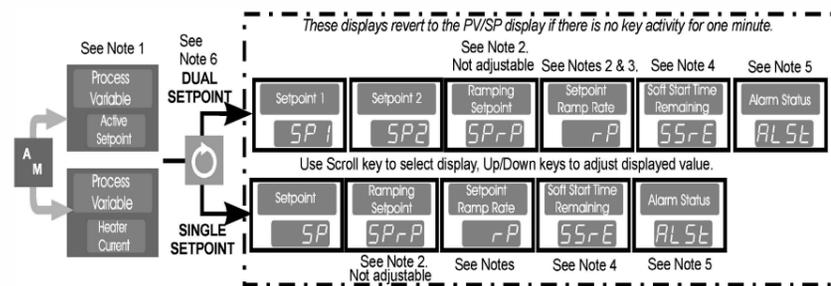


16-DIN PLASTICS CONTROLLER CONCISE PRODUCT MANUAL (59225-3)

OPERATING MODE

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



Display Sequence

NOTES

- Setpoint is not adjustable if Setpoint Strategy = 1 (see **SET UP MODE**), or if Soft Start is in progress. "Active Setpoint" is one of (a) Setpoint, (b) Setpoint 1, (c) Setpoint 2 or (d) Soft Start Setpoint.
- Appears only if setpoint ramping is enabled and ramp rate is in the range 1 - 9999 (see note 3).
- Ramp rate is adjustable in the range; blank (Off) or 1 - 9999 (On) and is in Eng units per hour. Only appears if setpoint ramping is enabled.
- Only appears if Soft Start is in progress.
- Appears only if an alarm is active.
- In dual setpoint operation, the lower display distinguishes between the active and inactive setpoint as shown on the right:



Soft Start

Used when a "gentle" start-up is required before going to full working temperature. Soft Start Setpoint and Soft Start Time (duration) are user-defined (see **SET UP MODE**). During a soft start, the lower display will be as shown on the right, when Heater Current display is selected.



Output Turn-Off and Manual Control Mode

According to **AM Key Usage** (see **SET UP MODE**), this key serves one of three functions:

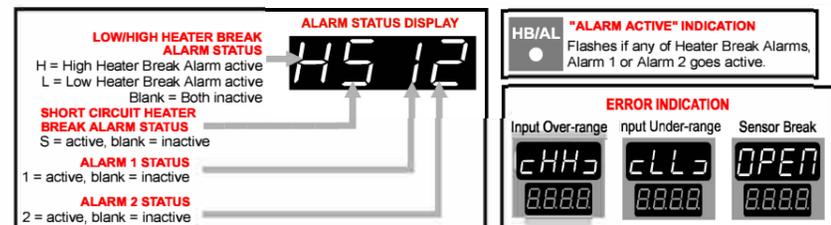
- Toggles between automatic control and control output(s) permanently off.
- Toggles between automatic control and manual control.
- Selects/de-selects heater current display (see below).

Heater Current Display



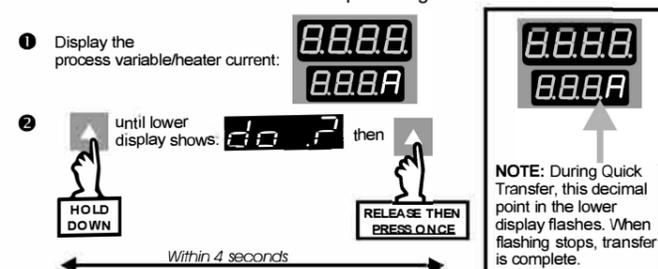
Flashes when heater current is over-range

Alarms and Error Displays



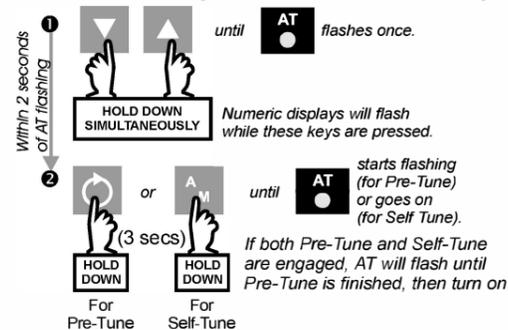
Quick Transfer of Heater Current to Nominal Value

