

59615-1 MaxVU Rail Standard Controller Concise Manual

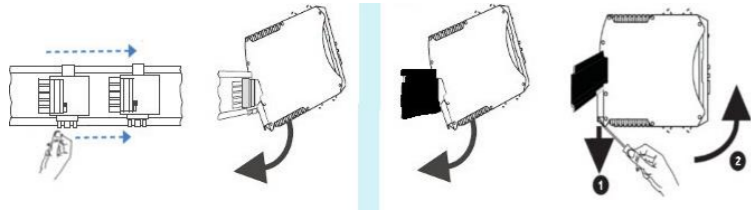
1. INSTALLATION

Installation Guidance

- Installation should only be performed by technically competent personnel.
- Standards compliance shall not be impaired when fitting into the final installation.
- It is the responsibility of the installing engineer to ensure that the configuration is safe.
- Local regulations regarding the electrical installation & safety must be observed.
- Impairment of protection will occur if the product is used in a manner not specified by the manufacturer.
- Due to the low weight of this instrument there are no special lifting or carrying considerations.
- Designed to offer a minimum of Basic Insulation only.
- 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 EN61010 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.
- When fitted to the final installation, an IEC/CSA APPROVED disconnecting device should be used to disconnect both LINE and NEUTRAL conductors simultaneously.
- Do not position the equipment so that it is difficult to operate the disconnecting device.
- Ventilation slots must not be covered and adequate air circulation must be allowed.
- Use conductor sizes 30-12 AWG, minimum temp rating of cables to be 80C.

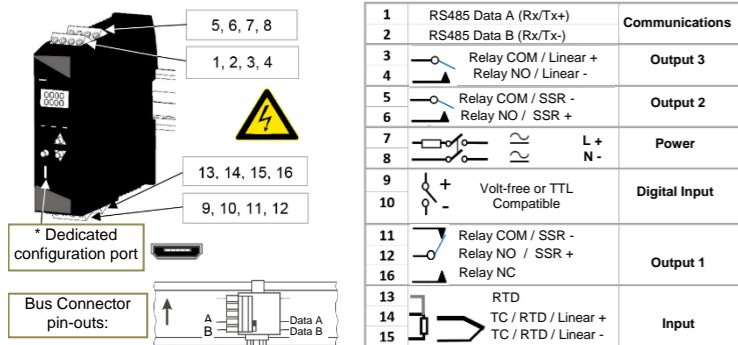


Bus Connector (optional) Mounting & Unmounting



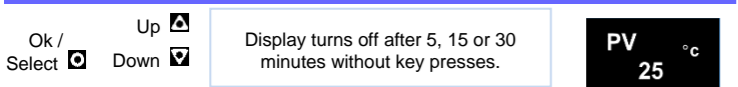
Terminal Wiring

CAUTION: Check information label on housing for correct operating voltage before connecting supply to Power inputs. Diagrams show all possible option combinations, check your exact product specification before connecting.



* NEVER DIRECTLY CONNECT DEDICATED CONFIGURATION SOCKET TO A USB PORT.

2. FRONT PANEL

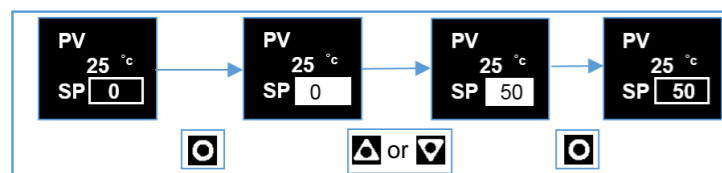


Display shows PV (process variable), units, SP (setpoint), alarm/latch statuses, error & warning messages. LEDs show respective output state: 1 2 3

Navigation & Editing

- Press **Up** or **Down** keys to navigate between parameters or menu items.
- Press **Select** to highlight and edit a parameter value.
- Press **Up** or **Down** to change the parameter value, then press **Select** within 60 seconds to confirm change.

For example, changing the setpoint (SP).



Navigating to Setup Mode or Advance Configuration from Operator Mode:

- Setup Mode - press **Select** & **Up**
- Advanced Configuration - press **Select** & **Down**

Returning to Operator Mode:

Press **Select** & **Up** to move back one level. After 120 seconds without key presses the unit returns automatically to the first Operator Mode screen.

3. SETUP (& FIRST POWER UP)

Important Note: When powered up for the first time, or after a factory reset (default) the instrument enters Setup.

