Electrical Safety

This equipment complies with the requirements of CE/IEC 61010-1:2001-2 "Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use". If the equipment is used in a manner NOT specified by the Company, the protection provided by the equipment may be impaired.

Symbols

One or more of the following symbols may appear on the equipment labelling:

- **Warning** – Refer to the manual for instructions
- **Caution** – Risk of electric shock
- Protective earth (ground) terminal
- Earth (ground) terminal
- Direct current supply only
- Alternating current supply only
- Both direct and alternating current supply
- The equipment is protected through double insulation

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

Health and Safety

To ensure that our products are safe and without risk to health, the following points must be noted:

1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
4. Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.
Displays and Function Keys
- Displays and function keys
- LED Indication
- Error Messages

Operator Mode (Level 1)
- Operator menus for:
  - Standard controller
  - Heat/Cool controller
  - Remote Set Point controller
  - Profile controller
  - Multiple Fixed Set Points controller
- Auto tuning

Set Up Mode (Levels 2, 3 and 4)
- Level 2 – Tuning
- Level 3 – Set Points
- Level 4 – Profile

Configuration Mode (Levels 5 and 6)
- Level 5 – Basic hardware and control functions
- Level 6 – Ranges and passwords

Installation
- Siting
- Mounting
- Electrical connections

Symbol Identification and Section Contents
1.1 Introduction – Fig. 1.1
The COMMANDER 250 front panel displays, function keys and LED indicators are shown in Fig. 1.1.

![Fig. 1.1 Front Panel Displays, Function Keys and Indicators](image)

**Function Keys**
- ▲ Raise
- ▼ Lower
- Auto/Manual
- Parameter Advance

**Notes.**
The fold-out page inside on the back cover of this manual shows all the frames in the programming levels. Space is provided on the page for writing the programmed setting or selection for each frame.
1.2 LED Alarms and Indicators – Figs. 1.2 and 1.3

**LED Status**

**All**
- All LEDs flashing – controller is in the configuration mode.

**A1**
- Flashes when Alarm 1 is active (off when inactive).

**A2**
- Flashes when Alarm 2 is active (off when inactive).

**R**
- On when the controller is operating on the remote set point value.
- Off when the controller is operating using the local set point value or one of the four fixed set points (in multiple set point mode).
- Flashes when a Ramp/Soak profile is running.

**M**
- On when the controller is operating in Manual control mode.
- Off when the controller is operating in Auto control mode.
- Flashes when the controller is performing an auto-tune.

*Fig. 1.2 LED Alarms and Indicators*
1.2 LED Alarms and Indicators – Figs. 1.2 and 1.3

**LED Status**

**OPI**  • LED indicates when the output 1 (heat) value is displayed in the lower display.

**OP2**  • LED indicates when the output 2 (cool) value is displayed in the lower display.

**°C**  • LED indicates when the controller is configured to measure in degrees Celsius.

**°F**  • LED indicates when the controller is configured to measure in degrees Fahrenheit.

Fig. 1.3 Secret-til-lit Indicators
1.3 Use of Function Keys – Fig. 1.4

A – Raise and Lower Keys

Use to change/set a parameter value and ...move between levels

B – Parameter Advance Key

Use to advance to the next frame and ...select the top (LEVEL) frame from within a level

Note. This key also stores any changes made in the previous frame

C – Auto/Manual Key

Use to select Auto or Manual control mode

Fig. 1.4 Use of Function Keys
### 1.4 Error Messages

<table>
<thead>
<tr>
<th>Display</th>
<th>Error/Action</th>
<th>To Clear Display</th>
</tr>
</thead>
</table>
| ![CAL](CAL.png) ![Err](Err.png) | **Calibration Error**  
Turn mains power off and on again. (If the error persists contact the Service Organization). | Press the key |
| ![CnFG](CnFG.png) ![Err](Err.png) | **Calibration Error**  
The configuration and/or setup data for the instrument is corrupted. Turn mains power off and on again (if the error persists, check the configuration/setup settings). | Press the key |
| ![A-d](A-d.png) ![Err](Err.png) | **A to D Converter Fault**  
The analog to digital converter is not communicating correctly. | Turn mains power off & on again. If the error persists contact the Service Organization |
| ![9999](9999.png) ![70](70.png) | **Process Variable Over/Under Range** | Restore valid input |
| ![1252](1252.png) ![70](70.png) | **Remote Set Point Over/Under Range**  
The remote set point value is over or under range. Flashing stops automatically when the remote set point comes back into range. | Select the local set point \((rSP.n)\) in the Operating Page or the Set Points Level |
| ![OpTe](OpTe.png) ![Err](Err.png) | **Option Error**  
Communications to the option board have failed. | Contact the Service Organization |
| ![t.Err](t.Err.png) ![1](1) | **Auto-tune Error**  
The number displayed indicates the type of error present – see Table 2.1 in Section 2.7. | Press any key. |
2 OPERATOR MODE

2.1 Introduction
Operator Mode (Level 1) is the normal day-to-day mode of the COMMANDER 250.

Frames displayed in level 1 are determined by the control strategy which is selected during configuration of the instrument – see Section 4.

---

**Note.** Only the operating frames relevant to the configured strategy are displayed in Operator Mode.

---

The five control strategies are:

- **Standard controller** – page 9
- **Heat/Cool controller** – page 10
- **Remote Set Point controller** – page 12
- **Profile controller** – page 14
- **Multiple Fixed Set Points controller** – page 16
2.2 Standard Controller

Process Variable Value

Control Set Point Value (Local set point)
[Set point low limit to set point high limit]

Process Variable Value

Control Output Value (%)
[0 to 100% (~10% to 110% for analog output)]
Adjustable in manual mode only.

Ramping Set Point Value (Read only)
The actual set point value is displayed i.e. the instantaneous value the controller is working to.

Security Code
[0 to 9999]
Select the appropriate security code to access:
Auto-tune enable frame (Level 1),
Set Up mode (Levels 2, 3, 4).

