

1/16 - 1/8 - 1/4 DIN PROCESS CONTROLLERS CONCISE PRODUCT MANUAL (59300-4)



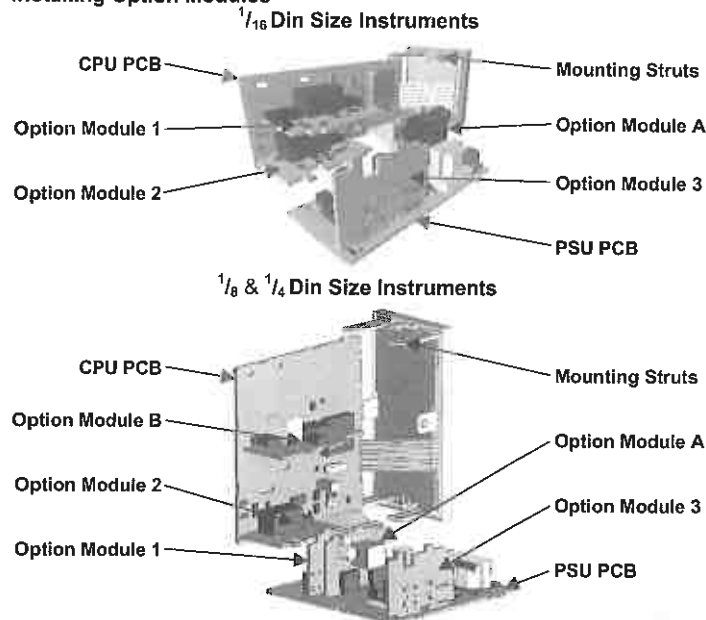
CAUTION: Installation should be only performed by technically competent personnel. Local Regulations regarding electrical installation & safety must be observed.

1. INSTALLATION

The models covered by this manual have three different DIN case sizes (refer to section 10). Some installation details vary between models. These differences have been clearly shown.

Note: The functions described in sections 2 thru 9 are common to all models.

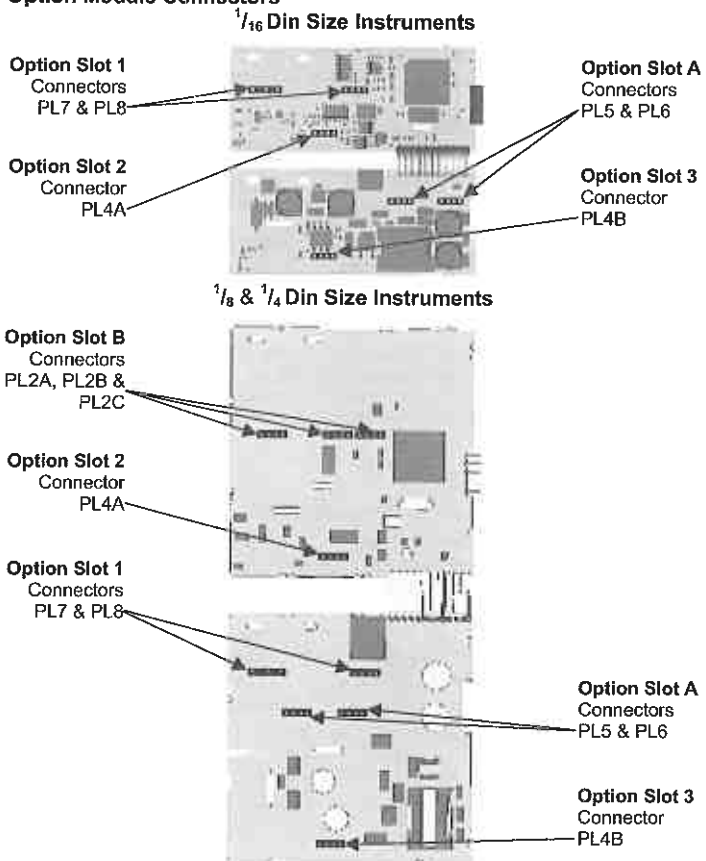
Installing Option Modules



- To access modules 1, A or B, first detach the PSU and CPU boards from the front by lifting first the upper, and then lower mounting struts. Gently separate the boards.
- Plug the required option modules into the correct connectors, as shown below.
 - Locate the module tongues in the corresponding slot on the opposite board.
 - Hold the main boards together while relocating back on the mounting struts.
 - 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: Option modules are automatically detected at power up.