The device remains in Setup, or will keep powering up back into Setup, until **all** parameters have been reviewed and the user **exits** Setup.

Some parameters may be hidden depending on configuration & hardware. Alternatively press **Select** & **Up** to enter Setup from Operator screen and **Select** & **Down** to exit.

Setup Lock	Enter code & press Select	Default 10
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Parameter	Description	Default Value		
>Input Type	J Thermocouple *	K Thermocouple		
	-200 – 1200°C		-128.8 – 537.7°C	
	-328 – 2192°F		-199.9 – 999.9°F	
	K Thermocouple *		-240 – 1373°C	-128.8 – 537.7°C
	-400 – 2503°F		-199.9 – 999.9°F	
	PT100 *		-199 – 800°C	-128.8 – 537.7°C
	-328 – 1472°F		-199.9 – 999.9°F	
	B Thermocouple		100 – 1824°C	211 – 3315°F
	C Thermocouple		0 – 2320°C	32 – 4208°F
	L Thermocouple *		0 – 762°C	0.0 – 537.7°C
32 – 1403°F	32.0 – 999.9°F			
N Thermocouple	0 – 1399°C	32 – 2551°F		
R Thermocouple	0 – 1795°C	32 – 3198°F		
S Thermocouple	0 – 1762°C	32 – 3204°F		
T Thermocouple *	-240 – 400°C	-128.8 – 400.0°C		
-400 – 752°F	-199.9 – 752.0°F			
Linear dc				
0 - 20mA	4 - 20mA			
0 - 50mV	10 - 50mV			
0 - 5V	1 - 5V			
0 - 10V	2 - 10V			
>Input Units	°C or °F (hidden when a linear input is used)	°C		
* Maximum of 1 decimal place for temperature inputs marked.				
>Input Decimal Place	0000 *	0000		
	000.0 *			
	00.00			
	0.000			
Scale Range max & min only visible when input is a linear type.				
>Input Scale Range Maximum	Maximum for application working range.	1000		
>Input Scale Range Minimum	Minimum for application working range.	0		
>Input Digital I/P Action	None Alarm Reset (clears latched alarms) Ctrl Enable/Disable (disables control) Ctrl Auto/Manual Pre-Tune Start/Stop Tune at SP Start/Stop	Ctrl Enable/Disable		
>Output 1 Usage	Heat Power Cool Power Alarm 1 Alarm 2 Alm. 1or2 Loop Alarm	Heat Power		
Control Loop Alarm time is 2x Integral (PID) or Loop Alarm Time (if mode is On.Off)				
>Output 2 Usage	Same options as Output 1 Usage	Alarm 1		
>Output 3 Usage	Same options as Output 1 Usage.	Alarm 2		
>Linear Out Usage	Heat Cool Retx PV Retx SP	Retx SP		
>Linear Out Type	0-10V 2-10V 0-20mA 4-20mA 0-5V 1-5V	0-10V		

>Linear Out Scale Range Maximum	Maximum PV value corresponding to maximum linear output.	Input type Max
>Linear Out Scale Range Minimum	Minimum PV value corresponding to minimum linear output.	Input type Min
>Alarm 1 Value	Range minimum to range maximum, or OFF (maximum +1). OFF disables alarm. Default PV High alarm type.	1373
>Alarm 2 Value	Same options as Alarm 1. Default PV Low alarm type.	-240
Setpoint	Target setpoint.	0
>Coms Unit Address	Modbus address from 1 to 255	1
>Coms Baud Rate	1200, 2400, 4800, 9600, 19200 & 38400	9600
>Coms Parity	Odd, Even or None	None
>Control Automatic Tuning	Off, Start Pre-Tune or Start Tune at SP *	Off
*Start Tune at SP not available for Heat & Cool processes.		
When you exit if necessary, press Select and Up to clear Control is Enabled Pop Up Alert.		

