YEAR 2000 COMPLIANT

User's Guide

omega.com®

OMEGA®

http://www.omega.com
e-mail: info@omega.com

CN3430 & CN3440 SERIES

Universal Temperature & Process Controllers

Programming Guide

omega.com®
OMEGA®

OMEGAnet® On-Line Service http://www.omega.com	Internet e-mail info@omega.com

Servicing North America:

USA: ISO 9001 Certified
One Omega Drive, Box 4047
Stamford, CT 06907-0047
Tel: (203) 359-1660 FAX: (203) 359-7700
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L 5A1
Tel: (514) 856-6928 FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

USA and Canada:
Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA℠
Customer Service: 1-800-622-2378 / 1-800-622-BEST℠
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN℠
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

Mexico and Latin America:
Tel: (95) 800-826-6342 FAX: (95) 203-359-7807
En Español: (95) 203-359-7803 e-mail: espanol@omega.com

Servicing Europe:

Benelux:
Postbus 8034, 1180 LA Amstelveen, The Netherlands
Tel: (31) 20 6418405 FAX: (31) 20 6434643
Toll Free in Benelux: 0800 0993344
e-mail: nl@omega.com

Czech Republic:
ul. Rude armady 1868, 733 01 Karvina-Hranice
Tel: 420 (69) 6311899 FAX: 420 (69) 6311114
Toll Free: 0800-1-66342 e-mail: czech@omega.com

France:
9, rue Denis Papin, 78190 Trappes
Tel: (33) 130-621-400 FAX: (33) 130-699-120
Toll Free in France: 0800-4-06342
e-mail: france@omega.com

Germany/Austria:
Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
Tel: 49 (07056) 3017 FAX: 49 (07056) 8540
Toll Free in Germany: 0130 11 21 66
e-mail: info@omega.de

United Kingdom: ISO 9002 Certified
One Omega Drive, River Bend Technology Centre
Northbank, Irlam, Manchester
M44 5EX, United Kingdom
Tel: 44 (161) 777-6611 FAX: 44 (161) 777-6622
Toll Free in the United Kingdom: 0800-488-488
e-mail: info@omega.co.uk

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

CONTENTS

1 INTRODUCTION

Documentation for the universal process controller is shown in Fig. 1.1. The **Standard Manuals** are supplied with all instruments. The **MODBUS Supplement** is supplied with instruments configured for MODBUS Serial Communication.

The Installation manual includes an **Installation Record** which should be completed as a log of the electrical installation. The record is useful when carrying out initial instrument programming and can be retained for future reference.

2 GENERAL PROGRAMMING

2.1 Preparation for Changes to the Parameters

Ensure that the external alarm/control circuits are isolated if inadvertent operation during programming is undesirable.

Any changes to the operating parameters are implemented using the ▲ or ▼ switches – see *Section 3 of the Operating Guide*.

> **Note.** The instrument responds instantly to parameter changes which are saved when the key is pressed.

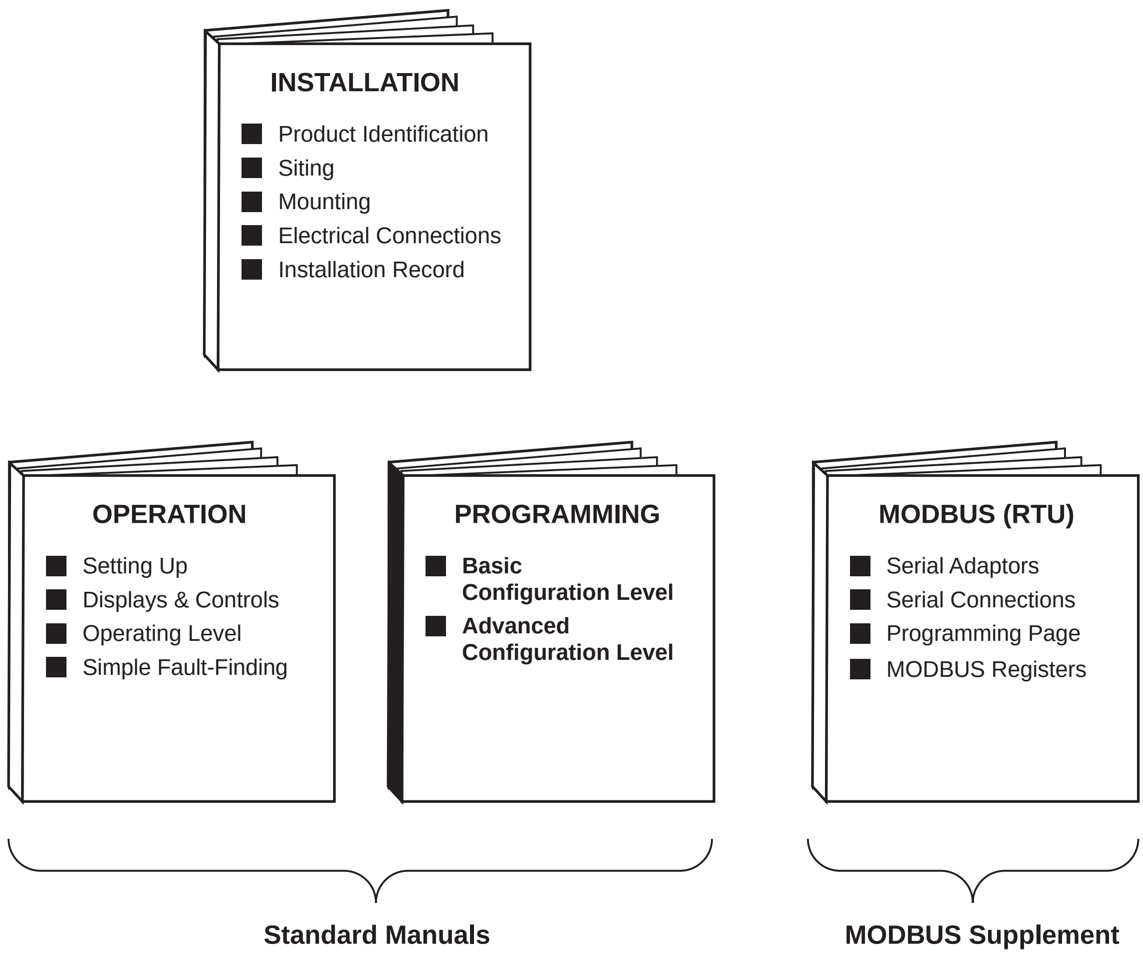
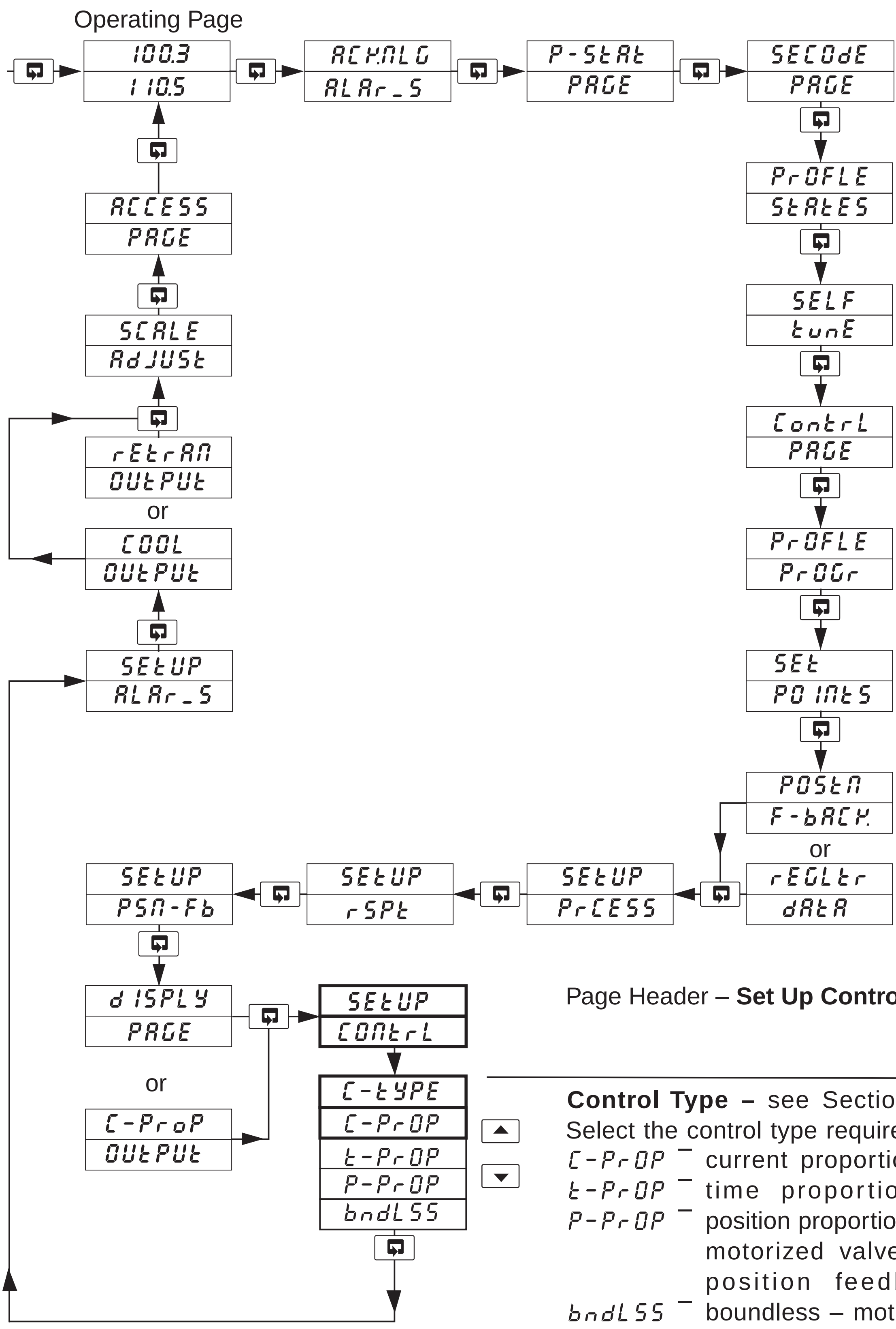


Fig. 1.1 Controller Documentation



Page Header – **Set Up Control.**

Control Type – see Section 4.10

Select the control type required:

C-PrOP – current proportioning.

t-PrOP – time proportioning.

P-PrOP – position proportioning – motorized valve with position feedback.

bndLSS – boundless – motorized valve without position feedback.

Press [key] then [key] to return to the **Operating Page.**

Note. It is recommended that the control type is set up before the instrument is configured.

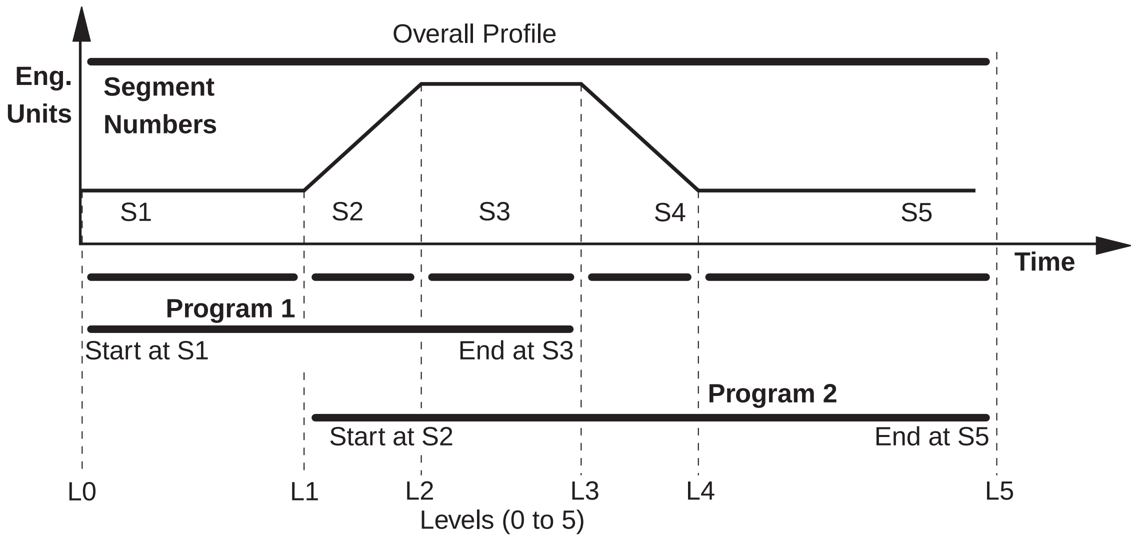
Fig. 3.1 Selecting the Control Type

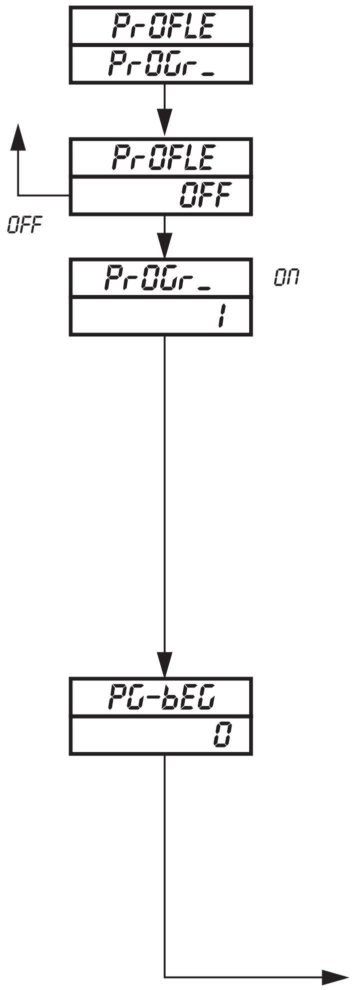
4 CONFIGURATION

4.1 Profile Program Page

Information.

- This page is inaccessible when a profile is running.
- Up to 9 programs.
- Total of 30 segments.
- Guaranteed Ramp/Soak feature.
- Repeat facility for each program.





Page Header – **Profile Program**.

Profile Enable
Select the profile function, on or OFF.

Program Select
Select the program required. A program consists of a number of segments. Each segment has a starting and finishing set point level.

Level 1 is the finishing level of segment 1 and the starting level of segment 2.

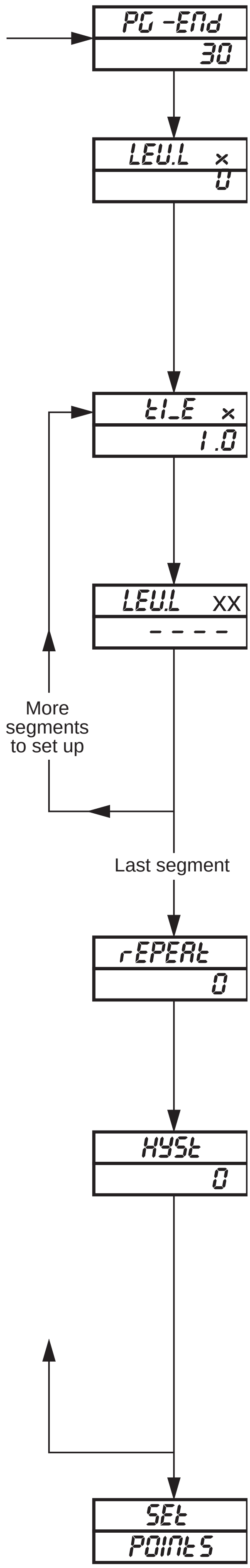
Level 10 is the finishing level of segment 10 and the starting level of segment 11.

Program Begin (start level)
This is the first level number of the program selected at **Program Select** above.

Set the program start level number for the program chosen at **Program Select**

Continued on next page.

…4.1 Profile Program Page



Program End (finish level)
Set the program end level number for the program chosen at **Program Select**.

Program First Segment Start Level
The number shown in the upper display is the start level number for the first segment.

Set the required value for the start level.
The units are display units between **Display Zero** and **Display Full Scale.**

Segment Time Period
The time number of the currently selected segment is shown in the upper display.
Set the required time period, between 0 and 999.9 minutes in 0.1-minute increments.

Segment Finish/Start Level
The number shown in the upper display is the finish level number for the currently selected segment and the start number for the next segment.
Set the required value for the segment finish/start level. The units are display units between display zero and full scale.

Advance to the next parameter, **Segment Time Period**, if more segments are to be set up or **Repeat** if the current segment is the last segment.

Program Repeat
Each program can be set to repeat up to 99 times or continuously.
Set the required repeat count, between 0 and 99, or InFntE for continuous repeats.

Program Hysteresis Value (for guaranteed ramp/soak)
A hysteresis value can be set in engineering units. Setting the value to zero turns the guaranteed ramp/soak facility off. If the process variable deviates beyond the value set, the program is suspended, but resumes automatically when the process variable returns within the set limits. The hysteresis value applies above and below the set point under all program conditions.
Set the hysteresis value required, within the display range limits.

Return to top of **Profile Program Page**
or
advance to **Set Points Page.**

4.2 Set Points Page

Information.

- Two local set points – Local and Dual.
- Remote set point facility – with Ratio and Bias.
- Remote set point tracking options – for bumpless Remote-to-Local set point transfers.
- Adjustable high and low limits for all set point types.
- Set point tracking for bumpless Manual-to-Auto transfers.

