

SECOND SETPOINT (SP2)

SECOND SETPOINT (SP2) Alarm Output

Configure SP2 output to operate as an alarm from **SP2.A** in Level 2 and set the temperature alarm setting in **SEt.2** Level 1. The alarm will be triggered when the process temperature changes according to the options listed below.

dV.hi	Rises above the main setpoint by the value inserted at SEt.2 .
dV.Lo	Falls below the main setpoint by the value inserted at SEt.2 .
Band	Rises above or falls below the main setpoint by the value inserted at SEt.2 .
FS.hi	Rises above the main setpoint by a SEt.2 value that is greater than the setpoint.
FS.Lo	Falls below the main setpoint by a SEt.2 value that is smaller than the setpoint.

SUBSIDIARY SP2 MODE

The following additional alarm functions can be added to the above alarm configurations using the features found in **SP2.b** in Level 2

LtCh	Once activated, the alarms will latch and can be manually reset when the alarm condition has been removed.
Hold	This prevents any alarm operation on power-up and is automatically disabled once the process reaches setpoint in order to allow normal alarm operation.
Lt.ho	Combines the effects of both LtCh & Hold and can be applied

SECOND SETPOINT (SP2) Proportional control output

Configure in **Level 1** using **CyC.2** to select proportional cycle time and **bnd.2** to adjust proportioning band.
 - For Heat/Cool operation see full operating manual.
 - In on/off mode, bnd.2 adjusts SP2 hysteresis.

SP2 OUTPUT AND LED INDICATION STATES - IN ALARM CONDITION

Alarm Type	ON-OFF Operating mode	Proportional Operating mode	Legend
Deviation	SP2 Output State SP2 LED State	SP2 Output State SP2 LED State	Output ON (relay or ssd energised)
Full scale	FS.hi FS.Lo	FS.hi FS.Lo	Output OFF (relay or ssd de-energised)
Strategy	CoOL	Temperature above setpoint	LED ON

SP2 ALARM ANNUNCIATOR

When an SP2 alarm mode is selected in SP2.A the alarm annunciator **-AL-** is displayed, alternating with the process temperature, during alarm condition.

Notes: The alarm will be automatically reset when the temperature returns within the **bnd.2** setting in Level 1. The annunciator may be disabled by selecting function **no.AL : on** in level 4.

SP2 in cool strategy See full operating manual (ADVANCED SETTINGS)

ERROR MESSAGES

Display Flashes	Fault Type	Action
inPt : FAIL	SENSOR FAULT Thermocouple burnout RTD/Pt100 open or short circuit or negative over-range.	Check sensor/wiring
dAtA : FAIL	NON-VOLATILE MEMORY ERROR	De-power briefly. Replace unit if problem persists
hAnd : FAIL	MANUAL POWER ERROR SP1 set to ON/OFF in CyC.t	Select proportional mode
tunE : FAIL	IMMEDIATE FAIL ON AUTOTUNE START Note: To reset and clear error press ▲ ▼ together briefly to cancel message. FAIL LATER DURING AUTOTUNE CYCLE The thermal characteristics of the load exceed the autotune algorithm limits. The failure point is indicated by any display 0.0 in tech e.g. Ctb = 0.0	1. If display setpoint=0 then enter setpoint 2. If SP1 set to ON/OFF in CyC.t then select proportional mode 3. If the error message persists, call local CAL representative for advice.

