







# Dynisco ATC990 Graphical 1/4 DIN Process Controller Concise Product Manual

# Operating Manual



The following symbols are used on the product labels:

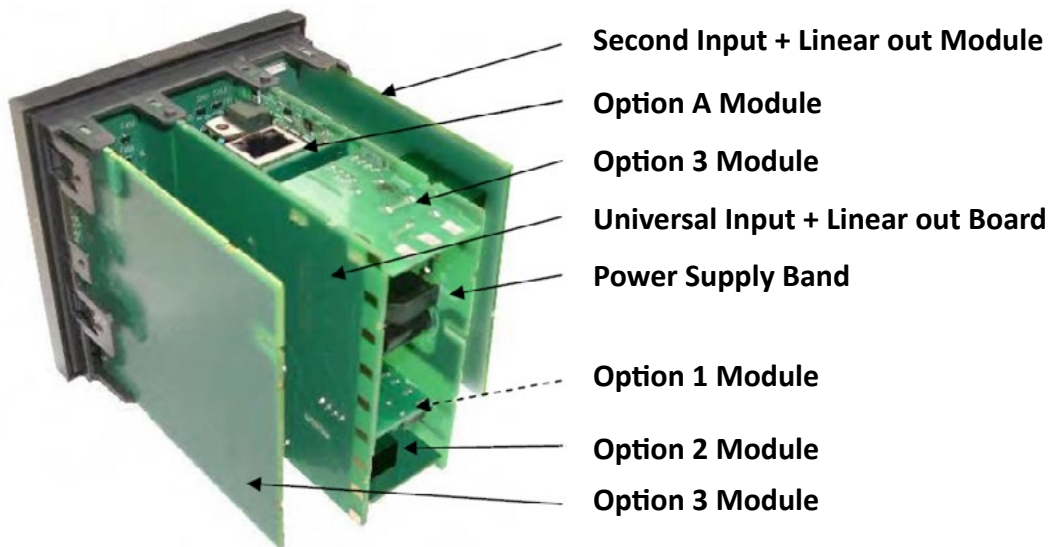
	<p>Caution, refer to installation manual when connecting <b>General danger to life or limb</b></p>		<p>Equipment protected throughout by double insulation</p>
	<p>Alternating current</p>		<p>Both direct and alternating current</p>

## 1. Installation



**CAUTION:** Installation should be only performed by technically competent personnel. It is the responsibility of the installing engineer to ensure that the configuration is safe. Local regulations regarding electrical installation & safety must be observed - e.g. US National Electrical Code (NEC) and/or Canadian Electrical Code. Impairment of protection will occur if the product is used in a manner not specified by the manufacturer.

## Installing Option Modules

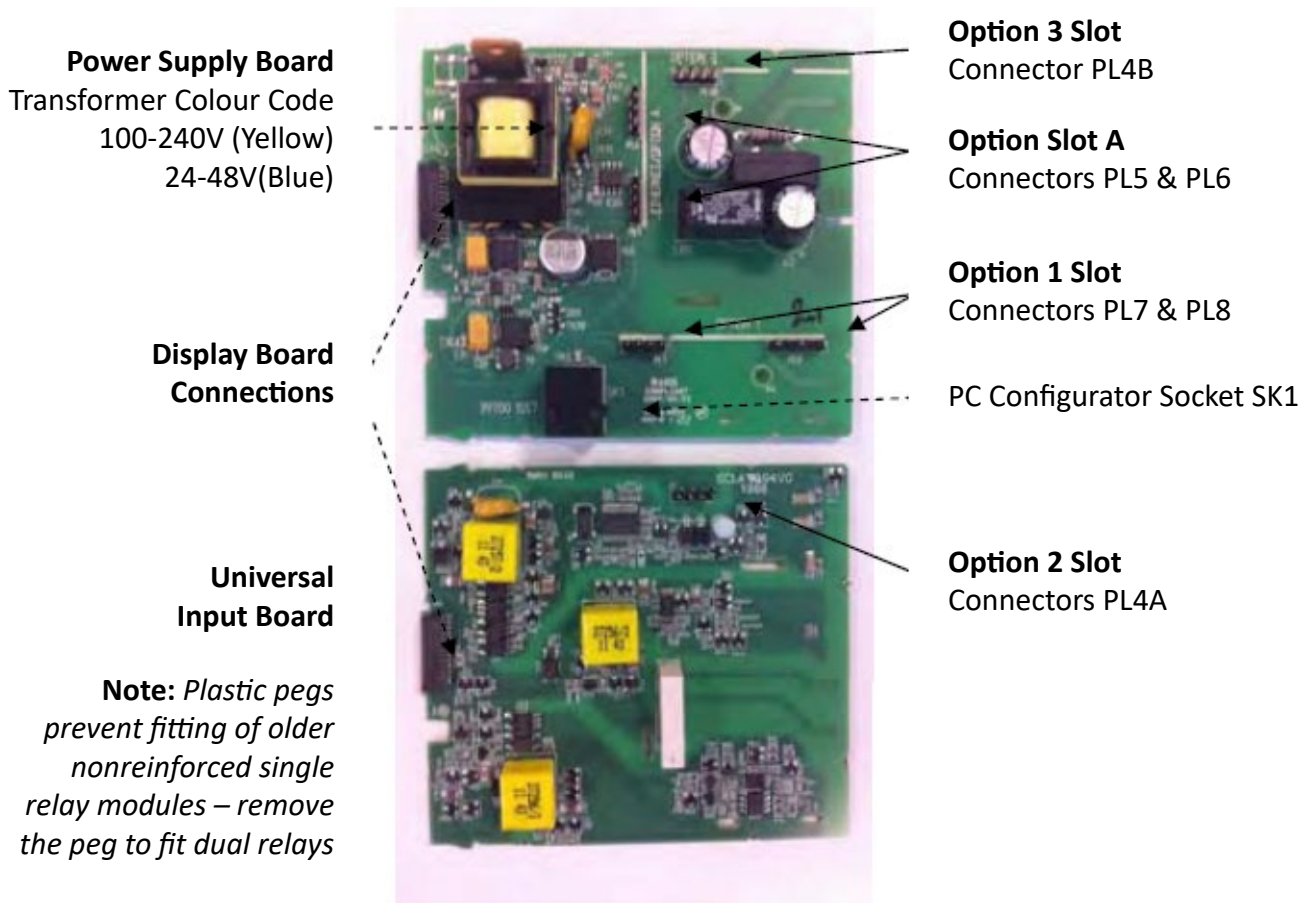


To access the option modules, first pull the instrument from the housing.