Auto-tune Enable
ON – Auto-tune on
OFF – Auto-tune off

Refer to page 18 for the Auto-tune procedure.

Level 1 (Operator mode)
Refer to Section 3 for levels 2, 3 and 4.

•1 Not displayed if the ramping set point facility is turned off – refer to Section 3.3.
2.3 Heat/Cool Controller

Process Variable Value

Control Set Point Value (Local set point)
[Set point low limit to set point high limit]

Process Variable Value

Control Output Value (Heat %)
[0% to 100% (0% to 110% for analog output)]
If adjusted below 0% the 'Cool' frame is displayed.

Control Output 2 Value (Cool %)
[0% to –100% (0% to –110% for analog output)]
If adjusted above 0% the 'Heat' frame is displayed.

Ramping Set Point Value (Read only)
The actual set point value is displayed i.e. the instantaneous value the controller is working to.

Continued on next page.

• 1 Not displayed if the ramping set point facility is turned off – refer to Section 3.3.
2 OPERATOR MODE...

...2.3 Heat/Cool Controller

Security Code
[0 to 9999]
Select the appropriate security code to access:
Auto-tune enable frame (Level 1),
Set Up mode (Levels 2, 3, 4).

Auto-tune Enable

ON – Auto-tune on
OFF – Auto-tune off

Refer to page 18 for the Auto-tune procedure.

Level 1 (Operator mode)
See Section 3 for levels 2, 3 and 4.
2.4 Remote Set Point Controller

Process Variable Value

Control Set Point Value
[Set point low to set point high limit]
Adjustable in local Set Point Mode only.

Process Variable Value

Control Output Value (%)
[0% to 100% (–10% to 110% for analog output)]
Adjustable in manual mode only.

Remote Set Point Selection
\( rSP_Y \) – Remote Set Point
\( rSP_n \) – Local Set Point

Local or remote set point can also be selected using a digital input.

The option to change the set point selection at this frame can be disabled in the configuration level.

Remote Set Point Value (read only)

Continued on next page…

Note. If the remote set point input fails while selected, the controller selects the local set point value automatically. The upper display changes to \( rSP.F \) and the lower display flashes. When the fault condition is removed the remote set point is re-selected automatically. To clear the error condition while the remote set point input is still outside its allowed range, select the local set point by pressing the \( \downarrow \) key (\( rSP.n \) is displayed).
...2.4 Remote Set Point Controller

Ramping Set Point Value (Read only)
The actual set point value is displayed i.e. the instantaneous value the controller is working to.

Security Code
[0 to 9999]
Select the appropriate security code to access:
Auto-tune enable frame (Level 1),
Set Up mode (Levels 2, 3, 4).

Auto-tune Enable
ON  – Auto-tune on
OFF – Auto-tune off

Refer to page 18 for the Auto-tune procedure.

Level 1 (Operator mode)
See Section 3 for levels 2, 3 and 4.

•1 Not displayed if the ramping set point facility is turned off – refer to Section 3.3.
2.5 Profile Controller

Process Variable Value

Control Set Point Value
[Set point low limit to set point high limit]

Process Variable Value

Control Output Value (%)
[0% to 100% (–10% to 110% for analog output)]
Adjustable in manual mode only.

Profile Segment Number (1 to 4) currently active

Profile Status

**STOP** – Profile inactive – the control set point is equal to the local set point value when the profile is not running.

**run** – Profile active – currently operating on the segment indicated.

**HOLD** – Profile hold – pauses the current ramp or soak mode by putting it into 'Hold' mode. The guaranteed ramp soak feature can also be used to put the profile into a 'Hold' mode until the process variable comes back within the hysteresis band.

**Note.** The profile status can be changed using a digital input.

Continued on next page…
...2.5 Profile Controller

Ramping Set Point Value (Read only)
The actual set point value is displayed i.e. the instantaneous value the controller is working to.

Security Code
[0 to 9999]
Select the appropriate security code to access:
  Auto-tune enable frame (Level 1),
  Set Up mode (Levels 2, 3, 4).

Auto-tune Enable
ON – Auto-tune on
OFF – Auto-tune off

Refer to page 18 for the Auto-tune procedure.

Level 1 (Operator mode)
See Section 3 for levels 2, 3 and 4.

•1 Not displayed if the ramping set point facility is turned off – refer to Section 3.3.
2.6 Multiple Fixed Set Points Controller
If the Multiple Fixed Set Points Controller type is selected during configuration, four fixed control set points can be set – see Section 4.4.

Notes.
- The top display momentarily displays the set point selected before reverting to the display of the process variable value.
- A digital input can also be used to select the fixed set points.

Control Output Value (%)
[0% to 100% (–10% to 110% for analog output)]
Adjustable in manual mode only.

Ramping Set Point Value (Read only)
The actual set point value is displayed i.e., the instantaneous value the controller is working to.

Continued on next page...

• 1 Not displayed if the ramping set point facility is turned off – refer to Section 3.3.
...2.6 Multiple Fixed Set Points Controller

Security Code
[0 to 9999]
Select the appropriate security code to access:
Auto-tune enable frame (Level 1),
Set Up Mode (Levels 2, 3, 4).

Auto-tune Enable
ON – Auto-tune on
OFF – Auto-tune off

Refer to page 18 for the Auto-tune procedure.

Level 1 (Operator mode)
See Section 3 for Levels 2, 3 and 4.
2.7 Auto-tune

**Notes.**
- Auto-tune optimizes process control by monitoring process performance and automatically updates the control parameters.
- Before starting auto-tune, the process variable must be stable (±2% of engineering range).

![Diagram of auto-tune cycles](image)

- **1 – 'Start up' auto-tune (from manual mode)**
  - 1a – Stable process before auto-tune
  - 1b – Process response during auto-tune

- **2 – 'At set point' auto-tune (from manual or automatic mode)**
  - 2a – Stable process before auto-tune
  - 2b – Process response during auto-tune

**Note.** The time taken to complete autotune depends upon the system response time.

**Fig 2.1 Typical Auto-tune Cycles**
2 OPERATOR MODE

...2.7 Auto-tune

From Security Code frame (any Operating page)
The correct password must be entered to access the auto-tune frame.