FUNCTION LIST (LEVELS 1 TO 4) - LEVEL 1

Function	Options [Factory settings]	Description
Select Autotune		
tunE	[oFF], on, ParK, At.Sp	Used to switch the Autotune feature on and off, to select ParK or tune at setpoint. ParK temporarily turns the output(s) off. To use select ParK and exit program mode. To disable re-enter program at tunE and select oFF .
SP1 Operating Parameters		
bAnD	0.1 to * C/F [10°C/18°F]	SP1 proportional band/Gain or Hysteresis * 25% sensor maximum Proportional control eliminates the cycling of on-off control. Heater power is reduced, by time proportioning action, across the proportional band.
int.t	oFF, 0.1 to 60 minutes [5.0]	SP1 integral time/reset Auto-corrects proportional control offset error
dEr.t	oFF 1 - 200 seconds [25]	SP1 derivate time/rate Suppresses overshoot and speeds response to disturbances
dAC	0.5 - 5.0 x bAnD [1.5]	SP1 derivative approach control dAC Tunes warm-up characteristics, independent of normal operating conditions, by controlling when derivative action starts during warm-up (smaller dAC value = nearer setpoint).
CyC.t	A --, on.oF, 0.1 - 81 sec [20]	SP1 proportional cycle-time (see section above) Determines the cycle rate of the output device for proportional control. Select on.oF for ON/OFF mode.
oFS.t	[0] to * C/F	SP1 offset/manual reset * ±50% bAnD . Applicable in proportional and ON/OFF mode with integral disable: Int.t : oFF .
SP.LK	[oFF] on	Lock main setpoint Locks the setpoint preventing un-authorized adjustment.
Programmer Settings		
SPrr	[0] to 9995 deg/hour	Sets the ramp rate
SPrn	on [oFF] hold	Switches the ramp on or off, or hold at last ramp value
SoAK --	[oFF] 0 to 1440 min	Sets the soak time
SP2 Operating Parameters		
SEt.2	0 to * C/F [0]	Adjust SP2 setpoint * Deviation Alarms DV.hi , DV.Lo , bAnD 25% sensor maximum. * Full scale alarms FS.hi , FS.Lo sensor range f/s
bnd.2	0.1 - * C/F [2.0 C/3.6°F]	Adjust SP2 hysteresis or proportional band/gain (see CyC.2 setting) * 25% of sensor full scale
CyC.2	[on.oFF] 0.1-81 seconds	Select SP2 ON/OFF or proportional cycle-time Select on.oFF for ON/OFF mode, or the cycle rate of SP2 output device for proportional mode.