- a. Detach the main boards by lifting first the upper, and lower mounting struts.
- b. Plug the required option modules into the correct connectors, as shown below.
- c. Locate the module tongues in the corresponding slot on the opposite board.
- d. Hold the Power and Input boards together while relocating on their mountings.
- e. Push the boards forward to ensure correct connection to the Display board.
- f. Replace the instrument by aligning the boards with the guides in the housing, then slowly push the instrument back into position.

**Note:** Option modules are automatically detected at power up.

## Main Board Connectors



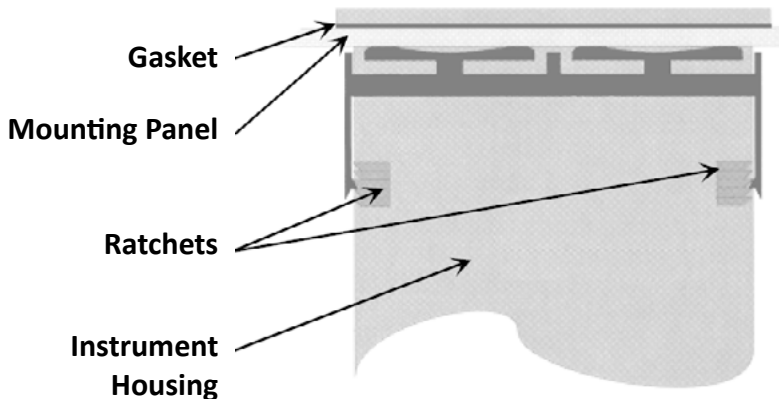
## Replacement of Main Boards



**CAUTION:** Replacement of main boards should only be carried out if unavoidable, and must only be carried out by trained personnel.

When replacing the power supply board, observe the transformer colour and case labelling to **check the supply voltage**, otherwise irreparable damage may occur. If the display or input boards are replaced, a full recalibration **must** be carried out.

## Panel Mounting



Slide mounting clamp over the instrument housing towards rear face of mounting panel until the tongues engage in ratchets and instrument is clamped in position.

Hold instrument firmly in position (apply pressure to bezel only)



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

## Rear Terminal Wiring



**CAUTION:** The instrument is double insulated. All external circuits connected must provide double insulation. Failure to comply with the installation instructions may impact the protection provided by the unit.

**Note:** The wiring diagrams shows all possible option combinations. The connections required depend on the options fitted. Use single strand (1.2mm / AWG18 max size) copper wire, except for the thermocouple input, where the correct thermocouple or compensating cable and connectors should be used.



## Main Terminals

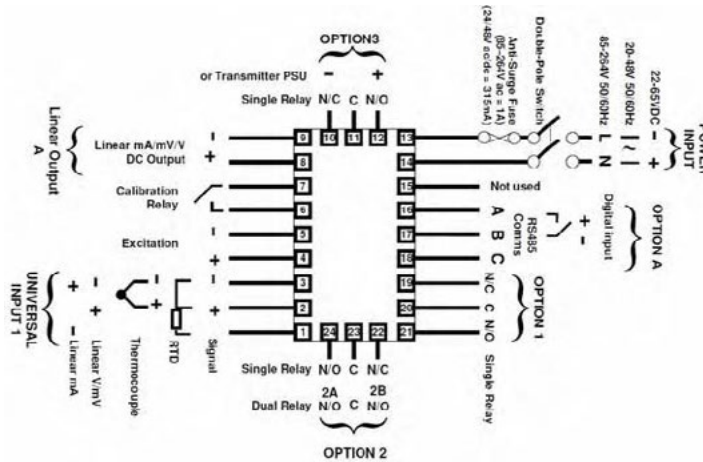


**CAUTION:** Check correct operating voltage on the side label before connecting power. A UL listed 1A anti-surge fuse, rated 250V (for AC) 65V (for DC) should be fitted to the power input. An IEC60947-1 & IEC60947-3 compliant isolation switch should be fitted close to the unit, in easy reach of the operator, and appropriately marked.

*All connections to the device must be made through a spade format or similar connection, with connection to the spade terminal touching both the insulation and conductor material. (Use a standard crimping tool) All connections must be Mechanically secured so as to prevent any wiring becoming loose and coming in contact with other wires or the instrument casing.*

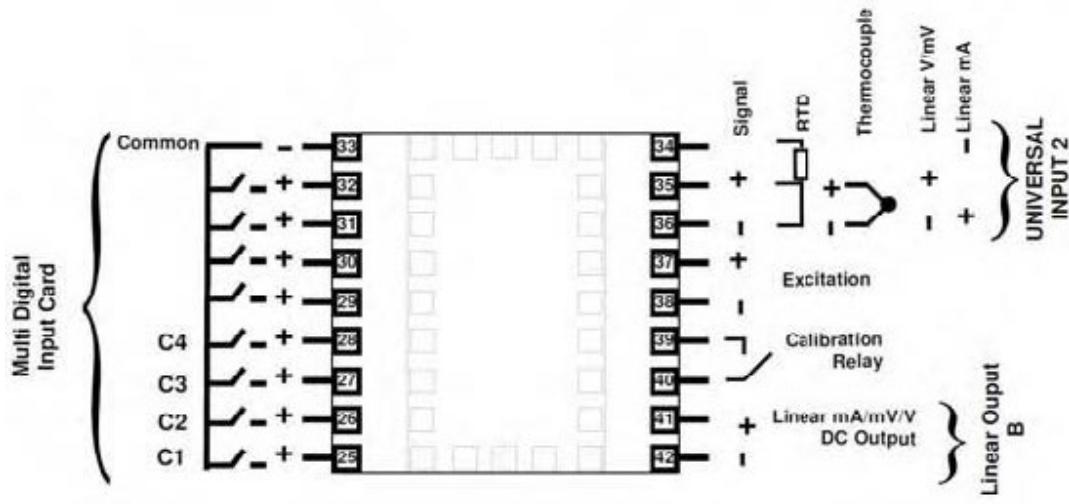


*The above applies to any and all connection to hazardous mains supply either direct or indirect (Through a switch (Relay))*



**CAUTION:** External computing devices connected to the communications port must comply with the standard, UL 60950.

## Additional Option Terminals



Electrical shock can result in death or serious injury. Avoid contact with the leads and terminals. High voltages that may be present on leads can cause electrical shock

## 2. Specifications

### Process Inputs 1 and 2

Sampling Rate:	Better than 10 per second.
Resolution:	16 bits. Always four times better than display resolution.
Impedance:	>10MΩ resistive, except DC mA (5Ω) and V (47kΩ).
Temp Stability:	Error <0.01% of span per °C change in ambient temperature.
Supply Variation:	Supply voltage influence negligible within supply limits.
Humidity Influence:	Negligible if non-condensing.
Process Display:	Displays up to 5% over and 5% under span limits.
Process Variable	Reading adjustable ± Controller Span. +ve values added to Process Variable, -ve values subtracted from Process Variable
Input Offset:	
Sensor Break	High or Low range break activates.as per user definition (default is to Break to a High scale range)
Detection:	

Isolation: Isolated from all outputs and other input at 240V AC.