Auto-tune Enable
ON – Auto-tune on
OFF – Auto-tune off

Auto-tune can be stopped at any time by pressing the key.

Settings for P + I control only
To tune for P + I control only, set the derivative term to 'OFF' in the Tuning Level – see Section 3.2.

Notes.
• On completion of auto-tune, the controller enters auto control mode and begins to control the process using the new PID values. For fine-tuning – see Section 3.
• For heat/cool control the cool proportional band is set to the same value as the heat proportional band (this value may need modification).
• If an error occurs during auto-tune, the controller reverts to manual mode with the control output set to the configured output value. An error message is displayed – see Table 2.1.

<table>
<thead>
<tr>
<th>Error</th>
<th>Description</th>
<th>Error</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PV failed during auto-tune</td>
<td>7</td>
<td>A resultant P, I or D value was calculated out of range</td>
</tr>
<tr>
<td>2</td>
<td>Auto-tune has timed out during an auto-tune step</td>
<td>8</td>
<td>PV limit exceeded (At start up auto-tune)</td>
</tr>
<tr>
<td>3</td>
<td>Process too noisy to auto-tune</td>
<td>9</td>
<td>Controller put into configuration mode</td>
</tr>
<tr>
<td>4</td>
<td>Process too fast to auto-tune</td>
<td>10</td>
<td>Auto-tune terminated by user</td>
</tr>
<tr>
<td>5</td>
<td>Process too slow to auto-tune</td>
<td>11</td>
<td>PV is changing in the wrong direction during step test</td>
</tr>
<tr>
<td>6</td>
<td>PV deviated from set point by &gt;25% eng. span during frequency response test</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.1 Auto-tune Error Codes
3.1 Introduction
To access the Set Up Mode (Levels 2, 3 and 4) the correct password must be entered in the security code frame (the default password code is 0). Refer to the fold-out sheet at the back of this manual for the contents of these levels.

3.2 Tuning (Level 2)

Level 2 – Tuning Level

Note. To select this frame from anywhere in this page, press the key for a few seconds.

Cycle Time

Heat Time Proportioning Output
[1.0 to 300.0 seconds (<1.0 = 'On/Off' control)]

Cool Time Proportioning Output
[1.0 to 300.0 seconds (<1.0 = 'On/Off control)]

Continued on next page.

• 1 Displayed only if output 1 is assigned to a relay or logic output.
• 2 Displayed only if heat/cool hardware configuration is selected.
...3 SET UP MODE

...3.2 Tuning (Level 2) – Fig. 3.2

On/Off Hysteresis Value
(used for both heat and cool outputs)
[In engineering units]

Proportional Band
Enter the proportional band value for the heat and cool outputs.

Heat Output (Output 1)
[0.1% to 999.9%]

Cool Output (Output 2)
[0.1% to 999.9%]

Continued on next page.

•1 Displayed only if On/Off control is selected for either output.
•2 Displayed only if heat/cool hardware configuration is selected.
...3.2 Tuning (Level 2)

- **Integral Action Time**
  
  [1 to 7200 seconds or OFF (OFF=0)]

- **Manual Reset Value**
  
  [0% to 100% or −100% to +100% for heat/cool]
  
  This value is applied as a bias to the control output.

  **Note.** Manual reset is applied with integral action both on and off.

- **Derivative Action Time**
  
  [0.1 to 999.9 seconds or OFF (OFF=0)]

- **Overlap for Heat/Cool Control**
  
  [−20.0% to +20.0%]
  
  This frame defines the portion of the proportional band (Proportional band heat + Proportional band cool) over which both outputs are active – see Fig. 3.1. Neither output is active in the deadband.

  A positive value gives an overlap and a negative value a deadband.

1 Displayed only if a heat/cool hardware configuration is selected.
Fig. 3.1 Proportional Band & Deadband/Overlap – Heat/Cool Control Only
3.3 Set Points (Level 3)

Level 3 – Set Points Level

**Note.** To select this frame from anywhere in this page, press the key for a few seconds.

Local Set Point Value
[Within set point high and low limits, in engineering units]

Remote Set Point Selection
Set Point Type:
- \(r\ SP.Y\) – remote set point
- \(r\ SP.n\) – local set point

Remote set point value.

Alarm 1 Trip Point
Alarm type:
- \(A\ i.h\ P\) = High process alarm
- \(A\ i.L\ P\) = Low process alarm
- \(A\ i.h\ d\) = High deviation alarm
- \(A\ i.L\ d\) = Low deviation alarm
- \(A\ i.L\ b\) = Loop break alarm

Trip Point:
- Process & deviation alarms [in engineering units]
- Loop break alarm [1 to 9999 seconds]

Continued on next page.

•1 Displayed only if the remote set point option is selected.
...3.3 Set Points (Level 3)

Alarm 1 Hysteresis Value
[in engineering units]

Alarm 2 Trip Point
Alarm type:
\[ \text{A2.hP} = \text{High process alarm} \]
\[ \text{A2.LP} = \text{Low process alarm} \]
\[ \text{A2.hd} = \text{High deviation alarm} \]
\[ \text{A2.Ld} = \text{Low deviation alarm} \]
\[ \text{A2.Lb} = \text{Loop break alarm} \]

Trip Point:
Process & deviation alarms [in engineering units]
Loop break alarm [1 to 9999 seconds]

Alarm 2 Hysteresis Value
[in engineering units]

Remote Set Point Input Ratio and Bias
The remote set point value =
\[ \text{ratio} \times \text{remote set point input} + \text{bias} \]

\text{Ratio}
[0.001 to 9.999]

\text{Bias}
[in engineering units]

Continued on next page.

1 Displayed only if custom alarm hysteresis is selected – see section 4.3.2, not displayed if Loop Break Alarm type selected.
2 Displayed only if the remote set point option is selected.
3.3 Set Points Level

Ramp Rate (for ramping set point facility)
[1 to 9999 engineering units per hour, or OFF]

The ramping set point facility can be used to prevent a large disturbance to the control output when the set point value is changed. This only applies to the local and multiple fixed set points.

