

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

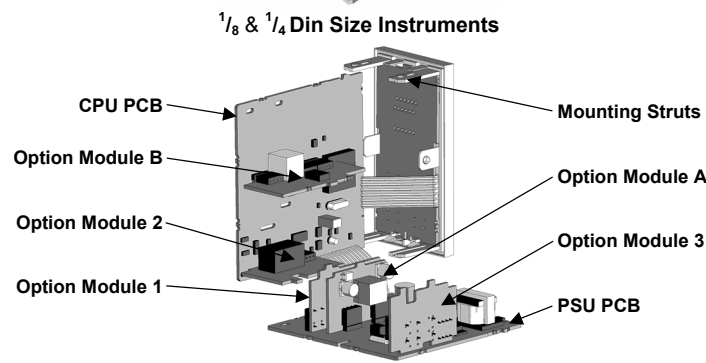
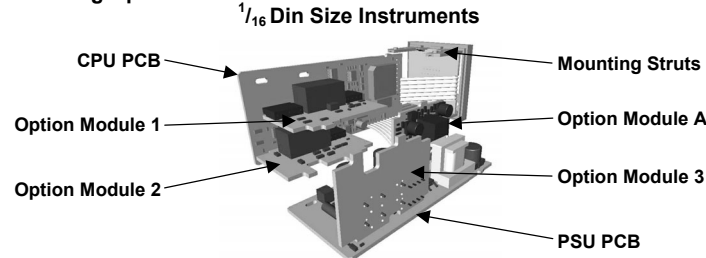
CAUTION: Installation should be only performed by technically competent personnel. Local Regulations regarding electrical installation & safety must be observed.

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.

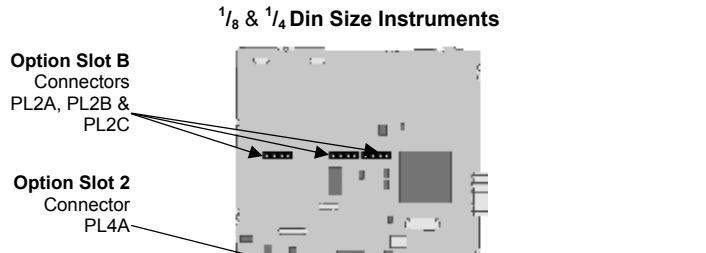
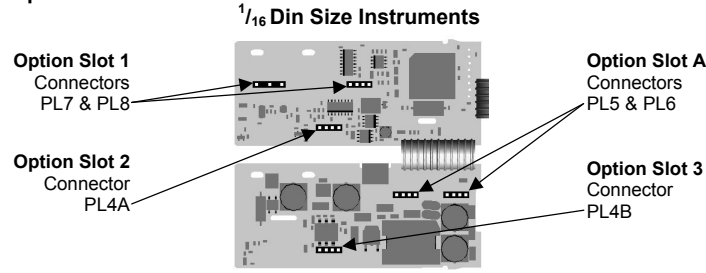
Installing Option Modules



- 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



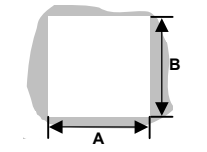
Panel-Mounting

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

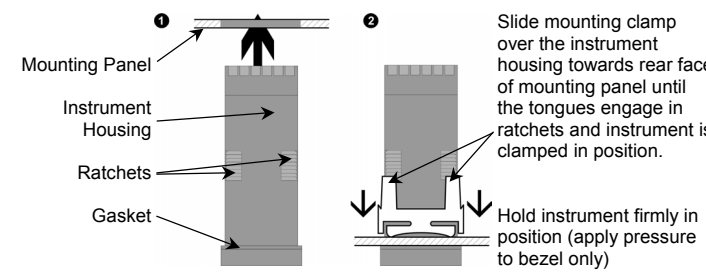
Cut-Out Dim A
1/16 & 1/8 Din = 45mm
1/4 Din = 92mm

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 48*n*-4mm (1/16 & 1/8 Din) or 96*n*-4mm (1/4 Din)