Strain Gauge Inputs: 350 to 5K $\Omega$  Strain Gage  
 Bridge Connection 4 or 6 wire (6 to use internal shunt cal switch)  
 Bridge Excitation 10 V +/- 7%  
 Bridge Sensitivity 1.4 - 4 mV/V  
 Input Signal Span - 25% to +125% of full scale (approximately - 10 mV to +50 mV)  
 Calibration Internal switch between CAL2 & CAL1 terminals(7&6 or 39&40).  
 External resistor only.  
 Shunt Value From 40% to 100%

Supported Thermocouple Types & Ranges:	Type	Range °C	Range °F
	B	+100 to 1824°C	+211 to 3315°F
	C	0 to 2320°C	32 to 4208°F
	D	0 to 2315°C	32 to 4199°F
	E	-240 to 1000°C	-400 to 1832°F
	J	-200 to 1200°C	-328 to 2192°F *
	K	-240 to 1373°C	-400 to 2503°F *
	L	0 to 762°C	32 to 1402°F *
	N	0 to 1399°C	32 to 2551°F *
	PtRh 20%:40%	0 to 1850°C	32 to 3362°F
	R	0 to 1759°C	32 to 3198°F
	S	0 to 1762°C	32 to 3204°F
	T	-240 to 400°C	-400 to 752°F *

*Optional decimal place can be displayed up to 999.9°C/F*

Thermocouple Calibration:  $\pm 0.1\%$  of full range,  $\pm 1$ LSD ( $\pm 1^\circ\text{C}$  for internal CJC if enabled). Linearization better than better  $\pm 0.2^\circ\text{C}$  ( $\pm 0.05$  typical) on ranges marked \* in the table above. Linearization for other ranges is better than better than  $\pm 0.5^\circ\text{C}$ .  
 BS4937, NBS125 & IEC584

Supported RTD Types & Ranges:	Type	Range °C	Range °F
	3-Wire PT100	-199 to 800°C	-328 to 1472°F
	NI120	-80 to 240°C	-112 to 464°F

*Optional decimal place can be displayed up to 999.9°C/F*

RTD Calibration: 0.1% of full range,  $\pm 1$ LSD.  
 Linearization better than  $\pm 0.2^\circ\text{C}$  ( $\pm 0.05$  typical).  
 PT100 input to BS1904 & DIN43760 (0.00385  $\Omega/\Omega/^\circ\text{C}$ ).

RTD Excitation: Sensor current 150 $\mu\text{A}$   $\pm 10\%$ .



Lead Resistance: <0.5% of span error for max 50Ω per lead, balanced.

Supported Linear Types & Ranges:	Type	Range	Offset Range
	mA DC	0 to 20mA DC	4 to 20mA DC
	mV DC	0 to 50mV DC	10 to 50mV DC
	V DC	0 to 5V DC	1 to 5V DC
	V DC	0 to 10V DC	2 to 10V DC

Scalable from -99999 to 100000. Decimal point selectable from 0 to 3 places, but limited to 5 display digits (e.g. 9999.9)

Maximum Overload: 1A on mA input terminals, 30V on voltage input terminals.  
 DC Calibration: ± 0.1% of full range, ± 1LSD.  
 DC Input Multi-Point Linearization: Up to 15 scaling values can be defined anywhere between 0.1 and 100% of input.

## Digital Inputs

Volt-free contacts (or TTL): Open contacts (>5000 Ω or 2 to 24VDC signal = Logic High  
 Closed contacts (<50 Ω or -0.6 to +0.8VDC signal = Logic Low.  
 Isolation: Reinforced safety isolation from inputs and other outputs.  
 Digital Input Sensitivity: Edge Sensitive. Requires High-Low or Low-High transition to change function.  
 Response Time: Slot A <0.25 second,

Selectable Digital Input Functions:	Function	Logic High	Logic Low
	Peak Reset	No Action	Reset Peak reading
	Alarm and Peak Reset	No Action	Reset Peak reading and Resets latched alarm if alarm conditions no longer exists
	Zero Calibration	No Action	Perform zero Calibration
	Zero Calibration, Alarm and Peak Reset	No Action	Perform zero Calibration, Reset Peak reading and Resets latched alarm if alarm conditions no longer exists
	Reset Latched Alarms	No Action	Resets latched alarm if alarm conditions no longer exists





Data Recorder	Stop Recording	Start Recording
Set Point Select	Select Local Setpoint 1A/2A	Select Alternate Setpoint
Auto Manual Control Select	Automatic Control mode	Manual Control Mode
PID Control Output	Enable PID Control outputs	Disable PID Control Outputs
Engage Pre Tune	No Action	Engages tuning mode selected
Engage Self Tune	No Action	Engages tuning mode selected
Increment Control Output	No Action	Increments control output percentage (0-100% in 20secs)
Decrement Control Output	No Action	Decrements control output percentage (100-0% in 20secs)

## Outputs

**Caution:** *Plastic pegs prevent fitting of older non-reinforced single relay modules – Remove the peg to fit dual relays (all dual relay modules have reinforced isolation)*

## Single Relay

Type & Rating: Single pole double throw (SPDT); 2A resistive at 120/240VAC.  
 Lifetime: >500,000 operations at rated voltage/current.  
 Isolation: Reinforced safety isolation from inputs and other outputs.

## Dual Relay

Type & Rating: Single pole single throw (SPST), 2A resistive at 120/240VAC. Dual relay modules have shared common.  
 Lifetime: >200,000 operations at rated voltage/current.  
 Isolation: Reinforced safety isolation from inputs and other outputs.

