

# 1/16 - 1/8 - 1/4 DIN VMD CONTROLLERS CONCISE PRODUCT MANUAL (59377-6)

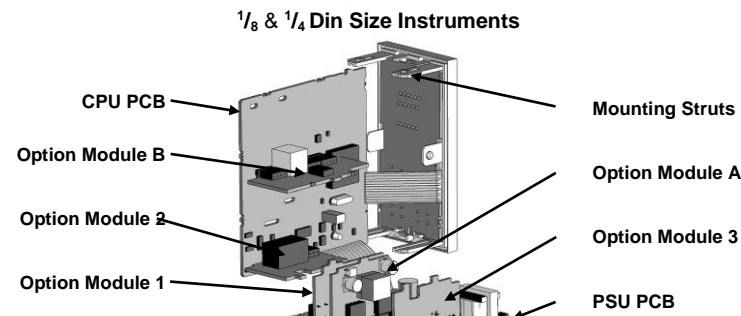
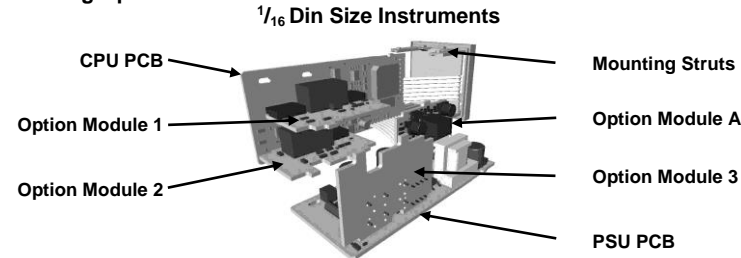
**CAUTION:** Installation should be only performed by technically competent personnel. Local Regulations regarding electrical installation & safety must be observed.

## 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

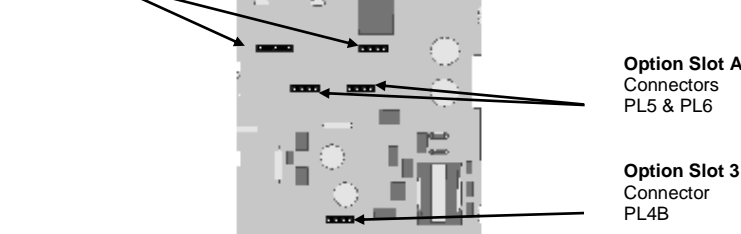
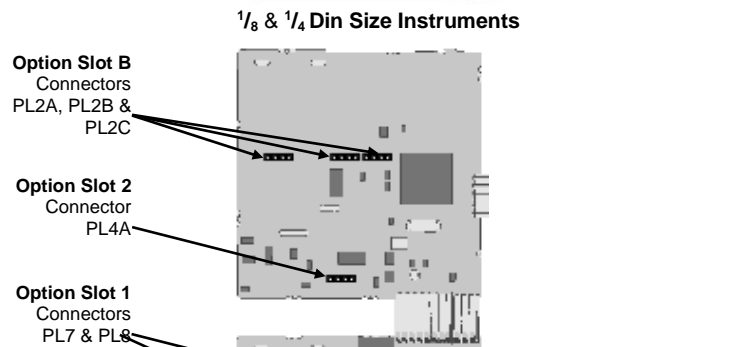
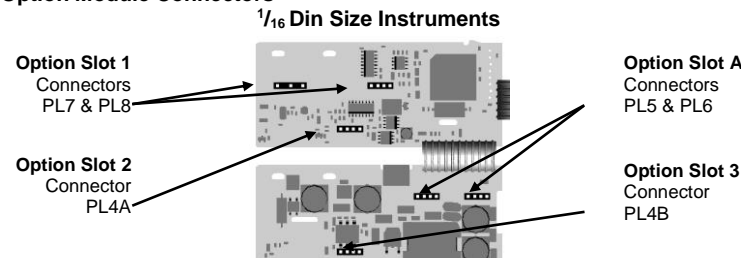


To access modules 1, A or B, first detach the PSU and CPU boards from the front by lifting first the upper, and then lower mounting struts. Gently separate the boards.