Option Module Connectors



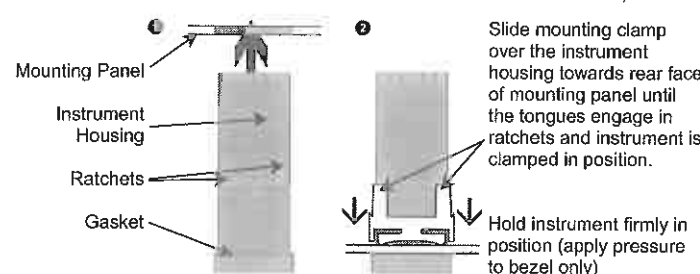
Panel-Mounting

The mounting panel must be rigid, and may be up to 6.0mm (0.25inch) thick. Cut-out sizes are:

Cut-Out Dim A
1/16 & 1/8 Din = 45mm
1/4 Din = 92mm

Cut-Out Dim B
1/16 Din = 45mm
1/8 & 1/4 Din = 92mm

For n multiple instruments mounted side-by-side, cut-out A is 48n-4mm (1/16 & 1/8 Din) or 96n-4mm (1/4 Din)

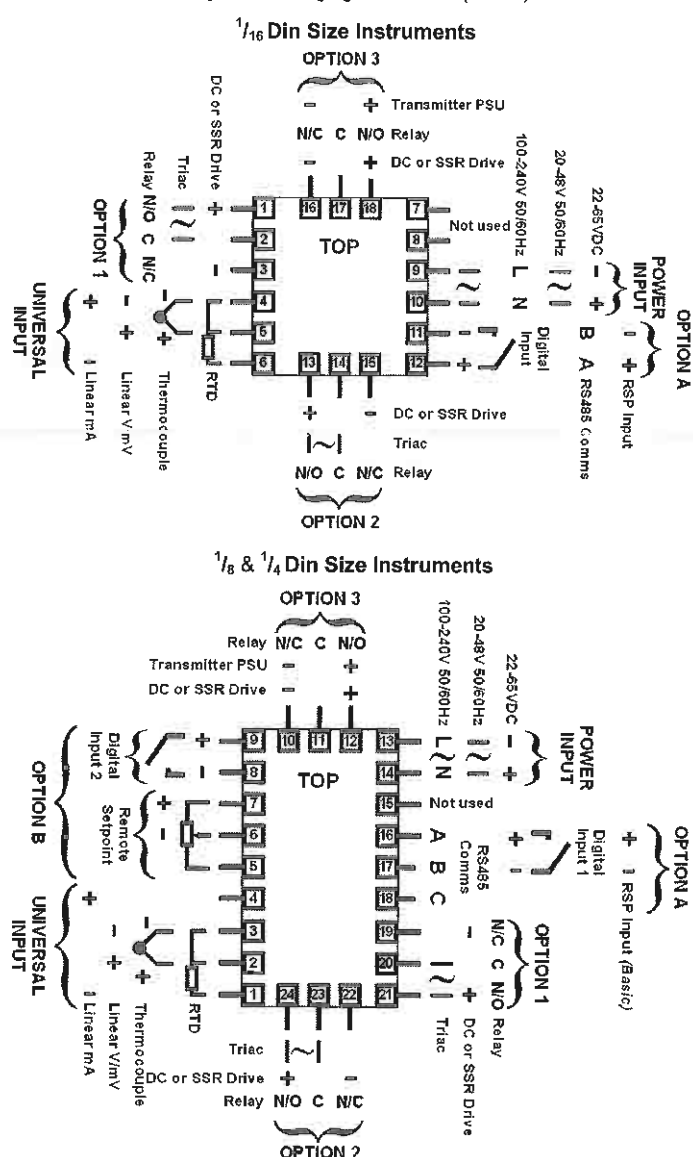


CAUTION: Do not remove the panel gasket; it is a seal against dust and moisture.

