2216L and 2208L Temperature Controllers

**Installing and Operating Instructions**

EUROTHERM CONTROLS

The 2216L and 2208L are precision PID temperature controllers ideal for plastic extrusion machines, ovens, chillers and other heating and cooling processes. The 2216L is in a 48 x 48mm panel size (1/16 DIN) and the 2208L in a 48 x 96 panel size (1/8 DIN). Both controllers have up to three outputs for heating, cooling and alarms. In addition the 2208L has two contact closure inputs to select second setpoint and standby mode (all outputs off, except alarms).

The controller will have been built and configured according to the ordering code given on page 5. Check the ordering code on the controller side labels to determine the configuration of your particular controller.
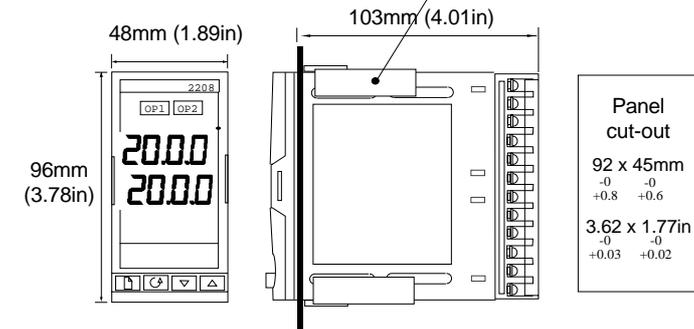
$C\epsilon$ This controller meets the European directives on safety and EMC.

DIMENSIONS AND INSTALLATION

Model 2216L
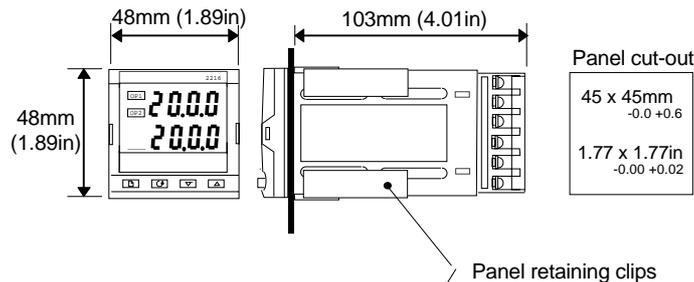
Model 2208L

To install the controller
Please read the safety information on pages 5 & 6 before proceeding.
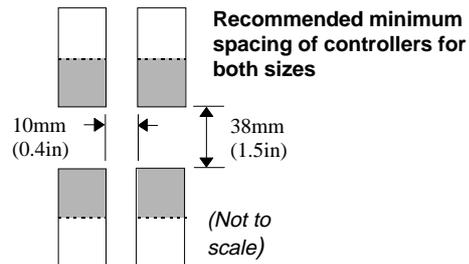Prepare the panel cut-out to the size shown
Insert the controller through the cut-out.
Spring the panel retaining clips into place. Secure the controller in position by holding it level and pushing both retaining clips forward.
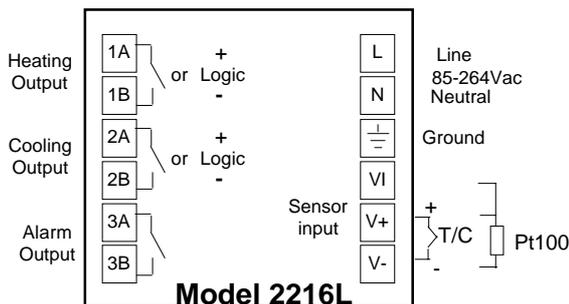**Unplugging the controller**
The controller can be unplugged from its sleeve by easing the latching ears outwards and pulling it forward out of the sleeve. When plugging the controller back into its sleeve, ensure that the latching ears click into place to maintain the IP65 sealing.

Recommended minimum spacing of controllers for both sizes

10mm (0.4in)   38mm (1.5in)   *(Not to scale)*

ELECTRICAL CONNECTIONS

Model 2216L

Model 2208L

Output ratings
Relay: 2A, 264Vac resistive
Logic: 18Vdc, 20mA (non-isolated)

Alarm output

The alarm output is non-latching and de-energised in the alarm state

Grounding
The ground connection is not required for safety purposes but must be connected to satisfy EMC requirements

Wire Sizes

All electrical connections are made to the screw terminals at the rear of the controller. These accept wire sizes from 0.5 to 1.5 mm^2 (16 to 22 AWG), and are protected by a hinged cover to prevent hands or metal making accidental contact with live wires. Rear terminal screws should be tightened to a torque of 0.4 Nm (3.5 lb in).
.

ENG
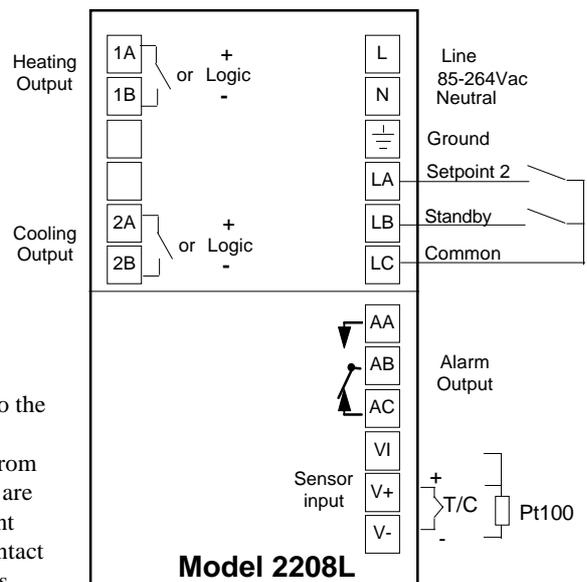
OPERATION

Switch on the controller. Following a 3 second self-test sequence, you will see the display shown below. It is referred to as the HOME display.