- 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



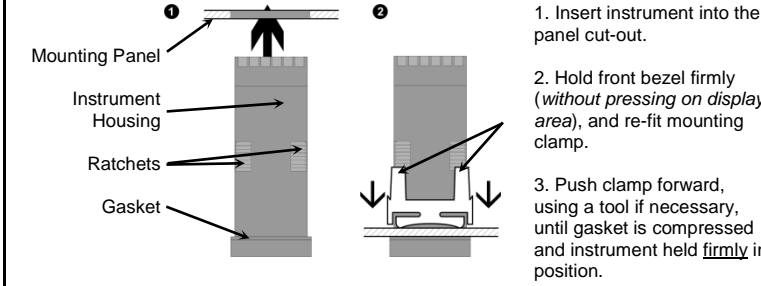
### Panel-Mounting

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

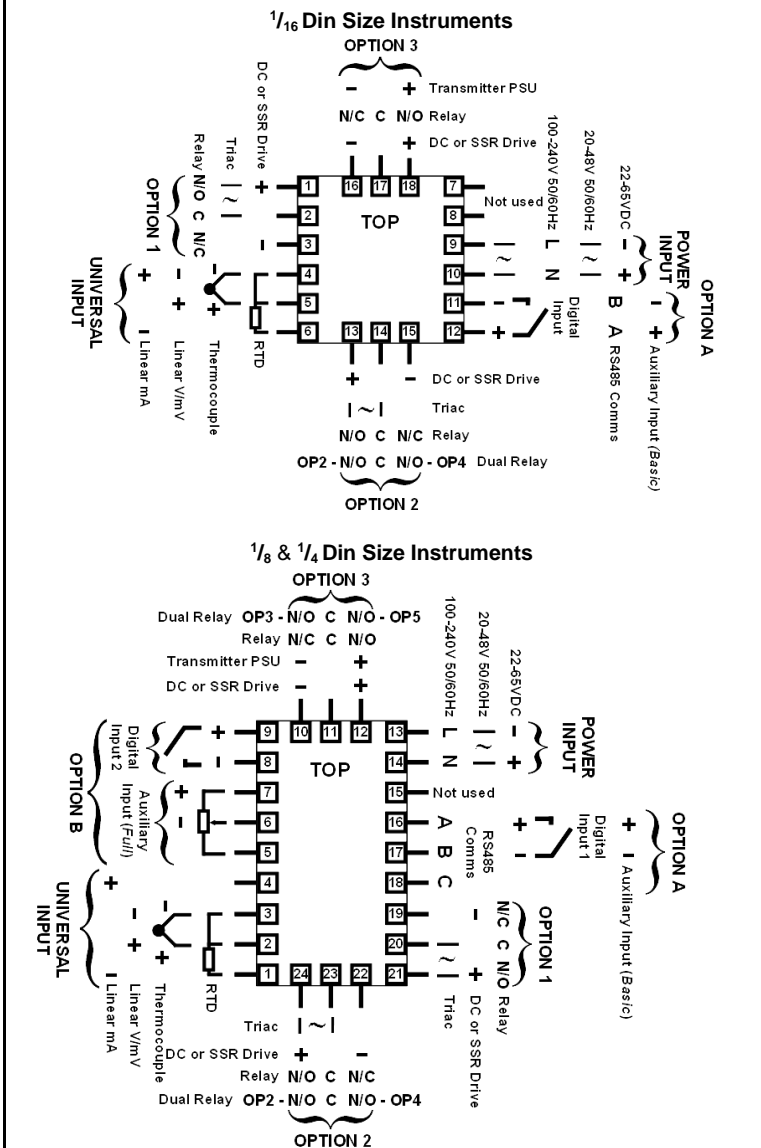
For *n* multiple instruments mounted side-by-side, cut-out A is 48*n*-4mm (1/16 & 1/8 Din) or 96*n*-4mm (1/4 Din)



**CAUTION:** For an effective IP66 & NEMA 4X seal against dust and moisture, ensure gasket is well compressed against the panel, with the 4 tongues located in the same ratchet slot.

### Rear Terminal Wiring

USE COPPER CONDUCTORS (EXCEPT FOR T/C INPUT). CABLE RATING 80°C MIN  
Single Strand wire gauge: Max 1.2mm (18SWG)



**Note:** This controller uses Three-Point Stepping Control. This requires two identical outputs (2 Relays, 2 Triacs, 2 SSR Drivers or 1 Dual Relay) for the valve Open & Close functions. See Output Usage 1-5 in Configuration Mode.

