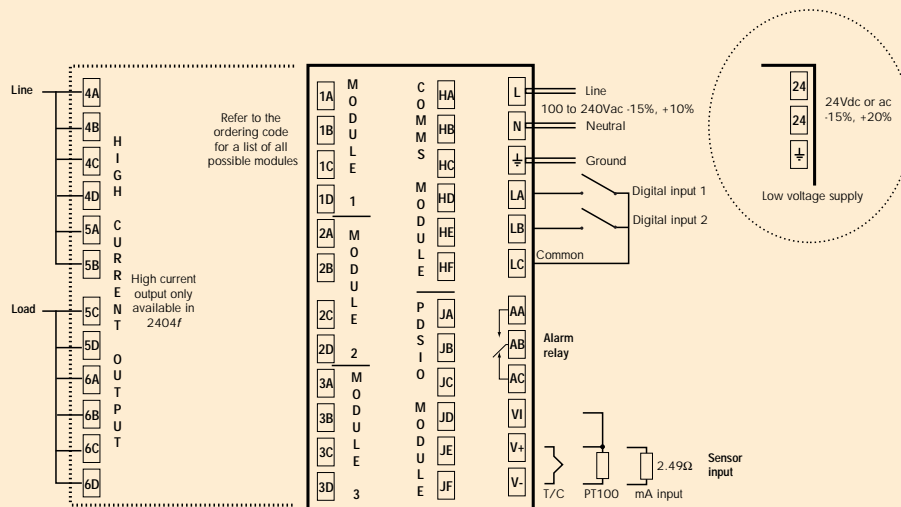
Technical Specification

Process value inputs

Low level range	-100 to + 100mV
High level range	0-20mA or 0-10Vdc
Sample rate	9Hz
Resolution	<2µV for low level inputs <0.2mV for high level inputs
Linearity	Better than 0.2°C ±1LSD
Calibration accuracy	±1°C or ±0.2% of reading, whichever is greater
User calibration	Low and high offsets can be applied
Input filtering	OFF to 999.9 seconds
Thermocouple types	Refer to the ordering code sensor input table
Cold Junction compensation	In automatic mode, >30 to 1 rejection of ambient temperature change OR external 0°C, 45°C, 50°C references
3-wire Pt100 input	Bulb current: 0.3mA. Up to 22ohm in each lead without error
Potentiometer input	330 to 15Kohm
Analogue input functions	Process value, remote setpoint, setpoint trim, external power limit, feedforward input, Valve position feedback
Second process value input functions	Select min, select max, derived value, transfer to 2nd PV

Digital inputs (Isolated except for fixed digital inputs 1 & 2)

Contact closure inputs	Open circuit voltage: 24 to 30Vdc Short circuit current: 24 to 29mA Off state: <100ohms input resistance On state: >28Kohm input resistance
Logic inputs (Current sinking)	Off state: -3 to 5Vdc @ <-0.4mA On state: 10.8 to 30Vdc @ 2.5mA
Digital input functions	Refer to the ordering code

Digital outputs

Relay rating	2A, 264Vac resistive
Single logic output*	18Vdc, 20mA (non-isolated)
Triple logic output	12Vac, 8mA per channel (isolated)
Triac	1A, 264Vac resistive (isolated)
High current output	Rating: 10amp, 264Vac resistive (2404ƒ only) (isolated)
Digital output functions	Refer to the ordering code

Analogue outputs

Range	0-20mA, 0-10VDC (isolated)
Resolution	1 part in 10,000 for analogue retrans. 1 part in 7,000 for DC control outputs
Analogue output functions	Refer to the ordering code
Transmitter supply	20mA, 24Vdc

Control functions

Control modes	On/Off, PID or motorised valve control, with or without a feedback potentiometer
Cooling algorithms	Linear, water, fan, oil
Tuning	One-shot and continuous adaptive tuning
Number of PID sets	Two
Auto manual control	Bumpless transfer or forced manual output available
Setpoint rate limit	Display units per sec, per min or per hour

Alarms

Number of alarms	Four
Alarm types	High, low, deviation high, deviation low, deviation band, rate of change.
Alarm modes	Latching or non-latching. Blocking. Energised or de-energised in alarm

Setpoint programming

Number of programs	Up to four
Segments per prog	16
Event outputs	Up to eight

Communications (All modules are isolated)

Profibus	High speed, RS485. Up to 1.5Mb/s
Modbus ®	RS232, 2-wire RS485 and 4-wire RS485 modules

PDSIO

Slave input (isolated)	Remote setpoint with holdback to master
Master output*	Retransmission of setpoint, process value or output

General

Display range	Four digits with up to two decimal places
Supply	100 to 240Vac -15%, +10% 48 to 62Hz, OR 24Vdc or ac -15%, +20%. 10W max.
Operating ambient	0 to 55°C and 5 to 95% RH non-condensing
Storage temperature	-10 to +70°C
Panel sealing	IP54
Dimensions (mm)	2408f: 48W x 96H x 150D 2404f: 96W x 96H x 150D
EMC standards	EN50081-2 & EN50082-2 generic standards for industrial environments
Safety standards	Meets EN61010, installation category II, pollution degree 2
Atmospheres	Not suitable for use above 2000m or in explosive or corrosive atmospheres.