Note. For remote set points, the ramp rate is applicable only when switching from remote to local mode, not from local to remote.

Offset Adjustment
An offset can be applied to the process variable input to enable spot calibration or the removal of system errors.

[±10% of engineering range in engineering units]
3.4 Profile (Level 4)
A four segment ramp/soak profile facility is provided. This level can only be accessed if the profile option is selected in the configuration level. The four segments are fixed as ramps or soaks as follows:

![Diagram of profile levels]

**Level 4 – Profile Level**

*Note.* To select this frame from anywhere in this page, press the key for a few seconds.

**Start value for 1st Segment (ramp).**
[Within display range (in engineering units)]

Enter the start value required.

**End Value for 1st Segment (ramp).**
[Within display range (in engineering units)]

Enter the end value required.

Continued on next page.

•1 With the self-seeking set point facility enabled, the first ramp starts at the current process variable value instead of the start value for the 1st segment.
...3 SET UP MODE

...3.4 Profile (Level 4)

Ramp Rate for 1st Segment.
[Engineering units*]

Enter the ramp rate required.
* The time option Eng Units/hr or Eng Units/min is set in the configuration level – see section 4.3.2.

Example. Required Ramp Rate 40°C/min
Ramp Rate set to 40, Time Option set to ‘Min’ – see section 4.3.2

Soak Time for 2nd Segment.
[0 to 999.9 minutes or hours]*

End Value for 3rd Segment (ramp).
[Within display range (in engineering units)]

Ramp Rate for 3rd Segment.
[Engineering units/hour or /minute]*

* Depending on the time option selected in the configuration level.

Continued on next page.

1 The engineering value is shown with an extra decimal place (up to a maximum of 3) for greater accuracy in setting the ramp rate.
...3.4 Profile (Level 4)

**Soak Time for 4th Segment.**

[0 to 999.9 minutes or hours]*

* Depending on the time option selected in the configuration level.

**Self Seeking Set Point Enable.**

*YES* – enable self seeking set point

*NO* – disable self seeking set point

When enabled, the controller inserts the current process variable value as the starting point on initiation of the profile (instead of the start value for segment 1).

**Profile Hysteresis for Guaranteed Ramp/Soak.**

[In engineering units or OFF = 0]

If the process variable deviates from the set point by more than the value set, the program is suspended but continues automatically when the process variable returns within the set limits. The hysteresis value applies above and below set point under all program conditions.

**Number of Program Repeats**

[0 to 99 or infinite ($\text{Inf} \geq 100$)]

•2 The engineering value is shown with an extra decimal place (up to a maximum of 3) for greater accuracy in setting the ramp rate.
4 CONFIGURATION MODE

4.1 Introduction
The Configuration Mode comprises two levels (5 and 6) as shown in Fig. 4.2.

Level 5 is divided into four frames. For most simple applications it is only necessary to set up the parameters in the first frame.

Note.
When in the configuration level:
- All the LED indicators flash.
- All relays and logic outputs are turned off.
- The analog output reverts to 0% (4mA) output level.

4.2 Accessing the Configuration Mode – Fig. 4.1
To access the Configuration Mode, set the security switch to the 'Configure' position (levels 1 to 4 cannot be accessed from this setting). When the configuration parameters are programmed, reset the security switch to the 'Normal' position. The Operating page is displayed automatically.

Fig. 4.1 Accessing the Configuration Mode (Config./Normal Switch)
Fig. 4.2 Configuration Frames (Levels 5 and 6)
4.3 Basic Hardware and Configuration (Level 5)

4.3.1 Hardware Assignment and Input Type – Fig. 4.3

Level 5 – Configuration

**Note.** To select this frame from anywhere in this page, press the key for a few seconds.

'ABCD' Settings

The parameter to be changed is indicated by the letter which is flashing. Parameter options are shown in Fig. 4.3.

- $A =$ Hardware configuration
- $b =$ Input type and range
- $c =$ Temperature units
- $d =$ Process variable display decimal places

**Note 1.** When the input type (parameter $b$) is changed, the range is set automatically to the maximum permissable for the input type selected.

**Note 2.** For custom settings contact the local distributor.

Continued on page 34.
### A – Hardware Configuration

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Rly 1</th>
<th>Rly 2*</th>
<th>Rly 3*</th>
<th>Logic O/P</th>
<th>An. O/P 1</th>
<th>An. O/P 2*</th>
<th>Control Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>50Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Time Prop. or On/Off</td>
</tr>
<tr>
<td>60Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Analog Prop.</td>
</tr>
<tr>
<td>1</td>
<td>R</td>
<td>Alm 1</td>
<td>Alm 2</td>
<td>O/P 1</td>
<td>PV</td>
<td>SP</td>
<td>Heat – Time Prop.</td>
</tr>
<tr>
<td>2</td>
<td>b</td>
<td>Alm 1</td>
<td>Alm 2</td>
<td>None</td>
<td>None</td>
<td>O/P 1</td>
<td>Cool – Time Prop.</td>
</tr>
<tr>
<td>3</td>
<td>c</td>
<td>O/P 1</td>
<td>O/P2</td>
<td>Alm 1</td>
<td>O/P 1</td>
<td>PV</td>
<td>Heat – Analog</td>
</tr>
<tr>
<td>4</td>
<td>d</td>
<td>O/P2</td>
<td>Alm 1</td>
<td>Alm 2</td>
<td>O/P2</td>
<td>O/P 1</td>
<td>Cool – TP or On/Off</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>Alm 1</td>
<td>Alm 2</td>
<td>None</td>
<td>O/P 1</td>
<td>PV</td>
<td>Alm Unit or Logic O/P</td>
</tr>
<tr>
<td>U</td>
<td>Custom</td>
<td>Custom</td>
<td>Custom</td>
<td>Custom</td>
<td>Custom</td>
<td>Custom</td>
<td>Custom</td>
</tr>
</tbody>
</table>