**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

### Supplementary Installation Information

- Compliance shall not be impaired when fitted to the final installation.
- Designed to offer a minimum of Basic Insulation only.
- The body responsible for the installation is to ensure that supplementary insulation suitable for Installation Category II is achieved when fully installed.
- To avoid possible hazards, accessible conductive parts of the final installation should be protectively earthed in accordance with EN6010 for Class 1 Equipment.
- Output wiring should be within a Protectively Earthed cabinet.
- Sensor sheaths should be bonded to protective earth or not be accessible.
- Live parts should not be accessible without the use of a tool.
- A disconnecting device should disconnect both LINE & NEUTRAL conductors simultaneously.
- The disconnecting device must be easily accessible.

**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 – SLCt

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 – ConF

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	
<b>Code</b>	<b>Input Type &amp; Range</b>	<b>Code</b>	<b>Input Type &amp; Range</b>	<b>Code</b>	<b>Input Type &amp; Range</b>
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	PtC	Pt100: -199 - 800 °C
cC	C: 0 - 2320 °C	NC	N: 0 - 1399 °C	PtF	Pt100: -328 - 1472 °F
cF	C: 32 - 4208 °F	NF	N: 32 - 2551 °F	PtL	Pt100: -128.8 - 537.7 °C
JC	J: -200 - 1200 °C	rC	R: 0 - 1759 °C	PtF	Pt100: -199.9 - 999.9 °F
JF	J: -328 - 2192 °F	rF	R: 32 - 3198 °F	S	S: 0 - 1762 °C
JL	J: -128.8 - 537.7 °C	SL	S: 0 - 1762 °C	0.20	0 - 20 mA DC
JF	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
PC	P: -128.8 - 537.7 °C	tC	T: -128.8 - 400.0 °C	0.5	0 - 5 V DC
PF	P: -199.9 - 999.9 °F	tF	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	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	rUL		Scale Range Lower Limit +100 to Range Maximum	Range max (Lin=1000)
Scale Range Lower Limit	rLL		Scale 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
Primary Output Control Action	Ctrl	rEu dir	Reverse Acting Direct Acting	rEu
Motor Travel Time	tr		0.05 to 5.00 (5 secs to 5 mins 0 secs) Time Valve takes to move between its physical end stops (full Open to full Closed).	1.00
Alarm 1Type	ALR1	P_H	Process High Alarm	P_H
		P_Lo	Process Low Alarm	
		dE	Deviation Alarm	
		bAnd	Band Alarm	
		nonE	No alarm	

Parameter	Lower Display	Upper Display	Adjustment range & Description
High Alarm 1 value**	Phr1		Range Minimum to Range Maximum in display units
Low Alarm 1 value**	PLR1		Range Min
Band Alarm 1 value**	bAL1		1 LSD to span from setpoint in display units
Dev. Alarm 1 value**	dAL1		+/- Span from setpoint in display units
Alarm 1 Hysteresis**	AHY1		1 LSD to full span in display units
Alarm 2 Type**	ALR2		Options as for alarm 1
High Alarm 2 value**	Phr2		Range Max
Low Alarm 2 value**	PLR2		Range Min
Band Alarm 2 value**	bAL2		5
Dev. Alarm 2 Value**	dAL2		5
Alarm 2 Hysteresis**	AHY2		Options as for alarm 1
Loop Alarm	LAEn		d SA (disabled) or EnAb (enabled)
Alarm Inhibit	Inh	nonE	No alarms inhibited
		ALA1	Alarm 1 inhibited
		ALA2	Alarm 2 inhibited
		both	Alarm 1 and alarm 2 inhibited
Output 1 Usage*	USE1	OPN	Valve Open
		CLS	Valve Close
		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
Linear Output 1 Range	tYP1	0.5	0 to 5 V DC output
		0.10	0 to 10 V DC output
		2.10	2 to 10 V DC output
		0.20	0 to 20 mA DC output
Retransmit Output 1 Scale maximum	ro1H	-1999 to 9999	(display value at which output will be maximum)
		-1999 to 9999	(display value at which output will be minimum)
		0.20	0 to 20 mA DC output
		4.20	4 to 20 mA DC output
Retransmit Output 1 Scale minimum	ro1L	-1999 to 9999	(display value at which output will be maximum)
		-1999 to 9999	(display value at which output will be minimum)
		0.20	0 to 20 mA DC output
		4.20	4 to 20 mA DC output
Output 2 Usage*	USE2		As for output 1
Linear Output 2 Range	tYP2		As for output 1
Retransmit Output 2 Scale maximum	ro2H	-1999 to 9999	(display value at which output will be maximum)
		-1999 to 9999	(display value at which output will be minimum)
		0.50	0 - 50 mV DC
		10.50	10 - 50 mV DC
Retransmit Output 2 Scale minimum	ro2L	-1999 to 9999	(display value at which output will be maximum)
		-1999 to 9999	(display value at which output will be minimum)
		0.5	0 - 5 V DC
		1.5	1 - 5 V DC
Output 3 Usage*	USE3		As for output 1
Linear Output 3 Range	tYP3		As for output 1
Retransmit Output 3 Scale maximum	ro3H	-1999 to 9999	(display value at which output will be maximum)
		-1999 to 9999	(display value at which output will be minimum)
		0.10	0 - 10 V DC
		2.10	2 - 10 V DC
Retransmit Output 3 Scale minimum	ro3L	-1999 to 9999	(display value at which output will be maximum)
		-1999 to 9999	(display value at which output will be minimum)
		0.10	0 - 10 V DC
		2.10	2 - 10 V DC
Output 4 Usage*	USE4		As for output 1 except Retransmit of PV or SP is not possible.
Output 5 Usage*	USE5		As for output 1 except Retransmit of PV or SP is not possible.
Display Strategy	d SP		1, 2, 3, 4, 5, 6 or 7 (refer to section 8)
Serial Communications Protocol	Prot	r7bn	Modbus with no parity
		r7bE	Modbus with Even Parity
		r7bo	Modbus with Odd Parity
Serial Communications Bit Rate	bAud	1.2	1.2 kbps
		2.4	2.4 kbps
		4.8	4.8 kbps
		9.6	9.6 kbps
Comms Address	Addr		1 to 255