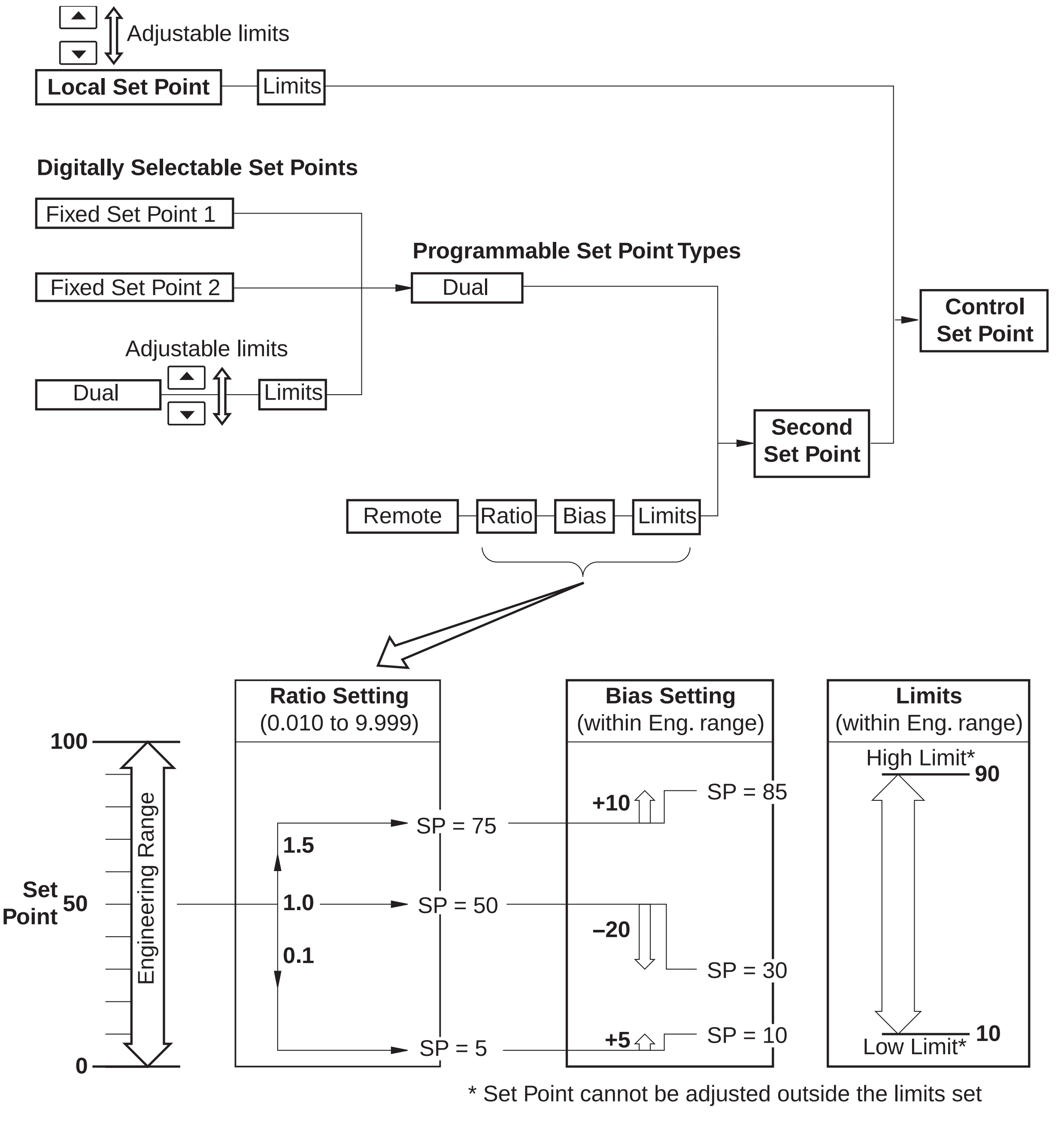
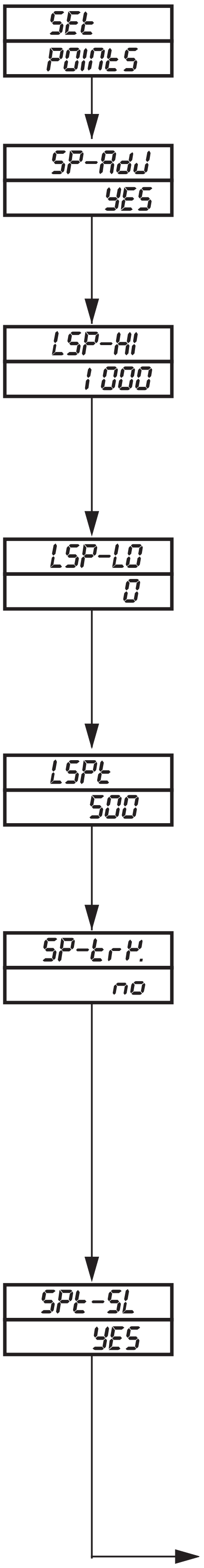


Fig. 4.1 Set Point Types

…4.2 Set Points Page

To gain access to this and subsequent pages, the correct configuration code must first be set in the Security Code Page – see *Section 5.5 of the Operating Guide*.



Page Header – **Set Points**.

Set Point Adjustment Enable
This frame allows display and adjustment of the set point in the **Operating Page Displays** (see *Section 5.2 of the Operating Guide*). Select YES to enable or no to disable.

Set Point High Limit
This is the maximum value to which the local set point can be adjusted.
Set the value required. The decimal point position is set automatically.

Set Point Low Limit
This is the minimum value to which the local set point can be adjusted.
Set the value required. The decimal point position is set automatically.

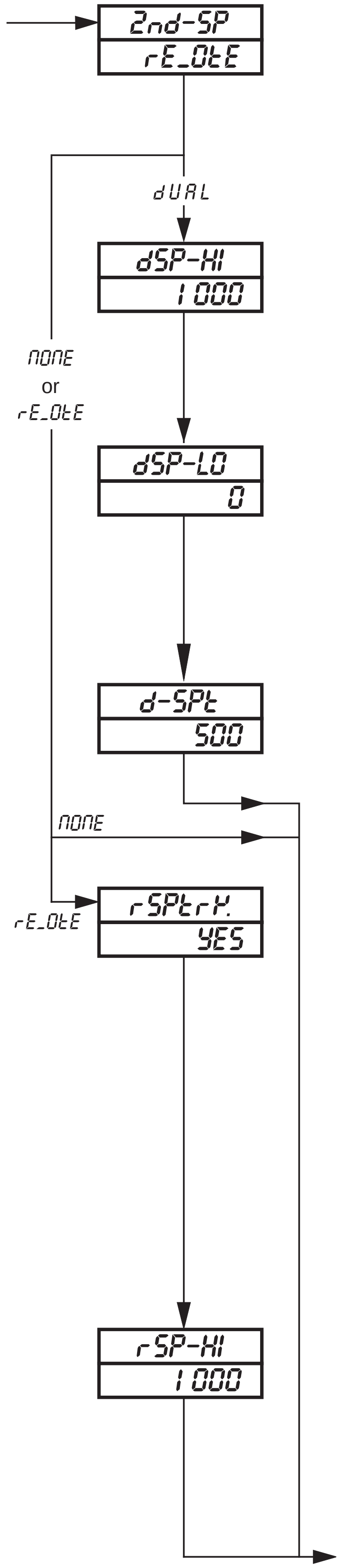
Local Set Point Value
Set the value required, within the limits set above. The decimal point position is set automatically to that set in the **Set Up Display Page** – see Section 4.8.

Set Point Tracking Enable
If **Set Point Tracking** is enabled and the controller is in Manual mode, the local set point tracks the process variable. When the controller is in **Set Point Tracking** mode, the local set point limits can be exceeded. If the local set point is outside of its limits when the tracking mode is disabled, the local set point value can only be adjusted towards its limits. Once within the limits, they apply as normal.
Select YES to enable or no to disable.

Set Point Select
This frame enables selection of set point type from the **Operating Page**, i.e. LOCAL, rE_OtE, or dUAL as applicable – see **Set Point Type Selection** (*Section 5.2 of the Operating Guide*).
Select YES to enable, or no to disable.

Continued on next page.

…4.2 Set Points Page



Second Set Point Type
This frame enables the setting up of a Second set point in addition to the Local set point.
Select the second set point type, NONE (no Second set point), dUAL (Dual set point) or rE_OtE (Remote set point).

Dual Set Point High Limit
This is the maximum value to which the Dual set point can be adjusted.
Select the value required. The decimal point position is set automatically.

Dual Set Point Low Limit
This is the minimum value to which the Dual set point can be adjusted.
Select the value required. The decimal point position is set automatically.

Adjustable Dual Set Point Value
Set the value required, restricted to the limits set in **Dual Set Point High Limit** and **Dual Set Point Low Limit** above.

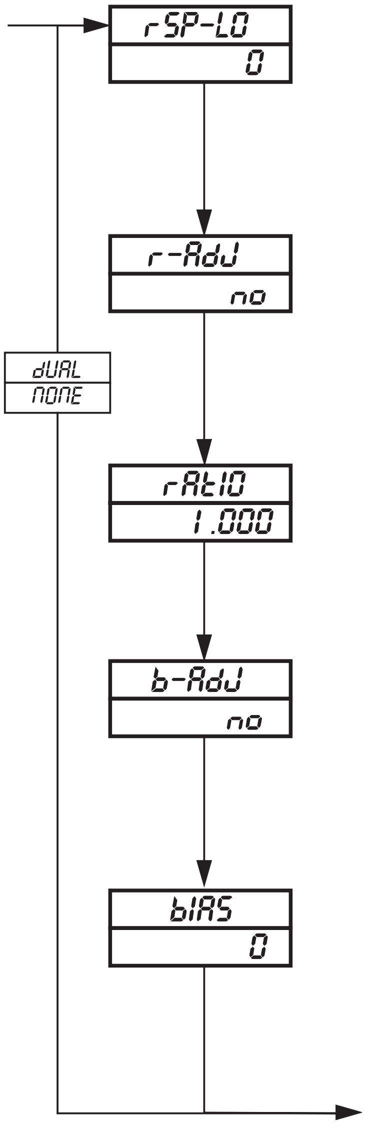
Advance to **Set Point Type Selection** on page 10.

Remote Set Point Tracking Enable
If **Remote Set Point Tracking** is enabled and the controller is in Remote mode, the Local set point tracks the remote set point. When the controller is in **Remote Set Point Tracking** mode, the local set point limits can be exceeded. If the local set point is outside of its limits when the tracking mode is disabled, the Local set point value can only be adjusted towards its limits. Once within the limits, they apply as normal. With Remote set point tracking enabled, if the controller is put into Manual mode, the set point reverts from remote to Local.
Select YES to enable or no to disable.

Remote Set Point High Limit
This is the maximum value to which the Remote set point can be adjusted.
Select the value required. The decimal point position is set automatically.

Continued on next page.

…4.2 Set Points Page



Remote Set Point Low Limit
This is the minimum value to which the Remote set point can be adjusted.
Select the value required. The decimal point position is set automatically.

Remote Set Point Ratio Adjust Enable
This frame enables or disables the display and adjustment of the remote set point ratio in the Operating Page (see *Section 5.2 of the Operating Guide*).
Select YES to enable or no to disable.

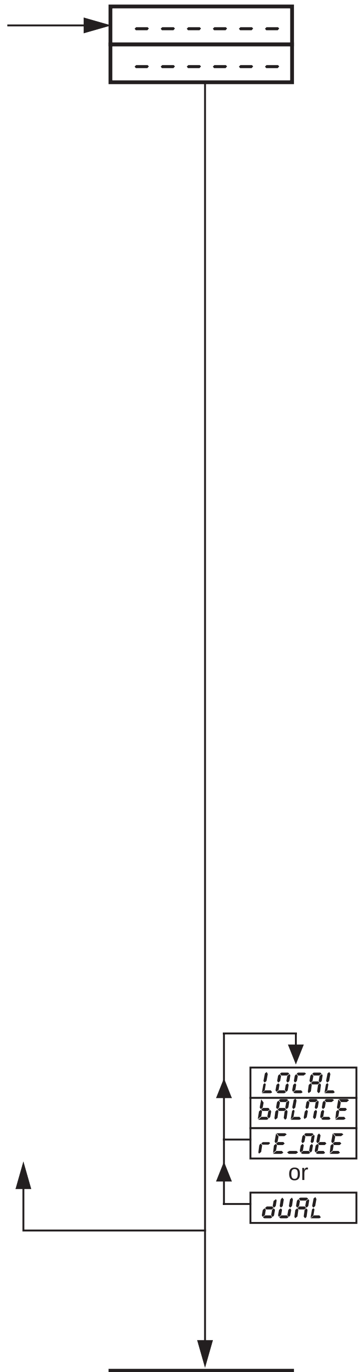
Remote Set Point Ratio
This is a scaling factor, i.e. it multiplies the remote set point input by the ratio value set. Set the required remote set point ratio between 0.010 and 9.999 in 0.001 increments.

Remote Set Point Bias Adjust Enable
This frame enables or disables the display and adjustment of the remote set point bias in the Operating Page (see *Section 5.2 of the Operating Guide*).
Select YES to enable or no to disable.

Remote Set Point Bias
This is an offset value set as a proportion of display span (may be ± the span value).
Set the remote set point bias in engineering units.

Continued on next page.

…4.2 Set Points Page



Set Point Type Selection

This frame displays the current set point type, or bALnCE and value – see **Set Point Type Selection** frame in the **Operating Page** – see *Section 5.2 of the Operating Guide*.

Upper Display – displays the set point type, or bALnCE:

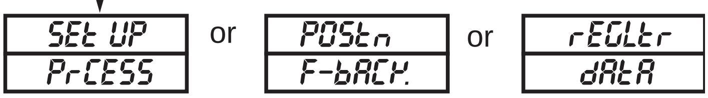
- LOCAL – Local set point
- bALnCE – Balance, the difference between the Local and Remote (or Dual) set point values
- rE_OtE – Remote set point on controllers with Remote set point facility
- dUAL – Dual set point

Lower Display – displays the value of the set point type shown in the upper display, but if the set point type is changed from Local to Remote (or Dual) the display shows the difference (bALnCE) between the Local set point value and the Remote (or Dual) set point value.

When Remote set point is selected and if Remote set point tracking is enabled, the Local set point value tracks the Remote set point value. The Local set point limits do not apply in this mode. If the Local set point is outside of its limits when Local set point type is re-selected, it can only be adjusted towards its limits. Once within these limits, they apply as normal.

Press [key] to select LOCAL, bALnCE, rE_OtE (or dUAL). rE_OtE and dUAL are dependent on the selection made at the **Second Set Point Type** parameter.

Return to the top of the **Set Points Page** or advance to the next page.



4.3 Motorized Valve Control

Information.

- Motorized valve control with or without feedback – position-proportioning (with feedback) or boundless (without feedback).
- Ratio and bias settings can be applied to adjust the range of valve travel (position-proportioning only).
- Deadband setting – adjustable to minimize hunting of the motorized valve.

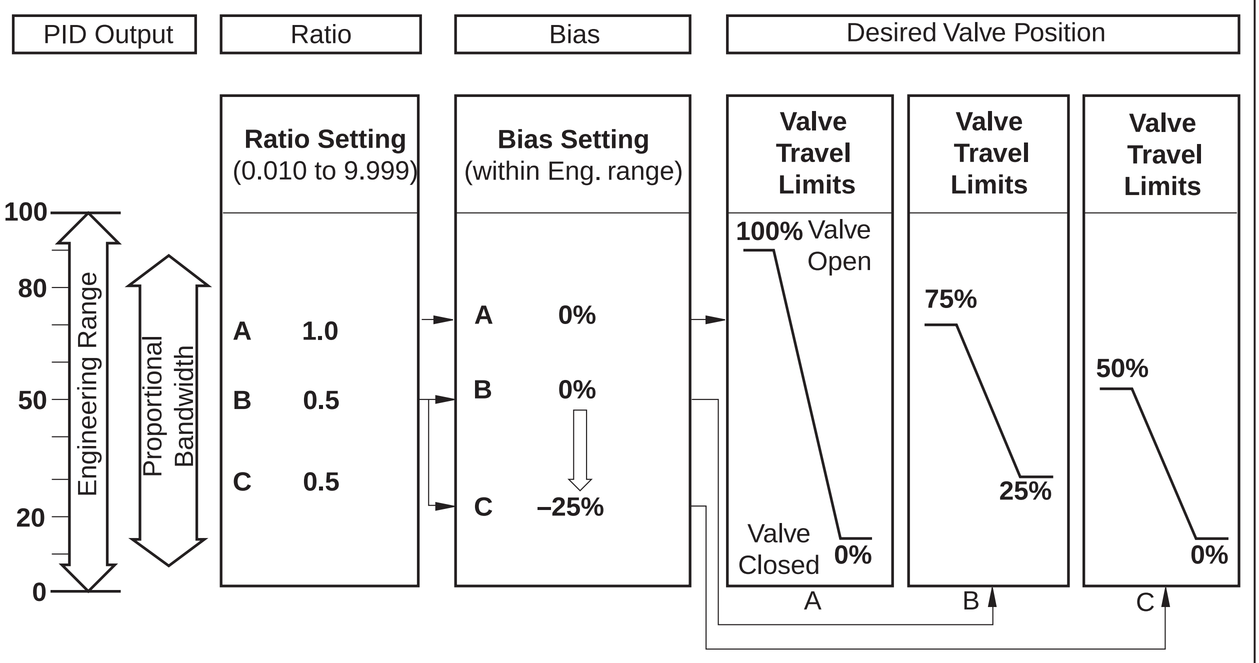
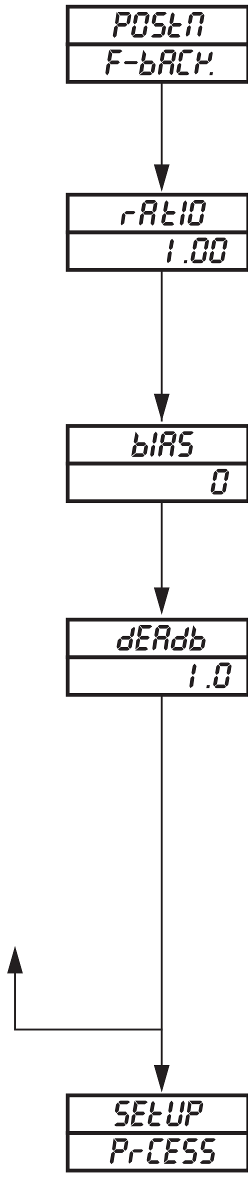


Fig. 4.2 Position-Proportioning Schematic Diagram

4.3.1 Position Feedback Page

This page appears only if P-PrOP is selected at the **Control Type** parameter in the **Set Up Control Page –** see Fig. 3.1 and Section 4.10.



Page Header – **Position Feedback Page**

Ratio

Ratio is a scaling factor, i.e. it multiplies the position feedback input by the value set here.

Set the required feedback ratio between 0.0 and 9.99 in 0.01 increments.

Bias

Bias is an offset as a percentage of the valve travel.

Set the required feedback bias between –100.0 and +100.0%.

Deadband

Deadband is set as a percentage of the position feedback span, between 0.0 and 10.0%, to produce a deadband around the valve control value. This gives minimum 'hunting' of the motorized valve.

Example. If the valve is to be driven to the 50% open position and the deadband is set to 4.0%, the motor stops driving when the position feedback is 48%. In this example, the deadband is between 48% and 52%.