## Linear DC

Ranges 0 to 5, 0 to 10, 1-5, 2 to 10V & 0 to 20, 4 to 20mA (selectable) with 2% over/under-drive when used for control outputs.  
 Resolution: 15 3/4 bit (1 part in 52K)  
 Accuracy: 0 to 20mA, 4 to 20mA into 500Ω max, 0 to 10V, 2 to 10V, 0 to 5V into 500 Ω min updated at about 65ms intervals. (130ms settling time)  
 Stability: ± 76ppm  
 Isolation: Reinforced safety isolation from inputs and other outputs.



## Transmitter PSU

Power Rating: 24V nominal (19 to 28V DC) into 400  $\Omega$  minimum resistance(60mA Drive).  
(Option to use DC Linear output as 0- 10V stabilised PSU).  
Isolation: Reinforced safety isolation from inputs and other outputs.

## Communications PC Configuration

Connection: RS232 via PC Configurator Cable to RJ11 socket under case.  
Isolation: Not isolated from input or SSR Driver outputs. For bench configuration only. **CAUTION:** Do not use in live applications.

## RS485

Connection: Locates in Option Slot A. Connection via rear terminals (refer to wiring diagram).  
Protocol: Modbus RTU.  
Slave/Master Mode Slave address range 1-255 or Setpoint master mode.  
Supported Speeds: 4800, 9600, 19200, 38400, 57600 or 115200 bps.  
Data Type: 8 data bits and 1 stop bit. Odd, even or no parity.  
Isolation: 240V reinforced safety isolation from all inputs and outputs.

## Ethernet

Connection: Locates in Option Slot A. Connection via RJ45 connector on top of case.  
Protocol: Modbus TCP. Slave only.  
Supported Speed: 10BaseT or 100BaseT  
Isolation: 240 V reinforced safety isolation from the supply, inputs and outputs (except SSR Drivers).

## Alarms

Alarm Types: Up to 3 alarms selectable as Process High, Process Low, Rate of Signal Change (per minute), Sensor/input Break, PV-SP Deviation, Band, Control Loop, Percentage of memory used, High and Low power  
Alarm Hysteresis: A deadband from 1 LSD to full span (in display units) for Process,.Rate Of Change Alarm hysteresis is the shortest time (1 to 9999 secs) the rate of change must be above the threshold for the alarm activate, or fall below the threshold to deactivate. **Note:** If the duration is less than this time, the alarm will not activate no matter how fast the rate of rise.  
Combined Outputs: Logical OR of alarms 1 & 2, 1 to 3,



## Operating Conditions (For Indoor Use)

Temperature:	0°C to 55°C (Operating), -20°C to 80°C (Storage).		
Relative Humidity:	20% to 95% non-condensing.		
Supply Voltage and Power:	Mains versions:	100 to 240VAC ± 10%, 50/60Hz, 24VA.	
	Low voltage versions:	20 to 48VDC 50/60Hz 15VA or 22 to 65VDC 12W.	

## Conformance Norms

EMI:	CE: Complies with EN61326.
Safety	CE: Complies with EN61010-1. UL, cUL to UL61010C-1.
Considerations:	Pollution Degree 2, Installation Category II.
Front Panel Sealing:	To IP66 (IP65 front USB connector). IP20 behind the panel. (IP rating not recognised / approved by UL).
Front Panel Cleaning	Wash with warm soapy water and dry immediately. Close the USB cover (if fitted) before cleaning.

## Display

Display Type:	160 x 80 pixel, monochrome graphic LCD with a dual colour (red/green) backlight.
Display Area:	66.54mm (W) x 37.42mm (H).
Display Characters:	0 to 9, a to z, A to Z, plus ( ) - and _
Trend View:	120 of 240 data points shown in a scrollable window. Data is not retained when power turned off or if time base is changed.
Trend Data:	Any active alarm plus PV (solid) & SP (dotted) at sample time or Max/Min PV between samples (candle-stick graph). Auto scales from 2 to 100% of Input Span.
Trend Sample Rate:	1; 2; 5; 10; 15; 30 seconds or 1; 2; 5; 10; 15; 30 minutes.

## Dimensions

Weight:	0.65kg maximum.
Size:	96 x 96mm (Front Bezel). 117mm (Depth Behind Panel).
Mounting Panel:	Panel must be rigid. Maximum thickness 6.0mm (0.25inch).
Panel Cut-out Size:	92mm x 92mm. Tolerance +0.5, -0.0mm.
Ventilation:	20mm gap required above, below and behind.

## Manufacturing Site

Address: The Hyde Business Park, Brighton, BN2 4JU, United Kingdom



### 3. Power Up Sequence

Following the power-up self-test and logo screen, the instrument normally enters Operation Mode, from which the user can select the instrument’s Main Menu (refer to the Screen Sequence list). The exceptions to this are the first power-up after purchase, when option modules have been changed or if an error is detected.

### Setup Wizard

An easy Setup Wizard runs automatically at first ever power-up. Follow the Wizard to setup parameters required for typical applications (screens marked w in the Screen Sequence list). A partial Wizard also runs whenever option modules have been changed, this only shows parameters affected by the changes. The Wizard can also be run from the Main Menu. It exits to Operation Mode once completed.

### Start-Up Errors

These messages indicate that a hardware or configuration an error has occurred.  
Caution: Do not continue with the process until the issue is resolved.

Message Displayed	Reason
Option Slot <i>n</i> Error	Fault detected. Replace the module in slot <i>n</i>
Configuration Problem	Check all instrument parameters before using
For Service Contact	Details of who to contact if a fault persists

### 4. Operation Mode

This mode is entered at power on, or accessed from the Main Menu. If required, all Operation Mode parameters can be made read only (see *Display Configuration*).

**Note: Configuration must be completed before starting normal operations.**

#### Normal Operation



**Typical Operation Screen**

Subsequent screens allow the display and selection/adjustment\* alarm status and trends.



Press **←** or **→** to move forward or back through the screens. Where adjustment is possible\*, press **▲** or **▼** to alter the values. \*If adjustment is not disabled in Configuration.