Comms Write	$r_{oEn}$	$r_{LW}$	Read/Write	$r_{LW}$
		$r_{L0}$	Read only	
Auxiliary Input A Usage	$r_{iPA}$	$r_{SP}$	Remote Setpoint ( <i>basic</i> )	$r_{in}$
		$P_{in}$	Valve Position Indication ( <i>basic</i> )	
Auxiliary Input B Usage	$r_{iPB}$	$r_{SP}$	Remote Setpoint ( <i>Full</i> )	$r_{in}$
		$P_{in}$	Valve Position Indication ( <i>Full</i> )	
Digital Input 1 Usage	$d_{iG1}$	$d_{iS1}$	Setpoint 1 / Setpoint 2 select**	$d_{iS1}$
		$d_{iRS}$	Automatic / Manual select	
Digital Input 2 Usage	$d_{iG2}$	$d_{iS1}$	Setpoint 1 / Setpoint 2 select**	$d_{iS1}$
		$d_{iRS}$	Automatic / Manual select	
		$d_{iRS}$	Remote / Local setpoint select	
		$0_{.20}$	0 to 20 mA DC input	
		$4_{.20}$	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	Available on full Aux. (Slot B) only
		$P_{ot}$	Potentiometer (2K $\Omega$ minimum)	
RSP Upper Limit	$r_{SPU}$		-1999 to 9999. Remote SP for max. input	Range max
RSP Lower Limit	$r_{SPL}$		-1999 to 9999. Remote SP for min. input	Range min
RSP Offset	$r_{SPO}$		Constrained within Scale Range Upper & Scale Range Lower limits	0
Configuration Lock Code	$CLoc$		0 to 9999. Unlock Code for this mode	20

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 (RSP) input is disabled.

