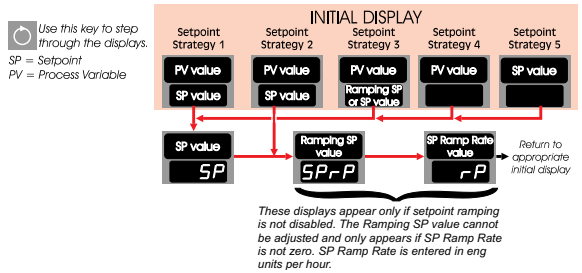
1/16-DIN PROCESS CONTROLLER CONCISE PRODUCT MANUAL (59222-3)

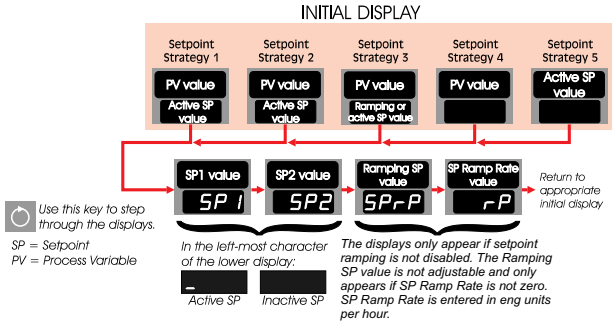
OPERATING MODE

NOTE: Set all Configuration Mode parameters and Set Up Mode parameters as desired before starting normal operations.

Single Setpoint Operation



Dual Setpoint Operation

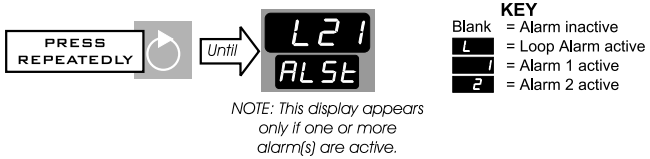


Adjusting Setpoint and Setpoint Ramp Rate

Select the display (see above) and then use the Raise and Lower keys to change the displayed value. **NOTE:** In Setpoint Strategy 2, the initial display allows setpoint adjustment.

Alarm Indication and Status Display

When any alarm is active, the **ALM** indicator will flash and the Alarm Status display may be accessed as follows:



Error/Fault Indications

Input Over-range — cHHɔ

Input Under-Range — cLLɔ

Sensor Break — OPEN

Manual Control (PoEn = 1 - See SET UP MODE)

To select/de-select manual control, press the Auto/Manual key (see right). The **SET** indicator will flash continuously in Manual Control mode. The Raise/Lower keys may then be used to adjust the output power.

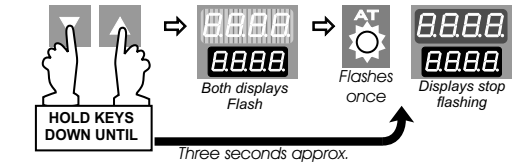
AUTO MAN

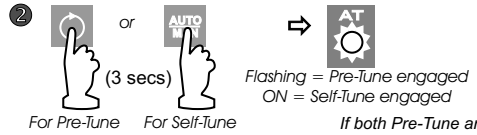
Pre-Tune and Self-Tune

Pre-Tune sets the Controllers PID parameters approximately; Self-Tune may then be used to optimise the tuning.

To engage:

1. With Controller showing a normal Operator Mode display:



2. 

If both Pre-Tune and Self-Tune are engaged, AT will flash until Pre-Tune is finished, then turn fully on.

To dis-engage:

Use same key sequence: ⇨ AT

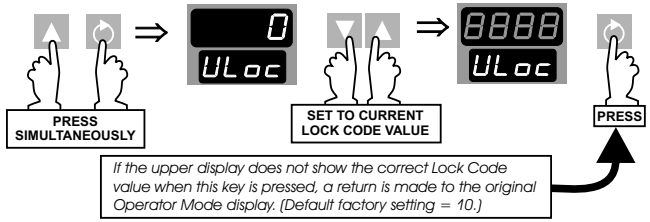
Goes OFF

NOTE: Pre-Tune will not engage (a) if the setpoint is ramping, (b) if the process variable is within 5% of input span of the setpoint or (c) if the proportional band = 0. It is a single-shot routine and is thus self-disengaging. If APt = 1 (Auto Pre-Tune enabled - see SET UP MODE), Pre-Tune will run for every power-up.