Rear Terminal Wiring

USE COPPER CONDUCTORS (EXCEPT FOR T/C INPUT)

Single Strand wire gauge: Max 1.2mm (18SWG)



These diagrams show all possible option combinations. The actual connections required depends on the 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

Note: At first power-up the message Go to Conf is displayed, as described in section 7 of this manual. Access to other menus is denied until configuration mode is completed

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 **SEL** and pressing **ENT**. In select mode, press **SEL** or **ENT** to choose the required mode, press **ENT** to enter. An unlock code is required to prevent unauthorised entry to Configuration, & Setup modes. Press **SEL** or **ENT** to enter the unlock code, then press **SEL** to proceed.

Mode	Upper Display	Lower Display	Description	Default Unlock Codes
Operator	OPER	SELE	Normal operation	None
Set Up	SEEP	SLCE	Tailor settings to the application	10
Configuration	CONF	SLCE	Configure the instrument for use	20
Product Info	INFO	SLCE	Check manufacturing information	None
Auto-Tuning	ATUN	SLCE	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 **SEL** to scroll through the parameters, then press **SEL** or **ENT** to set the required value. Press **ENT** to accept the change, otherwise parameter will revert to previous value. To exit from Configuration mode, hold down **SEL** and press **ENT**, to return to Select mode.

Note: Parameters displayed depends on how instrument has been configured. Refer to user guide (available from your supplier) for further details. Parameters marked * are repeated in Setup Mode.

Parameter	Lower Display	Upper Display	Adjustment range & Description		Default Value
Input Range/Type	inRE		See following table for possible codes		JC
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	PIRH20% 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	P6C	PI100: -199 - 800 °C
CF	C: 32 - 4208 °F	NF	N: 32 - 2551 °F	P6F	PI100: -328 - 1472 °F
JC	J: -200 - 1200 °C	RC	R: 0 - 1759 °C	P6C	PI100: -128.8 - 537.7 °C
JF	J: -328 - 2192 °F	RF	R: 32 - 3198 °F	P6F	PI100: -199.9 - 999.9 °F
UC	U: -128.8 - 537.7 °C	SC	S: 0 - 1762 °C	0.20	0 - 20 mA DC
UF	U: -199.9 - 999.9 °F	SF	S: 32 - 3204 °F	4.20	4 - 20 mA DC
VC	V: -240 - 1973 °C	TC	T: 240 - 400 °C	0.50	0 - 50 mV DC
VF	V: -400 - 2503 °F	TF	T: -400 - 752 °F	10.50	10 - 50 mV DC
EC	E: -128.8 - 537.7 °C	EC	E: -128.8 - 400.0 °C	0.5	0 - 5 V DC
EF	E: -199.9 - 999.9 °F	EF	E: -199.9 - 752.0 °F	1.5	1 - 5 V DC
LC	L: 0 - 762 °C	P24C	PIRH20% vs 40%; 0 - 1850 °C	0.10	0 - 10 V DC
LF	L: 32 - 1403 °F			2.10	2 - 10 V DC

