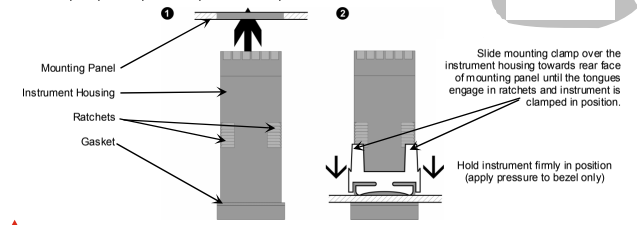
1/16-DIN PROCESS CONTROLLER
CONCISE PRODUCT MANUAL (59300-2)

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

1. INSTALLATION

Panel-Mounting

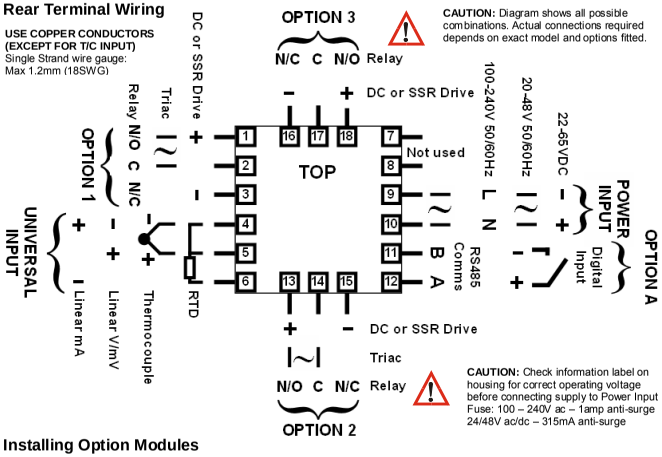
The mounting panel must be rigid and may be up to 6.0mm (0.25 inches) thick. The cut-out required for the instrument is shown on the right. Instruments may be mounted side-by-side in a multiple installation for which the cut-out width (for *n* instruments) is (48*n*-4)mm or (1.89*n*-0.16)inches.



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

Rear Terminal Wiring

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

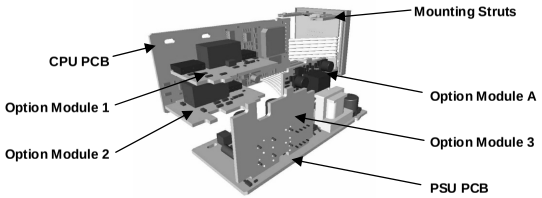


CAUTION: Diagram shows all possible combinations. Actual connections required depends on exact model and options fitted.

CAUTION: Check information label on housing for correct operating voltage before connecting supply to Power Input Fuse: 100 – 240V ac – 1amp anti-surge 24/48V ac/dc – 315mA anti-surge

Installing Option Modules

CAUTION: Turn off all power. Remove instrument by gripping the sides of the front panel and pulling the instrument out of its housing. ***Note its orientation.***

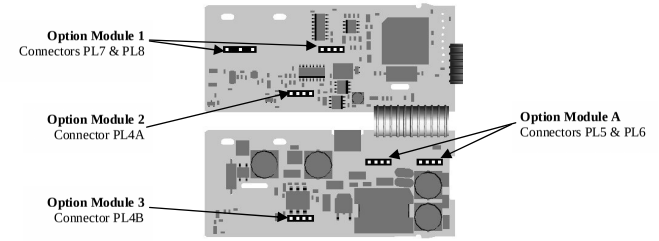


To access modules 1 or A, first detach the PSU and CPU boards from the front moulding by lifting first the upper, and then lower mounting struts. Gently separate the boards.

a). Plug the required option modules into the correct connectors, as shown below.
b). Locate the tongues on each module into the corresponding slot in the board opposite.
c). Hold the main boards together while relocating them back on the mounting struts.
d). Replace the instrument by aligning the CPU and PSU boards with their guides in the housing, then slowly push the instrument back into position.

Note: The instrument will automatically detect which option modules have been fitted.

Option Module Connectors



2. SELECT MODE

Select mode is used to access the configuration and operation menu functions.
It can be accessed at any time by holding down ↺ and pressing △.
Once in select mode, press △ or ▽ to select the required mode. An unlock code is required to prevent unauthorised entry to Configuration, Setup & Automatic Tuning modes.
Press △ or ▽ to enter the correct code number, then press ↺ to proceed.