To set the nominal value of heater current to the prevailing heater current value:



Pre-Tune & Self Tune

Pre-Tune: Tunes the Controller approximately in preparation for controlling the process (single-shot). **Self Tune:** Optimises tuning whilst the Controller is operating. To activate:



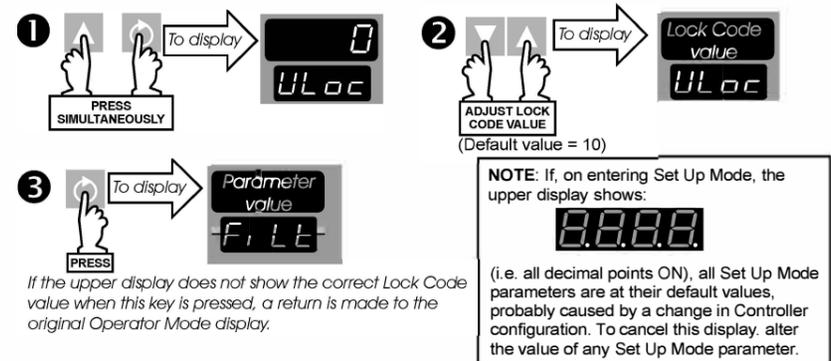
NOTE: Pre-Tune will not engage (a) if the setpoint is ramping, (b) if the process variable is within 5% of input span of the setpoint, (c) if the proportional band = 0 or (d) if Soft Start is operating. It is a single-shot routine and is thus self-disengaging. If **APLE** = 1 (Auto Pre-Tune enabled - 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 required before adjusting Set Up Mode parameters.

Entry/Exit

With Controller in Operator Mode with normal display, to enter Set Up Mode:



Use the same key sequence to exit Set Up Mode.

Set Up Mode Parameter Sequence

Use the Scroll key to step through the parameter displays and the Up/Down keys to change the value of the displayed parameter. The parameter sequence is:

Parameter	Legend	Adjustment Range	Default
Input Filter Time Constant	FILT	OFF, 0.5s to 100.0s in 0.5s increments	2.0s
Process Variable Offset	OFFS	±input span of Controller	0
Output Power	OUT1	0 to 100%	Read Only
Output Power 2	OUT2	0 to 100%	Read Only
Proportional Band 1 (PB1)	PB1	0.0% to 999.9% of input span	10.0%
Proportional Band 2 (PB2)	PB2	0.0% to 999.9% of input span	10.0%
Reset (Integral Time Constant)	RES	1s to 99m 59s and OFF	5m 00s
Rate (Derivative Time Constant)	RATE	00s to 99m 59s	1m 15s
Overlap/Deadband	DL	-20% to +20% of PB1 + PB2	0%
Manual Reset (Bias)	BRAS	0% to 100% (single output) -100% to +100% (dual output)	25%
ON/OFF Differential	d.F.1 d.F.2 d.F.F	0.1% to 10% of input span	0.5%
Setpoint High Limit	SPH	Setpoint to Range Maximum	Range Max.
Setpoint Low Limit	SPL	Range Minimum to Setpoint	Range Min.
Recorder Output Scale Max	ROPH	-1999 to 9999	Range Max.
Recorder Output Scale Min	ROPL	-1999 to 9999	Range Min.
Output 1 Power Limit	OPH1	0% to 100% of full power	100%
Output 1 Cycle Time	CT1	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512s	32s
Output 2 Cycle Time	CT2	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512s	32s
Process High Alarm 1 value	H-A1	Range Min. to Range Max.	Range Max.
Process Low Alarm 1 value	L-A1	Range Min. to Range Max.	Range Min.
Band Alarm 1 value	B-A1	0 to span from Setpoint	5 units
Deviation Alarm 1 value	D-A1	±span from Setpoint	5 units
Alarm 1 Hysteresis	AH1	1 - 250 units on safe side of alarm	1 unit
Process High Alarm 2 value	H-A2	Range Min. to Range Max.	Range Max.
Process Low Alarm 2 value	L-A2	Range Min. to Range Max.	Range Min.
Band Alarm 2 value	B-A2	0 to span from Setpoint	5 units
Deviation Alarm 2 value	D-A2	±span from Setpoint	5 units