Note: Decimal point shown in table indicates temperature resolution of 0.1°

Parameter	Lower Display	Upper Display	Adjustment range & Description	Default Value
Scale Range Upper Limit	ROL		Scale Range Lower Limit +100 to Range Maximum	Range max (Lin=1000)
Scale Range Lower Limit	RL		Range Minimum to Scale Range Upper Limit -100	Range min (Linear=0)
Decimal point position	dP05		0=XXXX, 1=XXX.X, 2=XX.XX, 3=X.XXX (non-temperature ranges only)	1
Control Type	CLYP	SNOL	Primary only	SNOL
Primary Output Control Action	CErL	REu	Primary & Secondary (e.g. heat & cool) Reverse Acting	REu
		Dir	Direct Acting	
		P.H.	Process High Alarm	
		P.Lo	Process Low Alarm	
Alarm 1Type	ALR1	dE	Deviation Alarm	P.H.
		bAnd	Band Alarm	
		none	No alarm	
High Alarm 1 value*	PhA1		Range Minimum to Range Maximum in display units	Range Max
Low Alarm 1 value*	PLA1			Range Min
Band Alarm 1 value*	bAL1		1 LSD to span from setpoint in display units	5
Dev. Alarm 1 value*	dAL1		+/- Span from setpoint in display units	5
Alarm 1 Hysteresis*	AH1		1 LSD to full span in display units	1
Alarm 2 Type*	ALR2			P.H.
High Alarm 2 value*	PhA2			Range Max
Low Alarm 2 value*	PLA2		Options as for alarm 1	Range Min
Band Alarm 2 value*	bAL2			5

Parameter	Lower Display	Upper Display	Adjustment range & Description	Default Value
Dev. Alarm 2 Value*	dAL2			5
Alarm 2 Hysteresis*	AH2		Options as for alarm 1	1
Loop Alarm	LAEn		d.5R (disabled) or EnAb (enabled)	d.5R
Loop Alarm Time*	LAET		1 sec to 99 mins. 59secs	59.59
Alarm Inhibit	inh			none
		nonE	No alarms inhibited	
		ALR1	Alarm 1 inhibited	
		ALR2	Alarm 2 inhibited	
		beth	Alarm 1 and alarm 2 inhibited	
		P.r	Primary Power	
		Sec	Secondary Power	
		AL.d	Alarm 1, Direct	
		AL.r	Alarm 1, Reverse	
		AL2.d	Alarm 2, Direct	
		AL2.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	
		AND.d	Logical Alarm 1 AND 2, Direct	
		AND.r	Logical Alarm 1 AND 2, Reverse	
		RETS	Retransmit SP Output	
		RETP	Retransmit PV Output	
		0.5	0 to 5 V DC output	
		0.10	0 to 10 V DC output	
		0.20	2 to 10 V DC output	
		4.20	4 to 20 mA DC output	
Linear Output 1 Range	LYP1			0.10
Retransmit Output 1 Scale maximum	ro1H		-1999 to 9999 (display value at which output will be maximum)	Range max
Retransmit Output 1 Scale minimum	ro1L		-1999 to 9999 (display value at which output will be minimum)	Range min
Output 2 Usage	USE2		As for output 1	Sec or AI2
Linear Output 2 Range	LYP2		As for output 1	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	AL.d
Linear Output 3 Range	LYP3		As for output 1	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.SP		1, 2, 3, 4, 5 or 6 (refer to section 8)	1
Serial Communications Protocol	ProE			P7b0
		ASCII	ASCII	
		P7b0	Modbus with no parity	
		P7bE	Modbus with Even Parity	
		P7bO	Modbus with Odd Parity	
		1.2	1.2 kbps	
		2.4	2.4 kbps	
		4.8	4.8 kbps	4.8
		9.6	9.6 kbps	
		19.2	19.2 kbps	
Comms Address	Addr		1 to 255 (Modbus), 1 to 99 (ASCII)	1
Comms Write	CoEn		Read/Write	r.u0
		r.O	Read only	
Digital Input 1 Usage	d.I1		Setpoint 1 / Setpoint 2 select*	d.I51
		d.IA5	Automatic / Manual select	
Digital Input 2 Usage	d.I2		Setpoint 1 / Setpoint 2 select*	d.Ic5
		d.IA5	Automatic / Manual select	
		d.Ir5	Remote / Local setpoint select	

Note: d.I2 has priority over d.I1 if both are configured for the same usage. If d.I1 or d.I2 = d.I51 the remote setpoint input is disabled.

