

SP2 OUTPUT AND LED INDICATION STATES - IN ALARM CONDITION

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

SP2 ALARM ANNUCIATOR
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 section on 'Cool Strategy' within full operating manual

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 1. Change conditions. eg. raise setpoint 2. Try tunE : At.SP 3. If the error message persists, call local CAL representative for advice.

FUNCTION LIST (LEVELS 1 TO 4) - LEVEL 1

Function	Options [Factory settings] shown in brackets	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.
oFSt	[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 unauthorised adjustment.
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% 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		
di.SP	[1] 0.1	Select display resolution: for display of process temperature, setpoint, oFS.t , 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	Select °C/°F or process units

LEVEL 3

Function	Options [Factory settings] shown in brackets	Description
Output Configuration		
SP1.d	[none] rLY SSd	Select SP1 output device Note: 'Read only' after initial configuration. rSET ALL full reset to factory settings required to change SP1.d subsequently.
SP2.d	[none] SSd rLY	Read SP2 output device (read only)
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.

LEVEL 4

Access to level 4 is gained through **UEr** in level 3. Press and hold ▲ or ▼ for 10 seconds. Enter level 4 at **LoCK**, release ▲ or ▼ together. Display reads **LoCK nonE**

Function	Options [Factory settings] shown in brackets	Description
Function Options		
dEr.S	0.1 to 1.0 [0.5]	Derivative sensitivity
di.SS	Dir, 1 to 32 [6]	Display sensitivity dir = direct display of input 1 = maximum, 32 = minimum sensitivity
no.AL	[oFF] on	Disable SP2 alarm annunciator-AL Select on to disable -AL
ProG	[Auto] STAY	Program mode auto-exit switch. Auto-exit returns display to normal if 60 seconds of key inactivity, select STAY to disable
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

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
mV range: -10 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 coefficient: 150ppm/°C SM
Reference conditions: 22°C ±2°C, rated voltage after 15 minutes settling time.

Output devices
SSD : solid state relay drive: To switch a remote SSR 5Vdc +0/-15% 10mA non-isolated form A/SPST contacts (AgCdO) : 2A/250ac resistive load
Miniature power relay:

General
Displays: 4 Digits, high brightness green or red LED. 10mm (0.4") high.
Digital range -199 to 9999
Hi-res mode -199.9 to 999.9
LED output indicators - SP1 round, green or red; SP2 round, green or red
Keypad: 3 elastomeric buttons

Environmental
Humidity: Max 80%
Altitude: up to 2000M
Installation: Categories II and III
Pollution: Degree II
Protection: NEMA 4X, IP66
EMC emission: EN50081-1 FCC Rules 15 subpart J Class A
EMC immunity: EN50082-2
Ambient: 0-50°C (32-130°F)
Mouldings: flame retardant polycarbonate
Weight: 100g (3.5oz).

Approvals CE, UL (file number E81867), cUL

FUNCTION MENU