Output 1 → OP1 OP2 ← Output 2
20 ← Actual Temperature
23 ← Required Temperature (Setpoint)
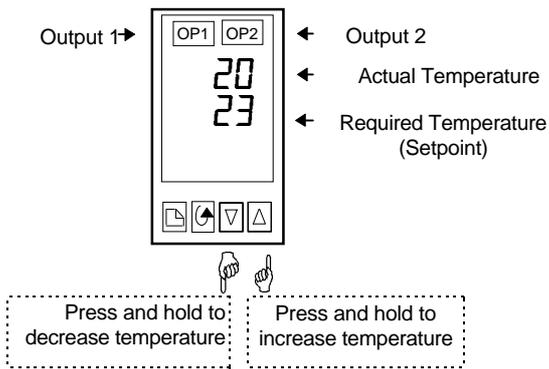
Press and hold to decrease temperature | Press and hold to increase temperature

After 2 secs the lower readout will 'blink' indicating that the new setpoint has been accepted.

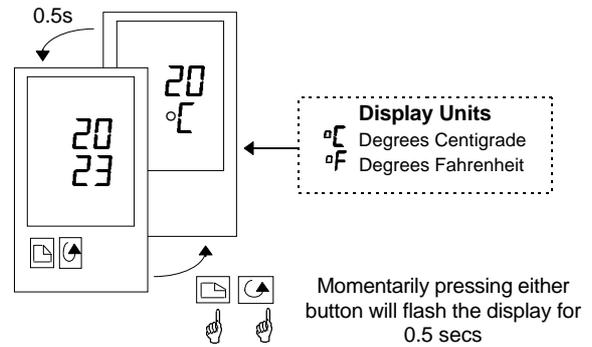OP1 will light when heating is ON
OP2 will light when cooling is ON

The display may flash an alarm message. The tables below list all of the possible messages and their meaning.

ALARM MESSAGES

Process Alarms	
Message	**Meaning**
1FSL	Alarm 1, Full Scale Low alarm: The temperature is below the low alarm setting
2FSH	Alarm 2, Full Scale High alarm: The temperature exceeds the high alarm setting
3dEu	Alarm 3, Deviation alarm: The difference between the setpoint and the temperature exceeds the deviation alarm setting
S.br	*Sensor Break:* Input sensor is open circuit or high resistance. Check the sensor.

Diagnostic alarms	
Message	**Meaning and Action**
EEEr	*Electrically Erasable Memory Error:* A parameter value has been corrupted. Contact Eurotherm Controls.
Hw.Er	*Hardware error:* Return for repair
LLLL	*Low display range exceeded:* Check input signal
HHHH	*High display range exceeded:* Check input signal
Err 1	*Error 1: ROM self-test fail.* Return for repair
Err2	*Error 2: RAM self-test fail.* Return for repair
Err3	*Error 3: Watchdog fail.* Return for repair
Err4	*Error 4: Keyboard failure.* Stuck button, or a button was pressed during power up.
Err5	*Error 5: Input circuit failure.* Return for repair
Pwr.F	*Power failure.* The line voltage is too low. Check that the supply is within the rated limits

VIEWING THE DISPLAY UNITS

0.5s

Display Units
°C Degrees Centigrade
°F Degrees Fahrenheit

Momentarily pressing either button will flash the display for 0.5 secs

NOTE

If you get lost, pressing [page] and [scroll] together will return you to the HOME display.

If, at any time, no key is pressed within 45 seconds, the display will always return to the HOME display.

USE OF THE 'SCROLL' BUTTON

Pressing the scroll button will display the output power and the two internal setpoints.

2nd Press

OP ← Output
100.0 ← Actual output power %

Upper readout is parameter name. Lower is value.

3rd Press

SP 1 ← Setpoint 1
0 ← Press ▽ or △ to change value

4th Press

SP 2 ← Setpoint 2
0 ← Press ▽ or △ to change value

Keep pressing to return to the HOME display
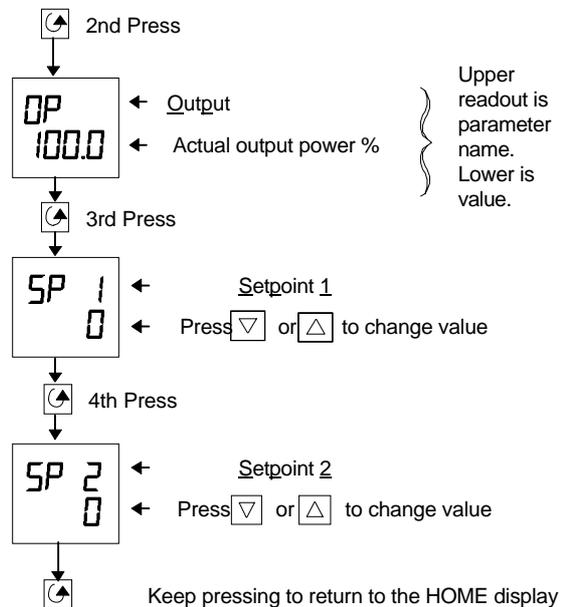
USE OF THE 'PAGE' BUTTON

The "PAGE" button accesses parameter LISTS
Parameters are settings in the controller which you can change to suit the process. Examples are: 'Alarms' and 'Autotune'. They are found under headings called **LISTS** and the full set is shown on the next page.

20 23 → AL LiSt → Atun LiSt

2nd press   3rd press

Keep pressing [page] to select more list headings continue around a continuous loop
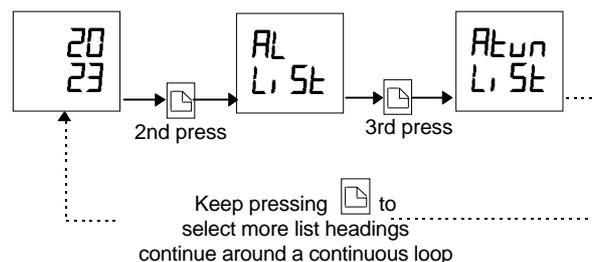
PARAMETER LISTS