Return to the top of the **Position Feedback Page** or advance to next page.

4.4 Motorized Valve Control Without Feedback (Boundless) – Fig. 4.3

A 'boundless' process controller provides an output that is effectively the time derivative of the required regulator position, i.e. the controller signals the regulator, not where to go (position derivative), but in which direction to travel and how far to move, by a series of integral action pulses. Thus, the controller does not need to know the absolute regulator position and is unaffected when the regulator reaches the upper or lower limit, as determined by the regulator's limit switches (giving rise to the term 'boundless').

In this system, the final regulator must act as an integrator, integrating both the raise and lower pulses in direction and duration so that the final position of the regulator reproduces the required 2- or 3-term control function. The regulator must remain stationary indefinitely in the absence of raise or lower commands.

When a deviation from set point is introduced, the regulator is driven for a length of time equivalent to the proportional step. The regulator is then driven by integral action pulses until the deviation is within the deadband setting.

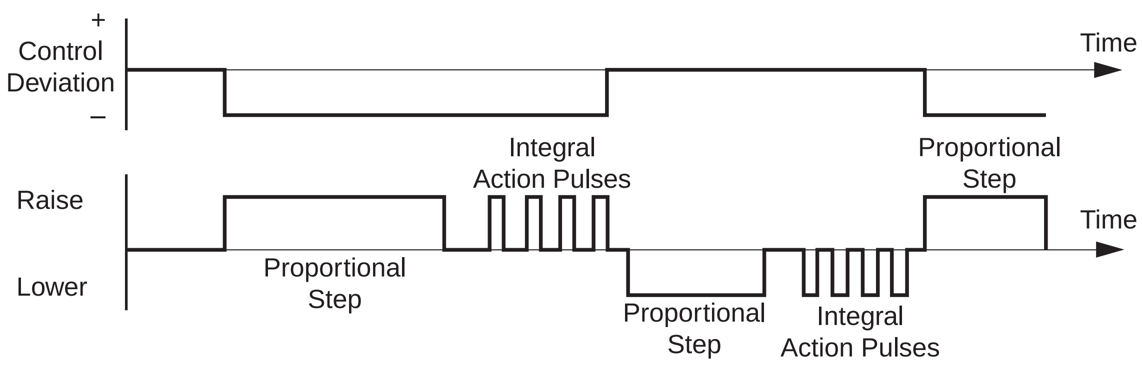


Fig. 4.3 Boundless Control Action

4.4.1 Calculation for Control Pulses, Steps and Deviation (Boundless Control only)

Minimum 'ON' time of integral action pulses (for a fixed control deviation).

$$= \frac{\text{Travel Time x Deadband \%}}{\text{\% Proportional Band}} \quad \text{(in seconds)}$$

Approximate minimum time between integral action pulses (for a fixed control deviation)

$$= \frac{\text{Integral Action Time x Deadband \%}}{\text{2 x \% Control Deviation}} \quad \text{(in seconds)}$$

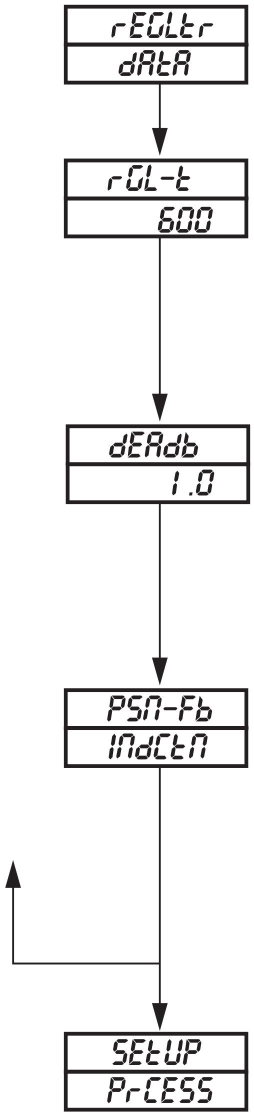
Duration of the proportional step

$$= 2 \text{ x } \left[\frac{\text{\% Control Deviation}}{\text{\% Proportional Band}} \right] \text{ x Travel Time in Seconds}$$

$$\text{\% Control Deviation} = \frac{\text{Set Point – Process Variable}}{\text{Span}}$$

4.4.2 Regulator Data Page

This page is displayed only when bndLESS is selected at the **Control Type** frame in the **Set Up Control Page** – see Fig. 3.1 and Section 4.10**.**



Page Header – **Regulator Data**

Regulator Travel Time
This is the time set for the regulator to travel from the fully open to the fully closed position or from the fully closed to the fully open position.
Set the value required in seconds, between 1 and 5000 seconds.

Deadband Setting
The deadband is set as a percentage of the engineering range span to produce a deadband around the control set point value. This reduces 'hunting' of the regulator.
Set the required value, between 0.0 and 10.0%.

Position Feedback Indication Enable
Select INdCtN to enable the **Valve Position** frame in the **Operating Page –** see *Section 5.2 of the Operating Guide*.
Select NONE to disable the **Valve Position** frame.

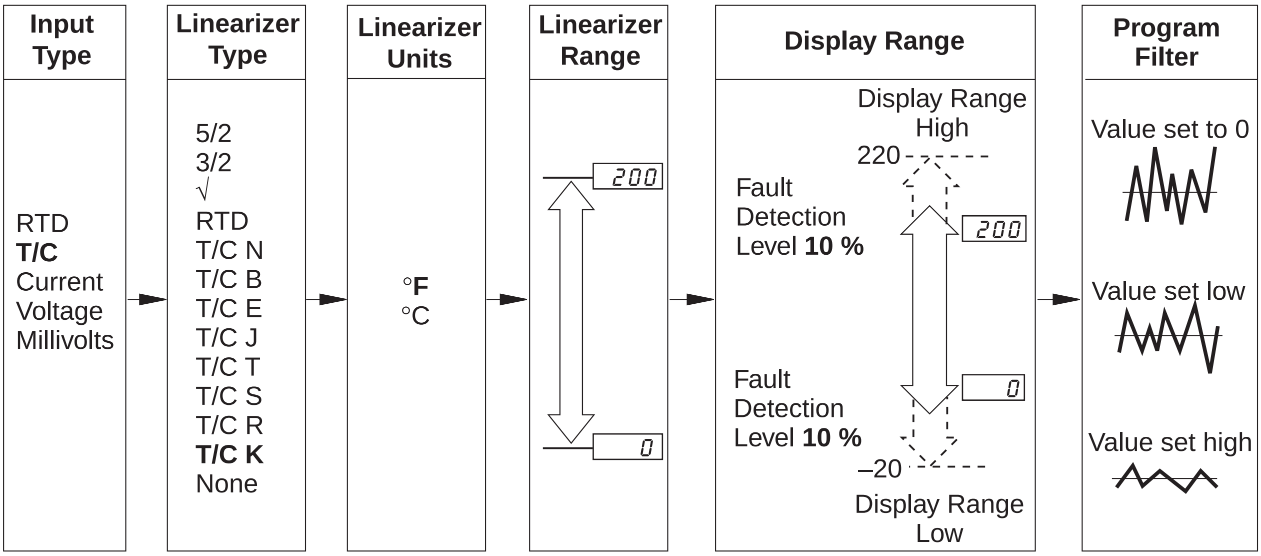
✶ **Note.** A value is only displayed in the **Valve Position** frame if the frame is enabled and the regulator has a feedback signal.

Return to top of **Regulator Data Page**,
or
Advance to **Set Up Process Variable Input Page.**

4.5 Set Up Process Variable

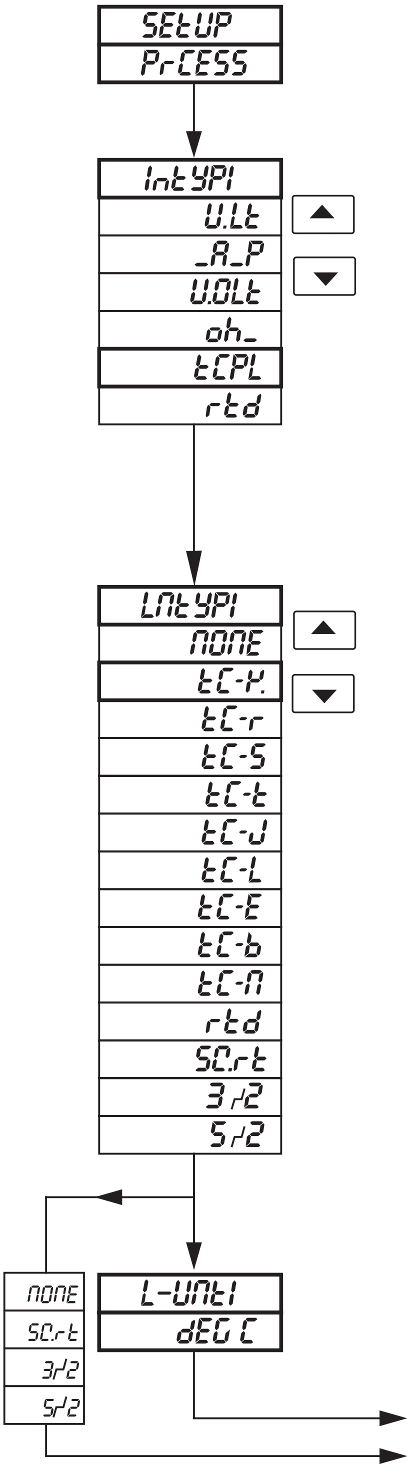
Information.

- Universal inputs – mV, mA, V, T/C, RTD and resistance.
- Internal cold junction compensation.
- Linearization of temperature sensors to allow use of non-linearizing transmitters or any electrical input.
- Programmable fault levels and actions.
- Digital filter reduces the effect of noise on inputs.



Example – Type K thermocouple, range 0 to 200°F with 10% fault detection levels.

4.5.1 Set Up Process Variable Input Page



Page Header – **Set Up Process Variable Input**.

Process Variable Input Type

Select the input type required:

_U.Lt	–	Millivolt (≤2000 mV)
_A_P	–	Current
U.OLt	–	Voltage
oh_	–	Resistance
tCPL	–	Thermocouple *
rtd	–	Resistance thermometer

*For thermocouple applications using an external fixed cold junction, select millivolt input type.

Linearizer Type

Select the linearizer type required:

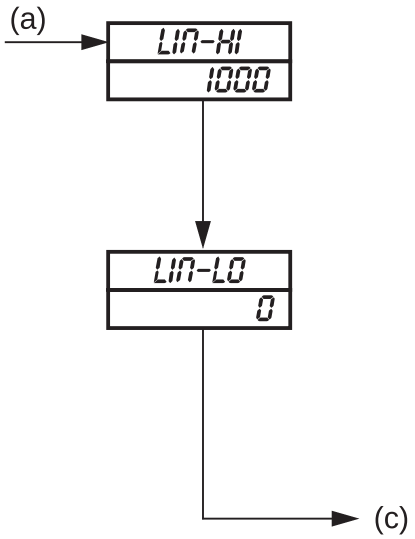
NONE	–	No linearizer
tC-K	–	Type K thermocouple
tC-r	–	Type R thermocouple
tC-S	–	Type S thermocouple
tC-t	–	Type T thermocouple
tC-J	–	Type J thermocouple
tC-L	–	Type L thermocouple
tC-E	–	Type E thermocouple
tC-b	–	Type B thermocouple
tC-N	–	Type N thermocouple
rtd	–	Resistance thermometer
SQ.rt	–	Square root
3/2	–	$x^{3/2}$
5/2	–	$x^{5/2}$

Linearizer Units

Select the temperature units required, °C or °F.

(a) Continued on next page.
(b) Continued on page 18.

…4.5.1 Set Up Process Variable Input Page



Linearizer Full Scale
Set the range maximum temperature in °C or °F as selected at **Linearizer Units** above, **within the limits detailed in Table 4.1**. If these limits are exceeded, LIN-Or (linearizer overrange) is displayed in the **Operating Page** – see *Table 5.1a of the Operating Guide*.

Linearizer Zero
Set the range minimum temperature in °C or °F as selected at **Linearizer Units** above, **within the limits detailed in Table 4.1**.

Continued on next page.

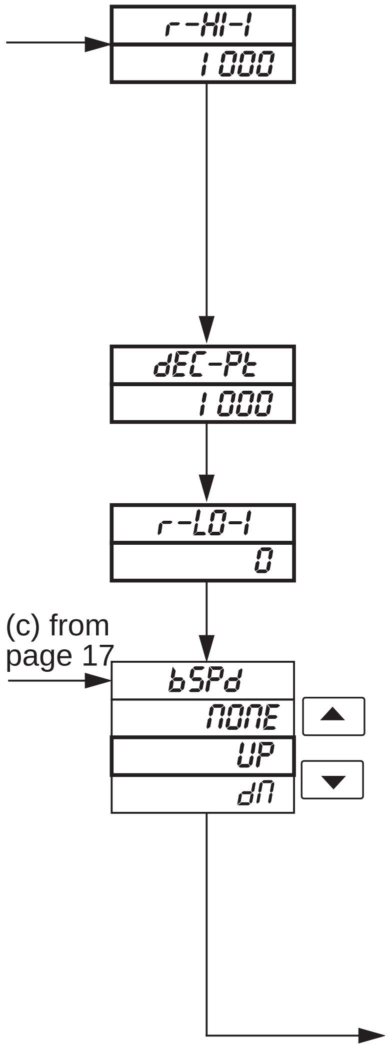
(T/C) / RTD Type	Degrees Celsius			Degrees Fahrenheit		
	Min.	**Max.**	**Min. Span**	**Min.**	**Max.**	**Min. Span**
Type B*	– 18	1800	710	0	3272	1278
Type E	– 100	900	45	– 148	1652	81
Type J	– 100	900	50	– 148	1652	90
Type K	– 100	1300	65	– 148	2372	117
Type L	– 100	900	50	– 148	1652	90
Type N	– 200	1300	90	– 328	2372	162
Type R & S*	– 18	1700	320	0	3092	576
Type T	– 250	300	60	– 418	572	108
RTD	– 200	600	25	– 328	1112	45

* Accuracy for types B, R and S is not guaranteed below 400°C.
Minimum span below zero Type T 70°C/126°F
T/C standard DIN 43710 IEC 584
RTD standard DIN 43760 IEC 751

Table 4.1 Temperature Limits

…4.5.1 Set Up Process Variable Input Page

(b) from page 16



Input Range Full Scale
Set the input range maximum in electrical units, **within the limits detailed in Table 4.2.**

Example. To set an input range full scale of 20mA, enter 200 in the input full scale display and advance to decimal point display. Set the decimal point to one place to give a value of 20.0.

Decimal Point
Set the decimal point position required for both the range full scale and range zero values.

Input Range Zero
Set the input range minimum in electrical units, **within the limits detailed in Table 4.2**.

Broken Sensor Protection Drive
In the event of a fault being detected on the input, the process variable is driven in the direction of the mode selected.
Select the broken sensor drive required:

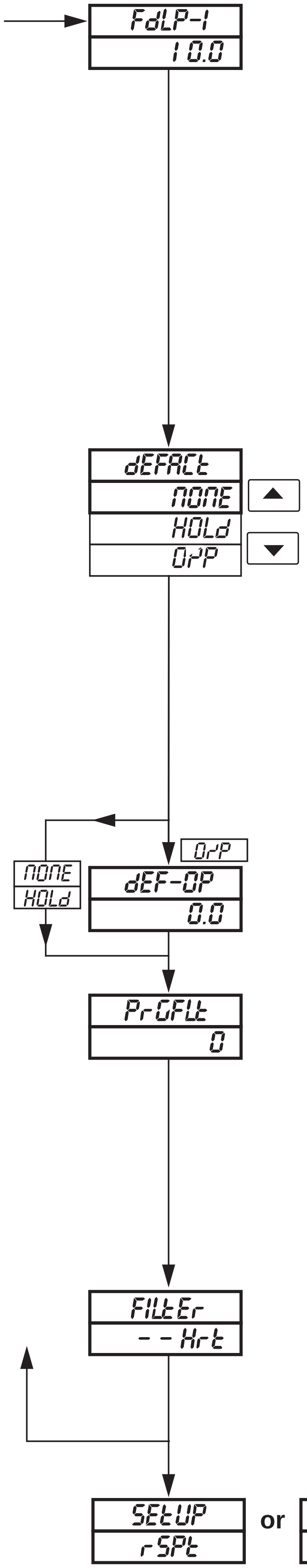
NONE – No drive
UP – Upscale drive
dN – Downscale drive.

Continued on next page.

Input Type	Min. Start	Max. Value	Min. Span
Millivolts	– 2000	2000	2.5
Volts	– 20	20	0.25
Milliamps	– 100	100	0.25
Resistance	0	8000	10

Table 4.2 Electrical Limits

…4.5.1 Set Up Process Variable Input Page



Fault Detection Level Percentage, Process Variable Input

A fault level percentage can be set to detect a deviation above or below the display limits. E.g. if set at 10.0%, then if an input goes more than 10% above full scale value or more than 10% below zero value, a fault is detected.

On some ranges the input circuitry may saturate before the fault level set is reached. In this case an error is detected at a level below that which is set.

Control actions and control outputs in the event of a fault are programmable – see below.

Set the value required, between 0.0 and 100.0% in 0.1% increments.

Default Control Action

Select the default control action required in the event of a fault:

NONE – No default action.

HOLd – The controller reverts to Manual mode when an error is detected. The control output is held at the value existing when the error was detected.

O/P – The controller reverts to Manual mode when an error is detected and the control output value changes to the **Default Control Output** value following.

Default Control Output

Set the default output value required in the event of a fault, between 0.0 and 100.0%.

Programmable Filter

This filters the process variable input, i.e. if the input is stepped, it smooths the transition between steps and may also be used for some degree of cleaning of noisy inputs. The filter time represents the time a step in the input takes to change the displayed process variable from 10 to 90% of the step.

Set value required, between 0 and 60 in 1-second increments.