## 5. Tuning Error Description

### Err Timeout

Timeout for Pulse experiment: Determined by empiric for pulse experiment of temperature processes. At start of phase limit start timeout with one minute (60sec set for pressure controller) When limit is reached the slope of the Pv is saved. At start of phase max reset timeout generator (4.5 minutes) Check active slope of Pv. When slope goes less then 0.35 of saved value, Save elapsed time of the running experiment and reset timeout generator with 4.5 of elapsed time. At start of phase Delta2 reset timeout generator (4.5 saved time) At start of phase Delta reset timeout generator (4.5 saved time)

### Err limit

The process reaction goes into the wrong direction after setting the controller output pulse.

### Err Parameter

The estimated process characteristic values are not valid  
( $T_g < 0.5$  sec) or (Gain  $< 0.005$ )

### Err Deviation

For pressure controller this is not used. For temperature controller we used this to monitor a maximum deviation of 6% for PV.

### Err InputFail

Indicate a fail state of measured Pv at screen for tuner state. Step experiment is a hidden option activated by controller parameter ( $PreDiff > 1.0$ )

### Err Timeout

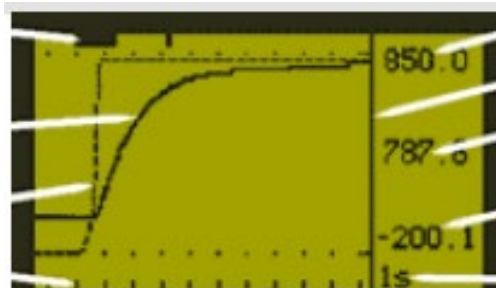
Timeout at step experiment. No visible reaction of process value 1000 seconds after start of experiment.

### Err Step

Error\_Step: Found a deep point of inflexion and the condition ( $[Tu * Vmax] > 50.0$ ) is true

### Trend View

Active Alam(s)  
Process Variable Trend  
Setpoint Trend (dotted)  
Time Markers  
(10 samples per marker)



Trend View

Trend Upper Scale Value



Cursor Line

PV Value At Cursor Line

Trend Lower Scale Value

Sample Interval (or Time at  
Cursor Line)



Trend View graphs PV; or Max/Min PV between samples, plus active alarms. Trend Scale Values adjust automatically to visible data (between 2 to 100% of the input span). Sample intervals are set in Display Configuration. Pressing  or  moves the Cursor Line back through the last 240 data points. **Note: Data is not retained at power down or the Sample Interval is changed.**

## Over/Under Range & Input Fail Indications



If the process or auxiliary inputs are >5% above or below the scale max/min, their displayed value is replaced with the word “HIGH” or “LOW”. If a signal break is detected, their value is replaced with “OPEN” and an uncalibrated input is replaced by “ERROR”. In OPEN or ERROR conditions, the Control Outputs go to the pre-set power value (see Control Config).

**Caution:** Correct the problem before continuing normal operation.



## 6. Serial Communications

Set Ethernet option IP address with supplied software for networks without DHCP. Refer to the User guide (from your supplier) for help with communications.

## 7. Strain Gauge Calibration Mode

Press the  +  to enter calibration mode from any location for quick access (see Strain Gauge Calibration in Configuration Mode) Only applicable when Sensor input type is set to Strain Gauge.

## 8. Auto/Manual Key Press

Press the  +  to change the control mode. When pressing these keys it will put the unit into manual mode if already in Auto and move back to the main operator screen. Pressing while in Manual will put the controller into Auto control and back to Main operator screen. **Use with Caution**

## 9. Pressure Control Description

This mode is entered at power on, or accessed from the Main Menu. If required, all Operation Mode parameters can be made read only (see Display Configuration).

**Note: Configuration must be completed before starting normal operations.**

### Output value indication:

Selectable between the following modes:

- range 0/100.0%.
- scalable with two proper values for RPM indication. (Same value as above only two point scaled to give RPM)

In automatic mode either mode is available (not at the same time)

In manual mode a parameter is provided to select the first or second method of indication.



### Tune algorithm:

The Tune procedure is activated by selecting Yes on Automatic Tune selection screen

The Tune can select two types of procedures:

- 1) The Pre-TUNE algorithm
- 2) The Self-Tune algorithm

#### 1) Pre-TUNE ALGORITHM

To implement the Pre-TUNE algorithm set the instrument in manual mode and then select Run "Pre-Tune". "Pre-Tune" will switch to OFF after PID parameters calculation (during this procedure the LED will be flashing).

The basic concepts of auto tuning system are based on the open loop pulse response, for this reason the Pre-TUNE function may be activated only in manual mode. The equivalent mathematical model of the process is characterized by three parameters: the gain, the time constant and the equivalent time delay.

The power output of the controller is changed by a small step value (This value has to be entered by the user before the pre tune can take place in manual mode) and the controller stores the process variable response. If the pre-tune step is set too high it will create an overshoot and therefore needs to be reduced. The pre-tune step power is added to manual power and displayed to the user but is not changeable. The expected range is from  $-25.0\%$  to  $25.0\%$  of full scale. The default value is  $10.0\%$ .

#### 2) Self-Tune ALGORITHM

In order to implement the Self-Tune algorithm the instrument should be in automatic mode. Then select run "Self-Tune". In this case the "ON" will be remembered by the instrument even if the instrument was switched off. In order to deactivate the Self-Tune, it is necessary to return the "Self-Tune" parameter to "No"

The self-tune is a on-line algorithm that "observes" the measured value and looks for oscillation due to variations of the load or set-point changes. When a significant pattern is "recognized" a decisional procedure starts in order to recalculate the parameters of PID controller.

When the Self-tune procedure is enabled the PI parameters (PB, TI) are read only.

### Automatic stand-by:

This function avoids overshoot due to temporary process interruptions (PV goes to zero). When the input signal goes to zero the controller output reaches the saturation for integral factor effect; when the process restarts the controlled output will have an excessive and dangerous overshoot.



When the “automatic stand-by” function is activated by setting the Pressure Standby Threshold to something other than OFF the algorithm monitors the controller input. When the input value leaves the requested band (specified by the “Pressure Standby Threshold” parameter) the control output assumes immediately the last value stored when the process was stable. (For steady state condition the process value must be inside of the requested band [Setpoint +/- Standby Threshold] for more than one minute. Once Calculated this value remains unchanged until there is a change of the setpoint, or changing the controller main state from manual to automatic mode. ) If the process value is inside of the band for more than one minute, the actual controller output value will be saved to become active during the recovery time and the delay time phase of standby sequence. Additionally an extra limitation of the controller output value will be activated to prevent very fast changes in the rotation speed of the motor by the Standby Active Limit.