Mode	Upper Display	Lower Display	Description	Default Unlock Codes
Operator	OPEr	SLCt	Normal instrument operation.	None
Set Up	SEtP	SLCt	Tailor settings to the application.	10
Configuration	ConF	SLCt	Configures the instrument for use.	20
Product Info	inFo	SLCt	Check manufacturing information.	None
Auto-Tuning	AtUn	SLCt	Invoke Pre-Tune or Self-Tune.	0

Note: The instrument will always return automatically to Operator mode if there is no key activity for 2 minutes.

3. CONFIGURATION MODE

First select Configuration mode from Select mode *(refer to section 2)*.
Press ↺ to scroll through the parameters, then press △ or ▽ to set the required value.
To accept a change AUTO MAN must be pressed, otherwise parameter will revert to previous value.
To exit from Configuration mode, hold down ↺ and press △, to return to Select mode.
Note: Parameters displayed depends on how instrument has been configured.
Parameters marked * are repeated in Setup Mode.

Parameter	Lower Display	Upper Display	Adjustment range	Default
Input Range/Type	inPt	*See following table for possible codes*		J T/C
Scale Range Upper Limit	rUL	Scale Range Lower Limit +100 to Range Max		Range max (Lin=1000)
Scale Range Lower Limit	rLL	Range Min. to Scale Range Upper Limit -100		Range min (Linear=0)
Decimal point position	dPoS	0=XXXX, 1=XXX.X, 2=XX.XX, 3=X.XXX (non-temperature ranges only)		1
Control Type	CtYP	SnGL	Primary (heat) only	SnGL
		duAL	Primary & Secondary (heat/cool)	
Primary Output Control Action	CtrL	rEu	Reverse Acting	rEu
		d ir	Direct Acting	
Alarm 1Type	ALA1	P_H i	Process High Alarm	P_H i
		P_Lo	Process Low Alarm	
		dE	Deviation Alarm	
		bAnd	Band Alarm	
		nonE	No alarm	
High Alm 1 value*	PhA1	Range Min. to Range Max in display units		Range Max.
Low Alm 1 value*	PLA1			Range Min.
Band Alm 1 value*	bAL1	1 LSD to span from setpoint in display units		5
Dev. Alm 1 value*	dAL1	+/- Span from setpoint in display units		5
Alm 1 Hysteresis*	AHY1	1 LSD to full span in display units		1
Alarm 2 Type*	ALA2	Options as for alarm 1		P_Lo
High Alm 2 value*	PhA2			Range Max.
Low Alm 2 value*	PLA2			Range Min.
Band Alm 2 value*	bAL2			5
Dev. Alm 2 Value*	dAL2			5
Alm 2 Hysteresis*	AHY2			1
Loop Alarm	LAEn	d iSA (disabled) or EnAb (enabled)		d iSA
Loop Alarm Time*	LAt i	1 sec to 99 mins. 59secs (only applies if primary proportional band = 0)		99.59
Alarm Inhibit	Inh i	nonE	No alarms Inhibited	nonE
		ALA1	Alarm 1 inhibited	
		ALA2	Alarm 2 inhibited	
		both	Alarm 1 and alarm 2 inhibited	
Output 1 Usage	USE1	Pr i	Primary (Heat) Power	Pr i
		SEc	Secondary (Cool) Power	
		A1_d	Alarm 1, Direct	
		A1_r	Alarm 1, Reverse	
		A2_d	Alarm 2, Direct	
		A2_r	Alarm 2, Reverse	
		LP_d	Loop Alarm, Direct	
		LP_r	Loop Alarm, Reverse	
		Or_d	Logical Alarm 1 OR 2, Direct	
		Or_r	Logical Alarm 1 OR 2, Reverse	
		Ad_d	Logical Alarm 1 AND 2, Direct	
		Ad_r	Logical Alarm 1 AND 2, Reverse	
		rEtS	Retransmit SP Output	
		rEtP	Retransmit PV Output	
Linear Output 1 Range	tYP1	0_5	0 – 5 V DC output 1	0_10
		0_10	0 – 10 V DC output	
		2_10	2 – 10 V DC output	
		0_20	0 – 20 mA DC output	
		4_20	4 – 20 mA DC output	
Retransmit Output 1 Scale maximum	roIH	-1999 to 9999 (display value at which output will be maximum)		Range max
Retransmit Output 1 Scale minimum	roIL	-1999 to 9999 (display value at which output will be minimum)		Range min
Output 2 Usage	USE2	As for output 1		Sec or AI2
Lin. O/P 2 Range	tYP2			0_10
Retransmit Output 2 Scale maximum	ro2H	-1999 to 9999 (display value at which output will be maximum)		Range max
Retransmit Output 2 Scale minimum	ro2L	-1999 to 9999 (display value at which output will be minimum)		Range min
Output 3 Usage	USE3	As for output 1		A1_d
Linear Output 3 Range	tYP3			0_10
Retransmit Output 3 Scale maximum	ro3H	-1999 to 9999 (display value at which output will be maximum)		Range max
Retransmit Output 3 Scale minimum	ro3L	-1999 to 9999 (display value at which output will be minimum)		Range min
Display Strategy	d iSP	1, 2, 3, 4, 5 or 6 *(refer to section 7)*		1
Comms Protocol	Prot	ASCI	ASCII	rtu
		rtu	Modbus with no parity	
		rtuE	Modbus with Even Parity	
		rtuo	Modbus with Odd Parity	
Bit rate	bAud	1.2	1.2 kbps	4.8
		2.4	2.4 kbps	
		4.8	4.8 kbps	
		9.6	9.6 kbps	
		19.2	19.2 kbps	
Comms Address	Addr	1	1 –255 (Modbus), 1-99 (ASCII)	1
Comms Write	CoEn	Read only or read/write		r_Wd
Digital Input Usage	d iG i	d iS1	Setpoint 1 / Setpoint 2 select	d iS1
		d iAS	Automatic / Manual select	
Config Lock Code	CLoc	0 to 9999		20