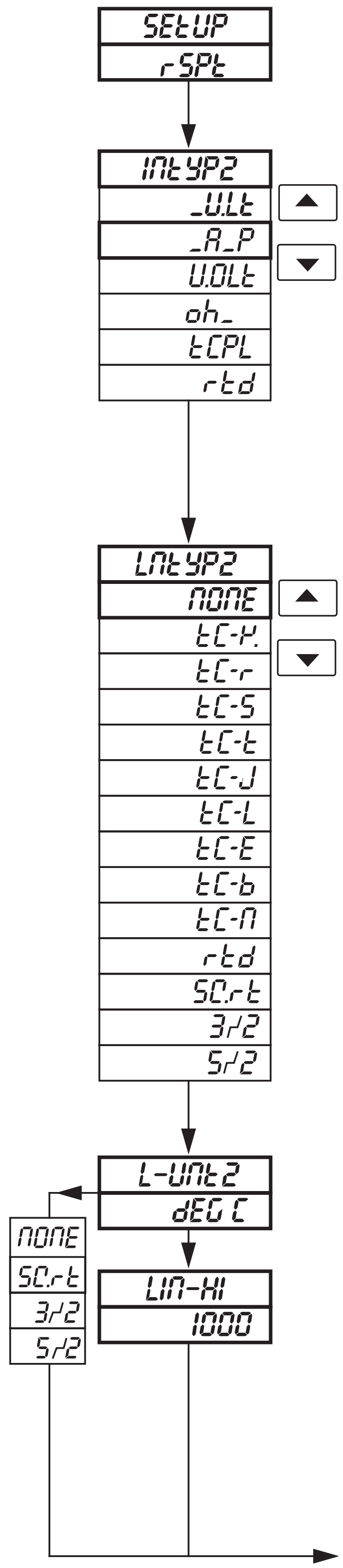
Mains Power Filter

Set the frequency of the power supply used (50 or 60Hz).

Return to top of **Process Variable Input Page** or advance to next program page.

4.6 Set Up Remote Set Point Page

Information.
- This page is omitted if Remote set point is not selected at Second Set Point Type in Set Points Page – see Section 4.2.
- Universal Input.



Page Header – **Set Up Remote Set Point Input**.

Remote Set Point Input Type
Select the input type required:

_U.L t	–	Millivot (≤2000mV)
_A_P	–	Current
U.OL t	–	Voltage
oh_	–	Resistance
t C P L	–	Thermocouple*
r t d	–	Resistance thermometer

*For thermocouple applications using an external fixed cold junction, select millivolt input type.

Remote Set Point Linearizer Type
Select the linearizer type required:

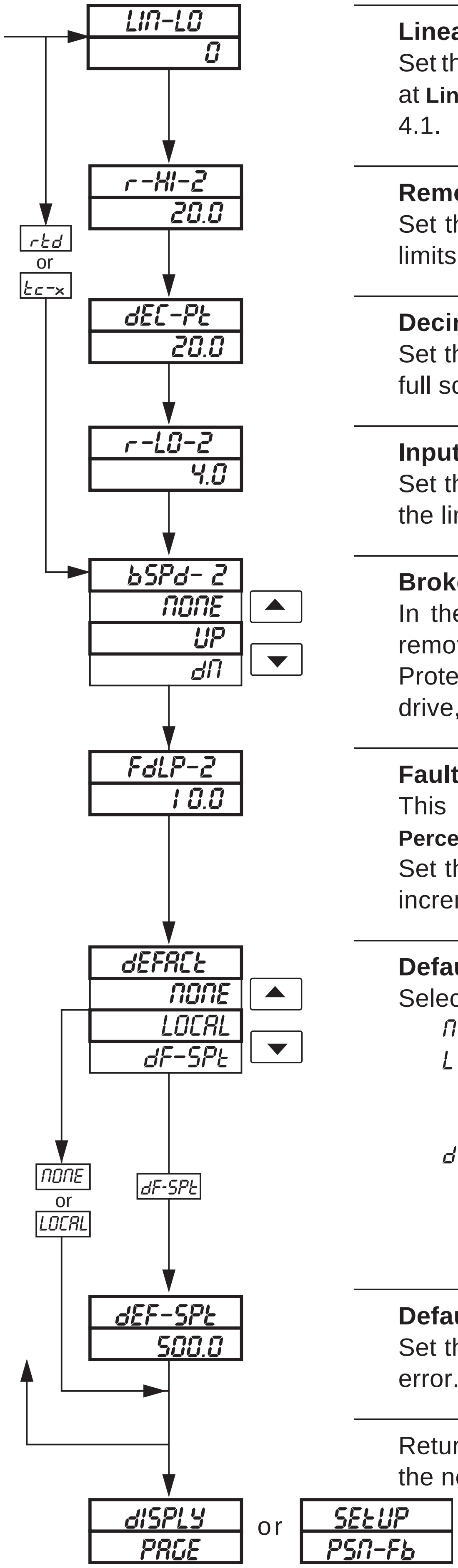
N O N E	–	No linearizer
t C - K	–	Type K thermocouple
t C - r	-	Type R thermocouple
t C - S	–	Type S thermocouple
t C - t	–	Type T thermocouple
t C - J	–	Type J thermocouple
t C - L	–	Type L thermocouple
t C - E	–	Type E thermocouple
t C - b	–	Type B thermocouple
t C - N	–	Type N thermocouple
r t d	–	Resistance thermometer
S Q.r t	–	Square root
3 / 2	–	x $^{3/2}$
5 / 2	–	x $^{5/2}$

Linearizer Units
Select the temperature units required, °C or °F.

Linearizer Full Scale
Set the range maximum temperature in °C or °F as selected at **Linearizer Units** above, within the limits detailed in Table 4.1. If limits are exceeded, L IN-Or (linearizer overrange) is displayed in the **Operating Page** – see *Table 5.1a of the Operating Guide*.

Continued on next page.

…4.6 Set Up Remote Set Point Input Page



Linearizer Zero
Set the range minimum temperature in °C or °F as selected at **Linearizer Units** above, within the limits detailed in Table 4.1.

Remote Set Point Range Full Scale
Set the remote set point range full scale value within the limits in **Table 4.2** – see page 18.

Decimal Point
Set the decimal point position required for **both** the range full scale and range zero values.

Input Range Zero
Set the remote set point range zero value required within the limits in **Table 4.2** – see page 18.

Broken Sensor Protection Drive
In the event of a fault being detected on the input, the remote set point is driven according to the Broken Sensor Protection Drive. Select the drive required: NONE for no drive, UP for upscale drive or dN for downscale drive.

Fault Detection Level Percentage, Remote Set Point
This frame is as described in the **Fault Detection Level Percentage, Process Variable Input** frame – see page 19. Set the value required, between 0.0 and 100.0% in 0.1% increments.

Default Action (Remote Set Point)
Select the default action required in the event of an error:

- NONE – No default action.
- LOCAL – The controller reverts to local mode when an error is detected and the local set point value is used.
- dF-SPt – The controller reverts to local mode when an error is detected and the set point value changes to the **Default Set Point** value below.

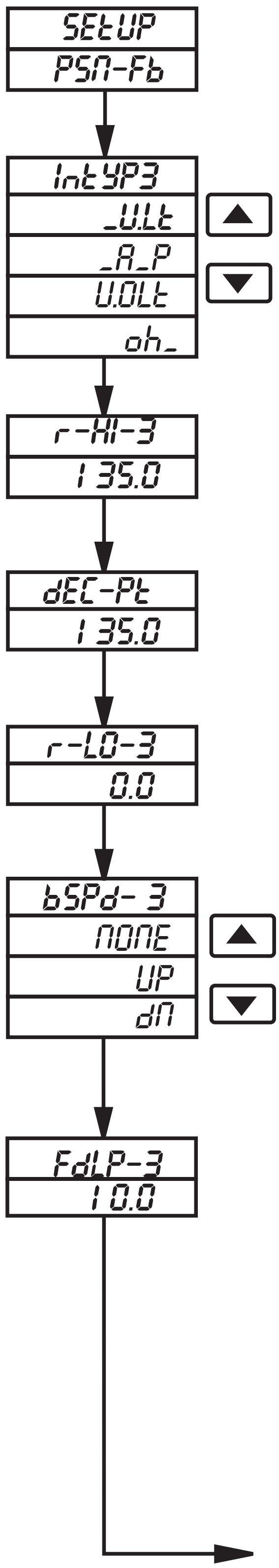
Default Set Point
Set the default set point value required in the event of an error.

Return to top of **Remote Set Point Input Page** or advance to the next programming page.

4.7 Set Up Position Feedback Page

Information.

- This page is only present if P-PrOP or bndLSS is selected at Control Type in the Set Up Control Page – see Fig. 3.1 and Section 4.10. If bndLSS is selected, Position Feedback Enable must be set to IndCtn to enable access to this page.
- Millivolt, current, voltage or resistance input.
- Programmable fault level and actions.



Page Header – **Set Up Position Feedback.**

Position Feedback Input Type
Select the input type required:

_U.Lt	–	Millivolt ≤2000mV
_A_P	–	Current
U.OLt	–	Voltage
oh_	–	Resistance

Position Feedback Range Full Scale
Set the position feedback range full scale value, within the limits of **Table 4.2** – see page 18.

Decimal Point Position
Set the decimal point position required for both the position feedback range full scale and range zero values.

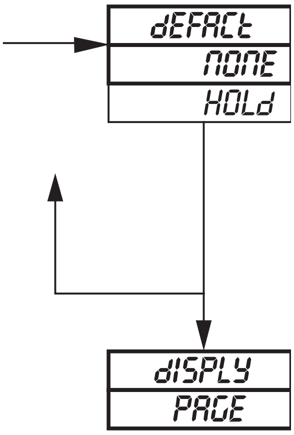
Position Feedback Range Zero
Set the position feedback range zero value, within the limits of **Table 4.2** – see page 18.

Broken Sensor Protection Drive
In the event of a fault being detected on the input, the remote set point is driven in the direction of the mode selected.
Select the broken sensor drive required: nOnE for no drive, UP for upscale drive or dn for downscale drive.

Fault Detection Level Percentage, Position Feedback Input
A fault level percentage can be set to detect a deviation above or below the display limits. E.g. if set to 10.0%, then if the position feedback input deviates by more than 10% above Full Scale value or 10% below zero value, a fault is detected. Position feedback action in the event of a fault is programmable – see **Default Action**.
Set the value required, between 0.0 and 100.0%.

Continued on next page.

…4.7 Set Up Position Feedback Page



Default Action

Select the default position feedback action required:

NONE – No default action

HOLd – The controller reverts to Manual mode and holds the valve position existing when the fault was detected.

Return to top of **Set Up Position Feedback Input Page**.

or

Advance to **Set Up Display Page**.

4.8 Set Up Display Page

Information.
- Set up engineering ranges and units.
- Programmable increments on deviation bargraph.
- Adjust display brightness.

dISPLY
PAGE

Page header – **Display Page.**

---

dIS-HI
1000

Display Full Scale
Set the display value which represents the maximum process variable input signal, between –9999 and +9999.
Example – For an input range of 4 to 20mA representing a pressure range of 50 to 250 bar, set 2500. The decimal point position is set at the next parameter.

---

dEC-Pt
1000

Decimal Point Position
Set the required number of decimal places for both the display full scale and display zero values. In the example shown above, set the decimal point position to show increments of 0.1 bar, i.e. 250.0.

---

dIS-LO
0

Display Zero
Set the display value which represents the minimum process variable input signal, between –9999 and +9999. In the example shown above, set 50.0. The decimal point position is set automatically.

INC_NT
1

Percentage Increment Per Bar (Bargraph)
This frame sets the percentage deviation from set point that each bar of the **Deviation Bargraph** represents – see *Fig. 4.1 in the Operating Guide*.
Set the value required, between 1 and 10% of display span.

UNItS
dEG C

Display Units
Select the required display units, dEG C, dEG F, or NONE to represent the process variable.

---

brIGHt
7

Brightness Adjustment
Select the required display brightness between 4 and 10.

Return to top of **Display Page** or advance to the next programming page.

SEtUP
CONtrL

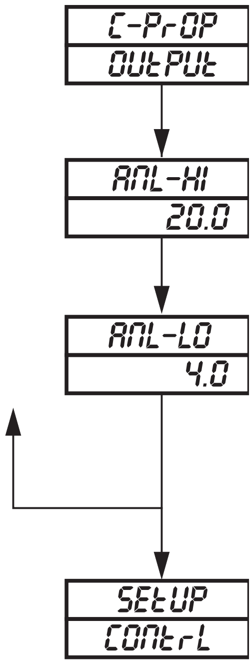
or

C-PrOP
OUtPUt

4.9 Current Proportioning Output Page

Information.

- This page is only present when C-PrOP is selected at **Control Type** frame in **Set Up Control Page** – see Fig. 3.1 and Section 4.10.
- Programmable current control output range.

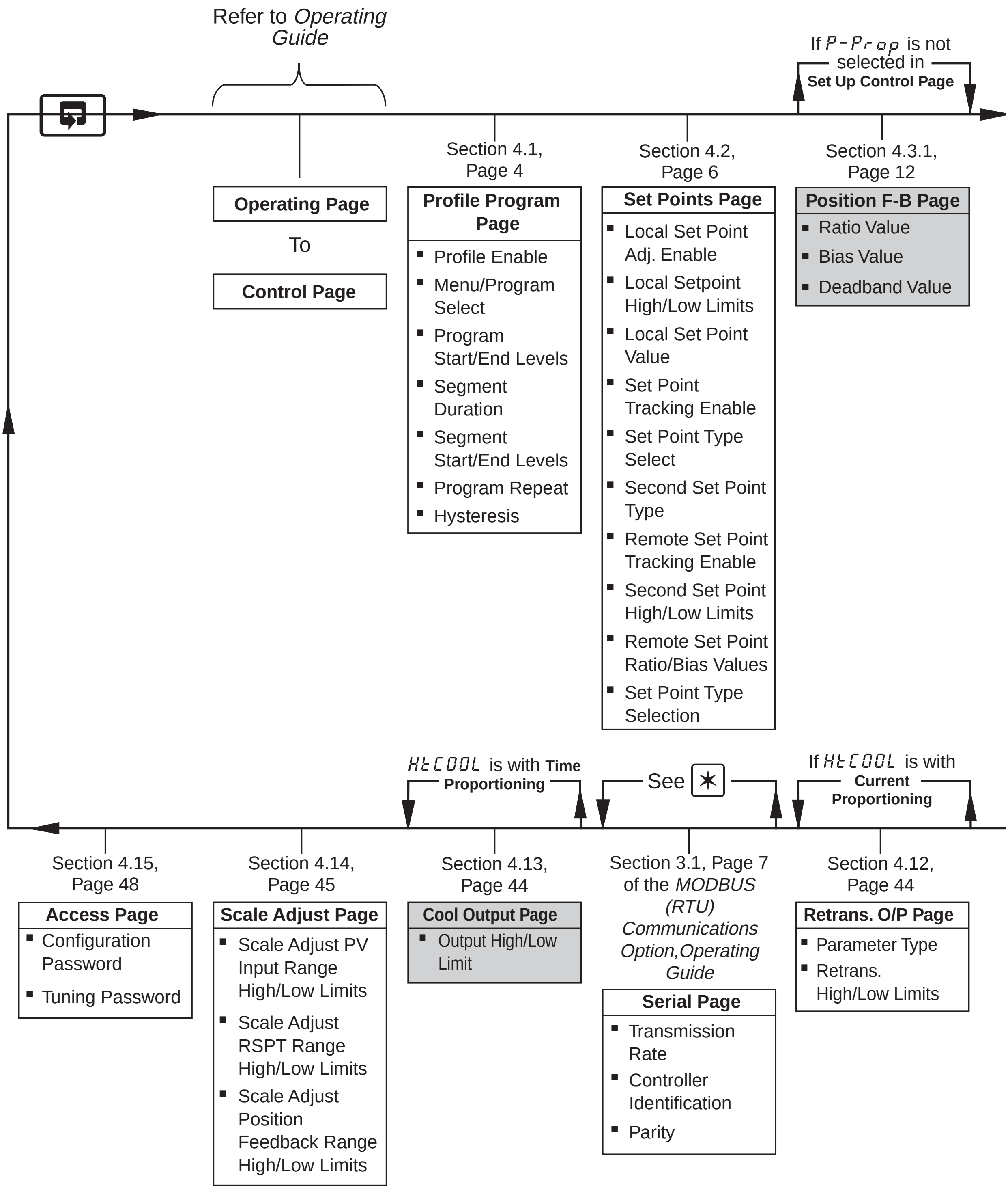


Page header – **Current Proportioning Output.**

Current Proportioning Output Maximum
Set the maximum analog output value, between 0.0 and 20.0mA in 0.1mA increments.

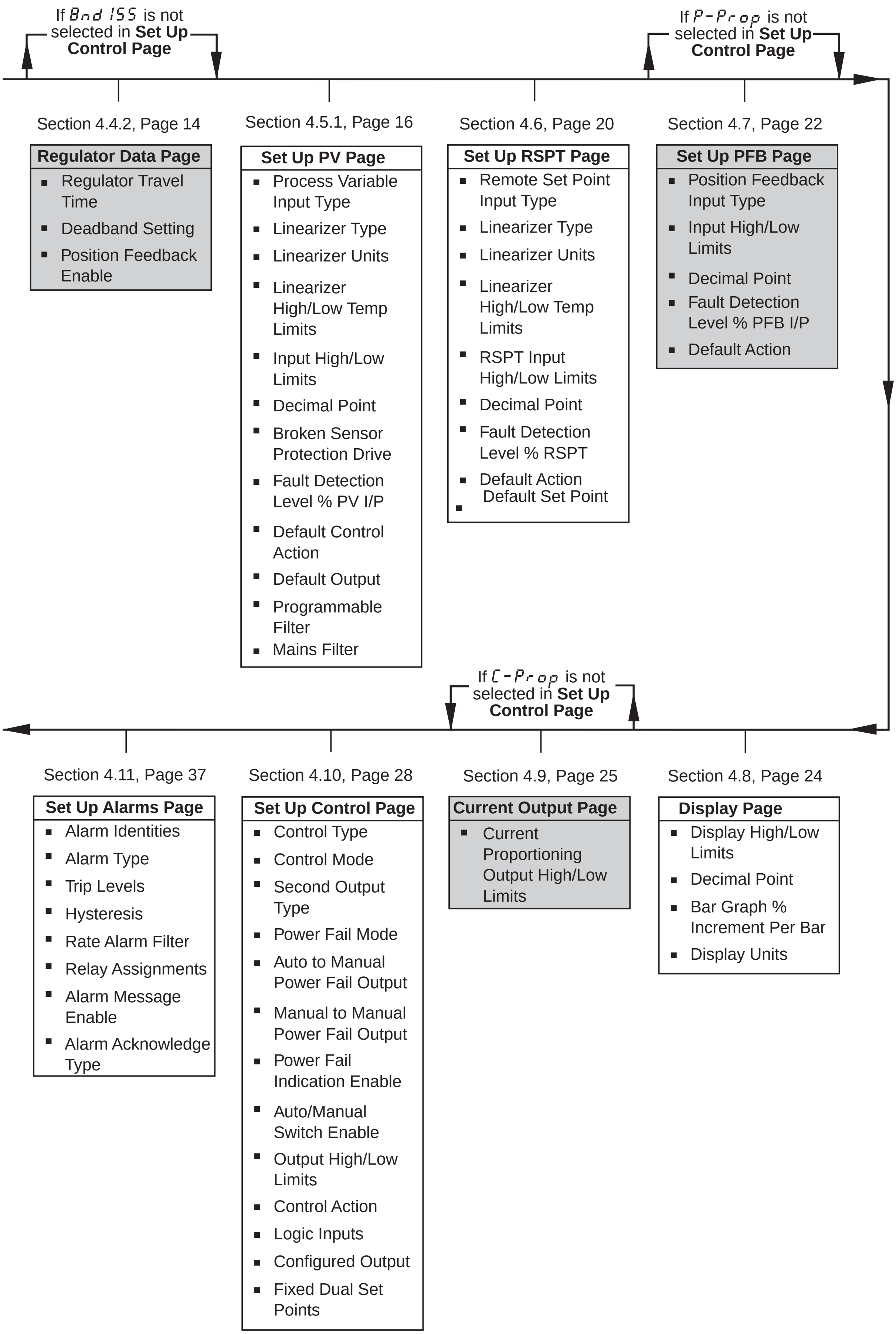
Current Proportioning Output Minimum
Set the minimum analog output value, between 0.0 and 20.0mA in 0.1mA increments.