Selecting and adjusting a parameter

1. Press ▢ to step through the list headings

2. Press ↻ to step through the parameters within a particular list

3. The upper display shows the parameter name and the lower display its value

4. Press ▽ to decrease the value of a selected parameter

5. Press △ to increase the value of a selected parameter.

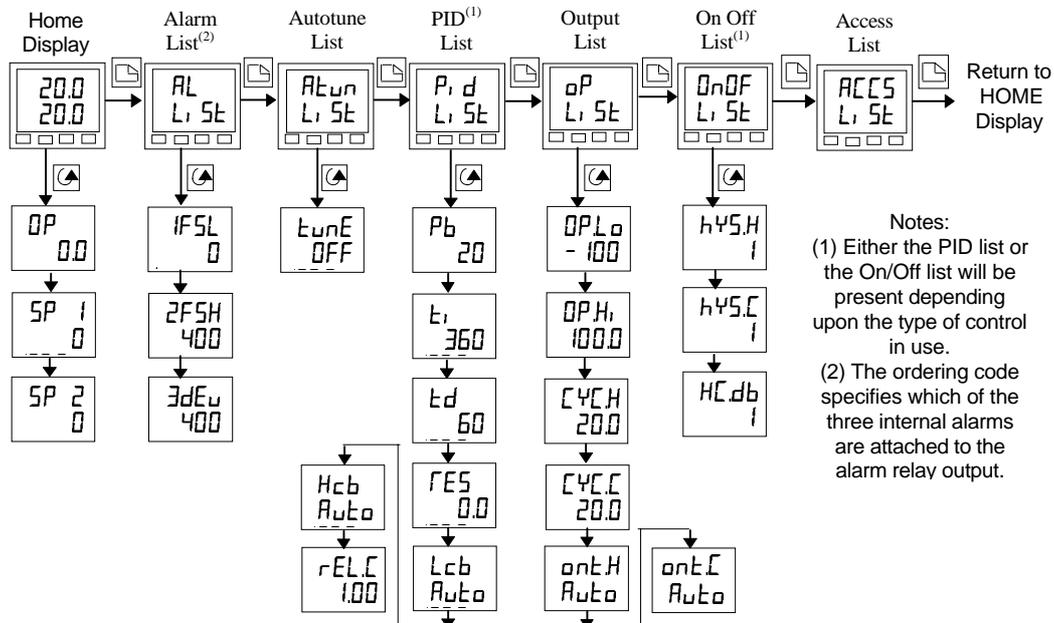| Home Display	Alarm List(2)	Autotune List	PID(1) List	Output List	On Off List(1)	Access List	Return to HOME Display
20.0 / 20.0	AL Li St	Atun Li St	Pi d Li St	oP Li St	OnOF Li St	ACCS Li St	
OP 0.0	IFSL 0	tunE OFF	Pb 20	OPLo -100	hYS.H 1		
SP 1 0	2FSH 400		ti 360	OP.Hi 100.0	hYS.C 1		
SP 2 0	3dEu 400		td 60	CYC.H 20.0	HC.db 1		
			Hcb Auto	rES 0.0	CYC.C 20.0		
			rEL.C 1.00	Lcb Auto	ontH Auto / ontC Auto		

Notes:
(1) Either the PID list or the On/Off list will be present depending upon the type of control in use.
(2) The ordering code specifies which of the three internal alarms are attached to the alarm relay output.

	Home List	Adjustable Range	Default setting	Customer setting
Home	Measured temperature and Setpoint			
OP	Output power demand	-100.0 to 100.0%		
SP 1	Setpoint 1 value	As per ordering code	0	
SP 2	Setpoint 2 value	As per ordering code	0	

AL	Alarm List	Adjustable Range	Default setting	Customer setting
IFSL	Full Scale Low alarm setting	0 to 9999 °C or °F	Setpoint minimum	
2FSH	Full Scale High alarm setting	0 to 9999 °C or °F	Setpoint maximum	
3dEu	Deviation Band alarm setting	0 to 9999 °C or °F	Setpoint maximum	

Atun	Autotune List (see Tuning)	Adjustable Range	Default setting	Customer setting
tunE	Self tune enable	OFF or on	OFF	

Pi d	PID List (see Tuning)	Adjustable Range	Default setting	Customer setting
Pb	Proportional band	0 to 9999 °C or °F	20	
ti	Integral time	OFF to 9999 secs	360	
td	Derivative time	OFF to 9999 secs	60	
rES	Manual reset (appears when ti set to OFF)	-100 to 100.0	0.0	
Lcb	Cutback low	Auto to 9999 °C or °F	Auto	
Hcb	Cutback high	Auto to 9999 °C or °F	Auto	
rEL.C	Relative cool gain	0.01 to 9.99	1.00	

oP	Output list	Adjustable Range	Default setting	Customer setting
OP.Lo	Cooling power limit (Output low limit)	-100 to 0.0 %	-100	
OP.Hi	Heating power limit (Output high limit)	0.0 to 100.0 %	100.0	
CYC.H	Heating output cycle time	0.2 to 999.9 secs	1 for logic output 20.0 for relay	
CYC.C	Cooling output cycle time	0.2 to 999.9 secs	5 for logic output 20.0 for relay	
ontH	Heating output minimum on time	Auto to 999.9 secs	Auto (=50mS)	
ontC	Cooling output minimum on time	Auto to 999.9 secs	Auto (=50mS)	

OnOF	On/off list (Used for On/Off control)	Adjustable Range	Default setting	Customer setting
hYS.H	Heating output hysteresis	0 to 9999 °C or °F	1	
hYS.C	Cooling output hysteresis	0 to 9999 °C or °F	1	
HC.db	Heat/Cool dead band	0 to 9999 °C or °F	0	

ACCS	Access list			
		Used for re-configuring the controller. (Separate instructions required)		

AUTOMATIC TUNING

In PID control, the output from the controller is the sum of three terms: **P**roportional, **I**ntegral and **D**erivative. These three terms deliver just the right amount of power to hold the temperature at setpoint without oscillation. For stable control, the PID values must be 'tuned' to the characteristics of the process being controlled. In the 2216L and 2208L this is done automatically using advanced tuning techniques.

Automatic tuning is performed by switching the output of the controller On and Off to induce an oscillation in the measured temperature. From the amplitude and period of the oscillation, the PID values, shown in the table below, are calculated.

Parameter	Display	Meaning or Function
Proportional band	Pb	The bandwidth in °C or °F over which the output power is proportioned between minimum and maximum.
Integral time	ti	Determines the time taken by the controller to remove steady-state error signals.
Derivative time	td	Determines how strongly the controller will react to the rate-of-change of temperature.
Low cutback	Lcb	The number of °C or °F below setpoint at which the controller will cutback the output power to prevent overshoot on heat up.
High Cutback	Hcb	The number of °C or °F above setpoint at which the controller will increase the output power to prevent undershoot on cool down.
Relative cool gain	rEL.C	Only present if cooling has been configured. Sets the cooling proportional band by dividing the Pb value by the rEL.C value.