Continued on next page...

Parameter	Lower Display	Upper Display	Adjustment range & Description	Default Value
Remote Setpoint Input Range	0.20	4.20	0 to 20 mA DC input	0.10
	0.10	2.10	4 to 20 mA DC input	
	0.10	2.10	0 to 10 V DC input	
	0.10	2.10	2 to 10 V DC input	
	0.5	1.5	0 to 5 V DC input	
	1.5	100	1 to 5 V DC input	
RSP Upper Limit	rSPu	Potentiometer (2KΩ minimum)	Available on full RSP (Slot B) only	Range max
	rSPu	-1999 to 9999		
RSP Lower Limit	rSPl	-1999 to 9999		Range min
RSP Offset	rSPo	Constrained within Scale Range Upper & Scale Range Lower limits		0
Configuration Lock Code	CLoc	0 to 9999		20

4. SETUP MODE

Note: Configuration must be completed before adjusting Setup parameters.
First select Setup mode from Select mode (refer to section 2). The MAN LED will light while in Setup mode. 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 & Description	Default Value
Input Filter Time Constant	FILF	OFF or 0.5 to 100.0 secs		2.0
Process Variable Offset	OFFS	±Span of controller		0
Primary Power	PPU	Current power levels (read only)		N/A
Secondary Power	SPU			
Primary Proportional Band	PbP	0.0% (ON/OFF) and 0.5% to 999.9% of input span		10.0
Secondary Proportional Band	PbS			
Automatic Reset (Integral Time)	ARST	1 sec to 99 mins 59 secs and OFF		5.00
Rate (Derivative Time)	RDTE	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)	MRBS	0% (-100% if dual control) to 100%		25
Primary ON/OFF Differential	dIFP	0.1% to 10.0% of input span centered about the setpoint.		1.1
Secondary ON/OFF Diff.	dIFS	(Entered as a percentage of span)		0.9
Prim. & Sec. ON/OFF Differential	dIFF			
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	CL1	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512 secs.		32
Output 2 Cycle Time	CL2			
Output 3 Cycle Time	CL3			
High Alarm 1 value	PHA1	Range Minimum to Range Maximum		R/max
Low Alarm 1 value	PLA1			R/min
Deviation Alarm 1 Value	VAL1	±Span from SP in display units		5
Band Alarm 1 value	BAL1	1 LSD to span from setpoint		5
Alarm 1 Hysteresis	AHY1	1 LSD to full span in display units		1
High Alarm 2 value	PHA2	Range Minimum to Range Maximum		R/max
Low Alarm 2 value	PLA2			R/min
Deviation Alarm 2 Value	VAL2	±Span from SP in display units		5
Band Alarm 2 value	BAL2	1 LSD to span from setpoint		5
Alarm 2 Hysteresis	AHY2	1 LSD to full span in display units		1
Loop Alarm Time	LAE	1 LSD to full span in display units		99.99
Auto Pre-tune	APt			
Auto/manual Control selection	PoEn	dISA (disabled) or EnAb (enabled)		dISA
Setpoint Select shown in Operator Mode	SSEn			
Setpoint ramp adjustment shown in Operator Mode	SPr			
SP Ramp Rate Value	rP	1 to 9999 units/hour or Off (blank)		Off
Setpoint Value	SP	Scale range upper to lower limits. (When dual or remote setpoint options are used, SP is replaced by SP1 & SP2 or LSP or rSP before the legend indicates the currently active SP)		Scale Range Minimum
Local Setpoint Value	LSP			
Setpoint 1 Value	SP1			
Setpoint 2 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	Default Value
Pre-Tune	PEu	On or OFF. Indication remains OFF if automatic tuning cannot be used at this time*	OFF
Self-Tune	SEu		
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 less than 5% of input span from 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	In1	Un1	Universal input
Option 1 module type fitted	OPn1	nonE	No option fitted
		FLY	Relay output
		SSr	SSR drive output
		Lin	Triac output
Option 2 module type fitted	OPn2	nonE	Linear DC voltage / current output
		FLY	As Option 1
		SSr	No option fitted
		Lin	Relay output
Option 3 module type fitted	OPn3	nonE	SSR drive output
		FLY	Linear DC voltage / current output
		SSr	Transmitter power supply
		Lin	No option fitted
Auxiliary Option A module type fitted	OPnA	RS485	RS485 communications
		DIG	Digital Input*
Auxiliary Option B module type fitted	OPnB	rSP	Remote Setpoint Input (basic)*
		nonE	No option fitted
Firmware type	FtU	nonE	Remote Setpoint Input (full) and Digital Input 2*
		155	
Firmware issue	ISS	Value displayed is firmware issue number	
Product Revision Level	PfL	Value displayed is Product Revision level	
Date of manufacture	dOPn	Manufacturing date code (mmyy)	
Serial number 1	Sn1	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. MESSAGES & ERROR INDICATIONS