Return to top of **Current Proportioning Output Page.**
or
Advance to **Set Up Control Page**.



These pages are not displayed for all **Control Type** selections – see **Section 4.10, Control Type** frame in the **Set Up Control Page**

✶ **Note**. The Serial Page is always displayed on wall-/pipe-mounted instruments and only displayed on panel-mounted instruments if a serial board is fitted.

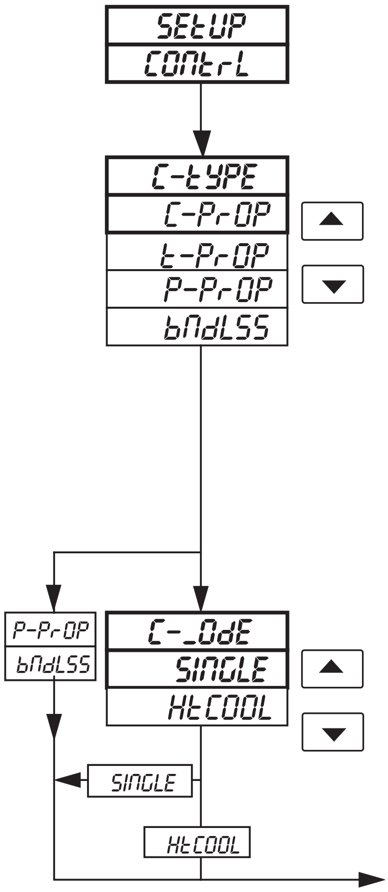


If Bnd ISS is not selected in Set Up Control Page
If P-Prop is not selected in Set Up Control Page
Section 4.4.2, Page 14
Regulator Data Page
Regulator Travel Time
Deadband Setting
Position Feedback Enable
Section 4.5.1, Page 16
Set Up PV Page
Process Variable Input Type
Linearizer Type
Linearizer Units
Linearizer High/Low Temp Limits
Input High/Low Limits
Decimal Point
Broken Sensor Protection Drive
Fault Detection Level % PV I/P
Default Control Action
Default Output
Programmable Filter
Mains Filter
Section 4.6, Page 20
Set Up RSPT Page
Remote Set Point Input Type
Linearizer Type
Linearizer Units
Linearizer High/Low Temp Limits
RSPT Input High/Low Limits
Decimal Point
Fault Detection Level % RSPT
Default Action
Default Set Point
Section 4.7, Page 22
Set Up PFB Page
Position Feedback Input Type
Input High/Low Limits
Decimal Point
Fault Detection Level % PFB I/P
Default Action
If C-Prop is not selected in Set Up Control Page
Section 4.11, Page 37
Set Up Alarms Page
Alarm Identities
Alarm Type
Trip Levels
Hysteresis
Rate Alarm Filter
Relay Assignments
Alarm Message Enable
Alarm Acknowledge Type
Section 4.10, Page 28
Set Up Control Page
Control Type
Control Mode
Second Output Type
Power Fail Mode
Auto to Manual Power Fail Output
Manual to Manual Power Fail Output
Power Fail Indication Enable
Auto/Manual Switch Enable
Output High/Low Limits
Control Action
Logic Inputs
Configured Output
Fixed Dual Set Points
Section 4.9, Page 25
Current Output Page
Current Proportioning Output High/Low Limits
Section 4.8, Page 24
Display Page
Display High/Low Limits
Decimal Point
Bar Graph % Increment Per Bar
Display Units

4.10 Set Up Control Page

Information.

- Control types – Current Proportioning, Time Proportioning (and On/Off), Position-proportioning (motorized valve control with feedback) and Boundless.
- Heat/cool function can be selected.
- Programmable power-up control modes and outputs.
- Reverse and direct control actions.
- High and low output limits.



Page Header – **Set Up Control.**

Control Type

Select the control type required:

C-PrOP – current proportioning – see Fig. 4.4.

t-PrOP – time proportioning – see Fig. 4.4.

P-PrOP – position proportioning – motorized valve with position feedback – see Fig. 4.6.

bNdLSS – boundless – motorized valve without position feedback. If bNdLSS is selected, the self-tune facility is not available and the **Self-tune Page** cannot be accessed – see Fig. 4.7.

Control Mode

Select the control mode required:

SINGLE – normal control mode, used for all applications except Heat/Cool.

HtCOOL – Heat/Cool control mode – see Fig. 4.5.

Continued on page 30.

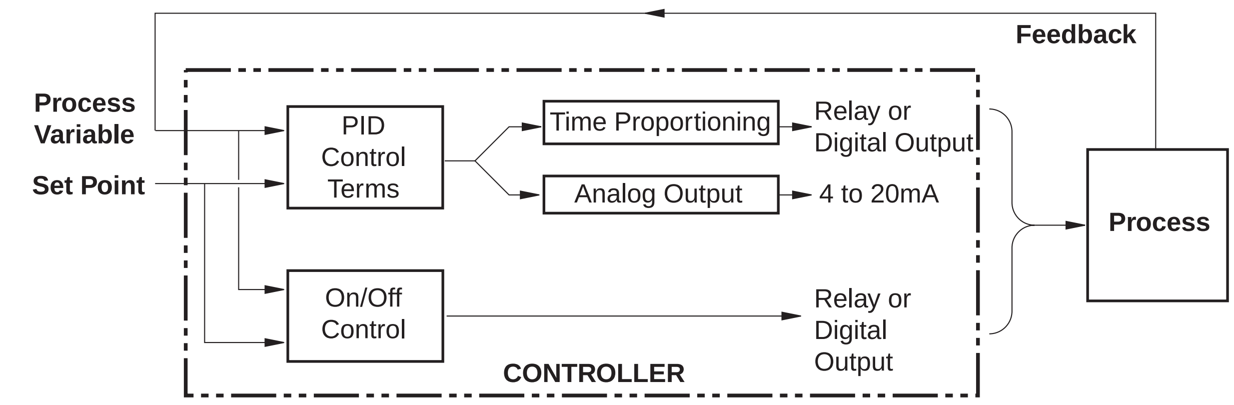


Fig. 4.4 Standard Control Schematic Diagram

…4.10 Set Up Control Page

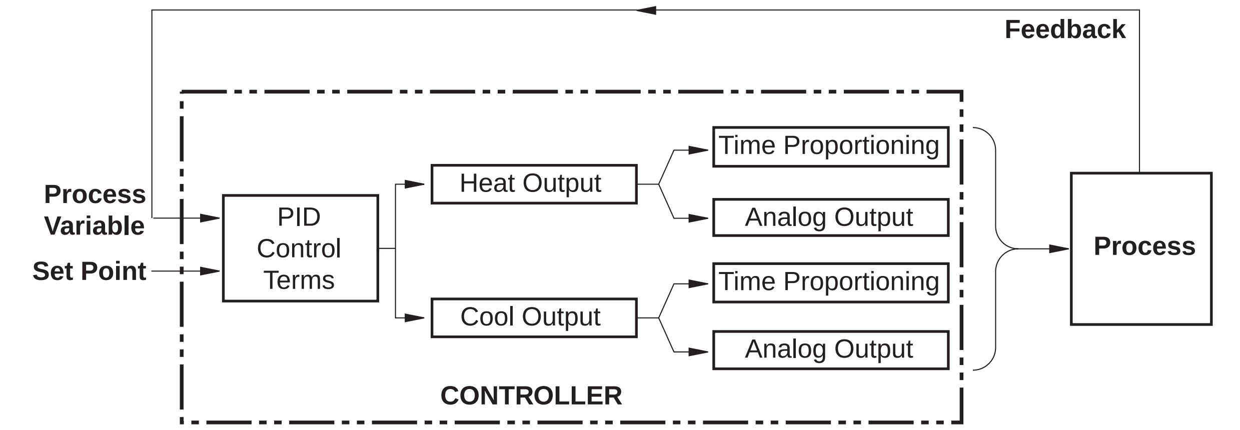


Fig. 4.5 Heat/Cool Control Schematic Diagram

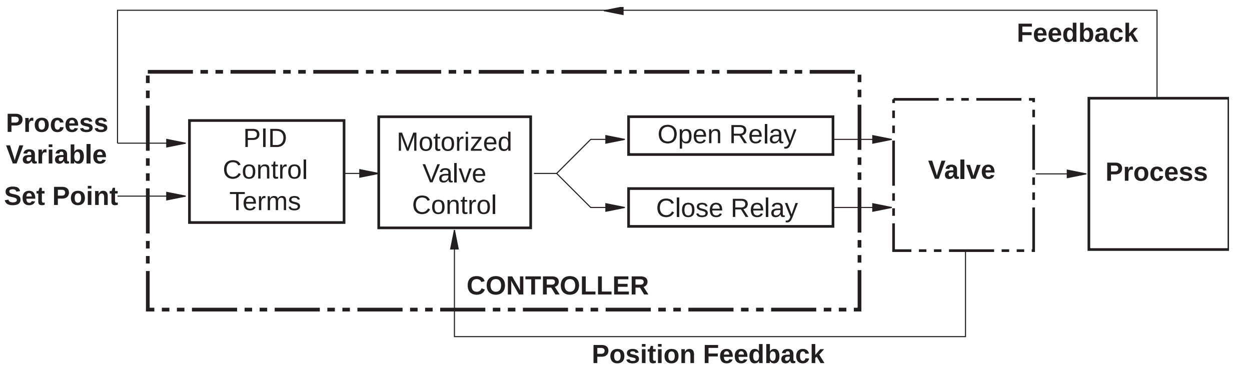


Fig. 4.6 Position Proportional Control Schematic Diagram

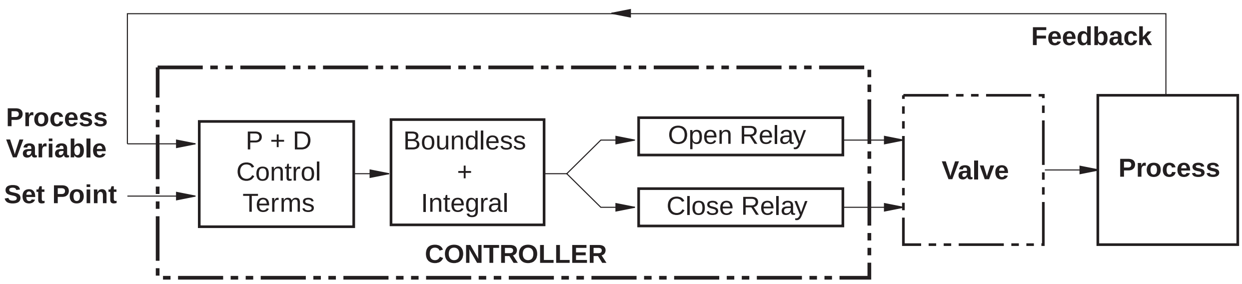
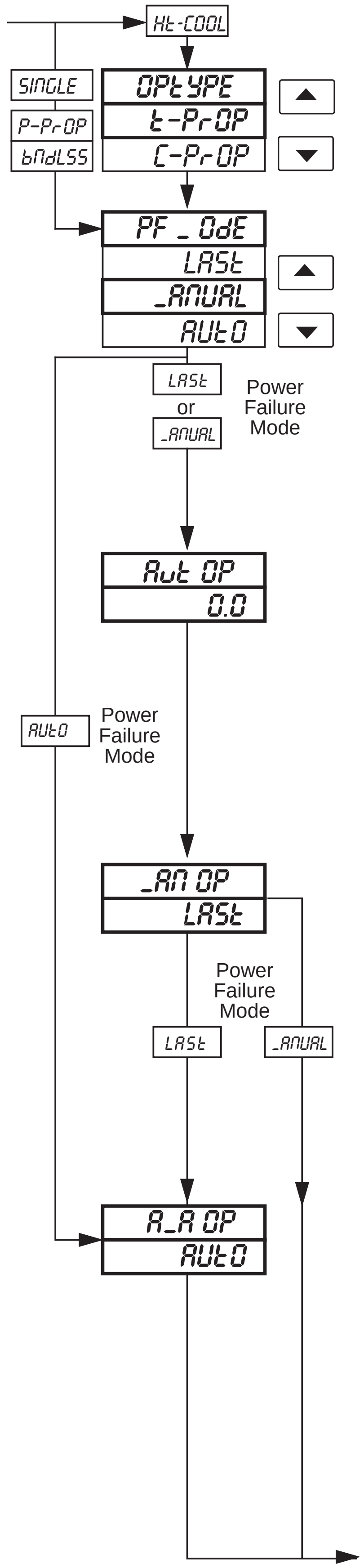


Fig. 4.7 Boundless Control Schematic Diagram

…4.10 Set Up Control Page



Second Output Type
Select t-PrOP for time proportioning output or C-PrOP for analog output.

Power Failure Mode
Select the default power failure mode required following a power interruption or failure:

- LASt – restart in the same mode existing prior to power failure.
- _ANUAL – restart in Manual mode. (Not applicable when boundless control type is selected).
- AUtO – restart in Auto mode.

Auto to Manual Power Fail Output
A control output value can be set when the power down state is AUtO and the power failure mode is _ANUAL.
Set the control output value required following a power failure, between 0.0 and 100.0% in increments of 0.1%.

✶ **Note**. This setting has no effect if power failure mode is set to AUtO.

Manual to Manual Power Fail Output
This is the control output value required when power down state is _ANUAL and power failure mode is _ANUAL.
Set the control output value required following a power failure, between 0.0 and 100.0% in increments of 0.1%, or LASt.

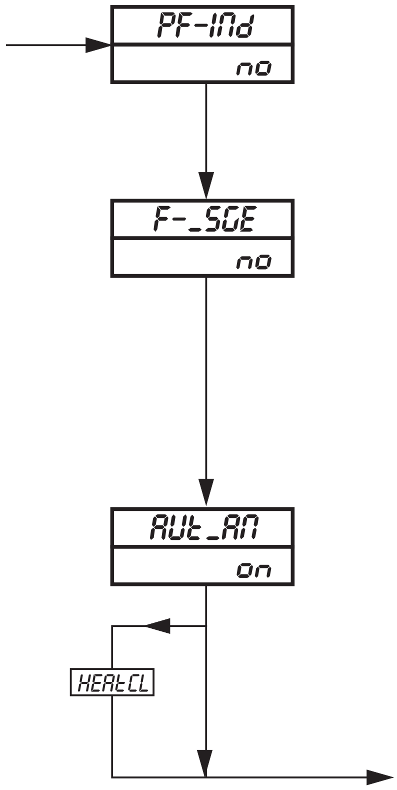
- LASt – the percentage control output present prior to the power failure is retained.

Auto Power Fail Output
This is the output value required when the power down state is AUtO and the power failure mode is AUtO.

Set the output value required following a power failure, between 0.0 and 100.0% in increments of 0.1 %, or AUtO. If AUtO is selected, normal start-up is restored on power up. If boundless control type is selected, this parameter must be set to AUtO.

Continued on next page.

…4.10 Set Up Control Page



Power Fail Indication Enable
If the indication is enabled, L INE FA ILEd is displayed in the **Operating Page** following a power failure.
Select YES to enable or no to disable indication.

Failure Message
The following **Operating Page** failure messages can be enabled or disabled – see *Section 5.2 of Operating Guide*.

- F- INPt – process input failure
- F-rSPt – remote set point failure
- F-POSN – position feedback failure

Select YES to enable or no to disable.

Auto/Manual Switch Enable/Disable
Select on to enable, or OFF to disable.

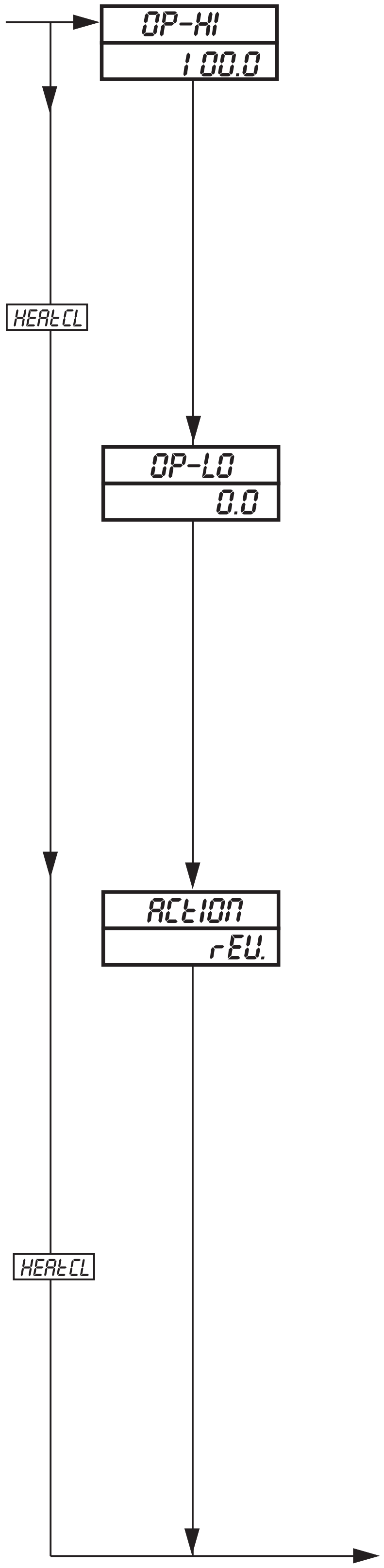
If HEAtCL is selected at **Control Mode**, advance to **Control Action (Heat)**, otherwise advance to **Output High Limit.**

Continued on next page.