SET UP MODE (SET Indicator ON)

NOTE: Set all Configuration Mode parameters as desired before adjusting Set Up Mode parameters.

Entry/Exit



To enter set Up Mode, put the Controller into Operator Mode with normal display, then:

To exit Set Up Mode, select the process variable display, then press the ▲ ◯ keys simultaneously.

NOTE: A return is made to Operator Mode if there is no key activity for two minutes.

Set Up Mode Parameter Sequence

Parameter	Legend	Adjustment Range	Default
Digital Filter Time Constant	FiLt	OFF, 0.5 to 100.0 secs. in 0.5 sec. increments	2.0 secs.
Process Variable Offset	OFFS	±span of Controller	0
Output 1 Power	Out1	Read only	N/A
Output 2 Power [5]	Out2	Read only	N/A
Proportional Band 1 (PB1)	Pb1	0.0% (ON/OFF Control) to 999.9% of input span	10.0%
Proportional Band 2 (PB2) [1,5]	Pb2	0.0% (ON/OFF Control) to 999.9% of input span	10.0%
Reset (Integral Time Constant) [1]	rSEt	1sec. to 99mins. 59secs. and OFF	5m 00s
Rate (Derivative Time Constant) [1]	rAtE	00secs. to 99mins. 59secs.	1m 15s
Overlap/Deadband [1,5]	OL	–20% to + 20% (of PB1 + PB2)	0%
Manual Reset (Bias) [1]	bi AS	0% to 100% (Output 1 only); -100% to +100% (Outputs 1 & 2)	25%
ON/OFF Differential (Output 1 only) [2]	di F1	0.1% to 10.0% of input span	0.5%
ON/OFF Differential (Output 2 only) [2,5]	di F2		
ON/OFF Differential (Outputs 1 & 2) [2,5]	di FF		
Setpoint High Limit	SPHi	Setpoint to Range Maximum	Range Max
Setpoint Low Limit	SPLo	Range Minimum to Setpoint	Range Min
Recorder Output Scale Maximum	roPH	–1999 to 9999	Range Max
Recorder Output Scale Minimum	roPL	-1999 to 9999	Range Min
Output 1 Power Limit [1]	OPHi	0% to 100% of full power	100%
Output 1 Cycle Time (Not with Linear Output)	Ct1	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512 secs.	32 secs
Output 2 Cycle Time (Not with linear Output)	Ct2	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512 secs.	32 secs
Process High Alarm 1 value [3]	h_A1	Range Min. to Range Max.	Range Max
Process Low Alarm 1 value [3]	b_A1	Range Min. to Range Max.	Range Min
Band Alarm 1 value [3]	L_A1	0 to span from setpoint	5 units
Deviation Alarm 1 value [3]	d_A1	±span from setpoint	5 units
Process High Alarm 2 value [3]	h_A2	Range Min. to Range Max.	Range Max
Process Low Alarm 2 value [3]	L_A2	Range Min. to Range Max.	Range Min
Band Alarm 2 value [3]	d_A2	0 to span from setpoint	5 units
Deviation Alarm 2 value [3]	b_A2	±span from setpoint	5 units
Loop Alarm Enable	LAEn	0 (disabled) or 1 (enabled)	0
Loop Alarm Time [6]	LAti	1sec. to 99mins. 59secs.	99m 59s
Scale Range Decimal Point [4]	rPnt	0, 1, 2 or 3	1
Scale Range Maximum [4]	rhi	–1999 to 9999	1000
Scale Range Minimum [4]	rLo	-1999 to 9999	0000
Auto Pre-Tune Enable/Disable	APt	0 (disabled) or 1 (enabled)	0
Manual Control Select Enable/Disable	PoEn	0 (disabled) or 1 (enabled)	0
Setpoint Ramping Enable/Disable	rPEn	0 (disabled) or 1 (enabled)	0
Setpoint Strategy	SPSt	1, 2, 3, 4 or 5	1
Communications Enable [7]	CoEn	0 (Read Only) or 1 (Read/Write)	1
Lock Code	Loc	0 to 9999	10

The normal Operator Mode Displays (setpoint, process variable, ramping setpoint, setpoint ramp rate) are also available in Set Up Mode. Once the Operator Mode displays have been viewed, the sequence restarts with the first Set Up Mode parameter (Digital Filter Time Constant).