If the process cannot tolerate 100% heating or cooling during tuning, the power can be restricted by the heating and cooling limits in the Output list. However, the measured value *must* oscillate to some degree for the tuner to determine values. Tuning is normally performed only once during the initial commissioning of the process. However, if the process under control subsequently becomes unstable (because its characteristics have changed), you can re-tune again at any time. It is best to start tuning the process from ambient temperature, to allow the tuner to calculate more accurately the cutback settings.

Heating and Cooling Output Cycle Times

Before commencing a tuning cycle, set the values of CYC.H (heating output cycle time) and CYC.C (cooling output cycle time) in the oP (output) list.
For a logic heating output (switching a solid state relay), set CYC.H to 1.0 sec.
For a relay output, set CYC.H to 20.0 sec.
For a logic cooling output used to control a solenoid valve, set CYC.C to 5.0 sec.

Tuning procedure

1. Set the setpoint to the value at which you will normally operate the process.
2. In the 'Atun' list, select 'tunE' and set it to 'on'
3. Press the Page and Scroll buttons together to return to the HOME display. The display will flash 'tunE' to indicate that tuning is in progress.
4. The controller will induce an oscillation in the temperature by turning the heating on and then off.
5. After two cycles of oscillation the tuning will be completed and the tuner will switch itself off.
6. The controller will then calculate the tuning parameters and resume normal control action.

If you want 'Proportional only' or 'P+D' or 'P+I' control, you should set the 'ti ' or 'td' parameters to OFF before commencing the tuning cycle. The tuner will leave them off and will not calculate a value for them.

Typical automatic tuning cycle
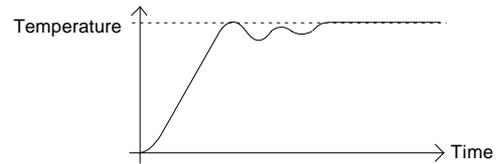
Calculation of the cutback values

When low cutback or high cutback is set to 'Auto' their values will be fixed at three times the proportional band, and will not be altered during automatic tuning. If set to any other value, they will be calculated as part of the tuning process.

MANUAL TUNING

If for any reason automatic tuning gives unsatisfactory results, you can manually tune the controller, as follows:
With the process at its normal running temperature:
1. Set *Integral Time* 'ti 'and *Derivative Time* 'td' to OFF.
2. Set *High Cutback* and *Low Cutback*, 'Hcb' and 'Lcb', to 'Auto'
3. Ignore the fact that the temperature may not settle precisely at the setpoint
4. Reduce the *proportional band* 'Pb' until the temperature just starts to oscillate. If the temperature is already oscillating, increase the proportional band until it just stops oscillating. Allow enough time between each adjustment for the temperature to stabilise. Make a note of the proportional band value 'B' and the period of oscillation 'T'.
5. Set the PID parameter values according to the formula below:

Type of control	Proportional band 'Pb'	Integral time 'ti '	Derivative time 'td'
Proportional only	2xB	OFF	OFF
P + I	2.2xB	0.8xT	OFF
P + I + D	1.7xB	0.5xT	0.12xT

Setting the cutback values

The above procedure sets up the parameters for optimum steady state control. If unacceptable levels of overshoot or undershoot occur during start-up or for large step changes in temperature, then manually set the cutback parameters Lcb and Hcb.
Proceed as follows:
1. Set the low and high cutback settings to 3 x the proportional band (that is to say, Lcb = Hcb = 3 x Pb).
2. Note the level of overshoot or undershoot that occurs for large temperature changes (see the diagrams below).
In example (a) increase Lcb by the overshoot value. In example (b) reduce Lcb by the undershoot value.

Example (a)   **Example (b)**
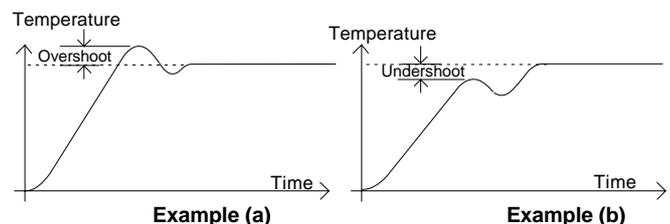
When the temperature approaches the setpoint from above, you can set Hcb in a similar manner.

Manual reset

When the integral term is set to OFF the parameter *manual reset* (rES) appears in the Pi d Li St. This parameter sets the output power when the error signal is zero. This value can be manually adjusted to remove the steady state error - the function normally performed by the Integral term.

RE-CONFIGURATION INSTRUCTIONS

The 2216L and 2208L are normally supplied pre-configured to a customer's requirement using the simple ordering code. The type of heating, cooling and alarm outputs are defined in the ordering code and cannot be changed by the customer because they are part of the fixed hardware build. You can, however, change the following software features:

1. The setpoint limits.
2. The temperature display units: °C or °F
3. The type of control: On/Off or PID
4. The type of input sensor
5. The alarm output configuration
6. To configure outputs 1 & 2 to heating and cooling

These instructions tell you how to make these changes.

TO CHANGE THE SETPOINT LIMITS

Separate high and low setpoint limits are available for setpoint 1 and setpoint 2. These restrict the range over which the operator can adjust the temperature thereby preventing damage to the product or the plant. To change the limits, first select 'FULL' access level as follows:
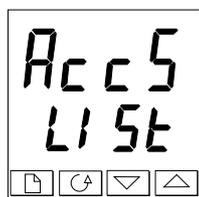
Access List Header

Press [ ] until you reach the ACCS list header.
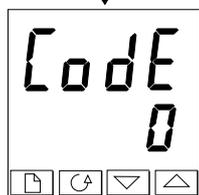
Press [↵]

Password Entry

Enter the password '5744' by pressing the [▲] or [▼] buttons.
When the correct password has been entered the lower readout will change to PASS indicating that access is now unlocked.

Press [↵]

Go To FuLL Level

Select 'FuLL' access level by pressing the [▲] or [▼] buttons.
Ignore the other possibilities:
OPEr;   Operator level
Edit   Edit level
conF: Configuration level.