Power Fail Mode	Mode on Power Down	Mode on Power Up	Control Output (Valve Position) on Power Up
Auto	Auto	Auto	Integral component of the control output is preset to give bumpless operation at power-up at the value set in the Auto-to-Auto frame.
	Manual	Auto	Integral component of the control output is preset to give bumpless operation at power-up at the value set in the Manual-to-Auto frame (or LAST)
Manual	Auto	Manual	Value set in Auto-to-Manual Output frame (or LAST)
	Manual	Manual	Value set in Manual-to-Manual Output frame or output value prior to power-down (if LAST selected)
Last	Auto	Auto	Integral component of the control output is preset to give bumpless operation at power-up at the value set in the Auto-to-Auto frame (or LAST)
	Manual	Manual	Value set in Manual-to-Manual Output frame or output value prior to power-down (if LAST selected)

Table 4.3 Power-up and Power-down Control Modes

…4.10 Set Up Control Page



Output High Limit

This limits the high level of the control output value (or valve position) when in Automatic mode. If the control output is above this limit when Automatic mode is selected, the output is allowed to stay at its current level but is not allowed to go any higher. Once the control output returns to, or falls below, this limit, the limit then applies. When the controller is in Manual mode, the output limits do not apply.

Select the output high limit value (or valve position) required, between 0.0 and 100.0% in 0.1 increments.

Output Low Limit

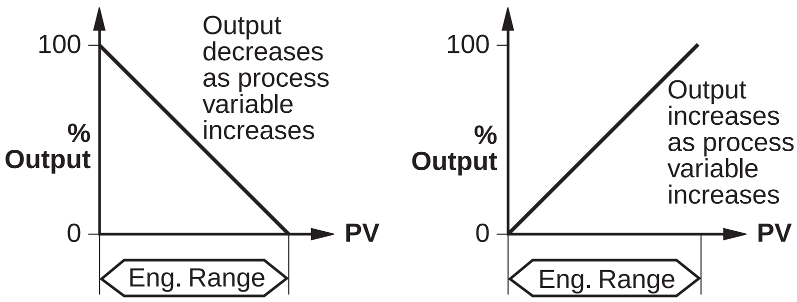
This limits the low level of the control output value (or valve position) when in Automatic mode. If the control output is below this limit when Automatic mode is selected, the output is allowed to stay at its current level but is not allowed to go any lower. Once the control output returns to, or rises above, this limit, the limit then applies. When the controller is in Manual mode, the output limits do not apply.

Select the output low limit value (or valve position) required, between 0.0 and 100.0% in 0.1 increments.

Control Action

Select the action for the PID control output:

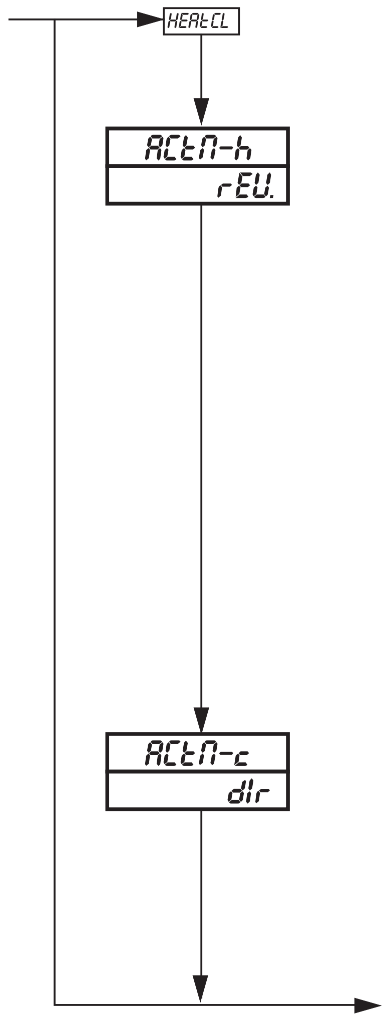
dir – direct acting
rEU. – reverse acting.



Reverse Acting **Direct Acting**

Continued on next page.

…4.10 Set Up Control Page

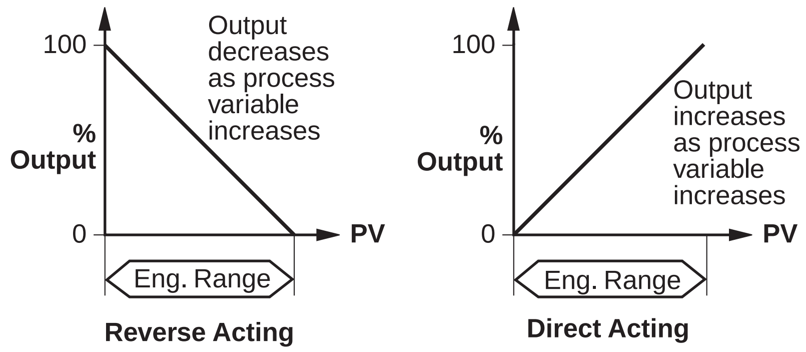


If HEAtCL was selected at **Control Mode**, advance to **Control Action (Heat)**, otherwise advance to **Logic Input Type 1.**

Control Action (Heat)

Select the action for the heat and PID control outputs:

- dir – direct acting
- rEU. – reverse acting.



Control Action (Cool)

Select the action for the cool control output:

- dir – direct acting
- rEU. – reverse acting.

Continued on next page.

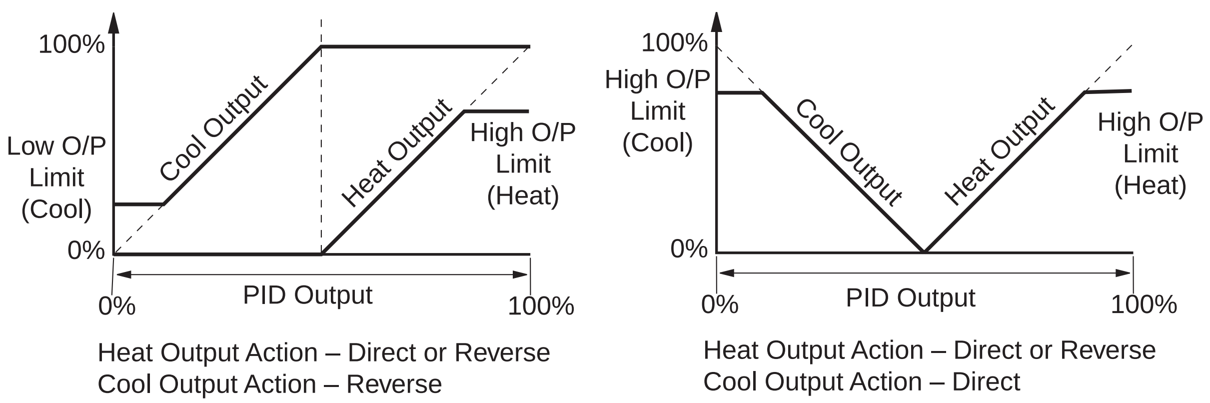
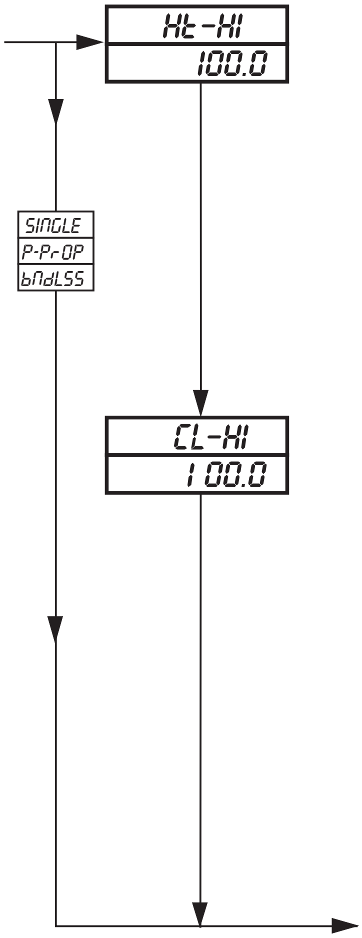


Fig. 4.8 Heat/Cool Control Actions

…4.10 Set Up Control Page

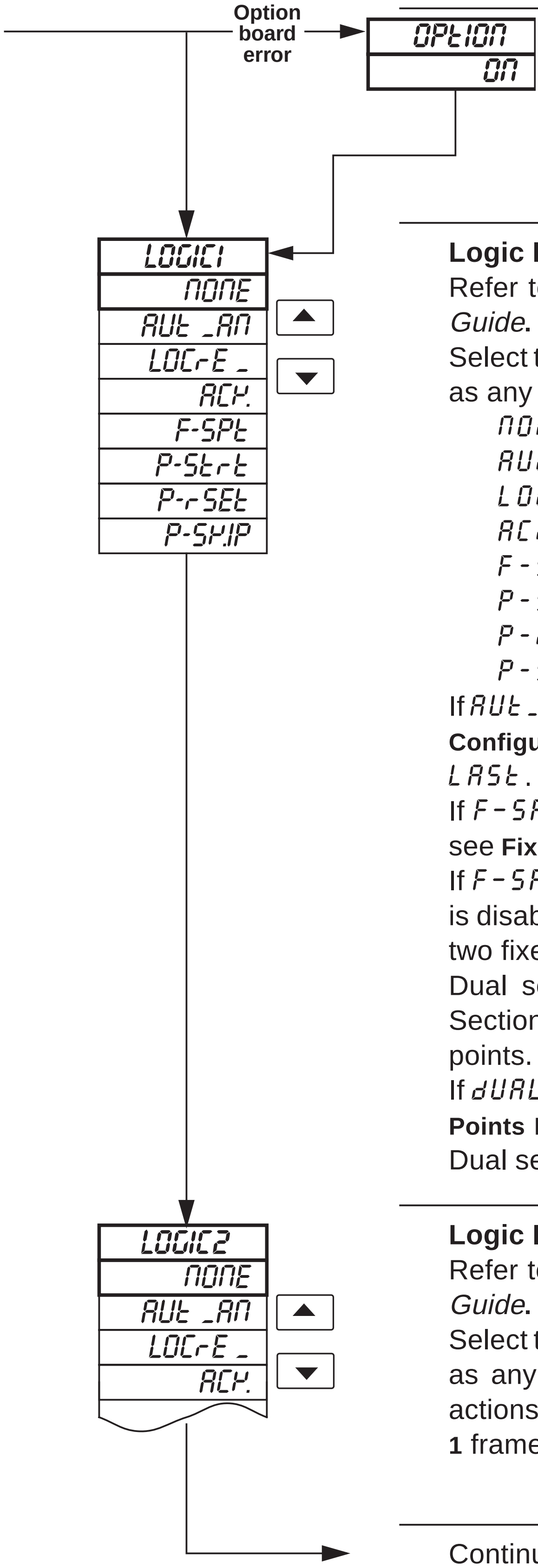


Heat Output High Limit
This limits the high level of the Heat control output value when in Automatic mode. If the control output is above this limit when Automatic mode is selected, the output is allowed to stay at its current level but is not allowed to go any higher. Once the control output returns to, or falls below, this limit, the limit then applies. When the controller is in Manual mode, the output limits do not apply. Select the heat output high limit value required, between 0.0 and 100.0% in 0.1 increments.

Cool Output High/Low Limit
This limits the high or low level of the Cool control output when in Automatic mode, depending on the **Control Action (Cool)** frame setting (rEU. is the low and dIr is the high setting). If the control output exceeds this limit when Automatic mode is selected, the output remains at its current level but is not allowed to go any further away from the limit. Once the control output returns to, or again falls within this limit, the limit then applies. When the controller is in Manual mode, the output limits do not apply. Select the Cool output high (low) limit required, between 0.0 and 100.0% in 0.1 increments.

Continued on next page.

…4.10 Set Up Control Page



Option Board Disable (not applicable to wall-/pipe-mounted variants)
If the Option board fails or is removed, press ⏎ to set OPt ION to OFF. Once set to OFF, this parameter is omitted.

Logic Input Type 1
Refer to *Section 4, Figs 4.18 and 4.19 in the Installation Guide*.
Select the logic input type for input 1 (must not be the same as any other logic input type):

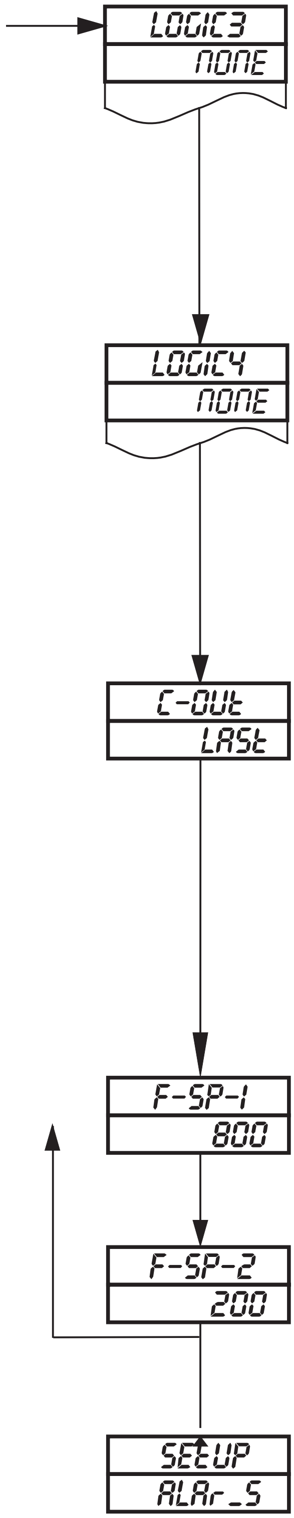
NONE	–	no function available
AUt_AN	–	auto/manual
LOCrE _	–	local/remote (dual)
ACK.	–	remote alarm acknowledge
F-SPt	–	fixed dual set point
P-Strt	–	program start/hold function
P-rSEt	–	program reset function
P-SK.IP	–	segment skip function

If AUt_AN is selected, the output reverts to the value set in **Configured Output** below, unless configured output is set to LASt.
If F-SPt is selected, two fixed set points are available – see **Fixed Dual Set Point 1** and **Fixed Dual Set Point 2** below.
If F-SPt is selected, the adjustable dual set point facility is disabled and the dual set point is the value of one of the two fixed set points.
Dual set point must be selected (in **Set Points Page** – Section 4.2) in order to enable the use of the fixed set points.
If dUAL is selected at **Set Point Type Selection** frame in **Set Points Page,** the Local/Remote selection becomes Local/Dual selection.

Logic Input Type 2
Refer to *Section 4, Figs. 4.18 and 4.19 in the Installation Guide*.
Select the logic input type for input 2 (must not be the same as any other logic input type). The selections and their actions are as for **Logic Input 1** above – refer to **Logic Input 1** frame for details.

Continued on next page.

…4.10 Set Up Control Page



Logic Input Type 3 (not available on wall-/pipe-mounted variants)
Refer to *Section 4, Figs. 4.18 and 4.19 in the Installation Guide*.
Select the logic input type for input 3 (must not be the same as any other logic input type). The selections and their actions are as for **Logic Input 1** – refer to **Logic Input 1** frame for details.

Logic Input Type 4 (not available on wall-/pipe-mounted variants)
Refer to *Section 4, Figs. 4.18 and 4.19 in the Installation Guide*.
Select the logic input type for input 4 (must not be the same as any other logic input type). The selections and their actions are as for **Logic Input 1** – refer to **Logic Input 1** frame for details.

Configured Output
Select the configured output, between 0.0 and 100.0% in 0.1% increments, or LASt.
If AUt_AN is selected for any of the logic inputs above, the manual control output equals the **Configured Output**, unless the configured output is LASt.

LASt – last auto output, i.e. the manual output tracks the automatic output. Found below 0%.

Fixed Dual Set Point 1
If the selection in any of the four logic inputs is F-SPt, a fixed set point may be set. Set the fixed set point required.

Fixed Dual Set Point 2
If the selection in any of the four logic inputs is F-SPt, a fixed set point may be set. Set the fixed set point value required.

Return to the top of **Set Up Control Page** or advance to the next programming page.

4.11 Set Up Alarms Page

Information.

- Ten alarms – identified A to K.
- Three operator acknowledge options.
- Global alarm acknowledgment by digital input, alarm, logic equation result or real-time event (if option fitted).
- High/low process alarms.
- High/low output alarms.
- High/low deviation alarms.
- Fast/slow rate-of-change-of-process-variable alarms.
- Adjustable hysteresis value to prevent oscillation of alarm state.