Min: [actual controller output - Standby Active Limit]  
Max: [actual controller output + Standby Active Limit]

The freezing of the output of the controller will last for a time specified by the “Pressure stand-by recovery time” parameter. If the parameter “Pressure standby recovery time” is set to Off, the controller will set to manual mode and the stored value for controller output becomes active until otherwise changed.

If the controller input does not recover within the specified time, the output value is forced to zero. If the controller input recovers within the specified time, the algorithm wait for two and half time the integral value; after this time has elapsed, the controller will come back automatically to normal “running” condition (limited by Standby Active Limit) to the output level calculated when the process was stable.

#### Auto-manual Start Up:

This parameter setting will allow the user to start the controller in either manual mode, where they will be able to start their process under their own manual control output value or in automatic mode where the controller outputs power to control the process automatically. Tuned values in manual mode should be defined from manual mode before this setting is changed from its default of starting process in Manual mode.

#### Differential Pressure value:

This is always to be calculated as A-B or pressure 1- pressure 2. Only available when controller has a 2nd Universal input card fitted.





### Manual to Automatic transfer:

When transferring from manual control to Automatic control there are two methods: Bumpless Mode (without modification of set point) and Set Point mode (when the current Set Point is modified it will be set to the actual measured input value). If in Manual mode runs as open loop i.e SP is really the percentage output power, hence how the transfer can be bumpless or SP change.

Input n Calibration resistor Percentage      Set the percentage of range the calibration shunt resistor needs to be set at between 40% and 100%. Default 80%

Start Input n Low Point Calibration      Press **↵**+**↵** keys to begin calibration procedure  
 Start Input n High Point Calibration      Press **↵**+**↵** keys to begin calibration procedure (Can only be accessed once a successful low calibration has been completed)

Error Messages      **Count Fail** means the low calibration will fail if the offset is less than -10mV or greater than +10mV. This signifies potential faulty sensors or the high calibration will fail if the count value is less than +20mV or greater than +50mV. This signifies potential faulty sensors RCal Fail means the high calibration will fail if the mV value is within 10mV of the low calibration value. This is a potential RCAL failure.

### Control Configuration

Control Type      w Select From Pressure or Single/Dual\*\*

Power Up Control State      Select From Automatic Control or Manual control on start up Default: Manual  
**Caution:** Use with care!

Control Input Source      Select from Universal Input 1 or Differential Input (only applicable if Input2 card fitted and set to non temperature)

Primary Control Action\*\*      Reverse or Direct acting

Primary/Secondary\*\* proportional band      Enter Value of required Proportional band ( up to 100 time input span, maximum of 999900 in pressure control, ON-OFF to 9999 in temperature control)

Integral Time      Enter Value of required integral time from Off to 99mins 59secs

Derivative Time\*\*      Enter Value of required derivative time from Off to 99mins 59secs

Manual Reset/Bias\*\*      Enter Value of required bias to apply to Proportional band from -100 to 100%  
 Default: 25%

Differential for On-Off Control\*\*      Enter Value of required ON-Off differential (a band centred about Setpoint to stop excessive on-off switch when output control is set to be on-off) 0-300 units of span

Prop band Overlap and Deadband\*\*      Enter value of required Overlap (+ive) or Deadband (-ive) of primary and secondary control outputs. -20to +20% of Span (Overlap both output on at same time dead band both output never on at the same time).

Scaled Power      Enables or Disables Display of Manual Power in RPM

Scaled Power lower and Upper      Limit Enter value to be displayed at 0% power and 100% power (must be a minimum of 100 units between upper and lower value)

Set point Upper and Lower      Limits Enter values to limit the maximum or minimum allowable Set point values

Local Set point value      Enter Value of required Local Set point (Constrained by input range and set point upper and lower limits)

Manual to Auto Power transfer      Select from Bumpless or Set point Mode

Pressure Tune Output Pulse      Enter Value of maximum output pulse to be applied in Pressure tuning mode.

Pressure standby Threshold      Enter Value of required threshold that activates Standby by recover period from OFF



- Pressure standby Recover Time      Enter Value of time allowed for control output to be in saturation before turning output off, from 0 to 60 secs
- Pressure Standby active Limit      Enter Value of allowed control output power value that is applied once PV enters Stable Band 0-100% Default: 20% Caution: Limits Max+ Min Output Power Value
- Output Configuration:**
- Linear Output n Type                    w From: 0-5, 0-10, 1-5, 2-10V & 0-20, 4-20mA or 0-10VDC adjustable Transmitter PSU.
- Adjustable 0-10V Transmitter PSU n      w Voltage required if Output n is 0-10VDC adjustable Transmitter PSU.
- Output n Usage                            w From: Alarms; Retransmit Process Variable .Primary Power, Secondary Power and Unused.
- Output n Alarm Selection                w Alarm 1; 2; 3; or Logical OR of alarms 1 to 2; 1 to 3;. Selectable Direct or Reverse Action.
- Retransmit Output n Scale Low      w Displayed value at which the retransmission output = minimum. Adjustable from -1999 to 9999.
- Retransmit Output n Scale High      w Displayed value at which the retransmission output = maximum. Adjustable from -1999 to 9999.
- Alarm Configuration:**
- Alarm n Type                                w From: Unused; High; Low; Rate Of Signal Change per minute; PV Signal Break; PV-SP Deviation, Band, Control Loop, Percentage Memory Used, High and Low Power
- Alarm n Input Selection                 w From: Universal Input 1 or 2
- Alarm n Value                                w Alarm activation point. – applicable if type is High; Low; Deviation; Band.
- Alarm n Hysteresis                        w Deadband on “safe” side of alarm, through which the signal must pass before alarm deactivates.
- Signal change Alarm n Min. Duration      Minimum time the rate of PV change must be above the alarm threshold for a Rate Of Change Alarm to change state (on or off). 1 to 9999 secs.
- Alarm n Inhibit                              w Prevents alarm activation if the alarm condition is true at power up. Activation occurs only after the condition has passed and then reoccurred.
- Alarm n Filter Time                        w Filter the time the alarm needs to be active for the action to take place from 0.5s to 100s
- Control loop Alarm Type                 w Manual Loop alarm time, from 1s to 59minus 59s or Automatic (2× integral)
- Percentage of Memory used              w 0-100%
- High or Low power value                 w 0-100%

**Communications Configuration:**

- No Comms Warning                        w If Communications Configuration menu is entered without a communications module fitted.
- Modbus RTU Parity                        w From: Odd; Even or None.
- Modbus RTU Data Rate                  w From: 9600; 19200; 57600 or 115200 bps.
- Master Mode, or Slave Address      w Slave address (1 to 255), or multi-zone Setpoint Master Mode.
- Master Mode Format                        w The data format required by the attached setpoint slaves. From: Integer; integer with 1 decimal place & float.
- Serial Communications Write Enable    w Enables/disables writing via RS485 or Ethernet (if fitted). When disabled, all parameters are read only.