Note: Refer to the full user guide (available from your supplier) for further details on these parameters.

Code	Input Type & Range	Code	Input Type & Range	Code	Input Type & Range
bC	B: 100 – 1824 °C	LC	L: 0.0 – 537.7 °C	P24F	PtRh20% vs 40%: 32 – 3362 °F
bF	B: 211 – 3315 °F	LF	L: 32.0 – 999.9 °F		
CC	C: 0 – 2320 °C	nC	N: 0 – 1399 °C	PtC	Pt100: -199 – 800 °C
CF	C: 32 – 4208 °F	nF	N: 32 – 2551 °F	PtF	Pt100: -328 – 1472 °F
JC	J: -200 – 1200 °C	rC	R: 0 – 1759 °C	Pt.C	Pt100: -128.8 – 537.7 °C
JF	J: -328 – 2192 °F	rF	R: 32 – 3198 °F	Pt.F	Pt100: -199.9 – 999.9 °F
J.C	J: -128.8 – 537.7 °C	SC	S: 0 – 1762 °C	0_20	0 – 20 mA DC
J.F	J: -199.9 – 999.9 °F	SF	S: 32 – 3204 °F	4_20	4 – 20 mA DC
KC	K: -240 – 1373 °C	tC	T: -240 – 400 °C	0_50	0 – 50 mV DC
KF	K: -400 – 2503 °F	tF	T: -400 – 752 °F	10_50	10 – 50 mV DC
K.C	K: -128.8 – 537.7 °C	t.C	T: -128.8 – 400.0 °C	0_5	0 – 5 V DC
K.F	K: -199.9 – 999.9 °F	t.F	T: -199.9 – 752.0 °F	1_5	1 – 5 V DC
LC	L: 0 – 762 °C	P24C	PtRh20% vs 40%: 0 – 1850 °C	0_10	0 – 10 V DC
LF	L: 32 – 1403 °F			2_10	2 – 10 V DC

4. SETUP MODE

Note: Configuration must be completed before adjusting Setup parameters.
First select Setup mode from Select mode *(refer to section 2)*. While in Setup Mode MAN is lit.
Press ↻ to scroll through the parameters, then press △ or ▽ to set the required value.
To exit from Setup mode, hold down ↻ and press △, to return to Select mode.
Note: Parameters displayed depends on how instrument has been configured.