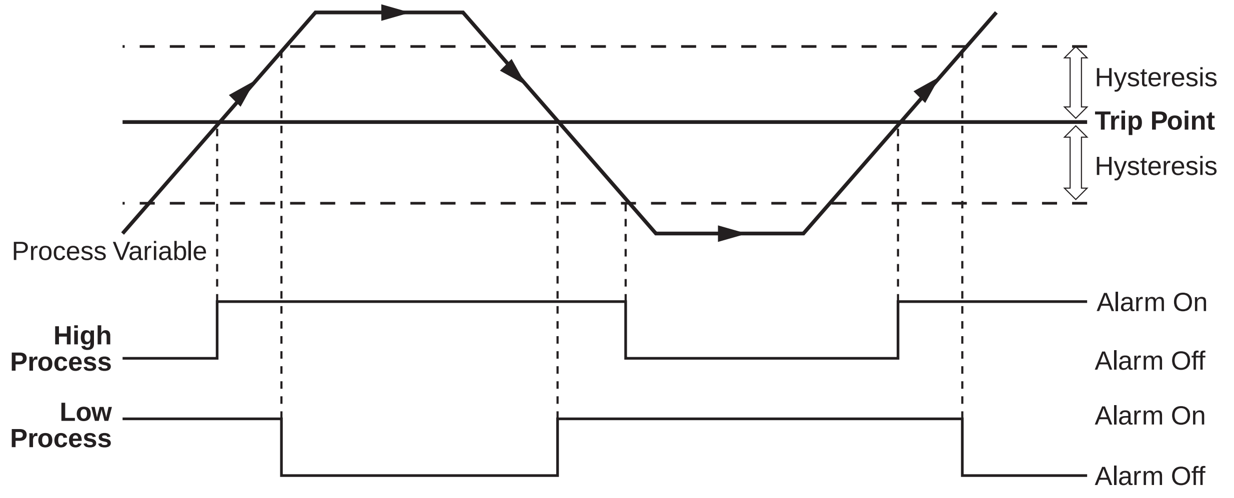


Fig. 4.9 High and Low Process with Hysteresis

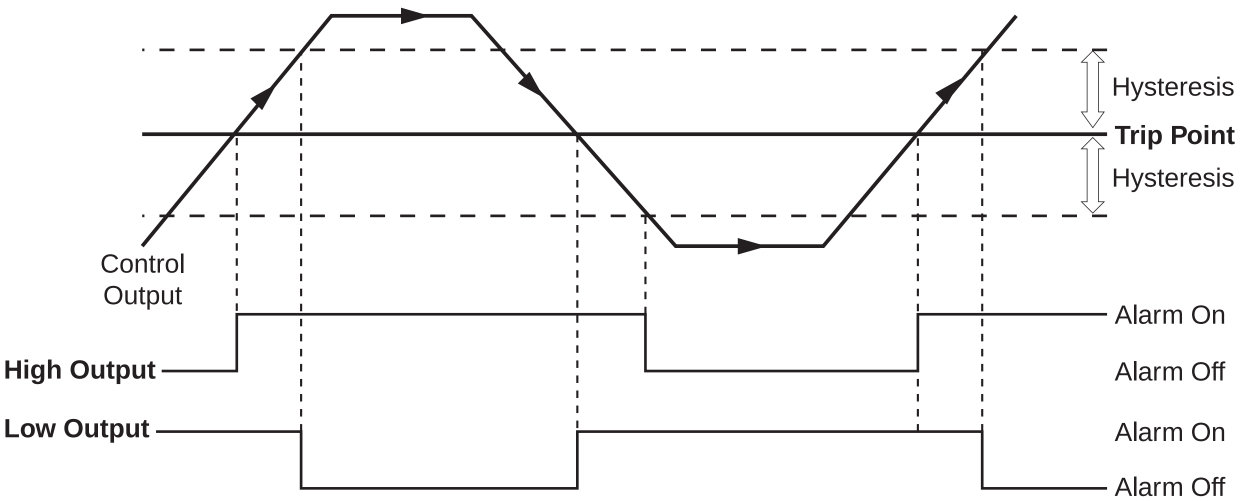


Fig. 4.10 High and Low Output with Hysteresis

…4.11 Set Up Alarms Page

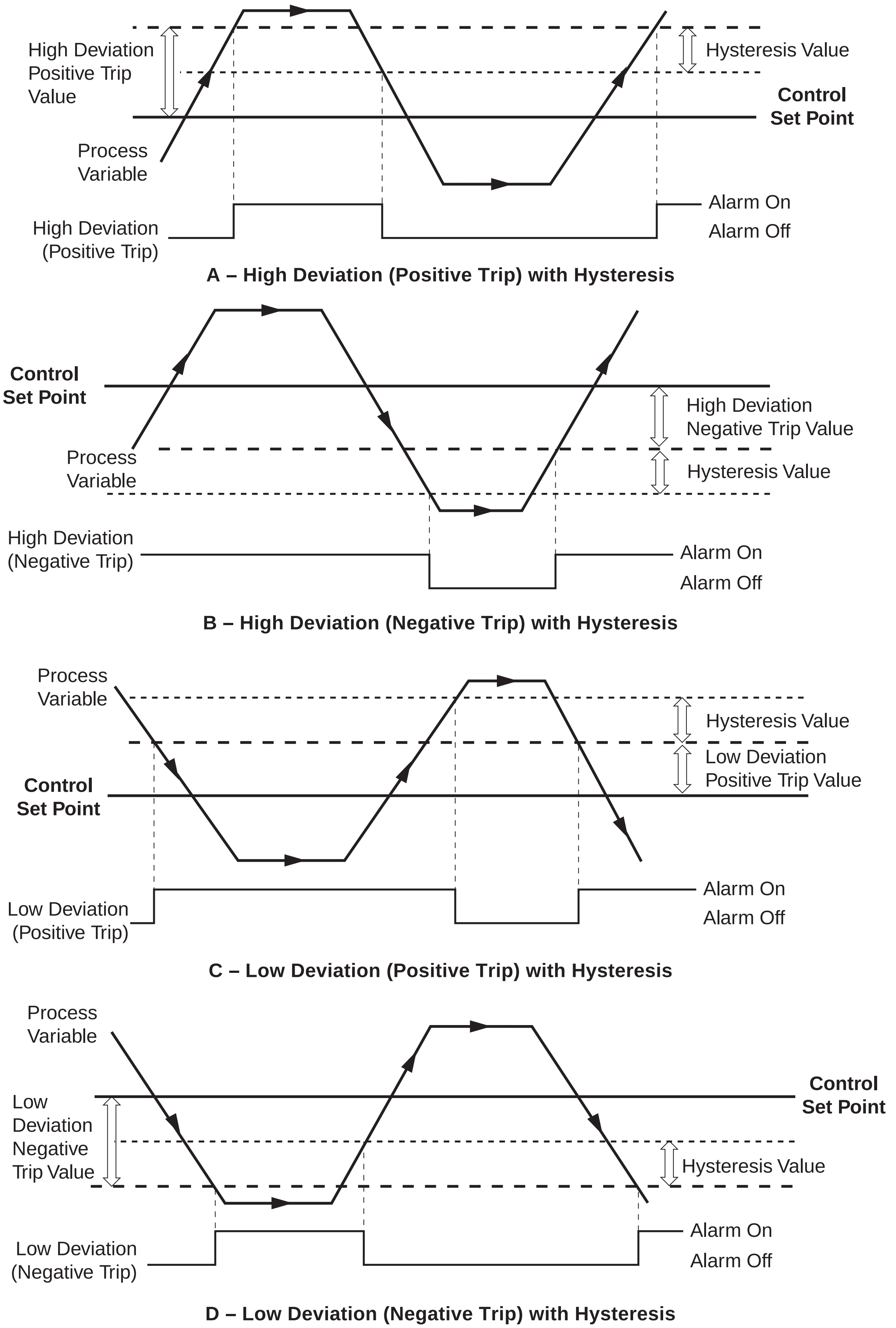


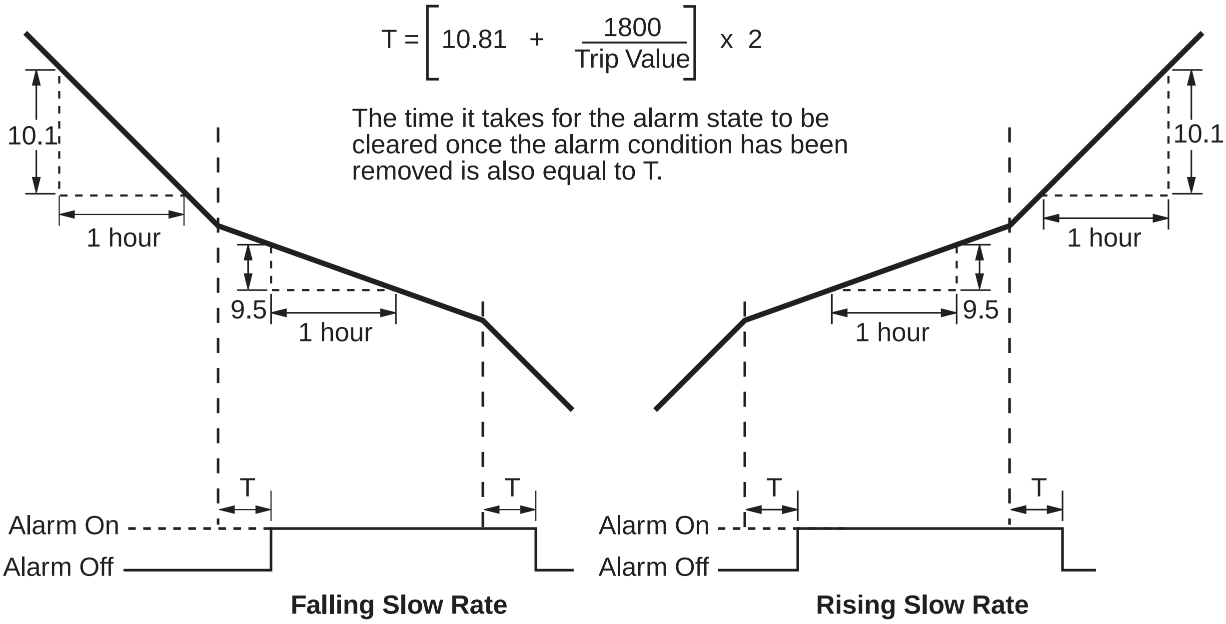
Fig. 4.11 High and Low Deviation with Hysteresis

…4.11 Set Up Alarms Page

The maximum time it takes to detect whether an alarm condition is present (T), in seconds, is calculated as follows:

$$T = \left[10.81 + \frac{1800}{\text{Trip Value}}\right] \times 2$$

The time it takes for the alarm state to be cleared once the alarm condition has been removed is also equal to T.



Examples shown are for a trip value of 10%/hour on a PV engineering range of 0.0 to 100.0

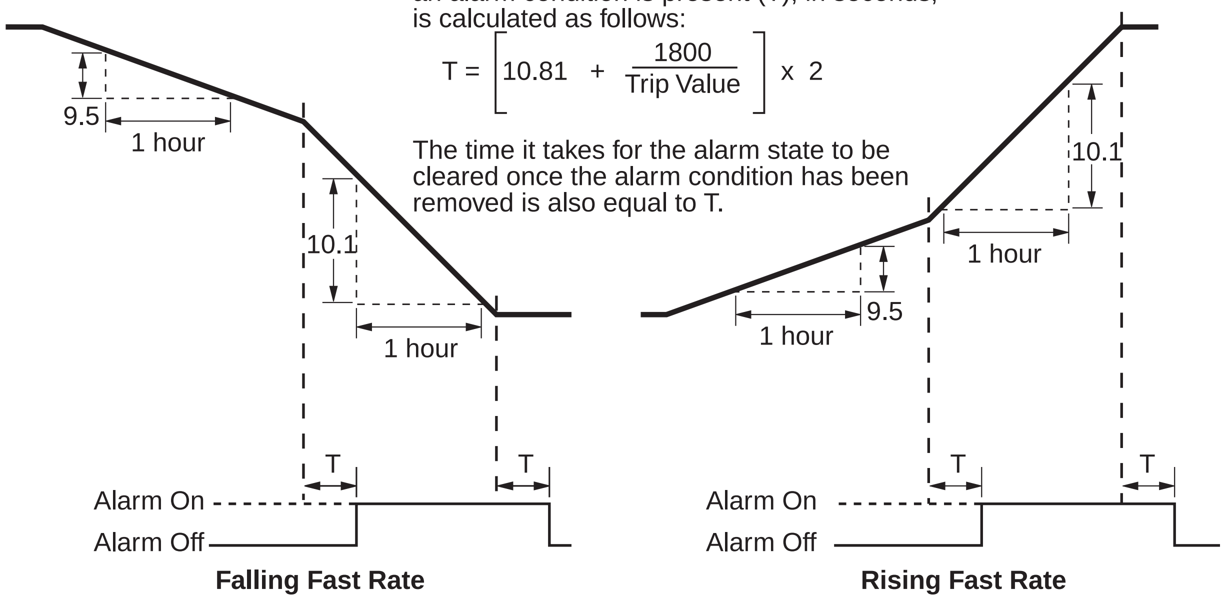
$$T = \left[10.81 + \frac{1800}{10}\right] \times 2 \qquad T = 382 \text{ seconds}$$

Fig. 4.12 Slow Rate Alarms with Hysteresis

The maximum time it takes to detect whether an alarm condition is present (T), in seconds, is calculated as follows:

$$T = \left[10.81 + \frac{1800}{\text{Trip Value}}\right] \times 2$$

The time it takes for the alarm state to be cleared once the alarm condition has been removed is also equal to T.

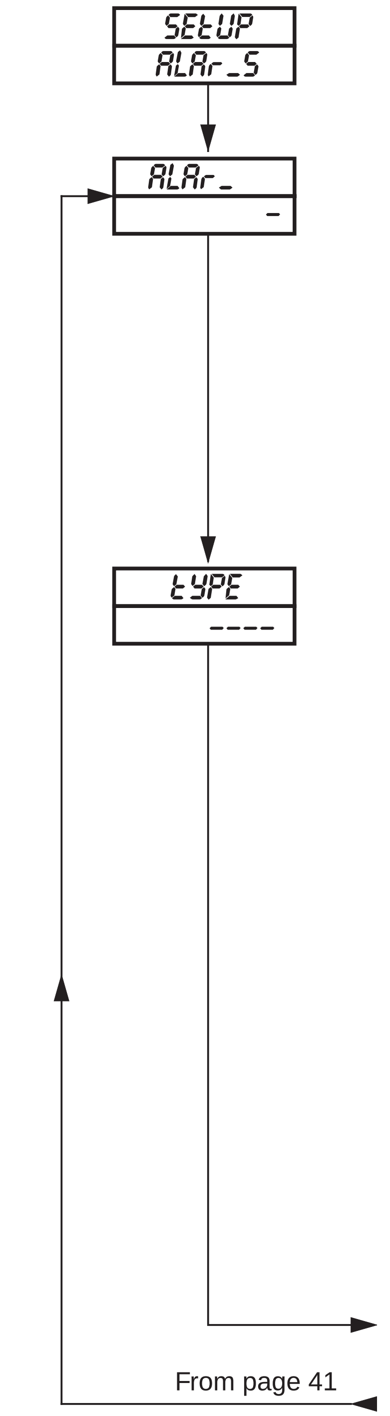


Examples shown are for a trip value of 10%/hour on a PV engineering range of 0.0 to 100.0

$$T = \left[10.81 + \frac{1800}{10}\right] \times 2 \qquad T = 382 \text{ seconds}$$

Fig. 4.13 Fast Rate Alarms with Hysteresis

…4.11 Set Up Alarms Page



Page Header – **Set Up Alarms.**

Alarm Identities

Up to ten alarms (A to K but not I) can be programmed. Each alarm can be assigned an Alarm Type, a Trip Level and a Hysteresis setting. Alarm A is the highest priority and K the lowest.

✶ **Note.** The alarm status LED indicators are:

A1	–	alarms A to E
A2	–	alarms F to K.

Select the Alarm identity.

Alarm Type

An alarm type can be assigned to the alarm identity selected above – Refer to Figs. 4.9 to 4.13.

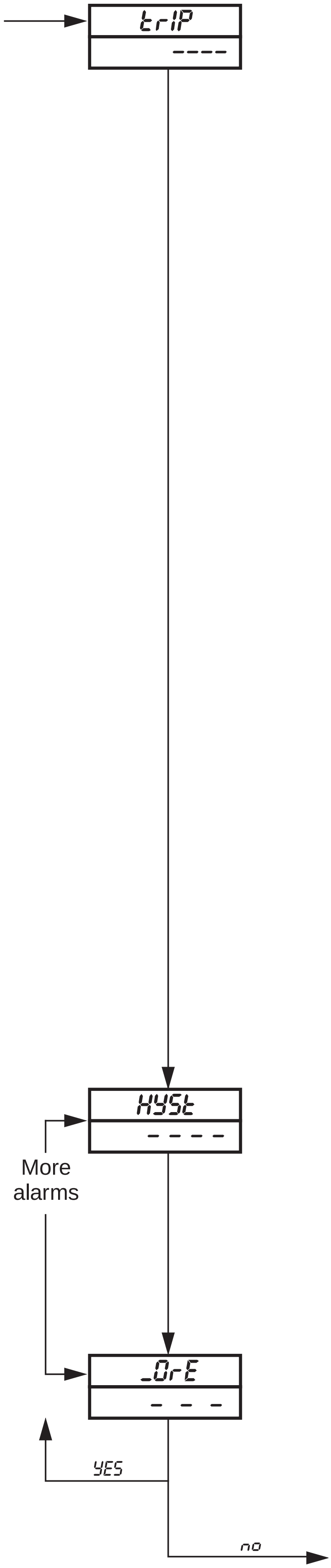
Select the alarm type:

nOnE	–	no alarm function
HPrC	–	high process
LPrC	–	low process
HdEU.	–	high deviation
LdEU.	–	low deviation
HOUt	–	high output
LOUt	–	low output
FrtE	–	fast rate (rate of change of process variable)
SrtE	–	slow rate (rate of change of process variable)
_OdE	–	mode alarm
PEU.t	–	program event
SEU.t	–	segment event

(a) Continued on next page.

(b) From **More Alarms to be Programmed** frame.

…4.11 Set Up Alarms Page



Trip Level
Set the trip value required for the alarm selected above. The following are displayed in engineering units:
HPrC, LPrC, HdEU. and LdEU.
HdEU. and LdEU. alarms have both positive and negative trip points. Refer to Fig. 4.11.
The following are displayed as percentages:
HOUt and LOUt.
The following are displayed as a percentage of span per hour between ±0.5 and ±500%:
FrtE and SrtE.
The following are displayed as event numbers:
PEU.t (1 to 9) and SEU.t (1 to 30).
If the **Alarm Type** is set to _OdE, the displayed characters are alpha, not numeric. The following codes are selectable:

AUtO	–	Automatic
_ANUAL	–	Manual
L-SPt	–	Local set point
r-SPt	–	Remote set point – only selectable if Second set point type is Remote set point
dSPt	–	Dual set point – only selectable if Second set point type is Dual set point
PU.FAIL	–	process variable failure
rSFAIL	–	Remote set point failure
PnFAIL	–	position feedback failure
InFAIL	–	any input failure
P-HOLd	–	alarm activated when program is on Hold (Profile only)

If AUtO, _ANUAL, L-SPt, r-SPt, or d-SPt is selected and an attempt is made to use that facility (Automatic, Manual, Local set point, Remote set point, or Dual set point), the alarm is activated.