Press [↵]
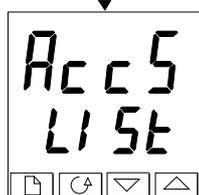
Access List Header

Press [ ] to return to the ACCS list header.
You are now in Full Access level.

TO CHANGE THE SETPOINT LIMITS … continued from the previous page.

Having selected FULL level, the FULL set of parameter lists shown below will be visible. Press ▯ to step across the list headers. You will eventually return to the HOME display. The high and low setpoint limits are in the SP Li St. To access them, press ▯ until you reach the SP Li St heading. Then press ↻ to step down the parameters within the list. Select the required parameter and adjust pressing the ▲ and ▼ buttons.

Home Display	Alarm List	Autotune List	PID List	Setpoint List	Input List	Output List	On Off List	Comms List	Access List
20.0 20.0	AL Li St	Atun Li St	Pi d Li St	SP Li St	i P Li St	oP Li St	OnOF Li St	cmS Li St	ACCS Li St

↻

| Display	Description
SSEL SP 1	Setpoint select 1 or 2. Shows currently selected setpoint number
SP 1 20	Shows setpoint 1 value
SP 2 0	Shows setpoint 2 value
SP 1.L 0	Setpoint 1 low limit. Press ▲ and ▼ to adjust
SP 1.H 400	Setpoint 1 high limit. Press ▲ and ▼ to adjust
SP2.L 0	Setpoint 2 low limit. Press ▲ and ▼ to adjust
SP2.H 400	Setpoint 2 high limit. Press ▲ and ▼ to adjust
SPrr OFF	Setpoint rate limit. Leave as OFF

RETURN TO OPERATOR LEVEL

Having adjusted the setpoint limits, return to Operator level as follows.

AccS Li St

Access list header

Press ▯ as many times as necessary until you reach the ACCS list header.

Press ↻

CodE PASS

Password entry

PASS will be displayed. If not, press the ▲ and ▼ to enter the password '5744'.

Press ↻

Goto OPEr

Goto Operator Level

Press the ▲ and ▼ to select OPEr level.

Press ↻ to return to the ACCS list header

AccS Li St

Access list header

You are now in back in Operator level and can resume normal operation.

TO CHANGE:

- **THE TEMPERATURE DISPLAY UNITS: °C OR °F**

- **THE TYPE OF CONTROL: ON/OFF OR PID**

- **THE INPUT SENSOR TYPE**

- **OUTPUTS 1 AND 2 TO HEATING OR COOLING**

- **THE ALARM OUTPUT CONFIGURATION,**

First select configuration level, as follows:
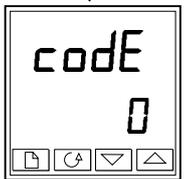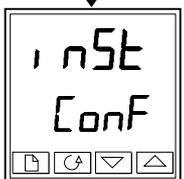
Access list header

Press [📄] until you reach the AccS list header.

Press [↻]

Password entry

Enter the password '5744' by pressing the [▲] and [▼] buttons.
Once the correct password has been entered the lower readout will change to 'PASS' indicating that access is now unlocked.

Press [↻]

Goto configuration Level

Select conF level by pressing the [▲] and [▼] buttons
Ignore the other possibilities:
   OPEr: Operator level
   Edit: Edit level
   FuLL: Full access level.

Press [↻]

Enter Configuration Password entry

Enter the configuration password 5744 by pressing the [▲] and [▼] buttons. Once the correct password has been entered, lower readout will change to 'PASS'.

Press [↻]

Configuration level reached

You are now in configuration level.

CONFIGURATION LEVEL:

Having selected configuration level as shown on the previous page, Pressing the [ ] button will step across the configuration parameter list headings as shown below. The lower readout will show `ConF` to indicate that it is a list heading.

Instrument configuration	Input configuration	Calibration configuration	Alarm configuration	Dig i/p LA configuration	Dig i/p LB configuration	Alarm o/p AA configuration	Module HA configuration

```
 ınSt        ıP         CAL         AL         LA         Lb         AA         HA
 ConF       ConF       ConF       ConF       ConF       ConF       ConF       ConF
```

	Exit configuration	Password configuration	Module 3A configuration	Module 2A configuration	Module 1A configuration

```
 EXıt       PASS        3A         2A         1A
  no        ConF       ConF       ConF       ConF
```
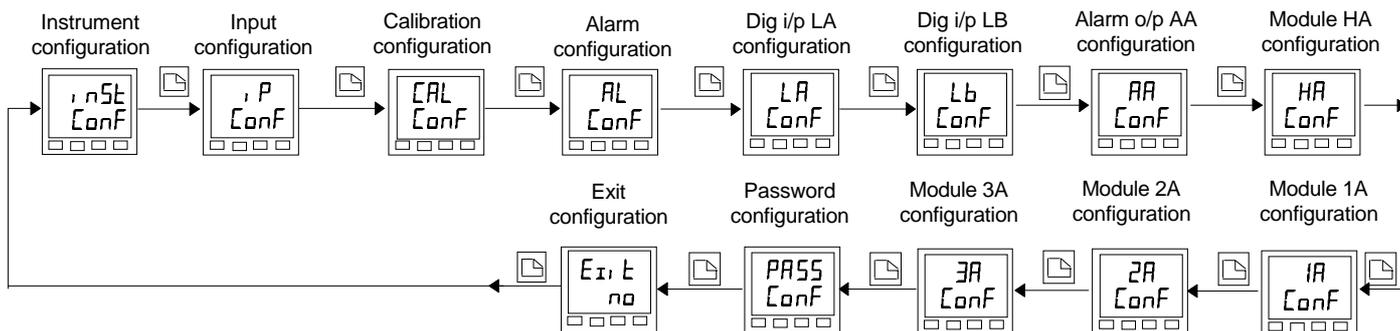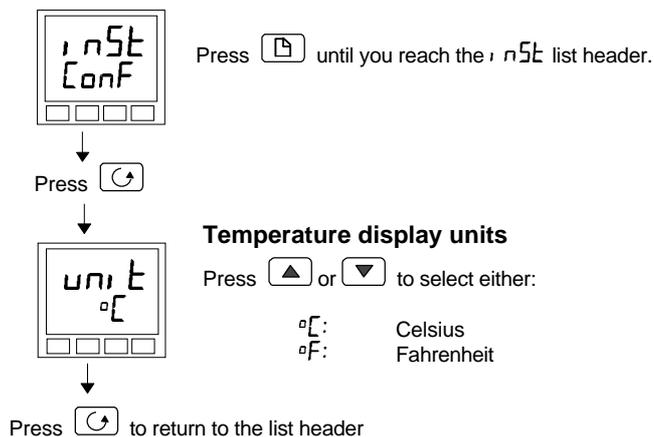
TO CHANGE THE TEMPERATURE DISPLAY UNITS

```
 ınSt
 ConF
```
Press [ ] until you reach the `ınSt` list header.