4. OPERATOR MODE

Name	Details
User Screen	PV 25 °C SP 37 PV - top SP - bottom Temperature Unit - right.
Manual control	PV 25 °C P% 50 Manual Power is shown as P%.
Transmitter view enabled	PV 25 °C Transmitter parameter = Enable, SP is hidden. Important: The device still functions as a controller, using the local Setpoint.
Important: Visibility for parameters below must be set to Show in Operator sub-menu.	
Alarm State	Alarm State Alarm 1 Alarm 2 Loop To clear latches press Select then Up to select Yes. Press Select to accept.
Latch State	Latch State Out 1 Out 2 Out 3 Output Latched but output not Latched - Latch not set
Maximum PV	To clear press Select then Up to select Yes. Press Select to accept. Screens show the Maximum & Minimum PV reached.
Minimum PV	
Control Enable	OFF - Control output(s) disabled. (Ignored when in manual mode). ON - Control output(s) enabled.
Manual Control Enable	OFF - Automatic control, PID or On-Off control available. ON - Manual control, Manual Power shown as P% xxx.
Time On Remaining	On Timer Visible when On Timer is active. See Ramp & Timers diagram.
Delay Time Remaining	Delay Timer Visible when Delay Timer is active. See Ramp & Timers diagram.

Warnings & Error Messages

Caution: Do not continue your process until any issues are resolved.

Name	Details
Pop up Alerts: Warnings and Confirmations	Alarm 1 For example, Pop Up Alert for Alarm 1. Pop Up Alerts need to be acknowledged. Press Select and Up to clear Pop Up Alert.
Pop up Alerts: Alarm 1, Alarm 2, Alarm 1 & 2, Starting Calibration, Calibration Ongoing, Calibration Fail, Control is Enabled, Tune Error messages, Tuning in progress, Setup not Completed & Offset in use (SP offset).	

ALARM	Details
LATCH	Alternates with PV to show Alarm is active. One or more outputs are latched on and no alarm is active.
HIGH	Process variable input > 5% over-range.
LOW	Process variable input > 5% under-range.
OPEN	Break detected in process variable input sensor, wiring or wrong input type selected. Shows OPEN until resolved, control is off.
ERROR	Selected input range is not calibrated. Shows ERROR until resolved, control is off.
TUNE	Alternates with SP. Auto-tuning is in progress.
P%	Manual power value replaces setpoint, shows P% xxx of power.
Ramp	Alternates with actual setpoint. Setpoint ramp is active.
OFF	Control is disabled. Control output(s) are off.
Control Delayed	Visible when Delay Timer is active. Control output(s) are off.
Tuning in progress	Alternates with setpoint. Tuning is active.

Tune Errors	Display alternates between Tune Error & Setpoint. Remains visible until Automatic Tuning is turned Off.	
	tErr1	PV within 5% of SP (for pre-tune)
	tErr2	Setpoint is ramping
	tErr3	Control is ON/OFF (not PID)
	tErr4	Control is manual
	tErr5	Tune at Setpoint not able to run
	tErr6	Sensor Break
	tErr7	Timer Running
tErr8	Control is Disabled	

5. SPECIFICATIONS

Important: Check your product code for exact hardware fitted.

PROCESS INPUT

- Thermocouple Calibration: ±0.25% of full range, ±1LSD & ±1°C for Thermocouple CJC. BS4937, NBS125 & IEC584.
- PT100 Calibration: ±0.25% of full range, ±1LSD. BS1904 & DIN43760 (0.00385Ω/°C).
- DC Calibration: ±0.25% of full range, ±1LSD.
- Sampling Rate: 4 per second.
- Impedance: >1MΩ resistive, except dc mA (5Ω) and V (47kΩ)
- Sensor Break Detection: Thermocouple, RTD, 4 to 20mA, 10 to 50mV, 2 to 10V and 1 to 5V ranges only. Control outputs turn off at sensor break.

DIGITAL INPUT (Isolated or Non-Isolated version)

- Functions: Reset Alarm, Control Enable/Disable, Auto/Manual, Pre-Tune Start/Stop or Tune at SP Start/Stop.
- Signal: Non-isolated - Open or Close only. Isolated - Open (2 to 24Vdc) or Closed (<0.8Vdc). Closed to Open transition = Reset, Enabled, Auto or Start.

OUTPUTS

- Relay Contacts: Form C SPDT (Op 1) / Form A SPST relay (other), 2A @ 250Vac.
- Relay Lifetime: >150,000 operations at rated voltage/current, resistive load.
- SSR Driver Capability: SSR drive voltage >10V at 20mA

Output 3 option only: DC (Linear)

- Types: 0 to 20mA, 4 to 20mA, 0 to 5V, 0 to 10V or 2 to 10V
- Load Resistance: Current Output 500Ω max, Voltage Output 500Ω min.
- Resolution: 8 bits in 250ms (10 bits in 1s typical, >10 bits in >1s typical).

RS485 SERIAL COMMUNICATIONS (Modbus RTU)

- Data Rate: 1200, 2400, 4800, 9600, 19200 or 38400 bps.