* Available only if option board is fitted

### B – Input Type and Range Configuration

<table>
<thead>
<tr>
<th>Display</th>
<th>THC Type B</th>
<th>0 to 20 mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>THC Type E</td>
<td>4 to 20 mA</td>
</tr>
<tr>
<td>E</td>
<td>THC Type J</td>
<td>0 to 5 V</td>
</tr>
<tr>
<td>J</td>
<td>THC Type K</td>
<td>1 to 5 V</td>
</tr>
<tr>
<td>K</td>
<td>THC Type N</td>
<td>0 to 50 mV</td>
</tr>
<tr>
<td>n</td>
<td>THC Type R</td>
<td>4 to 20 mA (square root lineariser)</td>
</tr>
<tr>
<td>r</td>
<td>THC Type S</td>
<td>Custom Configuration</td>
</tr>
<tr>
<td>S</td>
<td>THC Type T</td>
<td>PT100 RTD</td>
</tr>
<tr>
<td>P</td>
<td>PT100 RTD</td>
<td></td>
</tr>
</tbody>
</table>

### C – Temperature Units

<table>
<thead>
<tr>
<th>Display</th>
<th>Temperature Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Degrees C*</td>
</tr>
<tr>
<td>F</td>
<td>Degrees F*</td>
</tr>
<tr>
<td>O</td>
<td>No temperature units</td>
</tr>
</tbody>
</table>

* Temperature inputs only

### D – Process Variable Display Decimal Places

<table>
<thead>
<tr>
<th>Display</th>
<th>Decimal Places</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>xxxx</td>
</tr>
<tr>
<td>1</td>
<td>xxx . x</td>
</tr>
<tr>
<td>2</td>
<td>xx . xx</td>
</tr>
<tr>
<td>3</td>
<td>x . xxx</td>
</tr>
</tbody>
</table>

**Fig. 4.3 Hardware Assignment and Input Type**
4.3.2 Alarms and Set Point Types – Fig. 4.4

Note. All relays are de-energised in the alarm state.

The parameter to be changed is indicated by the letter which is flashing. Parameter options are shown in Fig. 4.4.

- $E$ = Alarm 1 type
- $F$ = Alarm 2 type
- $G$ = Alarm Hysteresis
- $H$ = Set Point type

Note. For custom settings contact the local distributor.

Continued on page 38.
**E – Alarm 1 Type**

<table>
<thead>
<tr>
<th>Display</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>High Process</td>
</tr>
<tr>
<td>2</td>
<td>Low Process</td>
</tr>
<tr>
<td>3</td>
<td>High Deviation</td>
</tr>
<tr>
<td>4</td>
<td>Low Deviation</td>
</tr>
<tr>
<td>5</td>
<td>Loop Break</td>
</tr>
</tbody>
</table>

* Refer to Figs. 4.5 and 4.6 for alarm action

**F – Alarm 2 Type**

<table>
<thead>
<tr>
<th>Display</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>High Process</td>
</tr>
<tr>
<td>2</td>
<td>Low Process</td>
</tr>
<tr>
<td>3</td>
<td>High Deviation</td>
</tr>
<tr>
<td>4</td>
<td>Low Deviation</td>
</tr>
<tr>
<td>5</td>
<td>Loop Break</td>
</tr>
</tbody>
</table>

**G – Alarm Hysteresis**

<table>
<thead>
<tr>
<th>Display</th>
<th>Hysteresis Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>0.1%</td>
</tr>
<tr>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>3</td>
<td>0.5%</td>
</tr>
<tr>
<td>4</td>
<td>1.0%</td>
</tr>
<tr>
<td>5</td>
<td>2.0%</td>
</tr>
<tr>
<td>6</td>
<td>5.0%</td>
</tr>
<tr>
<td>U</td>
<td>Custom</td>
</tr>
</tbody>
</table>

Value in % of engineering range

Value in engineering units (See Note 1)

**H – Set Point Type**

<table>
<thead>
<tr>
<th>Display</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Local Set Point Only</td>
</tr>
<tr>
<td>1</td>
<td>Local + Remote Set Point (no Remote Set Point Tracking)**</td>
</tr>
<tr>
<td>2</td>
<td>Local + Remote Set Point (with Remote Set Point Tracking)**</td>
</tr>
<tr>
<td>3</td>
<td>Multiple Fixed Set Points</td>
</tr>
<tr>
<td>4</td>
<td>Ramp/Soak (Time Units in Minutes)</td>
</tr>
<tr>
<td>5</td>
<td>Ramp/Soak (Time Units in Hours)</td>
</tr>
</tbody>
</table>

(See Note 2)

**Note 1.** When custom alarm hysteresis is selected, the alarm hysteresis values are set individually in the set up level – see section 3.3.

**Note 2.** Only available if option board is fitted. Remote set point input is 4 to 20 mA

With remote set point tracking enabled the local set point tracks the remote set point when in the remote set point mode.

---

*Fig. 4.4 Alarms and Set Point Types*
Loop Break Alarm
The loop break alarm indicates a fault in the control loop (e.g. failure of a heating element in a furnace). If the control output remains at maximum or minimum for a time exceeding the trip value (in seconds) without any response in the process value, the loop break alarm is activated.

Process and Deviation Alarms (High/Low) – Figs 4.5 and 4.6

![Diagram of Process and Deviation Alarms](image-url)

**Fig. 4.5 High and Low Process Alarm Action**
Fig. 4.6 High and Low Deviation Alarm Action
4.3.3 Operator Access and Control Action – Fig. 4.7

The parameter to be changed is indicated by the letter which is flashing. Parameter options are shown in Fig. 4.7.

\[ J = \text{Power recovery mode} \]
\[ K = \text{Operator selection enable – control functions} \]
\[ L = \text{Operator selection enable – set point functions} \]
\[ n = \text{Control action} \]

Note. For custom settings contact the local distributor.