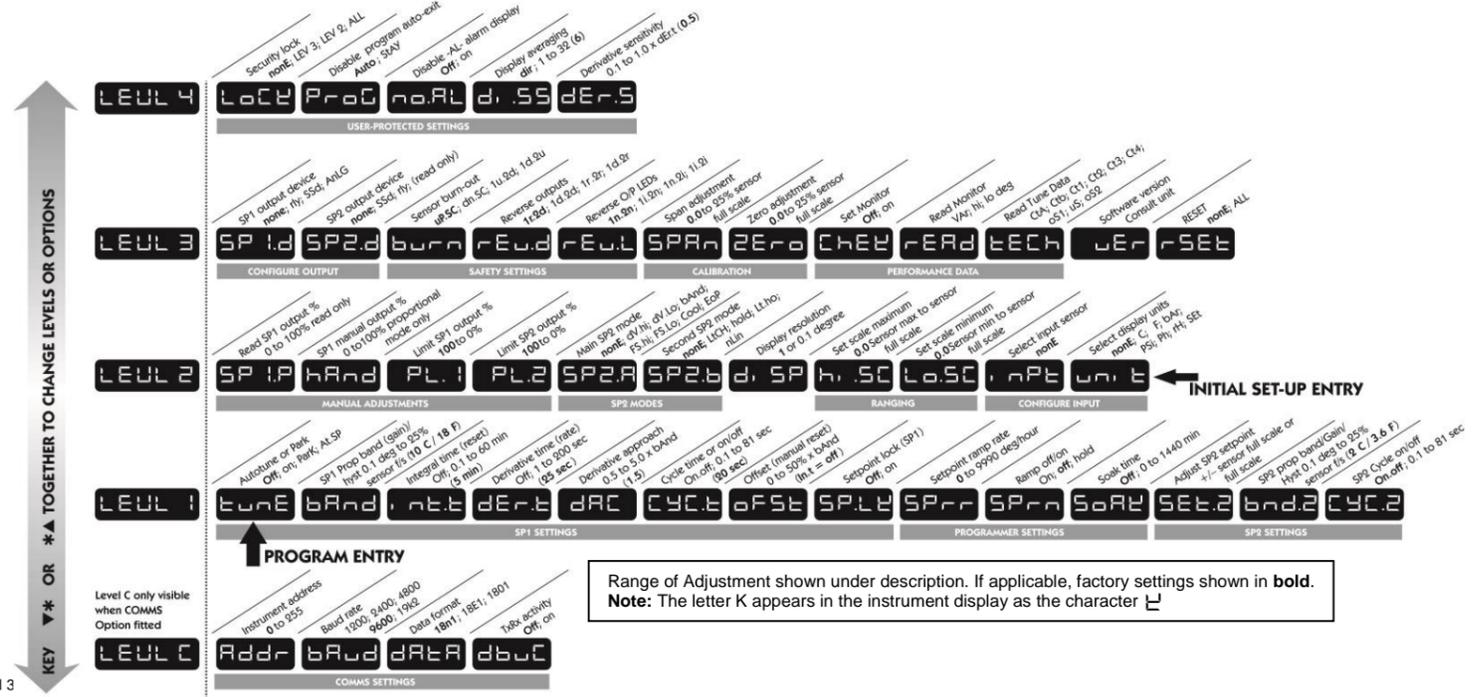
LEVEL 2

Function	Options [Factory settings] shown in brackets	Description
Manual Control Modes		
SP1.P	0 to 100 % 'read only'	Read SP1 output percentage power
hAnd	[oFF] 1 to 100 % (not in ON/OFF)	SP1 manual percentage power control For manual control should a sensor fail. Record typical SP1.P values beforehand.
PL.1	100 to 0 % duty cycle [100]	Set SP1 power limit percentage Limits maximum SP1 heating power during warm-up and in proportional band.
PL.2	100 to 0 % duty cycle [100]	Set SP2 percentage power limit (cooling)
SP2 Operating Modes		
SP2.A	[none] dV.hi dV.Lo bAnD FS.hi FS.Lo Cool	Main SP2 operating mode
SP2.b	[none] LtCh hoLd nLin	Subsidiary SP2 mode: latch/sequence. Non-linear cool proportional band
Input Selection and Ranging		
dLSP	[1] 0.1	Select display resolution: for display of process temperature, setpoint, OFSt , SEt.2 , hi.SC , LoSC
hi.SC	sensor minimum [sensor maximum] °C/°F	Set full scale
Lo.SC	[sensor minimum] sensor maximum °C/°F	Set scale minimum (default 0°C or 32°F)
inPt	[none]	Select input sensor (See SENSOR SELECTION table)
Unit	[none] °C °F bAr Psi Ph rh SEt	Select °C/°F or process units

LEVEL 3

Function	Options [Factory settings] shown in brackets	Description
Output Configuration		
Note: 'Read only' after initial configuration. rSET ALL full reset to factory settings required to change SP1.d subsequently.		
SP1.d	[none] rLY SSd rLY1 rLY2 SSd1	Select SP1 output device Dual Relay and Dual SSd output options are factory set.
SP2.d	[none] SSd rLY rLY2 rLY1 SSd2	Read SP2 output device (read only) Dual Relay and Dual SSd output options are factory set.
For SP1.d & SP2.d Note: (when in initial configuration only) Hold * and ▲ or ▼ for 10 seconds to move to or from output options shaded.		
burn	SP1 / SP2 [uP.SC] Upscale/Upscale dn.SC Downscale/Downscale 1u.2d Upscale/Downscale 1d.2u Downscale/Upscale	Sensor burn-out/break protection Caution: Settings affect fail safe state.
rEu.d	SP1 / SP2 [1r.2d] Reverse Direct 1d.2d Direct Direct 1r.2r Reverse Reverse 1d.2r Direct Reverse	Select output modes: Direct/Reverse Select Reverse on SP1 for heating and Direct for cooling applications. Caution: Settings affect fail safe state.
rEu.L	SP1 / SP2 [1n.2n] Normal Normal 1i.2n Invert Normal 1n.2i Normal Invert 1i.2i Invert Invert	Select SP1/2 LED indicator modes
SPAn	[0.0] to ±25% sensor maximum	Sensor span adjust For recalibrating to align readings with another instrument e.g. External Meter, data logger. See Full Operating Manual (ADVANCED SETTINGS).
ZERo	[0.0] to ±25% sensor f/s	Zero sensor error (see Sensor span adjust above).
ChEK	[oFF] on	Select control accuracy monitor
rEAD	[Var] hi Lo	Read control accuracy monitor
tECH	[Ct A] CT b Ct 1 Ct 2 Ct 3 Ct 4 oS 1 uS oS 2	Read Autotune tuning cycle data (see Operating Manual)
UEr		Software version number
rSET	[none] ALL	Resets all functions to factory settings Caution: This selection will lose all of the current settings.