OPERATING CONDITIONS

- Usage: For indoor use only, DIN-rail mounted in suitable enclosure.
- Ambient Temp: <95% humidity 0°C to 55°C (Operating), -10°C to 80°C (Storage).
- Relative Humidity: 20% to 95% non-condensing.
- Altitude: < 2000m
- Power Supply: Mains power version - 100 to 240Vac ±10%, 50/60Hz, 9VA
Low voltage version - 24Vac +10/-15% 50/60Hz 9VA or 24Vdc +10/-15% 5W.

ENVIRONMENTAL

- Standards: CE, UL & cUL.
- EMI: EN61326-1:2013, Table 2 & Class A.
- Warning:** This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.
- Safety: UL61010-1 Edition 3, EN61010-1 Version 2010, Pollution Degree 2 & Installation Class 2.

Protection Rating: IP20.

PHYSICAL

- Unit Size: Height - 99mm; Width – 22.5mm; Depth - 121mm
- Ventilation: A space of 80mm must be allowed above & below each unit.
- Weight: 0.20kg maximum

ISOLATION

	PSU	Universal Input	Relay	SSR	Linear	RS485 Comms	Non-Isolated Digital Input	Isolated Digital Input	Configuration Port
PSU									
Universal Input									
Relay									
SSR									
Linear									
RS485 Comms									
Non-Isolated Digital Input									
Isolated Digital Input									
Configuration Port									
	Not Applicable				No Isolation				Reinforced Isolation

6. SAFETY & WARNING SYMBOLS

Risk of electric shock. Caution, refer to the manual.

Alternating or direct current could be present. Equipment protected through-out by double insulation.

7. ADVANCED CONFIGURATION

Advanced Configuration gives access to all possible parameters; however, the device hides parameters that are irrelevant to your exact product specification & configuration.

Advanced Configuration Navigation

Enter by pressing & . Press or to navigate to the required menu, then press to enter.

Press & to exit up 1 level. Depending upon which menu you enter it may be necessary to exit 2 or 3 levels for Operator Mode.

Advanced Configuration main menu

Advanced Lock	Enter code & press	Default 20
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Menus	Description
User	Includes Status, Control & Manual Mode enable/disable.
Input	Configure the process input.
User Calibration	Single or two-point calibration adjustments for the process input.
Outputs	Configuration parameters for the outputs.
Control	PID control tuning & configuration parameters.
Setpoint & Timer	Setpoint & timer settings.
Alarms	Alarm configuration.
Communication	Modbus communications settings.
Display	Lock codes and Factory Default.
Operator Screens	Control what appears in Operator Mode.
Information	View serial number & manufacturing details.

User

Parameter	Description	Default Value
Alarm State	Alarm active Alarm set, but not active Alarm not set 	n/a
Latch State	Output Latched Latch set but output not Latched Latch not set 	n/a
Maximum PV	Maximum and Minimum PV recorded whilst powered up or since last reset.	n/a
Minimum PV	To clear press then to select Yes . Press to accept.	
Control Enable	OFF - Control output(s) disabled. (Ignored when in manual mode) SP replaced by OFF . ON - Control output(s) enabled. Setpoint visible in User screen.	ON
Manual Control Enable	OFF - Instrument in automatic control mode (PID or On-Off control). ON - Manual control ON. Power shown as Pxxx % in Operator mode, in place of SP.	OFF

Input

Parameter	Description	Default Value
Input Type	See Input Type table in SETUP (& FIRST POWER UP).	K Thermocouple
Units	Displayed as °C or °F (Units are hidden when a linear input is used)	°C
Decimal Place	0000	0000
	000.0	
	00.00	
	0.000	
Scale Range Maximum	Maximum for application working range	Max allowed for Input Type.
Scale Range Minimum	Minimum for application working range	Min allowed for Input Type.
Filter Time	OFF or 0.5 to 100.0 seconds in 0.5 increments	2.0
CJC Enable	Enable Enables the internal thermocouple CJC (Cold Junction Compensation). Disable Disables the internal CJC. External compensation must be provided for thermocouples.	Enable

Parameter	Description	Default Value
Digital I/P Action	None Alarm Reset (clears latched alarms) Ctrl Enable/Disable Ctrl Auto/Manual Pre-Tune Start/Stop Tune at SP Start/Stop (not available for heat/cool)	Ctrl Enable/Disable

User Calibration

Single-point offset or two-point calibration adjustment for process input. Can be used together, if required.