Tolerance +0.5, -0.0mm

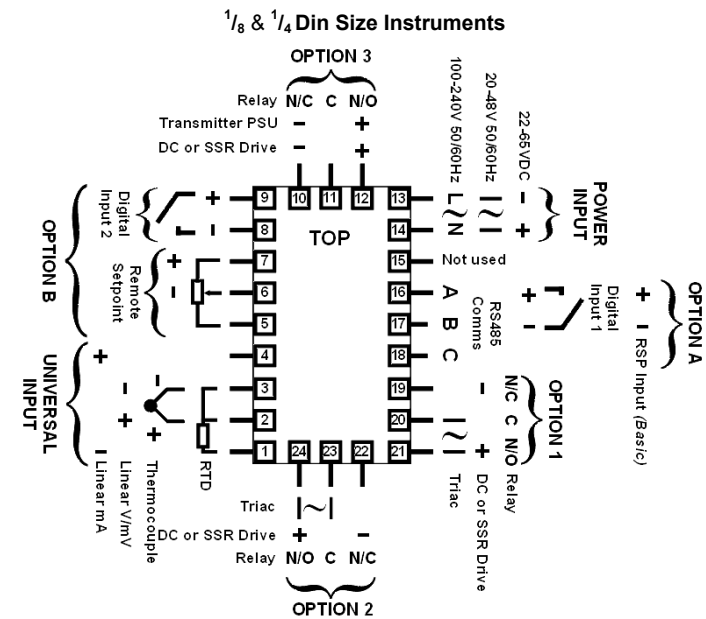
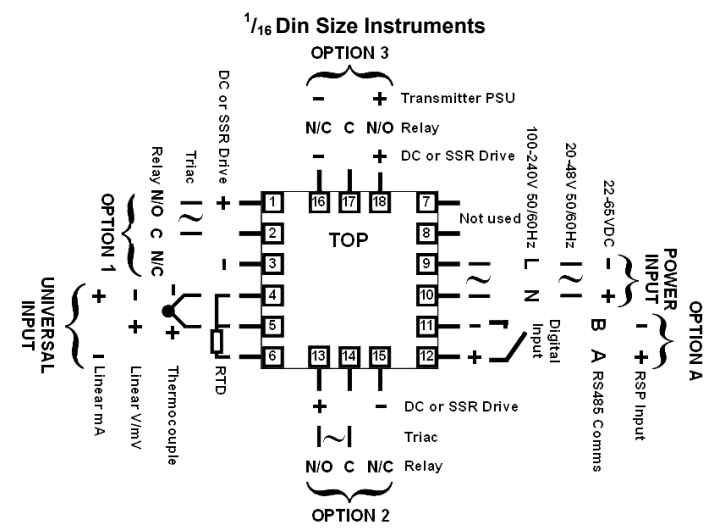


CAUTION: Do not remove the panel gasket; it is a seal against dust and moisture.

Rear Terminal Wiring

USE COPPER CONDUCTORS (EXCEPT FOR T/C INPUT)

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



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

Mode	Upper Display	Lower Display	Description	Default Unlock Codes
Operator	OPtr	SLct	Normal operation	None
Set Up	SEtP	SLct	Tailor settings to the application	10
Configuration	ConF	SLct	Configure the instrument for use	20
Product Info	inFo	SLct	Check manufacturing information	None
Auto-Tuning	Autun	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. Press `⏏` to accept the change, 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. 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	inPt		See following table for possible codes	JC
Code	Input Type & Range	Code	Input Type & Range	Code
bC	B: 100 - 1824 °C	LC	L: 0.0 - 537.7 °C	P24F
bF	B: 211 - 3315 °F	LF	L: 32.0 - 999.9 °F	
cC	C: 0 - 2320 °C	nC	N: 0 - 1399 °C	Pt100
cF	C: 32 - 4208 °F	nF	N: 32 - 2551 °F	PtF
JC	J: -200 - 1200 °C	rC	R: 0 - 1759 °C	Pt100
JF	J: -328 - 2192 °F	rF	R: 32 - 3198 °F	Pt100
J.C	J: -128.8 - 537.7 °C	S.C	S: 0 - 1762 °C	0.20
J.F	J: -199.9 - 999.9 °F	S.F	S: 32 - 3204 °F	4.20
K.C	K: -240 - 1373 °C	t.C	T: -240 - 400 °C	0.50
K.F	K: -400 - 2503 °F	t.F	T: -400 - 752 °F	10.50
K.C	K: -128.8 - 537.7 °C	t.C	T: -128.8 - 400.0 °C	0.5
K.F	K: -199.9 - 999.9 °F	t.F	T: -199.9 - 752.0 °F	1.5
L.C	L: 0 - 762 °C			0.10
L.F	L: 32 - 1403 °F	P24C	PIRh20% vs. 40%: 0 - 1850 °C	2.10