Parameter	Lower Display	Upper Display Adjustment Range	Default
Input Filter Time constant	F iLt	OFF or 0.5 to 100.0 secs	2.0
Process Variable Offset	OFFS	+/- Span of controller	0
Primary (Heat) power	PPwJ	Current power levels *(read only)*	N/A
Secondary (Cool) power	SPwJ		
Primary Proportional Band	Pb_P	0.0% (ON/OFF) and 0.5% to 999.9% of input span.	10.0
Secondary Proportional Band	Pb_S		
Automatic Reset (Integral Time)	ArSt	1 sec to 99 mins 59 secs and OFF	5.00
Rate (Derivative Time)	rAtE	00 secs to 99 mins 59 secs	1.15
Overlap/Deadband	OL	-20 to +20% of Primary and Secondary Proportional Band	0
Manual Reset (Bias)	b iAS	0%*(-100% if dual control)* to 100%	25
Primary ON/OFF Differential	d iFP	0.1% to 10.0% of input span centered about the setpoint	0.5
Secondary ON/OFF Diff.	d iFS		
Prim. & Sec. ON/OFF Diff.	d iFF		
Setpoint Upper Limit	SPuL	Current Setpoint to Range max	R/max
Setpoint Lower limit	SPLL	Range min to Current Setpoint	R/min
Primary Output Power Limit	OPuL	0% to 100% of full power.	100
Output 1 Cycle Time	Ct 1	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512 secs.	32
Output 2 Cycle Time	Ct2		
Output 3 Cycle Time	Ct3		
High Alarm 1 value	PhA 1	Range Min. to Range Max.	R/max
Low Alarm 1 value	PLA 1		R/min
Deviation Alarm 1 Value	dAL 1	+/- Span from SP in display units	5
Band Alarm 1 value	bAL 1	1 LSD to span from setpoint	5
Alarm 1 Hysteresis	AHy 1	1 LSD to full span in display units	1
High Alarm 2 value	PhA2	Range Min. to Range Max.	R/max
Low Alarm 2 value	PLA2		R/min
Deviation Alarm 2 Value	dAL2	+/- Span from SP in display units	5
Band Alarm 2 value	bAL2	1 LSD to span from setpoint	5
Alarm 2 Hysteresis	AHy 1	1 LSD to full span in display units	1
Loop Alarm Time	LAt i	1 sec to 99 mins. 59secs.	99.59
Auto Pre-tune	APt	d iSA disabled or EnAb enabled	d iSA
Auto/manual Control selection	PoEn		
Setpoint ramping	SPr		
SP Ramp Rate Value	rP	1 to 9999 units/hour or Off (blank)	Off
SP Value	SP	Scale range upper to lower limits	Scale Range min
SP1 Value	_ SP 1	Scale range upper to lower limits " _" indicates currently active SP.	
SP2 Value	_ SP2		
Setup Lock Code	SLoc	0 to 9999	10

5. AUTOMATIC TUNING MODE

First select Automatic tuning mode from Select mode *(refer to section 2)*.
Press ↻ to scroll through the modes, then press △ or ▽ to set the required value.
To exit from Automatic tuning mode, hold down ↻ and press △, to return to Select mode.
Pre-tune is a single-shot routine and is thus self-disengaging when complete.
If APt in Setup mode = EnAb, Pre-tune will attempt to run at every power up*.
Refer to the full user guide (available from your supplier) for details on controller tuning.

Parameter	Lower Display	Upper Display Adjustment Range	Default
Pre-Tune	Ptun	On or OFF. Indication remains OFF if automatic tuning cannot be used at this time*.	OFF
Self-Tune	Stun		
Tune Lock	tLoc	0 to 9999	0

**** Note: Automatic tuning will not engage if either proportional band = 0. Also, Pre-tune will not engage if setpoint is ramping, or the PV is within 5% of span of the setpoint.***

6. PRODUCT INFORMATION MODE

First select Product information mode from Select mode (*refer to section 2*).
Press ↻ to view each parameter. To exit from Product Information mode, hold down ↻ and press △ to return to Select mode. *Note: These parameters are all read only.*

Parameter	Lower Display	Upper Display	Description
Input type	In_ 1	Un i	Universal input only
Option 1 module type fitted	OPn 1	nonE	No option fitted.
		rLY	Relay
		SSr	SSR drive
		tr i	Triac
		L in	Linear voltage / Current output
Option 2 type fitted	OPn2	As Option 1.	
Option 3 type fitted	OPn3		
Auxiliary Option module type fitted	OPnA	nonE	No option fitted
		r485	RS485 comms
		d iG i	Digital Input
Firmware type	FuJ	Value displayed is firmware type number	
Firmware issue	ISS	Value displayed is firmware issue number	
Product Revision Level	PrL	Value displayed is Product Revision level.	
Date of manufacture	dOM	Manufacturing date code (mmyy)	
Serial number 1	Sn 1	First four digits of serial number	
Serial number 2	Sn2	Middle four digits of serial number	
Serial number 3	Sn3	Last four digits of serial number	

7. OPERATOR MODE

This mode is entered at power on. It can also be accessed from Select mode (*see section 2*).
Note: All configuration mode and Setup mode parameters must be set as required before starting normal operations.
Press ↻ to scroll through the parameters, then press △ or ▽ to set the required value.
Note: All parameters in Display strategy 6 are read only, and can only be adjusted via Setup mode.