NOTES

1. These parameters are not operative if the Proportional Band = 0.
2. Switching differential with ON/OFF control output (centred about setpoint).
3. Parameters are optional; only one legend will appear with each alarm.
4. Only applicable if a DC Linear input is fitted.
5. Only applicable if Output 2 is fitted and configured as COOL output.
6. Only applicable if Proportional Band = 0.
7. Applicable only if the Communications Option PCB is fitted and configured (see CONFIGURATION MODE - Option Selection).

Default Indication

This display (all decimal points ON) indicates that all Set Up parameters have been set to their default values (caused by a change to one or more of the critical Configuration Mode parameters). To clear this display, alter one of the Set Up Mode parameters.

SERIAL COMMUNICATIONS

Refer to the full manual for details of this option, available from your supplier.

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CAUTION: Installation and configuration should be performed only by personnel who are technically-competent and authorised to do so. Local Regulations regarding electrical installation & safety must be observed.

INSTALLATION

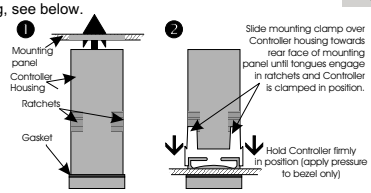
Panel-Mounting

The mounting panel must be rigid and may be up to 6.0mm (0.25 inches) thick. The cut-outs required for the Controllers are shown on the right. Controllers may be mounted side-by-side in a multiple installation for which the cut-out width (for n Controllers) is (48n-4)mm or (1.89n - 0.16) inches

45mm +0.5 -0.0

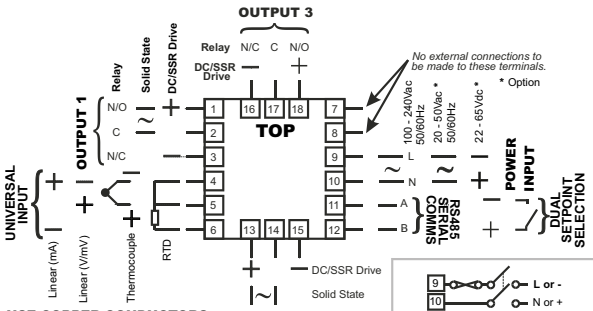
45mm +0.5 -0.0

For panel-mounting, see below.



CAUTION: Do not remove the panel gasket; it is a seal against dust and moisture.

Rear Terminals



USE COPPER CONDUCTORS (EXCEPT FOR T/C INPUT)
Single strand wire gauge:
Max. 1.2mm (18SWG)

RECOMMENDED MODE OF POWER CONNECTION

Fuse: 100 - 240V ac - 315mA antisurge
24V ac/dc - 315mA antisurge

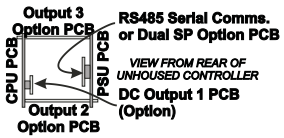
OUTPUT 1: Always primary control (HEAT) output - Relay, SSR Drive, Solid State or DC.

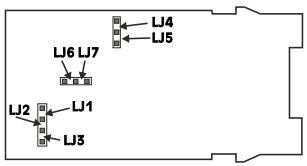
OUTPUT 2: Secondary control (COOL) output - Relay, SSR Drive, Solid State or DC.
Alarm Output - Relay, SSR Drive or Solid State.

OUTPUT 3: Alarm Output - Relay or SSR Drive.
Recorder Output - DC only for setpoint or process variable.

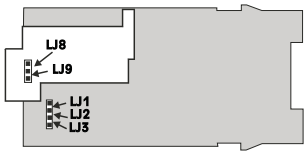
Input/Output Type Selection

To access the link jumpers, REMOVE ALL POWER, grip the side edges of the front panel and pull the Controller out of the housing, *noting its orientation*. To replace, align the CPU PCB and PSU PCB (see right) with their guides in the housing, then slowly push the Controller into position.