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	ruL		Scale Range Lower Limit +100 to Range Maximum	Range max (Lin=1000)
Scale Range Lower Limit	rLL		Range Minimum 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		Primary only	SnGL
Primary Output Control Action	CtrL		Reverse Acting	rEu
Alarm 1Type	ALA1		Process High Alarm	P_H1
High Alarm 1 value*	PhA1		Process Low Alarm	P_Lo
Low Alarm 1 value*	PLA1		Deviation Alarm	dE
Band Alarm 1 value*	bAL1		Band Alarm	bAnd
Dev. Alarm 1 value*	dAL1		No alarm	nonE
Alarm 1 Hysteresis*	AHY1		Range Minimum to Range Maximum in display units	
Alarm 2 Type*	ALA2		1 LSD to span from setpoint in display units	5
High Alarm 2 value*	PhA2		Options as for alarm 1	
Low Alarm 2 value*	PLA2			
Band Alarm 2 value*	bAL2			5

Parameter	Lower Display	Upper Display	Adjustment range & Description	Default Value
Dev. Alarm 2 Value*	dAL2		Options as for alarm 1	5
Alarm 2 Hysteresis*	AHY2			1
Loop Alarm	LAEn		d.sA (disabled) or EnAb (enabled)	d.sA
Loop Alarm Time*	LAEt		1 sec to 99 mins. 59secs	99.59
Alarm Inhibit	Inh1		nonE (No alarms Inhibited)	nonE
			ALA1 (Alarm 1 inhibited)	
			ALA2 (Alarm 2 inhibited)	
			both (Alarm 1 and alarm 2 inhibited)	
			Pr1 (Primary Power)	
			SEc (Secondary Power)	
			Al_d (Alarm 1, Direct)	
			Al_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)	
			rEtP (Retransmit SP Output)	
			rEtV (Retransmit PV Output)	
			0.5 (0 to 5 V DC output)	
			0.10 (0 to 10 V DC output)	
			0.20 (0 to 20 mA DC output)	
			4.20 (4 to 20 mA DC output)	
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	tYP2		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	tYP3		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	dSP		1, 2, 3, 4, 5 or 6 (refer to section 8)	1
Serial Communications Protocol	Prot		ASC1 (ASCII)	Prot
			P7bn (Modbus with no parity)	
			P7bE (Modbus with Even Parity)	
			P7bo (Modbus with Odd Parity)	
Serial Communications 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 to 255 (Modbus), 1 to 99 (ASCII)	1
Comms Write	CoEn		r_wJ (Read/Write)	r_wJ
			r_oJ (Read only)	
Digital Input 1 Usage	dIG1		d.S1 (Setpoint 1 / Setpoint 2 select*)	d.S1
			d.A5 (Automatic / Manual select)	
Digital Input 2 Usage	dIG2		d.S1 (Setpoint 1 / Setpoint 2 select*)	d.r5
			d.A5 (Automatic / Manual select)	
			d.r5 (Remote / Local setpoint select)	

Note: d IG2 has priority over d IG1 if both are configured for the same usage. If d IG1 or d IG2 = d IS1 the remote setpoint input is disabled.