**Recorder Configuration:**

*Refer to the Supplementary Product Manual for information about the additional screens when Data Recorder is fitted.*

- No Recorder Warning                    w If the Recorder Configuration menu is entered on an instrument without this option.
- Recording In Progress Warning        w If recording in progress when Recorder Configuration entered. - Access to the Start/ Stop or Abort screens only until the recording is stopped.



Recording Mode		Record Until Memory Used (Stop recording when full) or Continuous FIFO (First In - First Out - overwrites oldest data when full).
Recording Sample Interval		From: Every 1; 2; 5; 10; 15; 30 Seconds, or Every 1; 2; 5; 10; 15; 30 Minutes.
Recorder Trigger		The recording Start/Stop trigger method. From: Operation Mode; Recorder Menu; On Alarm; Digital Input
Trigger On Alarms		Any from: Alarm n – Where n is alarms 1 to 5. Any combination of these can be set to trigger (TRG) or not (OFF).
Values To Record		Any from: Process Variable value; Maximum or Minimum PV (since previous sample); Setpoint; Primary Power or Secondary Power.
Events To Record		Any from: Alarm n Status or Unit On/Off. Note: An alarm state change between samples is also recorded. This uses additional recorder memory.
Recorder Status Information		Shows if a recording is in progress; the recording mode; memory usage per sample; memory remaining and approximate recording time remaining.
<b>Recorder Clock Configuration:</b>		<i>Refer to the Supplementary Product Manual for information about the additional screens when Data Recorder is fitted.</i>
Date Format	w	The format used for displayed dates: dd/mm/yyyy (Day / Month / Year) or mm/dd/yyyy (Month / Day / Year). – Recorder versions only.
Set Date	w	Sets the internal clock Date. – Entered in the format defined by Date Format screen. – Recorder versions only.
Set Day Of Week	w	Sets the day of week used by the internal clock. – Recorder versions only.
Set Time	w	Sets the internal clock Time. – In hh:mm:ss (Hours : Minutes : Seconds) format. – Recorder versions only.
<b>Display Configuration:</b>		
Enable Custom Display Mode		Enables/disables Custom Operation Mode, if configured (requires PC configuration software).
Read Only Operation Mode?		Allows Operation Mode to be Read-Only or Read/Write. Screens can be seen but, values cannot be changed if Read-Only.
Operation Mode Bar Graph Format		From: PID Power or Control Deviation or.
Trend Sample Interval		Interval between display of next value on the trend graph From: Every 1; 2; 5; 10; 15; 30 Seconds, or Every 1; 2; 5; 10; 15; 30 Minutes.
Select Trend Mode		From: PV only, PV and SP or Max/Min PV between samples (candle-stick graph). Alarm activity is always shown.
Display Colour		From: Red only; Green only; Red to Green on Alarm or Green to Red on Alarm.
Invert Display		Standard or Negative display image.
Display Contrast		Screen contrast (0 and 100) to improve clarity. 100 = maximum contrast.
Language		Select English or the alternate local language. The alternate language type can be changed using the PC software.
<b>Lock Code Configuration:</b>		
Lock Code View 1		View and edit the Setup Wizard; Configuration Mode; Tuning Menu, Supervisor Mode, USB Menu and Recorder menu Lock Codes (1-9999 or OFF). Default Values = 10
<b>Reset To Defaults:</b>		
Reset To Defaults		Set all parameters to default values. Caution: User must reconfigure all required settings before using the instrument following a reset.



**\*Both Recorder Trigger state and Digital input selection must be the same to start recording**

**\*\* Applies to Temperature control Only not pressure control.**













## 10. Screen Sequences

The parameters displayed depend on how the instrument has been configured. After 2 minutes without key activity, most screens revert to the next higher menu level, until reaching the base Operation Mode display.

**Note:** Additional screens will be displayed if the USB, Profiler or Recorder Options are fitted - Refer to the *Supplementary Manual*. Screens marked  persist unless changed by the user. Screens marked W are also included in the Setup Wizard. Menus marked  = Require an un-lock code for access

### Screen Navigation

 = Accept Value & Move Back    
  = Next Item/Increment    
  = Prior Item/Decrement  
 = Accept Value & Move Forward    
   = Move Up One Menu Level  
 The symbols   are showed to the right of the lists when more menu options are available above  or below 


#### Operation Mode:

Base operating screen. LED Labels;


PV value; Percentage Output power(As % or RPM);Bar Graph Peak Display Screen(s)

Control Loop Setpoint  
Set point Value  
Alarm Status  
Trend View(s)

Select Auto/Manual Control  
- Custom Display screens ...

 LED Labels = LED indicator functions. Defaults are STBY,ALM1, ALM2 & ALM3 - these labels can be altered with configuration software  
Bar Graph = SP-PV deviation ( 20 units +ive or -ive Deviation maximum)

PV1 or PV2 and the Peak value(Peak Max or Min values shown depend on configuration Display parameters)  
Select the active Control Set point From Local or Remote  
Shows the Remote and Local Set point values  
Active / inactive status of all configured Alarms.

 A trend graph of PV1,PV2 or Differential, or the Max/Min value of the PV between samples. Any active alarm(s) are indicated at the top of the graph.(Values shown depend on configuration Display parameters)

Select between automatic or manual Control  
Up to 50 Configuration parameters can be copied into Operation Mode using the PC software. In this mode they are **not pass code protected**.

**Note: Operation Mode screens can be made globally read only from Display Configuration**


#### Setup Wizard:

 Setup Wizard Unlocking

- Screens marked w ...

Setup Wizard Completed

w Enter correct code number to access Setup Wizard. Default Value = 10

w Press  to select each major configuration parameter in turn. Follow the on-screen prompts to alter the values.


w Confirms completion of the Setup Wizard. Exits to Operation Mode.

#### Supervisor Mode:

Supervisor Mode Unlocking

- Supervisor Mode Screens ...