↓ Press [ ]

```
 unıt
  °C
```
Temperature display units
Press [▲] or [▼] to select either:

- °C: Celsius
- °F: Fahrenheit

Press [ ] to return to the list header

TO CHANGE THE TYPE OF CONTROL

```
 ınSt
 ConF
```
Press [ ] until you reach the `ınSt` list header.

↓

Press [ ] until the `CtrL` parameter is displayed

↓

```
 CtrL
 Pıd
```
Type of control
Press [▲] or [▼] to select either:

- Pıd: PID control
- On.OF: On/Off control

Press [ ] to return to the list header

TO CHANGE THE INPUT SENSOR TYPE

```
  ıP
 ConF
```
Press [ ] until you reach the `ıP` list header.

↓ Press [ ]

```
 ınPt
 Jtc
```
Input type
Press [▲] or [▼] to select either:

- Jtc: J type thermocouple input
- ktc: K type thermocouple input
- Ltc: L type thermocouple input
- ntc: N type thermocouple input
- ttc: T type thermocouple input
- rtd: 100Ω platinum resistance thermometer

Press [ ] to return to the list header

Selecting a new sensor type changes the setpoint limits.
Therefore, after changing the sensor type, reset the setpoint limits as described earlier in these instructions.

TO CHANGE OUTPUTS 1 & 2 TO HEATING OR COOLING

The controller is supplied with output 1 configured as a heating output, and output 2 configured as a cooling output. It is possible to re-configure either output for heating or cooling.

It is also possible to configure both outputs for heating (or cooling) The advantage of this is that one output can be fitted with a relay and the other with a logic, which gives the user the choice of using either a logic output or a relay output for the same function.

Proceed as follows:

Press 📄 until you reach the *1A* list header.
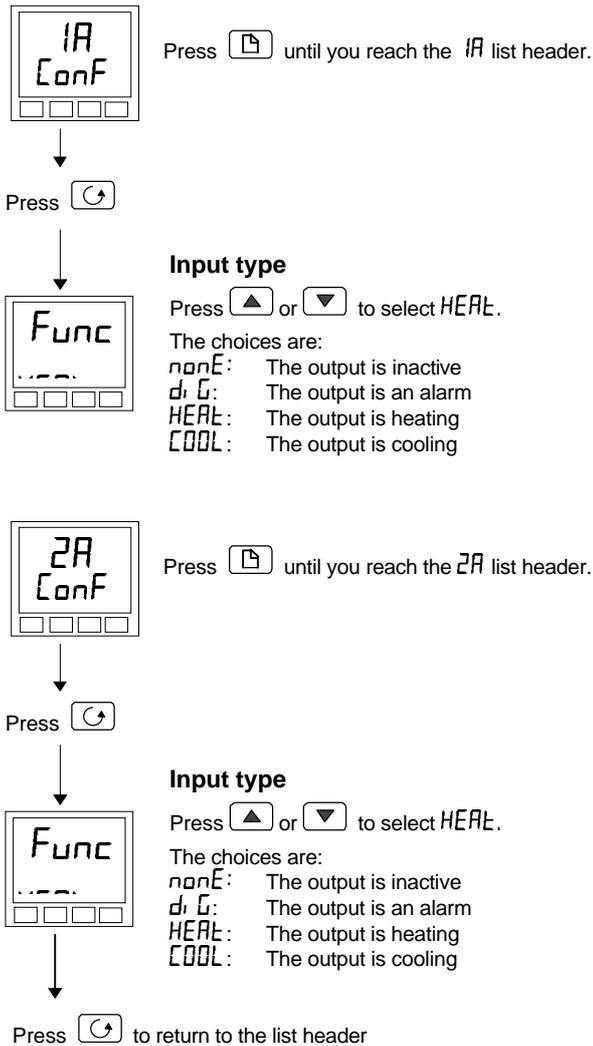
Press ↻

Input type
Press ▲ or ▼ to select *HEAt*.

The choices are:
nonE: The output is inactive
di G: The output is an alarm
HEAt: The output is heating
COOL: The output is cooling

Press 📄 until you reach the *2A* list header.

Press ↻

Input type
Press ▲ or ▼ to select *HEAt*.