FUNCTIONS MENU



Function	Options [Factory settings] shown in brackets	Description
Security		
LoCK	[none] LEV.3 LEV.2 ALL	Program security using Lock LEV.3 locks level 3 and 4 only- Technical Functions. LEV.2 locks levels 2, 3 and 4 only - Configuration and technical Functions. ALL locks all functions LoCK ALL
Function Options		
ProG	[Auto] STAY	Program mode auto-exit switch. Auto-exit returns display to normal if 60 seconds of key inactivity, select STAY to disable
no.AL	[oFF] on	Disable SP2 alarm annunciator-AL Select on to disable -AL
di.SS	Dir, 1 to 32 [6]	Display sensitivity dir = direct display of input 1 = maximum, 32 = minimum sensitivity
dEr.S	0.1 to 1.0 [0.5]	Derivative sensitivity

SPECIFICATION

Thermocouple	9 types
Standards:	IPTS/68/DIN 43710
CJC rejection:	20:1 (0.05°C) typical
External resistance:	100Ω maximum
Resistance thermometer	RTD-2/Pt100 2 wire
Standards:	DIN 43760 (100Ω 0°C/138.5Ω 100°C Pt)
Bulb current:	0.2mA maximum
Linear process inputs	nV range: 0 to 50mV
Applicable to all inputs SM = sensor maximum	Calibration accuracy: ±0.25%SM ±1°C
Sampling frequency:	Input 10Hz, CJC 2 sec.
Common mode rejection:	Negligible effect up to 140dB, 240V, 50-60Hz
Series mode rejection:	60dB, 50-60Hz
Temperature co-efficient:	150ppm/°C SM
Reference conditions:	22°C ±2°C, rated voltage after 15 minutes settling time.
Output devices	SSd/SSd1/SSd2: Solid state relay driver: To switch a remote SSR 5Vdc +/-15% 15mA non-isolated
Miniature power relay:	Form A/SPST contacts (AgCdO) rLY and rLY1: 2A/250ac resistive load rLY2: 1A/250ac resistive load
General	Displays: Upper, 4 Digits, high brightness green LED. 10mm (0.4") high. Lower, 4 Digits, Orange LED. 9mm (0.35") high (dual display version only)
Digital range:	-199 to 9999
Hi-res mode:	-199.9 to 999.9
LED output indicators:	Flashing, SP1 square, green; SP2 round, red
Keypad:	3 elastomeric buttons
Environmental	Humidity: Max 80%
Altitude:	Up to 2000m
Installation:	Category II
Pollution:	Degree II
Protection:	NEMA 4X, IP66, Installation Class 2, CSA 22.2 No 1010.1 and UL61010-1 Edition 3.
EMC Emission:	EN61326-1:2013 Class A. 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.
EMC Immunity:	EN61326-1:2013 Table 2.
Ambient:	0-50°C (32-130°F)
Mouldings:	Flame retardant polycarbonate
Weight:	1/32 DIN - 110g (3.9oz), 1/16 DIN single display - 120g (4.2oz), 1/16 DIN dual display - 130g (4.6oz).
Approvals	CE, UL, cUL, CSA and FM (3545)

Note: Applications where controller may be subjected to 110MHz – 130MHz radiated RF (common in aeronautical environments) If using the 12-24V variant fitted with RS232/485 comms option, individual Ferrites (Wuerth Elektronik, Part 742 711 31, or similar) must be fitted to all incoming and outgoing cables, at the point of entry / exit to the controller.