Parameter	Legend	Adjustment Range	Default
Alarm 2 Hysteresis	AH2	1 - 250 units on safe side of alarm	1 unit
Heater Current High Scale Limit	HCRH	10.0A to 20.0A in 0.1A increments 21A to 100A in 1A increments	50A
Heater Nominal Current	HCRN	0 to Heater Current High Scale Limit	High Scale Limit
Low Heater Break Alarm level (% or amount below nominal heater current)	L-HB	1% to 100% of nominal and 0 (OFF) or 0.1A/1A to Heater Current High Scale Limit.	20% or 0 (OFF)
High Heater Break Alarm level (% or amount above nominal heater current)	H-HB	1% to 100% of nominal and 0 (OFF) or 0.1A/1A to Heater Current High Scale Limit.	0 (OFF)
Short Circuit Heater Break Alarm	S-HB	0 (disabled) or 1 (enabled)	1 (enabled)
Soft Start Setpoint	SSSP	Range Min. to Range Max.	Range Min.
Soft Start Time	SSLT	15s to 59m 45s and 0 (OFF) in 15s increments	0 (OFF)
Auto Pre-Tune Enable/Disable	APLE	0 (disabled) or 1 (enabled)	0 (disabled)
AM Key Usage	butn	OFF Output Turn-off MAN Manual Control HCRH Heater Current display/Manual Control Disable	
Setpoint Ramping Enable/disable	rPEN	0 (disabled) or 1 (enabled)	0 (disabled)
Comms Write Enable/Disable	LoEn	0 (disabled) or 1 (enabled)	1 (enabled)
Setpoint Strategy	SPST	1 or 2 (see OPERATOR MODE - Display Sequence)	1
Lock Value	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 first Set Up Mode parameter (Input Filter Time Constant)

- NOTES:**
- These parameters are not operative if the Proportional Band = 0.
 - Switching differential with ON/OFF Control Output (centred about setpoint).
 - These parameters are optional; only one legend will appear for each alarm.
 - Only applicable if Output 2 is fitted.
 - Applicable only if the Communications Option PCB is fitted.
 - Applicable only when Heater Break Alarm is configured to Percentage Mode.
 - Does not appear if Heater Break Input Type is configured to be **SCRI** (see **CONFIGURATION MODE**).

RS485 SERIAL COMMUNICATIONS & MODBUS COMMUNICATIONS

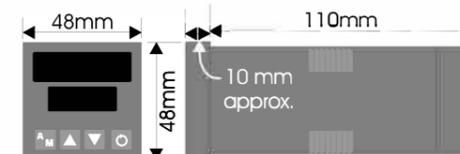
Refer to the full manual for details of this option, available from your supplier.

INSTALLATION

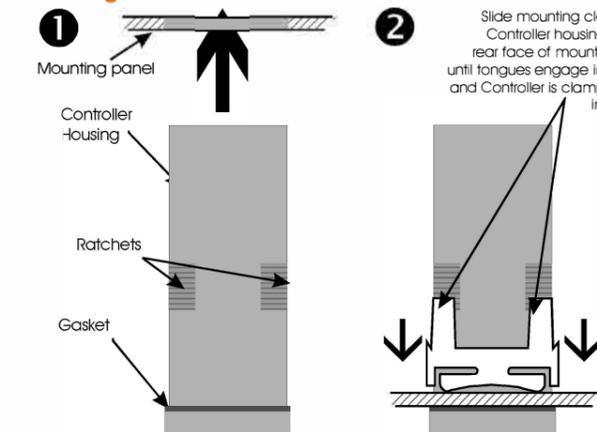
CAUTION: Installation should only be performed by personnel who are technically competent and authorised to do so. Local Regulations regarding electrical installation & safety must be observed.