The choices are:
nonE: The output is inactive
di G: The output is an alarm
HEAt: The output is heating
COOL: The output is cooling
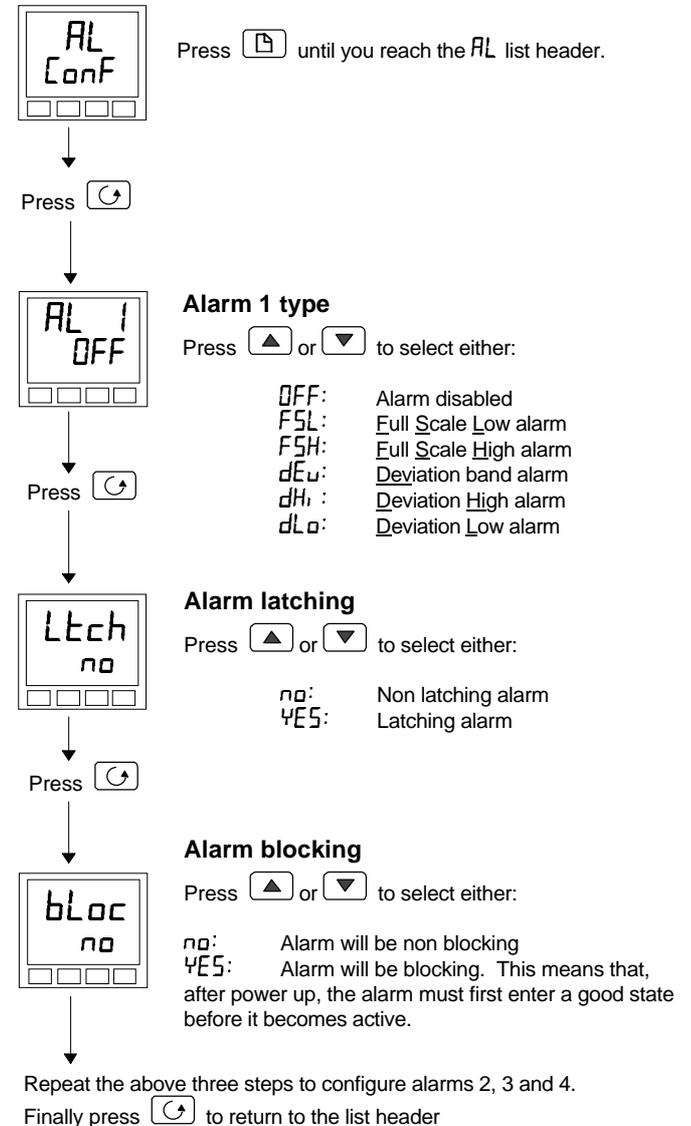
Press ↻ to return to the list header

TO RECONFIGURE THE ALARM OUTPUT

The alarm output is operated by up to four internal 'soft' alarms i.e. indication only. These alarms can be individually configured in the *AL ConF* list.

Note: If an alarm is disabled it will not appear in the alarm list in Operator level.

To re-configure the alarm output proceed as follows:

Press 📄 until you reach the *AL* list header.

Press ↻

Alarm 1 type
Press ▲ or ▼ to select either:

OFF: Alarm disabled
FSL: Full Scale Low alarm
FSH: Full Scale High alarm
dEu: Deviation band alarm
dHi: Deviation High alarm
dLo: Deviation Low alarm

Press ↻

Alarm latching
Press ▲ or ▼ to select either:

no: Non latching alarm
YES: Latching alarm

Press ↻

Alarm blocking
Press ▲ or ▼ to select either:

no: Alarm will be non blocking
YES: Alarm will be blocking. This means that, after power up, the alarm must first enter a good state before it becomes active.

Repeat the above three steps to configure alarms 2, 3 and 4.
Finally press ↻ to return to the list header

TO RETURN TO OPERATOR LEVEL

Press 📄 until you reach the *Exit* list header.

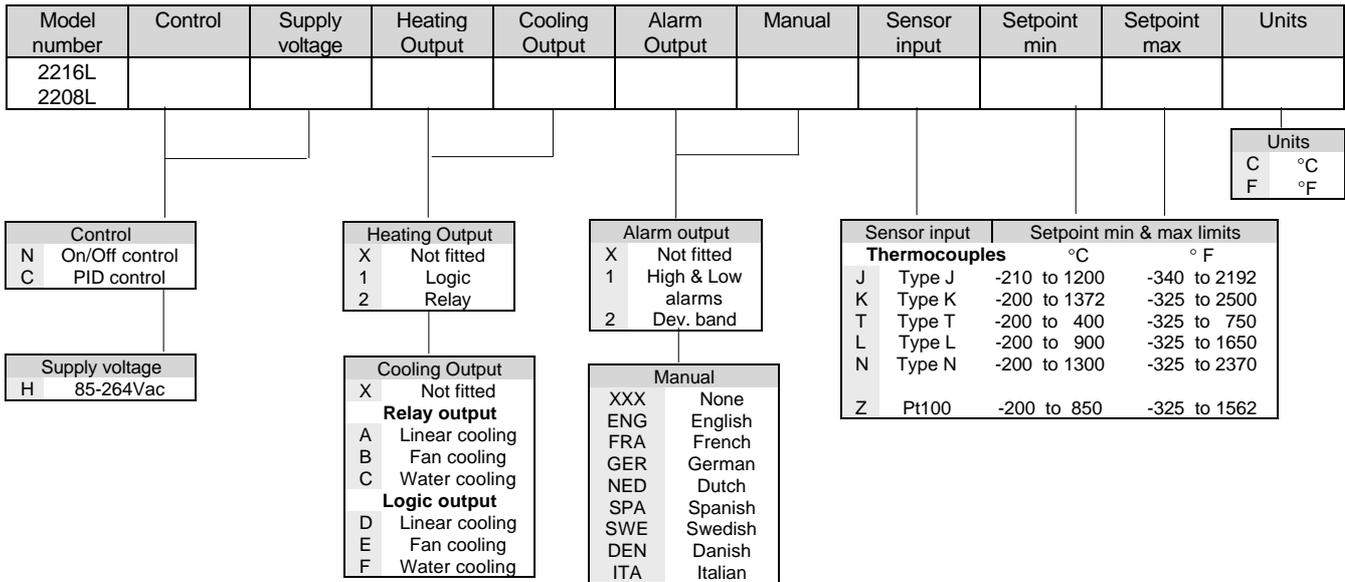Press ▲ or ▼ to select *YES*:

After a two second delay the controller will return to operator level and normal operation can be resumed.

ORDERING CODE

The controller is built and configured according to the ordering code shown below.

Model number	Control	Supply voltage	Heating Output	Cooling Output	Alarm Output	Manual	Sensor input	Setpoint min	Setpoint max	Units
2216L 2208L										

Units

C	°C
F	°F

Control

N	On/Off control
C	PID control

Supply voltage

H	85-264Vac

Heating Output

X	Not fitted
1	Logic
2	Relay

Cooling Output

X	Not fitted
Relay output	
A	Linear cooling
B	Fan cooling
C	Water cooling
Logic output	
D	Linear cooling
E	Fan cooling
F	Water cooling

Alarm output

X	Not fitted
1	High & Low alarms
2	Dev. band

Manual

XXX	None
ENG	English
FRA	French
GER	German
NED	Dutch
SPA	Spanish
SWE	Swedish
DEN	Danish
ITA	Italian

Sensor input   Setpoint min & max limits

		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		-200 to 1300	-325 to 2370
Z	Pt100		-200 to 850	-325 to 1562

TECHNICAL SPECIFICATION

Environmental ratings-

Panel sealing:	IP65, (EN 60529), or 4X, (NEMA 250).
Operating ambients:	0 to 55°C. Ensure that the enclosure is adequately ventilated. 5 to 95%RH, non condensing
Atmosphere:	Not suitable for use above 2000m or in explosive or corrosive atmospheres.