Continued on page 40.
### J – Power Recovery Mode

<table>
<thead>
<tr>
<th>Display</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Last Mode</td>
</tr>
<tr>
<td>1</td>
<td>Manual with Last Output</td>
</tr>
<tr>
<td>2</td>
<td>Manual with 0.0% Output</td>
</tr>
<tr>
<td>3</td>
<td>Manual with 100.0% Output</td>
</tr>
<tr>
<td>4</td>
<td>Auto</td>
</tr>
<tr>
<td>U</td>
<td>Custom</td>
</tr>
</tbody>
</table>

### K – Operator Selection Enable Control Functions

<table>
<thead>
<tr>
<th>Display</th>
<th>Auto/Manual and Autotune</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Enable Both Functions</td>
</tr>
<tr>
<td>1</td>
<td>Disable A/M, Enable Auto-tune</td>
</tr>
<tr>
<td>2</td>
<td>Enable A/M, Disable Auto-tune</td>
</tr>
<tr>
<td>3</td>
<td>Disable Both Functions</td>
</tr>
</tbody>
</table>

### L – Operator Selection Enable – Set Point Functions

<table>
<thead>
<tr>
<th>Display</th>
<th>Local Set Point Adjustment and Local/Remote Set Point Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Enable Both Functions</td>
</tr>
<tr>
<td>1</td>
<td>Disable Set Point Adjust, Enable Local/Remote Selection</td>
</tr>
<tr>
<td>2</td>
<td>Enable Set Point Adjust, Disable Local Remote Function</td>
</tr>
<tr>
<td>3</td>
<td>Disable Both Functions</td>
</tr>
</tbody>
</table>

### N – Control Action

<table>
<thead>
<tr>
<th>Display</th>
<th>Heat Action</th>
<th>Cool Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Reverse</td>
<td>Direct</td>
</tr>
<tr>
<td>1</td>
<td>Direct</td>
<td>Reverse</td>
</tr>
</tbody>
</table>

Fig. 4.7 Operator Access and Control Action
4.3.4 Digital Input and Serial Communications – Fig. 4.8

The parameter to be changed is indicated by the letter which is flashing. Parameter options are shown in Fig. 4.8.

- **P** = Digital input function
- **r** = Analog input digital filter
- **S** = Serial communications configuration
- **t** = Serial communication parity

**Note.** For custom settings contact the local distributor.

---

**Fig. 4.8 Digital Inputs**

Note. All digital input functions except 6 are triggered on the rising/falling edge, to enable the front panel keys to change the function when the digital input is operational.
### P - Digital Input Functions

<table>
<thead>
<tr>
<th>Display</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Auto/Manual</td>
</tr>
<tr>
<td>2</td>
<td>Local/Remote</td>
</tr>
<tr>
<td>3</td>
<td>Auto-tune Start</td>
</tr>
<tr>
<td>4</td>
<td>Ramp/Soak Run-Hold</td>
</tr>
<tr>
<td>5</td>
<td>Ramp/Soak Run-Stop</td>
</tr>
<tr>
<td>6</td>
<td>Front Panel Lockout</td>
</tr>
<tr>
<td>7</td>
<td>Select Fixed Set Points</td>
</tr>
</tbody>
</table>

### R - Analog Input Digital Filter

<table>
<thead>
<tr>
<th>Display</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 seconds</td>
</tr>
<tr>
<td>1</td>
<td>1 second</td>
</tr>
<tr>
<td>2</td>
<td>2 seconds</td>
</tr>
<tr>
<td>5</td>
<td>5 seconds</td>
</tr>
<tr>
<td>A</td>
<td>10 seconds</td>
</tr>
<tr>
<td>B</td>
<td>20 seconds</td>
</tr>
<tr>
<td>C</td>
<td>40 seconds</td>
</tr>
<tr>
<td>D</td>
<td>60 seconds</td>
</tr>
</tbody>
</table>

Input filter averages the process variable input values over the time set.

### S - Serial Communication Configuration

<table>
<thead>
<tr>
<th>Display</th>
<th>Baud Rate, 2/4 Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Off</td>
</tr>
<tr>
<td>1</td>
<td>2400, 2 Wire</td>
</tr>
<tr>
<td>2</td>
<td>2400, 4 Wire</td>
</tr>
<tr>
<td>3</td>
<td>9600, 2 Wire</td>
</tr>
<tr>
<td>4</td>
<td>9600, 4 Wire</td>
</tr>
</tbody>
</table>

### T - Serial Communications Parity

<table>
<thead>
<tr>
<th>Display</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Odd</td>
</tr>
<tr>
<td>2</td>
<td>Even</td>
</tr>
</tbody>
</table>

Fig. 4.9 Digital Input and Serial Communications
•1 The engineering range high and low values are automatically set to the maximum allowed value when thermocouple or RTD is selected in the configuration level – see Section 4.3.1.
...4.4 Ranges and Passwords (Level 6)

- **Retransmission Range**
  The retransmission range defines engineering range to be transmitted.

- **Retransmission High (20mA) Analog Output 1**
  [-999 to 9999 (in engineering units)]

- **Retransmission Low (4mA) Analog Output 1**
  [-999 to 9999 (in engineering units)]

- **Retransmission High (20mA) Analog Output 2**
  [-999 to 9999 (in engineering units)]

- **Retransmission Low (4mA) Analog Output 2**
  [-999 to 9999 (in engineering units)]

-1 Displayed only if the analog output is configured to retransmit the process variable or control set point value.

-2 Displayed only if the retransmission option board is fitted.
**...4 CONFIGURATION MODE**

**...4.4 Ranges and Passwords (Level 6)**

---

**Set Point Limit**
The Set Point Limit defines limits within which the local set point can be adjusted (these limits also apply to remote set point).

- **High Limit**
  
  [-999 to 9999]

- **Low Limit**
  
  [-999 to 9999]

**Fixed Set Point Values (1 to 4)**
Select the set point values required in the multiple fixed set point facility.

- **Fixed Set Point 1**
  
  [-999 to 9999 (in engineering units)]

- **Fixed Set Point 4**
  
  [-999 to 9999 (in engineering units)]

---

•1 This limit applies to the local and remote set point values.