* These inputs or outputs are not isolated from the main process value input.

Ordering Code

2408*f* / 2404*f*	1	2	3	4	5	6	7	8	9	10

1 Function

PID Controller
- CC Controller
- CG 1 x 8 seg program
- CP 1 x 16 seg program
- P4 4 x 16 seg program

On/Off Controller
- NF Controller
- NG 1 x 8 seg program
- NP 1 x 16 seg program
- N4 4 x 16 seg program

Motorised valve control
- VC Controller
- VG 1 x 8 seg program
- VP 1 x 16 seg program
- V4 4 x 16 seg program

2 Supply Voltage

- VH 85 to 264Vac
- VL 20 to 29Vac/dc

3 Module 1

- XX None

Relay: change-over
- R4 Fitted unconfigured
- YH Heating output
- RP Valve raise output

Or select Alarm 1 from table A

Logic
- L2 Fitted unconfigured
- LH Heating output
- M1 PDSIO mode 1

Triac
- T2 Fitted unconfigured
- TH Heating output
- TU Valve raise output

DC control (isolated)
- D4 Fitted unconfigured
- H6 0-20mA heating
- H7 4-20mA heating
- H8 0-5Vdc heating
- H9 1-5Vdc heating
- HZ 0-10Vdc heating

Triple I/O Modules
- TK Triple contact input
- TL Triple logic input
- TP Triple logic output

Dual relay + relay
- RR Fitted unconfigured
- RD Heating + cooling
- RM Valve raise and lower

Dual triac + triac
- TT Fitted unconfigured
- TD Heating + cooling
- TM Valve raise and lower

Dual logic + relay
- LR Fitted unconfigured
- LD Heating + cooling

Dual logic + triac
- LT Fitted unconfigured
- GD Heating + cooling

4 Module 2

- XX None

Relay: change-over
- R4 Fitted unconfigured
- YC Cooling output
- RL Valve lower output
- PO Program event 1
- PE Program end output

Or select Alarm 2 from table A

Dual relay + relay
- RR Fitted unconfigured
- PP Program events 1 & 2

Logic
- L2 Fitted unconfigured
- LC Cooling output

Triac
- T2 Fitted unconfigured
- TC Cooling output
- TW Valve lower output

DC control (isolated)
- D4 Fitted unconfigured
- C6 0-20mA cooling
- C7 4-20mA cooling
- C8 0-5Vdc cooling
- C9 1-5Vdc cooling
- CZ 0-10Vdc cooling

Triple I/O Modules
- TK Triple contact input
- TL Triple logic input
- TP Triple logic output
- MS 24Vdc transmitter supply

DC Retransmission
Select from table B

Potentiometer input
- VU Fitted unconfigured
- VS Valve position feedback
- VR Remote setpoint input

5 Module 3

- XX None

Relay: change-over
- R4 Fitted unconfigured
- PO Program event 4
- PE Program end output

Or select Alarm 3 from table A

Dual relay + relay
- RR Fitted unconfigured
- PP Program events 4 & 5

Other modules
- L2 Logic unconfigured
- T2 Triac unconfigured
- TK Triple contact input
- TL Triple logic input
- TP Triple logic output
- MS 24Vdc transmitter PSU

DC remote input
- D5 Fitted unconfigured
- W1 0 to 20mA setpoint*
- W2 4 to 20mA setpoint*
- W5 0 to 10V setpoint
- WP Second PV input*

Potentiometer input
- VU Fitted unconfigured
- VS Valve position feedback
- VR Remote setpoint input

DC Retransmission
Select from table B

6 Alarm Relay

- XX None
- RF Unconfigured
- RA Rate of change
- LF PDSIO load failure
- HF PDSIO heater failure
- SF PDSIO SSR failure
- PO Program event 7
- PE Program end output

Or select Alarm 4 from table A

7 10A output

- XX None
- R6 Fitted unconfigured
- RH PID heating

8 Comms module

- XX Not fitted

Profibus module
- PB High speed EIA-485

Modbus ® modules
- AM EIA-232
- FM 4-wire, EIA-485
- YM 2-wire EIA-485

Table A: Alarm relay functions
- FH High alarm
- FL Low alarm
- DB Deviation band
- DL Low dev. alarm
- DH High dev. alarm