Preparing the Mounting Panel

The mounting panel must be rigid and may be up to 6mm (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. The main dimensions of the controller are shown below:

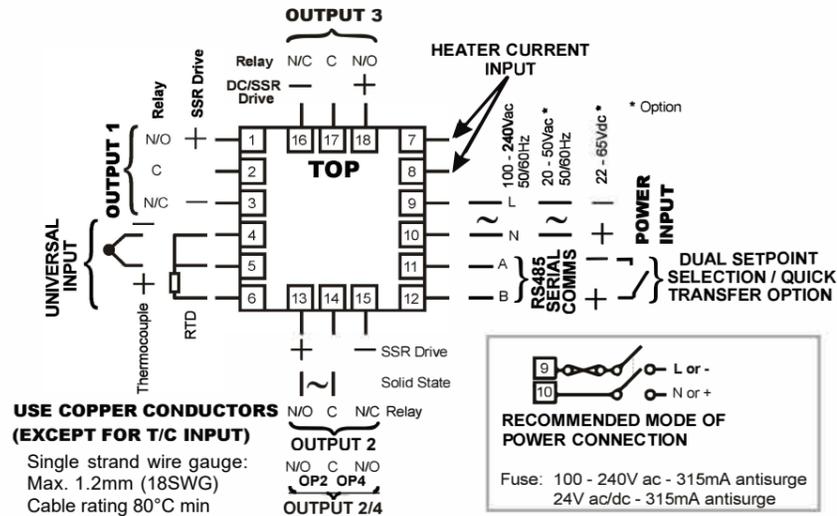


Panel-Mounting



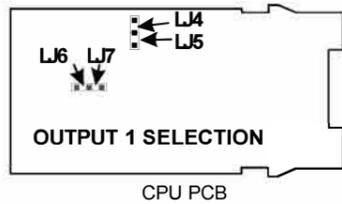
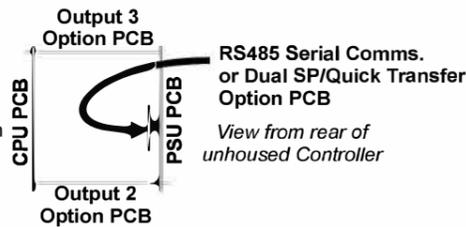
Hold Controller firmly in position (apply pressure to bezel only)

Rear Terminal Connections



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 its housing, noting its orientation. To replace the Controller in its housing, align the CPU PCB and PSU PCB (see right) with their guides in the housing, then slowly push the Controller into position.

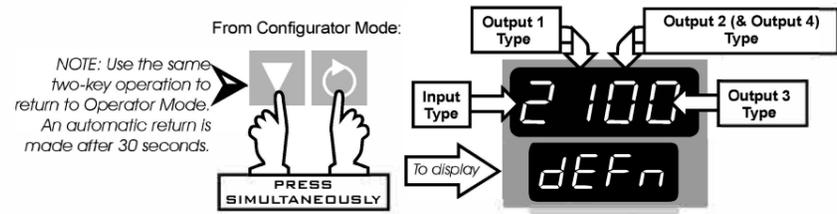


Output 1 Type	Output 3 Type
CPU PCB Link Jumpers	Output Type
	Link Jumpers (DC Output 3 Option PCB)
	DC (0 - 10V) LJ8
	DC (0 - 20mA) LJ9
	DC (0 - 5V) LJ8
	DC (4 - 20mA) LJ9
Output 1 Type:	
Relay	LJ5 & LJ6
SSR Drive	LJ4 & LJ7
	DC Output 3 Option PCB

CONFIGURATION MODE

To enter Configuration Mode, power-down and power-up, then hold down the \uparrow \circ keys until the first parameter (**inPE**) is displayed. Use the same two-key operation to return to Operator Mode. Use the \circ key to select the required parameter, use the \downarrow \uparrow keys to adjust that parameter value and use the \rightarrow key to confirm the new value.

Hardware Definition Code



Value	0	1	2	3	4	5	7	9
Input		RTD	Thermo-couple					
Output 1		Relay	SSR Drive					
Output 2	Not fitted	Relay or Solid State	SSR Drive					Relay Output 2 & 4*
Output 3	Not fitted	Relay		DC 0 - 10V	DC 0 - 20mA	DC 0 - 5V	DC 4 - 20mA	

* Dual Relay Option PCB must be fitted.