#### 4. SETUP MODE - $SEtP$

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  $\Delta$  or  $\nabla$  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	$F_{iLt}$	0.0 (Off) or 0.5 to 100.0 secs.	2.0
Process Variable Offset	$OFF5$	$\pm$ Span of controller	0
Primary Proportional Band	$P_{b,P}$	0.5 to 999.9 % of input span	10.0
Automatic Reset (Integral Time)	$A_{rSt}$	0.0 I to 99.59 (1 sec to 99 mins 59 secs)	5.00
Rate (Derivative Time)	$r_{AtE}$	0.00 to 99.59 (OFF to 99 mins 59 secs)	0.00
Setpoint Upper Limit	$SP_{uL}$	Current Setpoint to Range max	R/max
Setpoint Lower limit	$SP_{lL}$	Range min to Current Setpoint	R/min
Minimum Motor On Time	$t_{on}$	0.0 secs to (Motor Travel Time / 10) secs. The minimum drive effort to begin moving valve.	0.0
Set Valve Open Position	$P_{cuL}$	See instructions below to set the valve's fully open and closed positions.	Max. Aux.
Set Valve Closed Position	$P_{cLL}$		Min. Aux.
Valve Open Limit	$P_{iUL}$	$P_{iLL} + 1$ to 100. The maximum position valve will be driven to	100
Valve Closed Limit	$P_{iLL}$	0 to $P_{iUL} - 1$ . The minimum position valve will be driven to	0
High Alarm 1 value	$PhA1$		R/max
Low Alarm 1 value	$PLA1$	Range Minimum to Range Maximum	R/min
Deviation Alarm 1 Value	$dAL1$	$\pm$ Span from SP in display units	5
Band Alarm 1 value	$bAL1$	1 LSD to span from setpoint	5
Alarm 1 Hysteresis	$AH1$	1 LSD to full span in display units	1
High Alarm 2 value	$PhA2$		R/max
Low Alarm 2 value	$PLA2$	Range Minimum to Range Maximum	R/min
Deviation Alarm 2 Value	$dAL2$	$\pm$ Span from SP in display units	5
Band Alarm 2 value	$bAL2$	1 LSD to span from setpoint	5
Alarm 2 Hysteresis	$AH2$	1 LSD to full span in display units	1
Auto Pre-tune	$APt$		
Auto/manual Control selection	$P_{oEn}$	$d_{iSA}$ (disabled) or $EnAb$ (enabled)	$d_{iSA}$
Setpoint Select shown in Operator Mode	$SSEn$		
Setpoint ramp adjustment shown in Operator Mode	$SP_r$		
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 $LSP$ )	Scale Range Minimum
Local Setpoint Value	$LSP$		
Setpoint 1 Value	$SP1$		

Setpoint 2 Value	$SP2$	- or $\bar{\quad}$ before the legend indicates the currently active SP)	
Setup Lock Code	$SLoc$	0 to 9999	10

#### Setting the Valve Opened & Valve Closed Positions

With  $P_{cuL}$  in the lower display press  $\Delta$ . The top display shows  $oPnG$ . Press  $\Delta$  to drive open the valve until it reaches the "fully open" end stop. Press  $\nabla$ . The top display will go *Blank* and the Auxiliary Input value will be measured and stored as the value equal to the fully open valve position. Press  $\Delta$ . The lower display shows  $P_{cLL}$ . Press  $\Delta$ . The top display shows  $cLSG$ . Press  $\nabla$  to drive closed the valve until it reaches the "fully closed" end stop. Press  $\Delta$ . The top display will go *Blank* and the Auxiliary Input value will be measured and stored as the value equal to the fully closed valve position.

#### 5. AUTOMATIC TUNING MODE - $Atun$

First select Automatic tuning mode from Select mode (refer to section 2). Press  $\Delta$  to scroll through the modes, then press  $\Delta$  or  $\nabla$  to set the required value. To exit from Automatic tuning mode, hold down and press  $\Delta$ , 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	$P_{tun}$	On or OFF. *Pre-tune will not engage if setpoint is ramping, or the PV is less than 5% of input span from the setpoint. Indication remains OFF	OFF
Self-Tune	$S_{tun}$		
Tune Lock	$t_{Loc}$	0 to 9999	0