If Supervisor Mode is configured (requires PC software), enter correct code number to continue. Default Value = 10

Press  to select up to 50 Configuration parameters in turn. Follow on-screen prompts to alter the values.

P/N: n/a | Rev: n/a | ECO: n/a



- Configuration Menu:**

  - Configuration Mode Unlocking      Enter correct code number to access Configuration Mode. Default Value = 10
  - Configuration Options              Select required Configuration Menu Option from list. Press **Enter** to continue.

*Refer to the Configuration Menu screens sequences opposite for information about the Configuration Sub-Menus.*
  
- Automatic Tuning:**

  - Auto Tune Unlocking              Enter correct code number to access Automatic Tuning Mode. Default Value = 10
  - Run Pressure Pre-Tune              Select from Yes or No (Available only when in Manual Control Mode)
  - Run Pressure Self-Tune              Select from Yes or No (Available only when in Automatic Control Mode)
  - Pressure Tune Status              Shows the user the Tune Status, Result Message, Delay value, time constant and the Gain of the process.
  
- USB Menu:**

  - USB Mode Unlocking              Enter correct code number to access USB Menu. Default Value = 10
  - Read/Write To USB Device?      From: Read/Write Configuration File; Read/Write Profile File or Write Recorder Log File.
  - Enter A File or Folder Name      Enter an 8-character folder name for logs, or a file name for configurations and profiles. An extension (bct for configurations, .pfl for profiles) is added automatically. **Caution:** Existing files/folders with the same name will be over-written.
  - Writing Configuration File      The file is being written. **Caution:** Do not disconnect USB device until completed! Data loss or corruption may result.
  - Transfer Successful              Confirmation of successful data transfer. Press **Enter** to continue
  - Select File                          Select the Configuration file to transfer from the USB stick. **Caution:** A configuration read overwrites all existing instrument settings.
  - Reading Configuration          File The file is being read. **Caution:** Do not remove the memory stick whilst this operation is in progress. Data loss or corruption may result.
  - Transfer Successful              Confirmation of successful data transfer. Press **Enter** to continue
  - Transfer Failure                  For write failures, check the disk space on the USB stick. For read failures, check the maximum number of profiles/segments is not being exceeded.
  
- Recorder Control:**

  - Recorder Mode Unlocking      Enter correct code number to access Data Recorder Menu. – if Log Trigger is Recorder Menu Start/Stop. Default Value = 10
  - Recording In Progress Warning    If recording in progress when Recorder Menu entered. - Access to the Start/Stop or Abort screens only until the recording is stopped.
  - Start/Stop Data Recording      Manually Stop, or Start a new recording. – if Log Trigger is Recorder Menu Start/Stop.
  - Abort Recording                  Forces a recording to Stop, overriding the selected record trigger. – if



Delete Recording	Log Trigger is During Alarms; Digital Input A or B; or During Profile. Clears the recorder memory. Caution: Permanently removes All recorded data.
<b>Product Information Mode:</b>	
Input(s) Calibration Status	Calibration status of mVDC, VDC, mADC, RTD and Thermocouple CJC inputs. All should be "Calibrated".
Calibration Check Due Date	Date re-calibration is due. - if Calibration Reminder Enabled in Inputs Configuration.
Option Slot n Information	Type of Option Modules (if any) fitted in Option Slot s 1-4, A or B
Units Feature Information	Controller Only; USB Port; Data Recorder (includes USB Port).
Firmware Information	Type and version of firmware.
Serial Number Information	Instrument serial number.
Date of Manufacture	Date of Manufacture
<b>Service Information Mode:</b>	
For Service Contact	Contact information for Service, Sales or Technical Support.
<b>Input Configuration:</b>	
<b>Input n Setup</b>	
Process Variable Input Type	w From Strain Gauge, Thermocouple, RTD and Linear inputs. - see specifications section for details.
Engineering Units	w Select display units from: °C; °F; °K; bar; %; %RH; pH; psi or none.
Decimal Point Position	w Display resolution with 0; 1; 2 or 3 decimal places. Temperature inputs are limited to 1 decimal place.
Multi-Point Scaling Enable	Enables/disables Linear Input Multi-Point Scaling.
Scale Range Lower Limit	w Sets the usable span (min = 100 units, max = range limits - see specs) for temperature inputs. For Linear inputs, Upper & Lower Limits define the values shown (-1999 to 100000) when input is at minimum and maximum values. Min span = 100 units. If Multi-Point Scaling is enabled, up to 15
Multi-Point Scale Point(s)	
Scale Range Upper Limit	w breakpoints* can scale input vs. displayed value, between the linear input scale limits. *A breakpoint set at 100% input ends the sequence.
Input Filter time	Filter unwanted noise from input signal. Adjustable from 0.5 to 100.0 seconds (default = 0.5s). Caution: Use with care!
Input Failure Mode	Set to Fail High or Fail Low on sensor break
Input Peak Detection	Disabled, Maximum Peak or Minimum Peak
CJC Enable/Disable	Enables/disables internal Thermocouple Cold Junction Compensation. The default value is Enabled.
Process Variable Offset	Trims the PV. +Ve values add to, -Ve values subtract from measured input. Caution: Use with care!



**Input n Calibration (viewed when temperature input type selected)**

- Calibration Type Select from: Factory, single point and Two point Calibration
- Calibration Offset Enter value to offset input signal by, from off (no off set applied) to +ive or -ive maximum of input Span
- Calibration Low Temp & Low Offset Enter the value at which you conduct the low end calibration and required offset for calibration
- Calibration High Temp & High Offset Enter the value at which you conduct the High end calibration and required offset for calibration
- Calibration reminder**
- Calibration reminder Enable or Disable Calibration reminder
- Calibration Reminder Date Set the date that the Calibration reminder is due

**Digital Input Function Select**

- Digital input C1..4 Choose from the following: Input 1,2 or 1+2 Peak reset, Input, Alarm Reset, Input 1,2 or 1+2 Alarm and Peak reset, Input 1,2 or 1+2 Zero Calibration, Input 1,2 or 1+2 Zero Calibration, Alarm and Peak reset ,Data Recorder Start/Stop\*, Set Point selection, Auto or manual control, Enable/disable PID Control Outputs, Engage Pre Tune or self tune and Increments or decrement control output percentage .

**Strain Gauge Calibration**

- Input n Shunt resistor Enabled or Disable Default : Enabled