•2 Displayed only if the multiple fixed set point facility is selected.

Continued on next page...
...4.4 Ranges and Passwords (Level 6)

1. Output 1 (Heat) High Limit
   [0% to 110%]

2. Output 2 (Cool) High Limit
   [0% to 110%]

3. Configured Output
   [-10% (–110% for heat/cool) to 110% or LAST (default)]
   This output value is used when:
   - Manual control is selected using a digital input,
   - the process variable input fails,
   - the auto-tune fails.

4. Auto-Tune Password
   [0 to 9999 (default 0)]
   Enables access to the auto-tune facility in the operating level (Level 1).

5. Setup Password
   [0 to 9999 (default 0)]
   This password enables access to the setup levels (levels 2, 3, and 4) and to the auto tune facility.

6. Modbus Address
   [1 to 99]
   This frame allows the Modbus address to be set.

- This value applies only in automatic mode.
  The low limit is set automatically to 0.0% (~10% for analog outputs).
- Displayed only if a heat/cool hardware configuration is selected.
EC Directive 89/336/EEC
In order to meet the requirements of the EC Directive 89/336/EEC for EMC regulations, this product must not be used in a non-industrial environment.

End of Life Disposal
This instrument does not contain any substance that will cause undue harm to the environment. It can therefore be safely considered as normal waste and disposed of accordingly.

Cleaning
Clean the front panel only, using warm water and a mild detergent.
5.1 Siting – Figs. 5.1 and 5.2

- Close to the Sensor
- At Eye Level
- Avoid Vibration

Fig. 5.1 General Requirements
...5 INSTALLATION

...5.1 Siting – Figs. 5.1 and 5.2

Warning. Select a location away from strong electrical and magnetic fields. If this is not possible, particularly in applications where mobile communications equipment is expected to be used, screened cables within earthed (grounded) metal conduit must be used.

Fig. 5.2 Environmental Requirements
5.2 Mounting – Figs. 5.3 and 5.4
The instrument is designed for panel mounting (see Fig. 5.4). Overall dimensions are shown in Fig. 5.3.

**Note.** For NEMA4X protection, a minimum panel thickness of 2.5mm is recommended.

![Fig. 5.3 Overall Dimensions](image-url)
5.2 Mounting – Figs. 5.3 and 5.4

1. Cut a hole in the panel (see Fig. 5.3 for dimensions). Instruments may be closely stacked to DIN 43835.

2. Insert the instrument into the panel cut-out.

3. Fit the panel clamps, ensuring that the lugs are located correctly in their slots.

4. Secure the panel clamp using the retaining screws. The rubber friction sleeve prevents over-tightening.

Fig. 5.4 Mounting Details
5.3 Removing the Instrument from the Case – Fig. 5.5

1. Release the jacking screw cover

2. Turn the jacking screw anticlockwise to pull the instrument from the case

Fig. 5.5 Removing the Instrument from the Case
5.4 Electrical Connections – Fig. 5.6

Warning.

- The instrument is not fitted with a switch therefore a disconnecting device such as a switch or circuit breaker conforming to local safety standards must be fitted to the final installation. It must be mounted in close proximity to the instrument within easy reach of the operator and must be marked clearly as the disconnection device for the instrument.

- Remove all power from supply, relay and any powered control circuits and high common mode voltages before accessing or making any connections.

- Use cable appropriate for the load currents. The terminals accept cables up to 14AWG (2.5mm²).

- The instrument conforms to Mains Power Input Insulation Category 2, Pollution Degree 2 (EN601010–1).

- All connections to secondary circuits must have basic insulation.

- After installation, there must be no access to live parts, e.g. terminals.

- Terminals for external circuits are for use only with equipment with no accessible live parts.

- If the instrument is used in a manner not specified by the Company, the protection provided by the equipment may be impaired.

- All equipment connected to the instrument's terminals must comply with local safety standards (IEC 60950, EN601010–1).

Note.

- Always route signal leads and power cables separately, preferably in earthed (grounded) metal conduit.

- It is strongly recommended that screened cable is used for signal inputs and relay connections.

This equipment is protected through double insulation (Class II).
Note. Analog output 1 and the logic output use a common positive terminal, capable of driving both outputs simultaneously.
5.5 Relays, Arc Suppression and Outputs

5.5.1 Relay Contact Ratings
Relay contacts are rated at:

- 115/230V AC at 5A (non-inductive).
- 250V DC 25W max.

A suitable fuse must be fitted.

5.5.2 Arc Suppression
Arc suppression components are fitted to relays 2 and 3 only. If relay 1 is required to switch inductive loads, the arc suppression components supplied must be fitted.

5.5.3 Logic Output
18V DC at 20mA.

Min load 900Ω.

Isolated from inputs (not isolated from analog O/P 1),
dielectric strength – 500V DC for 1 minute.

5.5.4 Control or Retransmission Analog Outputs
Max. load 15V (750Ω at 20mA).

Analog O/P 1 – Isolated from inputs (not isolated from logic O/P),
dielectric strength – 500V DC for 1 minute.

Analog O/P 2 – Non-isolated.
SPECIFICATION

Summary
P, PI, PID single loop controller
Autotune facility
Fully user configurable
NEMA4X/IP66
PC Configuration

Operation
Display
High-intensity 7-segment, 2 x 4-digit red LED display
Display range –999 to +9999
Display resolution ±1 digit
Display height 12mm (0.43 in.)