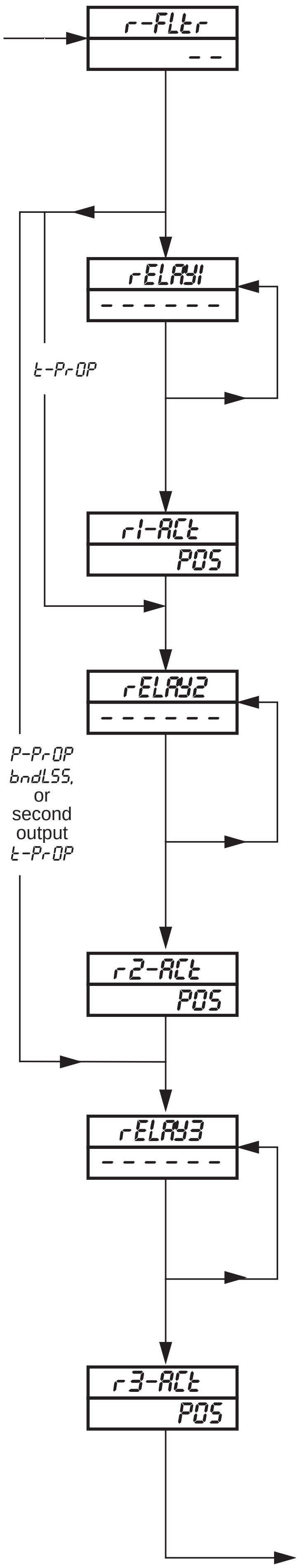
Hysteresis
The hysteresis is operational when the alarm is active.
Set the hysteresis value required (in engineering units), between display full scale and zero, or percentage rate set on rate alarms, in 0.1% increments. The alarm is activated at the trip level, but is only turned off after the alarm variable has moved into the safe region by an amount equal to the hysteresis value. Refer to Figs. 4.9 to 4.13.

More Alarms to be Programmed?
If there are, select YES otherwise, select no.

Return to **Alarm Identities** frame, or advance to the next parameter.

Continued on next page

…4.11 Set Up Alarms Page



Rate Alarm Filter
The process variable input can be filtered before its rate of change is calculated to activate any fast or slow rate alarms. The filter time represents the time a step in the input takes to change the input to the rate alarm from 10 to 90% of the step. Set value required, between 0 and 60 in 1 second increments.

Alarm Relay 1 Assignment
Up to 6 of the 10 alarms can be assigned to alarm relay 1, using a logic expression of up to 12 characters. (r = logic OR, n = logic AND, [ ] are brackets and ≡ is the terminator.)
Select the next character in the expression.
Press to store the character and return to select the next character or press to advance to the next frame.

Relay 1 Action
Select POS for the relay to be energized when the logic expression is satisfied. Select NEG for the relay to be de-energized when the logic expression is satisfied.

Alarm Relay 2 Assignment
Up to 6 of the 10 alarms can be assigned to alarm relay 2, using a logic expression of up to 12 characters. (r = logic OR, n = logic AND, [ ] are brackets and ≡ is the terminator.)
Select the next character in the expression.
Press to store the character and return to select the next character, or press to advance to the next frame.

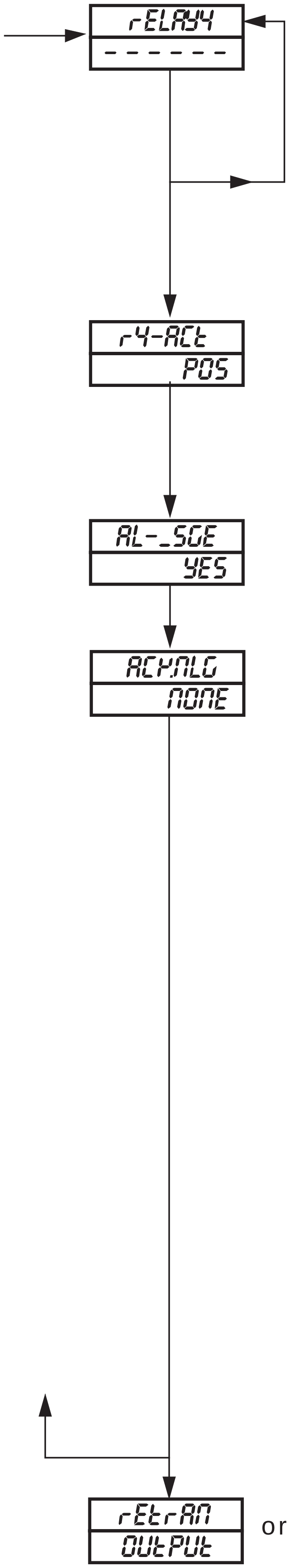
Relay 2 Action
Select POS for the relay to be energized when the logic expression is satisfied. Select NEG for the relay to be de-energized when the logic expression is satisfied.

Alarm Relay 3 Assignment
Up to 6 of the 10 alarms can be assigned to alarm relay 3, using a logic expression of up to 12 characters. (r = logic OR, n = logic AND, [ ] are brackets and ≡ is the terminator.) Select the next character in the expression.
Press to store the character and return to select the next character, or press to advance to the next frame.

Relay 3 Action
Select POS for the relay to be energized when the logic expression is satisfied. Select NEG for the relay to be de-energized when the logic expression is satisfied.

Continued on next page.

…4.11 Set Up Alarms Page



Alarm Relay 4 Assignment (not available on wall-/pipe-mounted variants)
Up to 6 of the 10 alarms can be assigned to alarm relay 4, using a logic expression of up to 12 characters. (r = logic OR, n = logic AND, [ ] are brackets and ≡ is the terminator.)
Select the next character in the expression.
Press to store the character and return to select the next character, or press to advance to the next frame.

Relay 4 Action (not available on wall-/pipe-mounted variants)
Select POS for the relay to be energized when the logic expression is satisfied. Select NEG for the relay to be de-energized when the logic expression is satisfied.

Alarm Message Enable
Set YES to enable, or no to disable the display of alarm messages in the **Operating Page**.

Alarm Acknowledge Type
Alarms may be acknowledged while they are displayed.
Select the alarm acknowledge type:

NONE – no acknowledge facility.

nor_AL – If the cause of the alarm no longer exists, the alarm state clears, but the display remains until alarm is acknowledged.

Alarm cause	Acknow.	Display	LED	Alarm State
Present	–	Flashing	Flashing	Active
Present	Yes	–	Steady	Active
Not present	–	–	Off	Inactive
Present	–	Flashing	Flashing	Active
Not present	–	Flashing	Off	Inactive
Not present	Yes	–	Off	Inactive

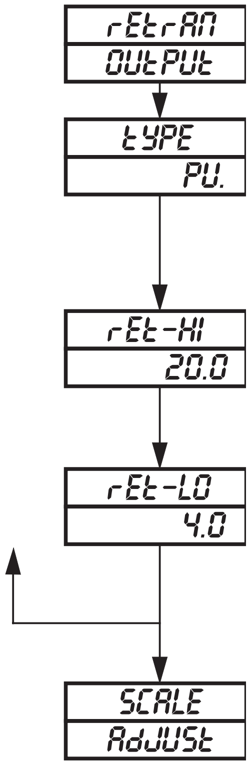
LAtCH – if the cause of the alarm no longer exists, the alarm state remains until it has been acknowledged.

Alarm cause	Acknow.	Display	LED	Alarm State
Present	–	Flashing	Flashing	Active
Present	Yes	–	Steady	Active
Not present	–	–	Off	Inactive
Present	–	Flashing	Flashing	Active
Not present	–	Flashing	Flashing	Active
Not present	Yes	–	Off	Inactive

Return to top of **Set Up Alarms Page** or advance to next programming page.

4.12 Retransmission Output Page

Information.
- Retransmission of process variable, set point, control output or position feedback input.
- Programmable current output range.
- Retransmission output can be used for cool output in heat/cool applications.



Page Header – **Retransmisson Output.**

Parameter Type
Select the parameter type to be retransmitted, PU. (process variable input), SPt (set point), OUt (output) or PFb (position feedback).

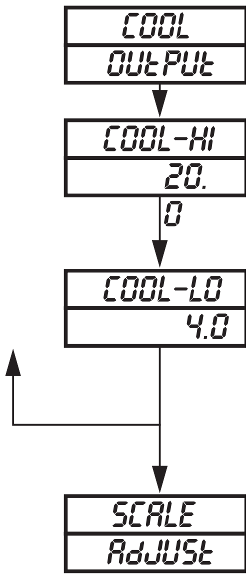
Retransmission Maximum
Set the maximum retransmission value, between 0.0mA and 20.0mA in 0.1mA increments.

Retransmission Minimum
Set the minimum retransmission value, between 0.0mA and 20.0mA in 0.1mA increments.

Return to top of **Retransmission Output Page**
or
Advance to **Scale Adjustment Page.**

4.13 Cool Output Page

This page is only present if HtCOOL is selected at **Control Mode** and C-ProP is selected at **Second Output Type** in the **Set Up Control Page –** see Fig. 3.1 and Section 4.10.



Page Header – **Cool Output Page**

Cool Output Maximum
Set the maximum value for the cool output, between 0.0mA and 20.0mA in 0.1mA increments.

Cool Output Minimum
Set the minimum value for the cool output, between 0.0mA and 20.0mA in 0.1mA increments.

Return to top of **Cool Output Page**
or
advance to **Scale Adjustment Page**.

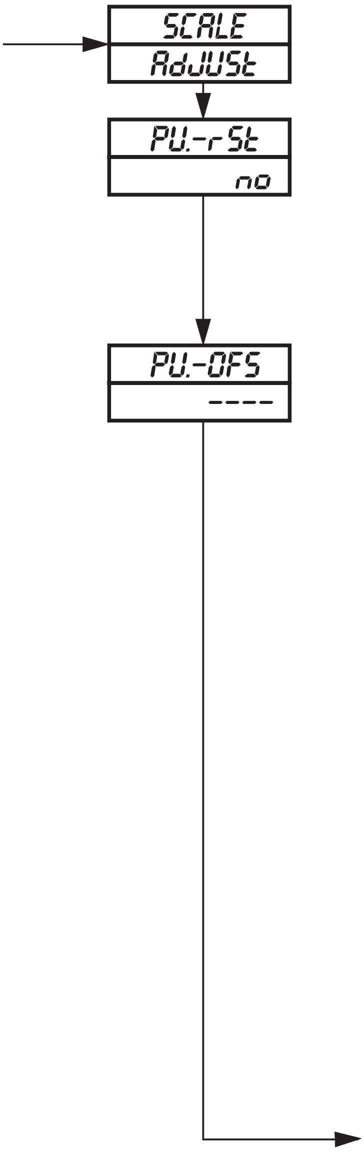
4.14 Scale Adjustment Page

Information.

- Process variable, Remote set point and position feedback inputs do not require recalibrating when the input type or range is changed.
- Scale Adjustment Reset – removes any previously programmed offset or scale adjustment settings.
- System offset errors – can be removed using Offset Adjustment.
- System scale errors – can be removed using Span Adjustment.
- Offset/Span Adjustment – can be used to perform spot calibration.

Switch off the power supply. Connect accurate signal sources, suitable for simulation over the entire input ranges, in place of the process variable signal connections (terminals 10, 11, 12), remote set point signal connections (terminals 7, 8 and 9) and position feedback connections (terminals 4, 5 and 6). For thermocouple inputs, connect the millivolt source using appropriate compensating cable – see *Section 4.6.1 of the Installation Guide*. For 2-lead resistance thermometers, the resistance box may be connected at the sensor end of the leads or the lead resistance must be added to the calibration values.
As a general rule, spot calibration values should be:

< 50% of range span value when using Offset Adjustment parameters.
> 50% of range span value when using Span Adjustment parameters.



Page header – **Scale Adjustment**

Process Variable Scale Adjustment Reset
Set YES and press to reset the process variable offset and span values to their nominal values. dONE is displayed to indicate that these parameters have been reset.

Process Variable Offset Adjustment
Electrical and resistance thermometer inputs:
Apply the correct input for the spot calibration required.
For RTD inputs, use resistance values obtained from standard tables.
Thermocouple Inputs:
Measure the ambient temperature at the output terminals of the signal source (calibrator). From thermocouple tables, obtain the millivolt equivalent of this temperature (a) and that for the spot calibration temperature (b). Subtract (a) from (b) and set the signal source to the resultant value. (The voltage is negative if the spot calibration temperature is less than the measured ambient temperature.)

Note. The displayed units are engineering units.
Set the value required. The decimal point position is set automatically.
Example – If the display range is 50 to 250.0 and a spot calibration is required at 100.0 and 225, inject a signal equivalent to 100 and set the display to 100.0.

Continued on next page.

4.14 Scale Adjustment Page

PV.-SPn

Process Variable Span Adjustment
Proceed as for **Process Variable Offset Adjustment** and apply the correct input for the spot calibration required. The displayed units are engineering units.
Set the value required. The decimal point position is set automatically.
For the example above inject a signal equivalent to 225.0 and set the display to 225.0.

Advance to **Position Feedback Scale Adjustment Reset** frame (instruments on which remote set point is not selected – see **Set Point Selection** frame in **Set Points Page**) or advance to next frame (instruments with remote set point selected).

rS-rSt
no

Remote Set Point Scale Adjustment Reset
The next three parameters are only included if the Remote set point facility is selected.
Set to YES and press to reset the Remote set point offset and span adjustments to their nominal values. dONE is displayed to indicate that these parameters have been reset.

rS-OFS

Remote Set Point Offset Adjustment
Proceed as for **Process Variable Offset Adjustment** frame and apply the correct input for the spot calibration required. The displayed units are engineering units as set in **Set Up Remote Set Point Page** – see Section 4.6.
Set the value required. The decimal point position is set automatically.
Example – If the remote set point range (see Section 4.6) is 50.0 to 250.0 and a spot calibration is required at 100.0 and 225, inject a signal equivalent to 100 and set the display to 100.0.

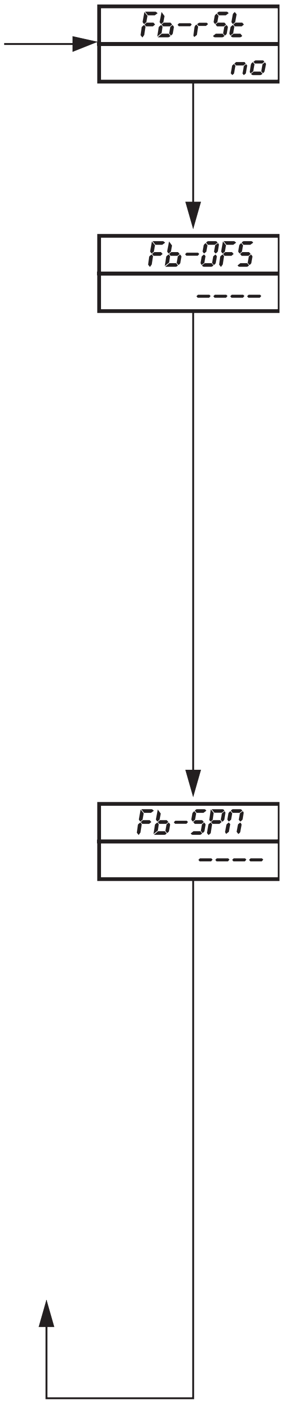
rS-SPn

Remote Set Point Span Adjustment
Proceed as for **Process Variable Span Adjustment** frame and apply the correct input for the spot calibration required. Ratio and bias settings are ignored. The displayed units are engineering units as set in **Set Up Remote Set Point Page** – see Section 4.6.
For the example above, inject a signal equivalent to 225 and set the display to 225.0.

Continued on next page.

4.14 Scale Adjustment Page

The next three parameters are only included if the position feedback facility is selected.



Position Feedback Scale Adjustment Reset
Set to YES and press to reset the position feedback offset and span adjustments to their nominal values. dONE is displayed to indicate that these parameters have been reset.

Position Feedback Offset Adjustment
Proceed as for **Process Variable Offset Adjustment** frame and apply the correct input for the spot calibration required. Ratio and bias settings are ignored.

Set the value required. The decimal point position is set automatically. For resistance inputs, use the external connections to drive the valve to the fully closed position.

Adjust or to bring the value displayed to that set in the **Position Feedback Range Zero** frame in the **Set Up Position Feedback Page**. If this value cannot be reached, adjust the value in **Position Feedback Range Zero** frame to bring it within the offset bandwidth of ±10%.

Position Feedback Span Adjustment
Proceed as for **Process Variable Span Adjustment** frame and apply the correct input for the spot calibration required. Ratio and bias settings are ignored.

Set the value required. The decimal point position is set automatically. For resistance inputs, use the external connections to drive the valve to the fully open position.

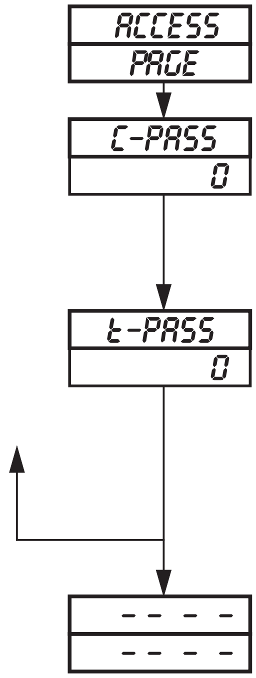
Adjust or to bring the value displayed to that set in the **Position Feedback Range Full Scale** frame in the **Set Up Position Feedback Page**. If this value cannot be reached, adjust the value in **Position Feedback Range Full Scale** frame to bring it within the span bandwidth of ±10%.

Return to the top of the **Scale Adjustment Page**.

4.15 Access Page

Information.

- **Tune Password –** protects the control settings and prevents unauthorized use of self-tuning.
- **Configuration Password –** protects the controller configuration set up.



Page Header – **Access Page.**

Configuration Password

The configuration password enables access to all programming pages (Security Level 2).
Set the required password, between 0 and 1999.

Tuning Password

The tuning password enables access to the **Self-tune, Control, Profile States** and **Profile Operating Pages** in addition to the **Operating Page** (Security Level 1).
Set the required password, between 0 and 1999.

Return to top of **Access Page**
or
return to **Operating Page –** see *Section 5.2 of Operating Guide*.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 37 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal three (3) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited tocontact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gauges
- Load Cells & Pressure Gauges
- Displacement Transducers
- Instrumentation & Accessories

FLOW / LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine / Paddlewheel Systems
- Totalizers & Batch Controllers

pH / CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop / Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION

- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

M2952 / 0299