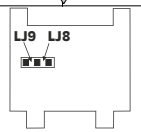


CPU PCB (Relay/SSR/Solid State Output 1)



CPU PCB (DC Output 1)

Input Type and Output 1 Type		Output 2 / Output 3 Type	
	Link Jumpers on CPU PCB	Output Type	Link Jumper Fitted On DC Output Board
Input Type:		DC (0 - 10V)	LJ8
RTD	None (parked)	DC (0 - 20mA)	LJ9
DC (mV)	None (parked)	DC (0 - 5V)	LJ8
Thermocouple	LJ3	DC (4 - 20mA)	LJ9
DC (mA)	LJ2		
DC (V)	LJ1		
Output 1 Type:			
Relay	LJ5 & LJ6		
Solid State	LJ5 & LJ6		
SSR Drive	LJ4 & LJ7		
DC (0 - 10V)	LJ8		
DC (0 - 20mA)	LJ9		
DC (0 - 5V)	LJ8		
DC (4 - 20mA)	LJ9		



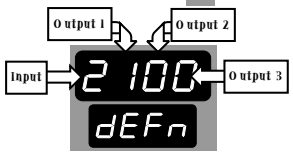
DC Output 2/3 Option PCB

CONFIGURATION MODE

To enter Configuration Mode, from power-up, hold down the ▲ ↺ keys until the first parameter (inPt) is displayed. Use the same keys to return to Operator Mode. Use the ↺ key to select the parameter, use the ▲ ▼ keys to change the value and use the AUTO MAN key to confirm a new value.

Hardware Definition Code

To display this Code (see right and following table), from Configuration Mode, press the ▼ ↺ keys. Use the same keys to return to normal Configuration Mode. Adjust and confirm new values as previously described.



Value	0	1	2	3	4	5	7
Input		RTD/ Linear DC (mV)	TC	Linear DC (mA)	Linear DC (V)		
Output 1		Relay or Solid State	SSR	DC (0 - 10V)	DC (0 - 20mA)	DC (0 - 5V)	DC (4 - 20mA)
Output 2 or 3	Not fitted	Relay or ***Solid State - OP2 Only***	SSR	DC (0 - 10V)	DC (0 - 20mA)	DC (0 - 5V)	DC (4 - 20mA)

Option Selection

With the Hardware Definition Code displayed, press the ↺ key to display the Option Selection (see right) Use the same key to return to the Hardware Definition Code display. Adjust and confirm new settings as previously described.

Configuration Mode Parameter Sequence

Parameter	Legend	Description	Default
Input Range	inPt	Four-digit code (see below this Table)	See below
Output 1 Action	ctrL	rEu Reverse-acting	rEu
		dir Direct-acting	
Alarm 1 Type	ALA1	P_hi Process High Alarm	P_hi
		P_Lo Process Low Alarm	
		dE Deviation Alarm	
		bAnd Band Alarm	
		nonE No alarm	
Alarm 2 Type	ALA2	As for Alarm 1 Type	P_Lo
Alarm Inhibit	Inhi	nonE No alarms inhibited	nonE
		ALA1 Alarm 1 inhibited	
		ALA2 Alarm 2 inhibited	
		both Alarm 1 & Alarm 2 inhibited	
Output 2 Usage	USE2	Out2 Secondary control (COOL) output	Out2
		A2_d Alarm 2 output, direct-acting	
		A2_r Alarm 2 output, reverse-acting	
		Or_d OR of Alarm 1 and Alarm 2, direct-acting	
		Or_r OR of Alarm 1 and Alarm 2, reverse-acting	
		Ad_d AND of Alarm 1 and Alarm 2, direct-acting	
		Ad_r AND of Alarm 1 and Alarm 2, reverse-acting	
		LP_d Loop Alarm Output, direct-acting	
		LP_r Loop Alarm Output, reverse-acting	
		HY_d Alarm Hysteresis Output, direct-acting	
		HY_r Alarm Hysteresis Output, reverse-acting	
Output 3 Usage	USE3	AI_d Alarm 1 output, direct-acting	AI_d
		AI_r Alarm 1 output, reverse-acting	
		OR, AND, Loop Alarm Output and Hysteresis Output options as for Output 2 Usage	
		rEc5 Recorder Output - Setpoint	
		rEcP Recorder Output - Process Variable	
Comms. Baud Rate	bAud	Selectable: 1200, 2400, 4800 or 9600 Baud	4800
Comms. Address	Addr	Unique address for Controller; in the range 1 - 32.	1
CJC Enable/Disable	CJC	EnAb Enabled	EnAb
		diSA Disabled	
Lock Code	Loc	Set Up Mode Lock Code - Read Only	N/A

The input ranges available, their codes and default settings are as follows:

Type	Range	Code	Type	Range	Code	Type	Range	Code
TC (R)	0 - 1650°C	1127	TC (K)	–200 - 1373°C	6709	RTD	–149.7 - 211.9°F	2231
TC (R)	32 - 3002°F	1128	TC (K)	–328 - 2503°F	6710	RTD	0 - 300°C	2251
TC (S)	0 - 1649°C	1227	TC (L)	0.0 - 205.7°C	1815	RTD	0.0 - 100.9°C	2295
TC (S)	32 - 3000°F	1228	TC (L)	32.0 - 402.2°F	1816	RTD	32.0 - 213.6°F	2296
TC (J)	0.0 - 205.4°C	1415	TC (L)	0 - 450°C	1817	RTD	–200 - 206°C	2297
TC (J)	32.0 - 401.7°F	1416	TC (L)	32 - 841°F	1818	RTD	–328 - 402°F	2298
TC (J)	0 - 450°C	1417	TC (L)	0 - 762°C	1819	RTD	–100.9 - 537.3°C	7222
TC (J)	32 - 842°F	1418	TC (L)	32 - 1403°F	1820	RTD	–149.7 - 999.1°F	7223
TC (J)	**0 - 761°C**	**1419**	TC (B)	211 - 3315°F	1934	DC Lin	0 - 20mA	3413
TC (J)	32 - 1401°F	1420	TC (B)	100 - 1824°C	1938	**DC Lin**	**4 - 20mA**	**3414**
TC (T)	–200 - 262°C	1525	TC (N)	0 - 1399°C	5371	DC Lin	0 - 50mV	4443
TC (T)	–328 - 503°F	1526	TC (N)	32 - 2550°F	5324	DC Lin	10 - 50mV	4499
TC (T)	0.0 - 260.6°C	1541	**RTD**	**0 - 800°C**	**7220**	DC Lin	0 - 5V	4445
TC (T)	32.0 - 501.0°F	1542	RTD	32 - 1471°F	7221	DC Lin	1 - 5V	4434
TC (K)	–200 - 760°C	6726	RTD	32 - 571°F	2229	**DC Lin**	**0 - 10V**	**4446**
TC (K)	–328 - 1399°F	6727	RTD	–100.9 - 100.0°C	2230	DC Lin	2 - 10V	4450

Default - each input type (thermocouple, RTD, DC Linear) has its own default range(s) **(bold type)**.

NOTE: Changes between input ranges may also require link jumper changes (see previously).

SPECIFICATION

UNIVERSAL INPUT

Input Impedance: Greater than 100MΩ resistive, except for DC mA (4.7Ω) and V (47kΩ) inputs).
Isolation: Isolated from all outputs (except SSR) at 240V AC.

OUTPUTS

Relay
Contact Type/Rating: Single pole double throw (SPDT); 2A resistive at 120/240V AC.
Lifetime: >500,000 operations at rated voltage/current. Isolated from all other inputs/outputs.

SSR Drive/TTL
Drive Capability: SSR > 4.2V into 1kΩ min.
Isolation: Not isolated from input or other SSR drive outputs.

Solid State
Operating Voltage Range: 20 - 280Vrms (47 - 63Hz)
Current Rating: 0.01 - 1A (full cycle rms on-state @ 25°C); derates linearly above 40°C to 0.5A @ 80°C. Isolated from all other inputs/outputs

DC
Resolution: 8 bits in 250mS (10 bits in 1s typical, >10 bits in >1s typical).
Isolation: Isolated from all other inputs and outputs.

OPERATING CONDITIONS FOR INDOOR USE

Ambient Temperature (Operating): 0°C to 55°C
Ambient Temperature (Storage): –20°C to 80°C
Relative Humidity: 20% - 95% non-condensing
Supply Voltage: 100 - 240V ac 50/60Hz (standard) 7.5VA
20 - 50V ac 50/60Hz (option) 7.5VA or
22 - 65V dc (option) 5W maximum.

ENVIRONMENTAL.

Approvals: CE, UL, ULC
EMI Susceptibility: Complies with EN61326
EMI Emissions: Complies with EN61326
Safety Considerations: Complies with EN61010-1
Front Panel Sealing: To IP66

PHYSICAL

Dimensions
Depth: 110mm (behind panel)
Front panel height: 48mm
Front panel width: 48mm

Weight: 0.21kg maximum