Option Selection

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



Heater Break Input Type

With the Option Selection displayed, use the \circ key to return to show the Heater Break Input Type display (see right). The Heater Break Alarms which can be used with each input type are as follows:

	Standard Input	SCRI Input
Low Heater Break Alarm	Yes	Yes
High Heater Break Alarm	Yes	Yes
Short Circuit Heater Break Alarm	Yes	No

Adjust and confirm new settings as previously described.

Configurator Mode Parameter Sequence

To edit parameters, use the keys shown on the right. Parameter sequence as follows:



Parameter	Legend	Adjustment Range	Default
Input Range	inPE	Four-digit code (see below this table)	See below
Output 1 Action	Act1	Reverse-acting Direct-acting	Reverse-acting
Alarm 1 Type	ALA1	Process High Alarm Process Low Alarm Deviation Alarm Band Alarm No alarm	Process High Alarm
Alarm 2 Type	ALA2	As for Alarm 1 Type	Process Low Alarm
Alarm Inhibit	inhi	No alarms inhibited Alarm 1 inhibited Alarm 2 inhibited Both alarms inhibited	none
Heater Break Alarm Strategy	hbSE	% of nominal current Absolute amps	Pctn
Output 2 Usage	USE2	Control (COOL) output Alarm 2, direct-acting Alarm 2, reverse-acting Heater Break Alarm, direct-acting Heater Break Alarm, reverse-acting OR of Alarm 1 and Alarm2, direct-acting OR of Alarm 1 and Alarm 2, reverse-acting AND of Alarm 1 and Alarm 2, direct-acting AND of Alarm 1 and Alarm 2, reverse-acting	Alarm 2, direct-acting

Parameter	Legend	Adjustment Range	Default
Output 3 Usage	USE3	Alarm 1, direct-acting Alarm 1, reverse-acting Heater Break Alarm, direct-acting Heater Break Alarm, reverse-acting OR of Alarm 1 and Alarm2, direct-acting OR of Alarm 1 and Alarm 2, reverse-acting AND of Alarm 1 and Alarm 2, direct-acting AND of Alarm 1 and Alarm 2, reverse-acting Recorder Output - Setpoint (DC only) Recorder Output - Process Variable (DC only)	Alarm 1, direct-acting (relay/SSR drive/solid state) or Recorder Output - PV (DC Output)
Output 4 Usage	USE4	Heater Break Alarm, direct-acting Heater Break Alarm, reverse-acting	hb-d
Comms. Baud rate	baud	1200, 2400, 4800 and 9600	4800
Comms. Protocol	Prot	MODBUS RTU, no parity MODBUS RTU, odd parity MODBUS RTU, even parity ASCII	r7bn
Comms. Address	Addr	MODBUS RTU protocol: 1 - 128 (standard) 1 - 255 (enhanced) ASCII: 1 - 99	1
CJC Enable/Disable	EJC	Enabled Disabled	Enabled
Lock Code	Loc	Read Only	-

NOTE: When Heater Break Alarm Strategy is set to Absolute Amps, the Heater Nominal Current parameter (see **SET UP MODE - Parameter Sequence**) is not available and Quick Transfer (see **OPERATOR MODE**) is disabled.

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

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

* Default (not in North America) I Default (North America)

SPECIFICATION

UNIVERSAL INPUT

Input Impedance: Greater than 100MΩ resistive.
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 0 to 10V nominal into 500Ω minimum (>4.2V into 1KΩ for OP2/3)
Isolation: Not isolated from input or other SSR drive outputs.

Solid State

Operating Voltage Range: 20 - 240Vrms (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

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

ENVIRONMENTAL

Approvals: CE, UL, ULC
EMC Immunity: EN61326-1:2013 Table 2
EMC Emission: EN61326-1:2013 Class A
Safety Considerations: UL61010-1 Edition 3 & EN61010 version 2010
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Front Panel Sealing:

To IP66.

PHYSICAL

Dimensions: Depth: 110mm (behind panel)
Front Panel - Width: 48mm Height: 48mm
Weight: 0.21kg maximum