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Parameter	Lower Display	Upper Display	Adjustment range & Description	Default Value
Remote Setpoint Input Range	rSP	0.20	0 to 20 mA DC input	0.10
		4.20	4 to 20 mA DC input	
		0.10	0 to 10 V DC input	
		2.10	2 to 10 V DC input	
		0.5	0 to 5 V DC input	
		1.5	1 to 5 V DC input	
		100	0 to 100mV DC input	
	Potentiometer (2KΩ minimum)	Available on full RSP (Slot B) only		
RSP Upper Limit	rSPu		-1999 to 9999	Range max
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 \leftarrow to scroll through the parameters, then press \rightarrow or \downarrow to set the required value. To exit from Setup mode, hold down \leftarrow and press \rightarrow 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	FILt		OFF or 0.5 to 100.0 secs	2.0
Process Variable Offset	OFFS		±Span of controller	0
Primary Power	PPUJ		Current power levels (read only)	N/A
Secondary Power	SPUJ			
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)	rARtE		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)	bRS		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. (Entered as a percentage of span)	0.5
Secondary ON/OFF Diff.	dIFS			
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	PHR1		Range Minimum to Range Maximum	R/max
Low Alarm 1 value	PLR1			R/min
Deviation Alarm 1 Value	dRAL1		±Span from SP in display units	5
Band Alarm 1 value	bRAL1		1 LSD to span from setpoint	5
Alarm 1 Hysteresis	AHY1		1 LSD to full span in display units	1
High Alarm 2 value	PHR2		Range Minimum to Range Maximum	R/max
Low Alarm 2 value	PLR2			R/min
Deviation Alarm 2 Value	dRAL2		±Span from SP in display units	5
Band Alarm 2 value	bRAL2		1 LSD to span from setpoint	5
Alarm 2 Hysteresis	AHY2		1 LSD to full span in display units	1
Loop Alarm Time	LARt		1 LSD to full span in display units	99.59
Auto Pre-tune	APt			
Auto/manual Control selection	PaEn		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			
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 - 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			

5. AUTOMATIC TUNING MODE

First select Automatic tuning mode from Select mode (refer to section 2). Press \leftarrow to scroll through the modes, then press \rightarrow or \downarrow to set the required value. To exit from Automatic tuning mode, hold down \leftarrow and press \rightarrow 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	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 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 \leftarrow to view each parameter. To exit from Product Information mode, hold down \leftarrow and press \rightarrow to return to Select mode. **Note: These parameters are all read only.**

Parameter	Lower Display	Upper Display	Description
Input type	In_1	Un_1	Universal input
Option 1 module type fitted	OPn1	nonE	No option fitted
		rLY	Relay output
		SSr	SSR drive output
		tr_1	Triac output
Option 2 module type fitted	OPn2	L in	Linear DC voltage / current output
			As Option 1
Option 3 module type fitted	OPn3	nonE	No option fitted
		rLY	Relay output
		SSr	SSR drive output
		L in	Linear DC voltage / current output
Auxiliary Option A module type fitted	OPnA	dc24	Transmitter power supply
		nonE	No option fitted
		r485	RS485 communications
		dIG_1	Digital Input*
Auxiliary Option B module type fitted	OPnB	rSP_1	Remote Setpoint Input (basic)*
		nonE	No option fitted
Firmware type	FLUJ	rSP_1	Remote Setpoint Input (full) and Digital Input 2*
			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	d0r7		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 \leftarrow to enter the Configuration Mode, next press \rightarrow or \downarrow to enter the unlock code number, then press \rightarrow to proceed
Input Over Range	CHK	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	CHK	**	RSP input over-range
RSP Under Range	LL	**	RSP input under-range
RSP Break	OPEN	**	Break detected in RSP input signal
Option 1 Error	Err	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 \leftarrow to scroll through the parameters, then press \rightarrow or \downarrow 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
dIG_1, 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. dIG_1 = 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	SPrP	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 PaEn is set to EnAb in Setup mode, manual control can be selected/de-selected by pressing the \leftarrow key in Operator mode, or by changing the status of a digital input if dIG_1 or dIG_2 have been configured for dISA in Configuration mode. While in Manual Control mode, the MAN 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 \rightarrow or \downarrow 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.



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