Parameter	Description	Default Value
Offset	Shifts the input value up or down by a single offset amount across the entire range.	0
Low Point	Enter value at which the low point error was measured.	Lower Limit
Low Offset	Enter equal, but opposite offset value to the observed low point error.	0
High Point	Enter value at which the high point error was measured.	Upper Limit
High Offset	Enter an equal, but opposite offset value to the observed high point error.	0

Outputs

Parameter	Description	Default Value
>Output 1 Usage	Heat Cool Alarm 1 Alarm 2 Alm. 1or2 Loop Alarm	Heat
Control Loop Alarm is set as 2x Integral (PID) or Loop Alarm Time (On.Off control)		
Alarm Action	Direct - Output active when alarm triggers Reverse - Output active when alarm is not triggered	Direct
Latching	Off - Alarm doesn't latch On - Alarm latches & needs to be cleared	Off
LED Indicator	Direct - LED Indicator lit when output is active Reverse - LED Indicator lit when output is inactive	Direct

Parameter	Description	Default Value
>Output 2 Usage	Same options as Output 1 - Usage	Alarm 1
Alarm Action	Same options as Output 1 - Alarm Action	Direct
Latching	Same options as Output 1 - Alarm Latching	Off
LED Indicator	Same options as Output 1 - LED Indicator	Direct

Parameter	Description	Default Value
>Output 3 or >Linear Out Usage	3 rd output - either Relay/SSR driver (Output 3) or Linear.	Output 3: Alarm 2
>Output 3 Alarm Action	Same options as Output 1 - Alarm Action	Direct
>Output 3 Alarm Latching	Same options as Output 1 - Alarm Latching	Off
>Output 3 LED Indicator	Same options as Output 1 - LED Indicator	Direct

Parameter	Description	Default Value
>Linear Out Usage	0-10V 2-10V 0-20mA 4-20mA 0-5V 1-5V	0-10V
>Linear Out Scale Range Maximum	Display value for maximum output, -1999 to 9999	Input type Max
>Linear Out Scale Range Minimum	Display value for minimum output, -1999 to 9999	Input type Min

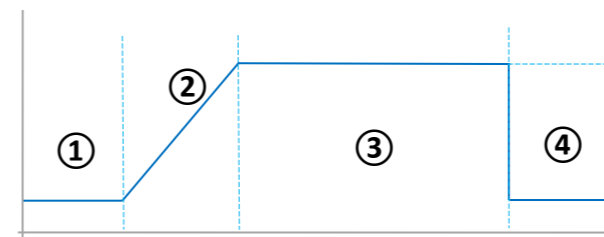
Parameter	Description	Default Value
Control	PID control tuning & configuration & Loop Alarm. Hidden if no control outputs are set.	
Proportion Heat Band	ON/OFF (0.0) or PID control in display units. 1 to 9999 - 0 decimal places	161
Proportion Cool Band	0.1 to 999.9 - 1 decimal place 0.01 to 99.99 - 2 decimal places 0.001 to 9.999 - 3 decimal places	161
Auto Reset (Integral)	0.01 to 99.59. and OFF (0.00) (minutes & seconds).	5.00

Parameter	Description	Default Value
Rate (Derivative)	0.01 to 99.59 or OFF (0.00) (minutes & seconds).	1.15
Overlap/Deadband	In display units, range -20 to +20% of Heat & Cool Proportional Band	0
Differential (On/Off)	Visible when using On/Off control. In display units centred about the setpoint. Range: 0.1% to 10.0% of input span	8
Loop Alarm Time	Visible when On/Off control & Loop Alarm assigned to an output. Sets time before the loop alarm triggers. (minutes & seconds)	99.59
Manual Rst (Bias)	Manual Reset 0 to 100% (-100% to 100% if heat/cool control)	25%
Heat Cycle Time	0.1 to 512.0 seconds	32.0
Cool Cycle Time		32.0
Output Interlock	Prevents simultaneous activation of both heat & cool outputs. On / Off Only set to On if Overlap/Deadband = 0.	Off
Heat Power Limit	% power upper limit 0 to 100%	100%
Cool Power Limit	% power upper limit 0 to 100%	100%
Power Up Action	Last - Powers up with control enable in the same state as on power off or power failure. On - Always powers up with control enabled.	Last
Automatic Tuning	Off Start Pre-Tune Start Tune at SP *	Off

*Start Tune at SP not available for Heat & Cool process.