These messages indicate that an error has occurred or there is a problem with the process variable input signal or its wiring.
Caution: Do not continue with the process until the issue is resolved.

Parameter	Upper Display	Lower Display	Description
Instrument parameters are in default conditions	GoTo	Conf	Configuration & Setup required. This screen is seen at first turn on, or if hardware configuration has been changed. Press to enter the Configuration Mode, next press or to enter the unlock code number, then press to proceed
Input Over Range	[HH]	Normal	Process variable input > 5% over-range
Input Under Range	[LL]	Normal	Process variable input > 5% under-range
Input Sensor Break	OPEN	Normal	Break detected in process variable input sensor or wiring
RSP Over Range	[HH]	Normal	RSP input over-range
RSP Under Range	[LL]	Normal	RSP input under-range
RSP Break	OPEN	Normal	Break detected in RSP input signal
Option 1 Error	OPn1		Option 1 module fault
Option 2 Error	OPn2		Option 2 module fault
Option 3 Error	OPn3		Option 3 module fault
Option A Error	OPnA		Option A module fault or RSP in both A & B
Option B Error	OPnB		Option B module fault

8. OPERATOR MODE

This mode is entered at power on, or 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 Operator Mode parameters in Display strategy 6 are read only (see dISA in configuration mode), they can only be adjusted via Setup mode.

Upper Display	Lower Display	Display Strategy and When Visible	Description
PV Value	Active SP Value	1 & 2 (initial screen)	PV and target value of selected SP. Local Setpoints are 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 dISA and RSP not fitted	Target value of SP. Adjustable except in Strategy 6
SP1 Value	SP1	Digital input = dISA. - lit if active SP = SP1	Target value of SP1. Adjustable except in Strategy 6
SP2 Value	SP2	Digital input = dISA. - lit if active SP = SP2	Target value of SP2. Adjustable except in Strategy 6
Local SP Value	LSP	RSP fitted. - or - lit if the active SP = LSP	Target value of local setpoint. Adjustable except in Strategy 6
Remote SP Value	rSP	RSP fitted. - or - lit if the active SP = rSP	Target value of remote setpoint. Read only
dISA, LSP or rSP	SPS	RSP is fitted, digital input is not dISA and SSEN is enabled in Setup mode	Selects local/remote active setpoint. LSP = local SP, rSP = remote SP. dISA = selection via digital input (if configured). Note: selecting LSP or rSP will override digital input, active SP indication changes to - Adjustable except in Strategy 6
Actual SP Value	SPr	rP is not blank	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
Active Alarm Status	ALSt	When one or more alarms are active. 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 key in Operator mode, or by changing the status of a digital input if dISA or dISA2 have been configured for dISA in Configuration mode. While in Manual Control mode, the indicator will flash 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: Manual power level is not restricted by the OPuL power limit.