9 PDSIO module

- XX None

PDSIO input
- M6 Fitted unconfigured
- RS Setpoint input

PDSIO output
- M7 Fitted unconfigured
- PT PV retransmission
- TS Setpoint retrans
- OT Output retrans

10 Manual

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

Table B: DC retransmission
- D6 Fitted unconfigured

First character
- V- PV retransmission
- S- Setpoint retrans.
- O- Output retransmission
- Z- Error retransmission

Second character
- -1 0-20mA
- -2 4 to 20mA
- -3 0 to 5V
- -4 1 to 5V
- -5 0 to 10V

Configuration

11	12	13	14	15	1	17	18	19	20	21

11 Sensor Input / 12 13 Setpoint Min/Max

Thermocouples

		°C		°F	
J	Type J	-210 to 1200		340 to 2192	
K	Type K	-200 to 1372		-325 to 2500	
T	Type T	-200 to 400		-325 to 750	
L	Type L	-200 to 900		-325 to 1650	
N	Type N	-250 to 1300		-418 to 2370	
R	Type R	-50 to 1768		-58 to 3200	
S	Type S	-50 to 1768		-58 to 3200	
B	Type B	-0 to 1820		32 to 3308	
P	Platinell II	0 to 1369		32 to 2496	

Resistance thermometer

Z	Pt100	-200 to 850		-325 to 1562	

Factory downloaded inputs

C	Type C - W5%Re/W26%Re	0 to 2319		32 to 4200	
D	Type D - W3%Re/W25%Re	0 to 2399		32 to 4350	
E	E Thermocouple	-200 to 999		-325 to 1830	
1	Ni/Ni18%Mo	0 to 1399		32 to 2550	
2	Pt20%Rh/Pt40%Rh	0 to 1870		32 to 3398	
3	W/W26%Re (Englehard)	0 to 2000		32 to 3632	
4	W/W26%Re (Hoskins)	0 to 2010		32 to 3650	
5	W5%Re/W26%Re (Englehard)	10 to 2300		50 to 4172	
6	W5%Re/W26%Re (Bucose)	0 to 2000		32 to 3632	
7	Pt10%Rh/Pt40%Rh	200 to 1800		32 to 3632	
8	Exegen K80 I.R. pyrometer	-45 to 650			

Process inputs (linear) Note: will be scaled to setpoint min and max

F	-100 to +100mV	Scaleable -1999 to 9999
Y	0 to 20mA*	Scaleable -1999 to 9999
A	4 to 20mA*	Scaleable -1999 to 9999
W	0 to 5Vdc	Scaleable -1999 to 9999
G	1 to 5Vdc	Scaleable -1999 to 9999
V	0 to 10Vdc	Scaleable -1999 to 9999

14 Units

- C °C
- F °F
- K Kelvin
- X Linear input

17 Control Options

- XX None
- DP Direct acting PID control

18 Heating Options

- XX None
- PD Power feedback disabled

19 Cooling Options

- XX None
- CF fan cooling
- CW Water cooling
- CL Oil cooling
- CO On/off cooling

20 Panel buttons

- XX None
- MD Auto/man button disabled
- RD Run/hold button disabled
- MR Auto/manual & run/hold disable

21 Program Options

- XX None
- HD Dwell time in hrs
- HR Ramp rate in units/hour (mins is standard)

15 16 Logic inputs 1 & 2

- XX Disabled
- AM Manual select
- SR Remote setpoint select
- S2 Second setpoint select
- EH Integral hold
- AC Alarm acknowledge
- RP Setpoint rate limit enable
- RN Run program
- HO Hold program
- RE Reset program
- RH Run/hold program
- NT Reset/Run program
- TN Reset/Run program
- HB Prog. holdback enable
- KL Keylock
- P2 PID2 select
- ST One-shot tune enable
- AT Adaptive tune enable

- FA Select full access level
- RB Simulates pressing
- LB Simulates pressing
- SB Simulates pressing
- PB Simulates pressing
- B1 Least sig. BCD digit
- B2 2nd BCD digit
- B3 3rd BCD digit
- B4 4th BCD digit
- B5 5th BCD digit
- B6 Most sig. BCD digit
- SY Standby - ALL ops OFF
- SC Program synch.
- SG Skip seg. without changing setpoint
- PV Select PV2
- AG Advance to end of seg. & step to target SP
- M5 CTX mode 5 (Input 2 only)

*   A 2.49Ω 1% current sense resistor is supplied as standard. If greater accuracy is required, a 0.1% resistor can be ordered as part no. **SUB2K/249R.1**

Windows® configuration software

- PROF - ENG English
- - FRA French
- - GER German
- - ITA Italian
- - NED Dutch
- - SPA Spain
- - SWE Swedish

Profibus communications manual
Part no. HA026290/ENG