Equipment ratings

Power supply	100 to 240Vac -15%, +10% / 48 to 62Hz, 10Watts maximum consumption
Relay (isolated)	Maximum: 264Vac, 2A resistive. Minimum: 12Vdc, 100mA.
Over current protection:	Use a minimum of $0.5mm^2$ or 16awg wire for plant connections. External over current protection is required. Use independent fuses for the controller supply and each relay output. Suitable fuses are EN60127 (type T) rated at 2A
Logic outputs and inputs	Logic outputs: 18V at 20mA, non-isolated. Logic contact closure inputs: Non-isolated from the sensor input.

Electrical safety

Meets EN 61010, Installation category II, pollution degree 2.

Voltage transients on any mains power connected to the controller must not exceed 2.5kV.

Isolation:	All isolated inputs and outputs have reinforced insulation to protect against electric shock. (See live sensor note)

SAFETY AND EMC INFORMATION

Safety

This controller complies with the European Low Voltage Directive 73/23/EEC, amended by 93/68/EEC, by the application of the safety standard EN 61010.

Electromagnetic compatibility

This controller conforms with the essential protection requirements of the EMC Directive 89/336/EEC, amended by 93/68/EEC, by the application of a Technical Construction File. This controller satisfies the general requirements of the industrial environment defined in EN 50081-2 and EN 50082-2.

GENERAL

The information contained in these instructions is subject to change without notice. While every effort has been made to ensure the accuracy of the information, Eurotherm Controls shall not be held liable for errors contained herein.

Unpacking and storage

The packaging should contain the controller with two panel retaining clips and this instruction leaflet.

If on receipt, the packaging or the controller are damaged, do not install it but contact your nearest Eurotherm Controls agent.

If the controller is to be stored before use, protect from humidity and dust in an ambient temperature range of -30°C to +75°C.

SERVICE AND REPAIR

This controller has no user serviceable parts. Contact your nearest Eurotherm Controls agent for repair.

Caution: Charged capacitors

Before removing a controller from its sleeve, switch off the supply and wait two minutes to allow capacitors to discharge. Failure to observe this precaution may damage the controller or cause some discomfort to the user.

Electrostatic discharge precautions

When the controller is removed from its sleeve, it is vulnerable to damage by electrostatic discharge from someone handling the controller. To avoid this, before handling the unplugged controller discharge yourself to ground.

Cleaning

Do not use water or water based products to clean labels or they will become illegible. Isopropyl alcohol may be used to clean labels. A mild soap solution may be used to clean other exterior surfaces of the product.

Safety Symbols

The following safety symbols are used on the controller:

⚠ Caution, (refer to the accompanying documents) ⏚ Functional earth (ground) terminal

Personnel

Installation must only be carried out by qualified personnel

Enclosure of live parts

To prevent hands or metal tools touching parts that may be electrically live, the controller must be installed in an enclosure.

Caution: Live sensors

The logic outputs and the two contact closure inputs are electrically connected to the sensor input (e.g. thermocouple). In some installations the temperature sensor may become live. The controller is designed to operate under these conditions, but you must ensure that this will not damage other equipment connected to these inputs and outputs, and that service personnel do not touch these connections while they are live. With a live sensor, all cables, connectors and switches for connecting the sensor and non-isolated inputs and outputs must be mains rated.

Wiring

Wire the controller in accordance with the wiring data given in these instructions. Take particular care not to connect AC supplies to the low voltage sensor input or logic outputs. Only use copper conductors for connections, (except thermocouple). Ensure that the installation complies with local wiring regulations.

Power Isolation

The installation must include a power isolating switch or circuit breaker that disconnects all current carrying conductors. The device should be mounted in close proximity to the controller, within easy reach of the operator and marked as the disconnecting device for the controller.

Earth leakage current

Due to RFI Filtering, there is an earth leakage current of less than 0.5mA. This may affect the design of an installation of multiple controllers protected by Residual Current Device (RCD), or Ground Fault Detector (GFD), type circuit breakers.

Voltage rating

The maximum continuous voltage applied between any connection and ground must not exceed 264Vac.

For the above reason the controller should not be wired to a three phase supply with an unearthed star connection. Under fault conditions such a supply could rise above 264Vac with respect to ground and the product would not be safe.

Conductive pollution

Electrically conductive pollution must be excluded from the cabinet in which the controller is mounted. For example, carbon dust is a form of electrically conductive pollution. Where condensation is likely, for example at low temperatures, include a thermostatically controlled heater in the cabinet.

Grounding of the temperature sensor shield

In some installations it is common practice to replace the temperature sensor while the controller is still powered up. Under these conditions, as additional protection against electric shock, we recommend that the shield of the temperature sensor is grounded. Do not rely on grounding through the framework of the machine.

Over-temperature protection

When designing any control system it is essential to consider what will happen if any part of the system should fail. In temperature control applications the primary danger is that the heating will remain constantly on. This could damage the product, the machinery being controlled, or even cause a fire.

Reasons why the heating might remain constantly on include:
- the temperature sensor becoming detached from the process
- thermocouple wiring becoming short circuit;
- the controller failing with its heating output constantly on
- an external valve or contactor sticking in the heating state

Where damage or injury is possible, we recommend fitting a separate over-temperature protection unit, with an independent temperature sensor, which will isolate the heating circuit.

Please note that the alarm relays within the controller will not give protection under all failure conditions.

Installation Requirements for EMC

- For general guidance refer to Eurotherm Controls EMC Installation Guide, HA025464.
- When using relay outputs it may be necessary to fit a filter suitable for suppressing the conducted emissions. The filter requirements will depend on the type of load. For typical applications we recommend Schaffner FN321 or FN612.

Routing of wires

To minimise the pick-up of electrical noise, the sensor input wiring should be routed away from high-current power cables. Where it is impractical to do this, use shielded cables with the shield grounded at both ends.

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