Setpoint

Parameter	Description	Default Value
Enable Timer	Enabled Enables the Delay and On Timers. Applies at next power-up / control enable. Disabled Delay and On Timers ignored. (Setpoint ramping still functions.)	Disabled
Delayed Start Time	Time from power-up or control enable before control begins from 00.01 to 99.59. or OFF (0.00. (hours & minutes) If OFF control starts immediately.	OFF
Ramp Rate	Rate actual setpoint changes from current PV to target setpoint following power-up or control enable. From 0.001 to 9999. or OFF (1000) (Units / hr). Any setpoint changes also follow this rate.	OFF
On Time	The time the target setpoint will be maintained once reached, from 00.01 to 99.59 or Off (00.00) (hours & minutes) Infinite (100.00) - control remains on indefinitely.	Infinite
Upper Limit	Used to limit the Maximum setpoint value.	Scale Range Maximum
Lower Limit	Used to limit Minimum setpoint value.	Scale Range Minimum
Offset	Offsets the setpoint. For use in multi-zone setpoint slave applications. Offset in use pop-up appears when SP is changed.	0



Ramp & Timers diagram – delay, ramp and timer

- From power up or control enable the unit delays process control until the Delay Timer expires (time set by Delayed Start Time).
- Setpoint ramps from the current PV to the target setpoint at Ramp Rate (SPr indicates ramping). If Ramp Rate is OFF the active setpoint steps directly to target setpoint.
- When the active setpoint reaches the target setpoint, the On Timer counts down (time set by On Time).
- When the On Timer finishes the control switches off. If On Time is set to INF then the control stays on.

Parameter	Description	Default Value
>Alarm 1		
Type	None PV High PV Low Deviation Band	PV High
Value	Range minimum to range maximum, or OFF (maximum +1). OFF disables alarm.	1373

Parameter	Description	Default Value
Hysteresis	0 to full span.	1
>Alarm 2		
Type	Same options as Alarm 1	PV Low
Value		-240
Hysteresis		1
>Options	Alarm Inhibit temporarily deactivates alarms at power-up & on change in setpoint.	
Alarm Inhibit	None Alarm 1 Alarm 2 Alarm 1 & 2	None
Alarm Notification	None Alarm 1 Alarm 2 Alarm 1 & 2	Alarm 1 & 2
Sensor Break Alarm	On - activates both alarms, if configured, when a sensor break is detected.	Off

Communications

Modbus communications settings, only shown when RS485 option is fitted.

Parameter Name	Description	Default Value
Unit Address	Modbus address from 1 to 255	1
Baud Rate	Coms data rate in kbps 1200, 2400, 4800, 9600, 19200 & 38400.	9600
Parity	Parity checking: Odd, Even or None	None

Display

Lock codes & Factory Defaults.

Parameter Name	Description	Default Value
Setup Unlock Code	View & adjust Setup lock code. From 1 to 9999 or Off for no lock code.	10
Advanced Unlock Code	View & adjust Advanced lock code. From 1 to 9999 or Off for no lock code.	20
Screen Timeout	Screensaver time 5, 15 or 30 mins.	5
Selected language	Display language, 2 available – English plus either German or French .	English
Transmitter	Transmitter view Enable hides the setpoint. Important: The device still functions as a controller even though SP is hidden. For transmitter function, Linear Outp – Usage must be PV Retransmit or SP Retransmit .	Disable
Reset to Defaults	Reset parameters back to factory defaults. To clear press then to select Yes . Press to accept.	

Operator Screens

Controls what appears in Operator Mode.

Parameter Name	Description	Default Value
Control Enabled	Hide or Show parameters in Operator Mode.	Hide
Manual Ctrl Enabled		Hide
Alarm State		Hide
Latch State		Show
Maximum PV		Hide
Minimum PV		Hide
Remaining On Time		Hide
Remaining Delay Time		Hide

Information (Read-Only)

Parameter Name	Description
PRL	The hardware/software revision level.
DOM	Date of manufacture (mmyy).
FW Version	The firmware version number & code type.
FW Type	
Serial	Instrument serial number.
Out1 Out2 Out3	SSR (SSR driver) or Relay SSR (SSR driver) or Relay . None, SSR (SSR driver), Relay or Linear .
Comm DI	Comms option - Fitted or None . Digital Input options – Iso (isolated) or NonIs (non-isolated).

Please refer to the full manual for further information on any topic.