9. SERIAL COMMUNICATIONS

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

10. SPECIFICATIONS

UNIVERSAL INPUT

Thermocouple: ±0.1% of full range, ±1LSD (±1°C for Thermocouple CJC).
Calibration: BS4937, NBS125 & IEC584.
PT100 Calibration: ±0.1% of full range, ±1LSD.
BS1904 & DIN43760 (0.00385Ω/Ω°C).
DC Calibration: ±0.1% of full range, ±1LSD.
Sampling Rate: 4 per second.
Impedance: >10MΩ resistive, except DC mA (5Ω) and V (47kΩ).
Sensor Break Detection: Thermocouple, RTD, 4 to 20 mA, 2 to 10V and 1 to 5V ranges only. Control outputs turn off.
Isolation: Isolated from all outputs (except SSR driver).
Universal input must not be connected to operator accessible circuits if relay outputs are connected to a hazardous voltage source. Supplementary insulation or input grounding would then be required.

REMOTE SETPOINT INPUT

Accuracy: ±0.25% of input range ±1 LSD.
Sampling Rate: 4 per second.
Sensor Break Detection: 4 to 20 mA, 2 to 10V and 1 to 5V ranges only. Control outputs turn off if RSP is the active SP.
Isolation: Slot A - Basic isolation, Slot B - Reinforced safety isolation from other inputs and outputs.

DIGITAL INPUTS

Volt-free(or TTL): Open(2 to 24VDC) = SP1, Local SP or Auto Mode, Closed(<0.8VDC) = SP2, Remote SP or Manual Mode.
Isolation: Reinforced safety isolation from inputs and other outputs.

OUTPUTS

Relay
Contact Type & Rating: Single pole double throw (SPDT); 2A resistive at 120/240VAC.
Lifetime: >500,000 operations at rated voltage/current.
Isolation: Basic isolation from universal input and SSR outputs.

SSR Driver

Drive Capability: SSR drive voltage >10V into 500Ω min.
Isolation: Not isolated from universal input or other SSR driver outputs.

Triac

Operating Voltage: 20 to 280Vrms (47 to 63Hz).
Current Rating: 0.01 to 1A (full cycle rms on-state @ 25°C); derates linearly above 40°C to 0.5A @ 80°C.
Isolation: Reinforced safety isolation from inputs and other outputs.

DC

Resolution: 8 bits in 250mS (10 bits in 1s typical, >10 bits in >1s typical).
Isolation: Reinforced safety isolation from inputs and other outputs.

Transmitter PSU

Power Rating: 20 to 28V DC (24V nominal) into 910Ω minimum resistance.
Isolation: Reinforced safety isolation from inputs and other outputs.

SERIAL COMMUNICATIONS

Physical: RS485, at 1200, 2400, 4800, 9600 or 19200 bps.
Protocols: Selectable between Modbus and West ASCII.
Isolation: Reinforced safety isolation from all inputs and outputs.

OPERATING CONDITIONS (FOR INDOOR USE)

Ambient: 0°C to 55°C (Operating), -20°C to 80°C (Storage).
Temperature:
Relative Humidity: 20% to 95% non-condensing.
Supply Voltage and Power: 100 to 240VAC ±10%, 50/60Hz, 7.5VA (for mains powered versions), or 20 to 48VAC 50/60Hz 7.5VA or 22 to 65VDC 5W (for low voltage versions).

ENVIRONMENTAL

Standards: CE, UL, ULC.
EMI: Complies with EN61326 (Susceptibility & Emissions).
Safety: Complies with EN61010-1 & UL3121.
Considerations: Pollution Degree 2, Installation Category II.
Front Panel Sealing: To IP66 (IP20 behind the panel).

PHYSICAL

Front Bezel Size: 1/16 Din = 48 x 48mm, 1/8 Din = 96 x 48mm, 1/4 Din = 96 x 96mm.
Depth Behind Panel: 1/16 Din = 110mm, 1/8 & 1/4 Din = 100mm.
Weight: 0.21kg maximum.