#### 6. PRODUCT INFORMATION MODE - $inFo$

First select Product information mode from Select mode (refer to section 2). Press  $\Delta$  to view each parameter. To exit from Product Information mode, hold down and press  $\Delta$  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
		$nonE$	No option fitted
		$rLY$	Relay output
Option 1 module type fitted	$OPn1$	$SSr$	SSR drive output
		$tr_1$	Triac output
		$L_{in}$	Linear DC voltage / current output
		$nonE$	No option fitted
		$dRLY$	Dual Relay output
		$rLY$	Relay output
		$SSr$	SSR drive output
		$tr_1$	Triac output
		$L_{in}$	Linear DC voltage / current output
		$dc24$	Transmitter power supply
Option 3 module type fitted	$OPn3$		As Option 2
		$nonE$	No option fitted
Auxiliary Option A module type fitted	$OPnA$	$r4B5$	RS485 communications
		$d_{iG1}$	Digital Input*
		$rSP_1$	Auxiliary Input ( <i>basic</i> )*
		$nonE$	No option fitted
Auxiliary Option B module type fitted	$OPnb$	$rSP_1$	Auxiliary Input ( <i>full</i> ) and Digital Input 2*
Firmware type	$FLW$		Value displayed is firmware type number
Firmware issue	$ISS$		Value displayed is firmware issue number
Product Revision Level	$P_rL$		Value displayed is Product Revision level
Date of manufacture	$dOrY$		Manufacturing date code (mmyy)
Serial number 1	$S_n1$		First four digits of serial number
Serial number 2	$S_n2$		Middle four digits of serial number
Serial number 3	$S_n3$		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 connection or signal. **Caution: Do not continue with the process until the issue is resolved.**

Parameter	Upper Display	Lower Display	Description
	$CoTo$	$ConF$	Configuration & Setup required. This screen is seen at first turn on, or if hardware configuration has been changed. Press $\Delta$ to enter the Configuration Mode, next press $\Delta$ or $\nabla$ to enter the unlock code number, then press $\Delta$ to proceed

Parameter	Upper Display	Lower Display	Description
Input Over Range	$CHH$	Normal	Process variable input > 5% over-range
Input Under Range	$CLL$	Normal	Process variable input > 5% under-range
Input Sensor Break	$OPEN$	Normal	Break detected in process variable input sensor or wiring.
Aux. Over Range	Normal	$CHH$ **	Auxiliary input over-range ** also seen wherever Aux value would be displayed
Aux. Under Range	Normal	$CLL$ **	Auxiliary input under-range
Auxiliary Input Break	Normal	$OPEN$ **	Break detected in Auxiliary 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 fault or Aux fitted in both A & B
Option B Error		$OPnb$	Option B module fault

#### 8. OPERATOR MODE - $OPtR$

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  $\Delta$  to scroll through the parameters, then press  $\Delta$  or  $\nabla$  to set the required value.

Note: All Operator Mode parameters in Display strategy 6 are read only (see  $d_{iSP}$  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
PV Value	Auxiliary Input Value	7 (initial screen)	PV and Valve Position or Flow. Read only
SP Value	$SP$	1 & 3 - 7 if digital input is not $d_{iS1}$ and RSP not configured	Target value of SP. Adjustable except in Strategy 6
SP1 Value	$SP1$	Digital input = $d_{iS1}$ . lit if active SP = SP1	Target value of SP1. Adjustable except in Strategy 6
SP2 Value	$SP2$	Digital input = $d_{iS1}$ . lit if active SP = SP2	Target value of SP2. Adjustable except in Strategy 6
Local SP Value	$LSP$	RSP fitted. lit if the active SP = $LSP$	Target value of local setpoint. Adjustable except in Strategy 6
Remote SP Value	$rSP$	RSP fitted. lit if the active SP = $rSP$	Target value of remote setpoint. Read only
$d_{iG1}$ , $LSP$ or $rSP$	$SP5$	RSP is fitted, digital input is not $d_{iS1}$ and $SSEn$ is enabled in Setup mode	Selects local/remote active setpoint. $LSP$ = local SP, $rSP$ = remote SP. $d_{iG1}$ = selection via digital input (if configured). Note: selecting $LSP$ or $rSP$ will override digital input, active SP indication changes to $\bar{\quad}$ . Adjustable except in Strategy 6
Actual SP Value	$SP_rP$	$rP$ is not blank	Actual (ramping) value of selected SP. Read only
Ramp Rate	$rP$	$SP_r$ 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 Valve Control

If  $P_{oEn}$  is set to  $EnAb$  in Setup mode, manual control can be selected/de-selected by pressing the  $\Delta$  key in Operator mode, via serial communications, or by changing the status of a digital input if  $d_{iG1}$  or  $d_{iG2}$  has been configured for  $d_{iRS}$  in Configuration mode. While in Manual Control mode, the  $\Delta$  indicator will flash and the lower display will show  $rPA_n$ . If Valve Position Indication is configured, the lower display will show  $P_{xxx}$  instead of  $rPA_n$ , where xxx is the valve position as read by the Auxiliary Input.  $P0$  means the valve is fully closed,  $P100$  means the valve is fully opened.