Upper Display	Lower Display	Display Strategy When Visible	Description
PV Value	Active SP Value	1 & 2 (initial screen)	PV and target value of selected SP *SP adjustable in Strategy 2*
PV Value	Actual SP Value	3 & 6 (initial screen)	PV and actual value of selected SP (e.g. ramping SP value). *Read only*
PV Value	*(Blank)*	4 (initial screen)	Process variable only. *Read only*
Active SP Value	*(Blank)*	5 (initial screen)	Target value of selected setpoint only. *Read only*
SP Value	SP	1, 3, 4, 5 & 6 if digital input is not d iS 1	Target value of SP *Adjustable except in Strategy 6*
SP1 Value	_ SP 1	"_"lit if dig I/P = d iS 1 and active SP is SP1	Target value of SP1 *Adjustable except in Strategy 6*
SP2 Value	_ SP2	"_"lit if dig I/P = d iS 1 and active SP is SP2	Target value of SP2 *Adjustable except in Strategy 6*
Actual SP Value	SPrP	SPr enabled and rP is not zero	Actual (ramping) value of selected SP *Read only*
Ramp Rate	rP	SPr enabled in Setup mode	SP ramping rate, in units per hour. *Adjustable except in Strategy 6*

Upper Display	Lower Display	Display Strategy When Visible	Description
Active Alarms	ALSt	When one or more alarms are active. ALM **ALM** indicator will also flash	Alarm 2 active Alarm 1 active Loop Alarm active

Manual Control
If PoEn is set to EnAb in Setup mode, manual control can be selected/de-selected by pressing the AUTO MAN key while in Operator mode, or by changing the status of the digital input if d iG i has been configured for d iAS in Configuration mode. The MAN indicator will flash while in Manual Control mode and the lower display will show Pxxx (where xxx is the current manual power level). Switching to/from manual mode is via Bumpless Transfer.
Press △ or ▽ to set the required output power. ***Caution: Not restricted by OPuL limit.***

8. ERROR/FAULT INDICATIONS

Parameter	Upper Display	Lower Display	Description
Instrument parameters are in default conditions	Goto	Conf	Configuration & Setup required. Seen at first turn on or if hardware configuration changed. Press ↻ to enter the Configuration Mode, next press △ or ▽ to enter the unlock code number, then press ↻ to proceed.
Over Range	[HH]	Normal	Input > 5% over-range
Under Range	[LL]	Normal	Input > 5% under-range
Sensor Break	OPEN	Normal	Break in input sensor or wiring
Option 1 Error	Err	OPn 1	Option 1 module fault
Option 2 Error		OPn2	Option 2 module fault
Option 3 Error		OPn3	Option 3 module fault
Option A Error		OPnA	Auxiliary Option module fault

9. SERIAL COMMUNICATIONS

Refer to the full user guide (available from your supplier) for details of this option.

10. SPECIFICATIONS

UNIVERSAL INPUT
Impedance: >10MΩ resistive, except DC mA (5Ω) and V (47kΩ).
Isolation: Isolated from all outputs (except SSR) at 240VAC.
DIGITAL INPUT
Volt-free(or TTL): Open(2-24VDC) = SP1 or Auto, Closed(<0.8VDC) = SP2 or Manual.
OUTPUTS
Relay
Contact Type/Rating: Single pole double throw (SPDT); 2A resistive at 120/240VAC.
Lifetime: >500,000 operations at rated voltage/current.
Isolation: Isolated from input and other outputs.
SSR Drive/TTL
Drive Capability: SSR >10V into 500Ω min.
Isolation: Not isolated from input or other SSR drive outputs.
Triac
Operating Voltage: 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.
Isolation: Isolated from input and other outputs.
DC
Resolution: 8 bits in 250mS (10 bits in 1s typical, >10 bits in >1s typical).
Isolation: Isolated from input and other outputs.
OPERATING CONDITIONS FOR INDOOR USE
Ambient Temperature: 0°C to 55°C (Operating)
Ambient Temperature: –20°C to 80°C (Storage)
Relative Humidity: 20% - 95% non-condensing
Supply Voltage: 100 - 240VAC 50/60Hz 7.5VA for mains powered versions.
20 - 48VAC 50/60Hz (option) 7.5VA or
22 - 65VDC 5W maximum for low voltage versions
ENVIRONMENTAL
Standards: CE, UL, ULC
EMI: Complies with EN61326 (Susceptibility & Emissions)
Safety Considerations: Complies with EN61010-1 & UL3121
Pollution Degree 2, Installation Category II
Front Panel Sealing: To IP66
PHYSICAL
Dimensions Depth: 110mm (behind panel)
Front panel height: 48mm
Front panel width: 48mm
Weight: 0.21kg maximum