Press  $\Delta$  to move the valve motor in the "open" direction or  $\nabla$  to move the valve motor in the "close" direction. Keep pressing the key until the desired valve position is achieved

#### 9. SERIAL COMMUNICATIONS

Refer to the full user guide (available from your supplier) for details. You cannot connect both configuration port & RS485 port at the same time.

### 10. SPECIFICATIONS

#### UNIVERSAL INPUT

Thermocouple:  $\pm 0.1\%$  of full range,  $\pm 1$  LSD ( $\pm 1^\circ\text{C}$  for Thermocouple CJC).  
Calibration: BS4937, NBS125 & IEC584.  
PT100 Calibration:  $\pm 0.1\%$  of full range,  $\pm 1$  LSD.  
BS1904 & DIN43760 (0.00385  $\Omega/^\circ\text{C}$ ).

DC Calibration:  $\pm 0.1\%$  of full range,  $\pm 1$  LSD.  
Sampling Rate: 4 per second.  
Impedance: >10M $\Omega$  resistive, except DC mA (5 $\Omega$ ) and V (47k $\Omega$ ).  
Sensor Break Detection: Thermocouple, RTD, 4 to 20 mA, 2 to 10V and 1 to 5V ranges only. "Close Valve" outputs turn ON.  
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.

#### AUXILIARY INPUT

Calibration:  $\pm 0.25\%$  of input range  $\pm 1$  LSD.  
Sampling Rate: 4 per second.  
Sensor Break Detection: 4 to 20 mA, 2 to 10V and 1 to 5V ranges only. Valve 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. 120VAC max. (240V for alarm or indirect switching of valves).  
Lifetime: >500,000 operations at rated voltage/current.  
Isolation: Basic isolation from universal input and SSR outputs.  
**Dual Relay**  
Contact Type & Rating: 2 x single pole single throw, with shared common; 2A resistive. 120VAC max. (240V for alarm or indirect switching of valves).  
Lifetime: >200,000 operations at rated voltage/current.  
Isolation: Reinforced safety isolation from inputs and other outputs.

**SSR Driver**  
Drive Capability: SSR drive voltage >10V into 500 $\Omega$  min.  
Isolation: Not isolated from universal input or other SSR driver outputs.

**Triac**  
Operating Voltage: 20 to 140Vrms (280V max. for alarm or indirect switching of valves) @ 47 to 63Hz.  
Current Rating: 0.01 to 1A (full cycle rms on-state @ 25 $^\circ\text{C}$ ); derates linearly above 40 $^\circ\text{C}$  to 0.5A @ 80 $^\circ\text{C}$ .  
Isolation: Reinforced safety isolation from inputs and other outputs.

**DC Linear**  
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: 19 to 28V DC (24V nominal) into 910 $\Omega$  minimum resistance.  
Isolation: Reinforced safety isolation from inputs and other outputs.

#### SERIAL COMMUNICATIONS

Physical: RS485, at 1200, 2400, 4800, 9600 or 19200 bps.  
Protocol: Modbus RTU.  
Isolation: Reinforced safety isolation from all inputs and outputs.

#### OPERATING CONDITIONS (FOR INDOOR USE)

Ambient Temperature: 0 $^\circ\text{C}$  to 55 $^\circ\text{C}$  (Operating), -20 $^\circ\text{C}$  to 80 $^\circ\text{C}$  (Storage).  
Relative Humidity: 20% to 95% non-condensing.  
Altitude: <2000m  
Supply Voltage and Power: 100 to 240VAC  $\pm 10\%$ , 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, cUL & CSA.  
EMI: Complies with EN61326-1:2013  
Safety Considerations: Complies with UL61010-1 Edition 3, EN61010-1 Version 2010 & CSA 22.2 No 1010.192. Pollution Degree 2, Installation Category II.  
Front Panel Sealing: To IP66 & NEMA 4X when correctly mounted - see section 1  
**PHYSICAL**  
Front Bezel Size:  $\frac{1}{16}$  Din = 48 x 48mm,  $\frac{1}{8}$  Din = 96 x 48mm,  $\frac{1}{4}$  Din = 96 x 96mm.  
Depth Behind Panel:  $\frac{1}{16}$  Din = 110mm,  $\frac{1}{8}$  &  $\frac{1}{4}$  Din = 100mm.  
Weight: 0.21kg maximum.