Configuration
User defined via front panel or PC Configurator

Standard Functions
Control types
Programmable for manual, on/off, time proportioning, current proportioning and heat/cool control

Set points
Local
Remote
4 selectable, fixed value
Ramping set point

Profile controller
Number 4 ramp/soak segments
Features Guaranteed ramp/soak, self seeking set point, program repeat
Controls Run, hold and stop from front panel switches
Run/hold or run/stop from digital input

Alarms
Number Two user-defined
Type High/low process
High/low deviation
Loop break alarm
...SPECIFICATION

Standard Build

Control output/retransmission
- Analog, configurable in the range of 4 to 20mA
- Max. load: 15V (750Ω at 20mA)
- Accuracy: ≤0.25% of span
- Dielectric: 500V DC from input (not isolated from logic output)

Logic output
- 18V DC at 20mA
- Min. load: 400Ω
- Dielectric: 500V DC from input (not isolated from control output)

Relay output
- One relay as standard (SPDT) 5A @ 115/230V AC
Analog Input

Number
- One as standard
- One optional 4 to 20mA remote set point input

Input sampling rate
250ms per channel

Type
Universally configurable to provide (Channel 1 only):
- Thermocouple (THC)
- Resistance Thermometer (RTD)
- Millivolt
- Current
- DC voltage

Input impedance
- mA: 100Ω
- mV, V: >10MΩ

Linearizer functions
Programmable for standard inputs:
- √, THC types B, E, J, K, N, R, S, T or Pt100

Broken sensor protection
- Upscale drive on THC and RTD
- Downscale drive on milliamps and voltage

Cold junction compensation
- Automatic CJC incorporated as standard
- Stability <0.05°C/°C change in ambient temperature

Input protection
- Common mode isolation >120dB at 50/60Hz with 300Ω imbalance
- Series mode rejection >60dB 50/60Hz

Transmitter power supply
- 24V, 30mA max. powers one 2-wire transmitter
## Standard Analog Input Ranges

<table>
<thead>
<tr>
<th>Thermocouple</th>
<th>Maximum Range °C</th>
<th>Maximum Range °F</th>
<th>Accuracy (% of reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>−18 to 1800</td>
<td>0 to 3270</td>
<td>0.25% or ±2°C (3.6°F) above 200°C (392°F) *</td>
</tr>
<tr>
<td>E</td>
<td>−100 to 900</td>
<td>−140 to 1650</td>
<td>0.25% or ±0.5°C (0.9°F)</td>
</tr>
<tr>
<td>J</td>
<td>−100 to 900</td>
<td>−140 to 1650</td>
<td>0.25% or ±0.5°C (0.9°F)</td>
</tr>
<tr>
<td>K</td>
<td>−100 to 1300</td>
<td>−140 to 2350</td>
<td>0.25% or ±0.5°C (0.9°F)</td>
</tr>
<tr>
<td>N</td>
<td>−200 to 1300</td>
<td>−325 to 2350</td>
<td>0.25% or ±0.5°C (0.9°F)</td>
</tr>
<tr>
<td>R</td>
<td>−18 to 1700</td>
<td>0 to 3000</td>
<td>0.25% or ±1.0°C (1.8°F) [above 300°C (572°F)] *</td>
</tr>
<tr>
<td>S</td>
<td>−18 to 1700</td>
<td>0 to 3000</td>
<td>0.25% or ±0.5°C (0.9°F) [above 200°C (392°F)] *</td>
</tr>
<tr>
<td>T</td>
<td>−250 to 300</td>
<td>−400 to 550</td>
<td>0.25% or ±0.5°C (0.9°F)</td>
</tr>
</tbody>
</table>

* For B, R and S thermocouples, performance accuracy is not guaranteed below value stated.

<table>
<thead>
<tr>
<th>Min. span below zero</th>
<th>Type T 70°C (126°F)</th>
<th>THC standards DIN 43710</th>
<th>IEC 584</th>
</tr>
</thead>
</table>

### RTD

<table>
<thead>
<tr>
<th>RTD</th>
<th>Maximum Range °C</th>
<th>Maximum Range °F</th>
<th>Accuracy (% of reading) **</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT100</td>
<td>−200 to 600</td>
<td>−325 to 1100</td>
<td>0.25% or ±0.5°C (0.9°F)</td>
</tr>
</tbody>
</table>

** RTD, 3-wire platinum, 100Ω per DIN 43760 standard (IEC751), with range of 0 to 400Ω

### Linear Inputs

<table>
<thead>
<tr>
<th>Linear Inputs</th>
<th>Range</th>
<th>Accuracy (% of reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milliamps</td>
<td>0 to 20</td>
<td>0.25% or ±2µA</td>
</tr>
<tr>
<td>Milliamps</td>
<td>4 to 20</td>
<td>0.25% or ±2µA</td>
</tr>
<tr>
<td>Volts</td>
<td>0 to 5</td>
<td>0.25% or ±200µV</td>
</tr>
<tr>
<td>Volts</td>
<td>1 to 5</td>
<td>0.25% or ±200µV</td>
</tr>
<tr>
<td>Millivolts</td>
<td>0 to 50</td>
<td>0.25% or ±20µV</td>
</tr>
</tbody>
</table>

### Square Root Input

<table>
<thead>
<tr>
<th>Linear Inputs</th>
<th>Range</th>
<th>Accuracy (% of reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milliamps</td>
<td>4 to 20</td>
<td>0.25% or ±2µA</td>
</tr>
</tbody>
</table>

*** Below input of 4.64mA (20% flow) the input is linear
Options
One option board can be installed from:
- Type 1 One relay
- Type 2 Two relays + one digital input + remote set point
- Type 3 One relay + one digital input + remote set point + Modbus serial communications
- Type 4 One relay + one digital input + remote set point + retransmission

Relay output
- SPDT 5A @ 115/230V AC

Digital input
- Type Volt-free
- Minimum pulse 250ms

Modbus serial communications
- Connections RS422/485, 2 or 4-wire
- Speed 2.4k or 9.6k baud rate
- Protocol Modbus RTU slave

Remote Set Point Input
- 4 to 20 mA DC, 100Ω nominal input impedance
- Preset to process variable engineering units

Auxiliary Analog Output
- Analog, configurable in the range of 4 to 20mA
  - Max. load 15V (750Ω at 20mA)
  - Isolation 500V DC from input

Physical
Size
- 96 wide x 96 high x 122.5mm
  (3.78 in. wide x 3.78 in. high x 4.82 in.)

Weight
- 520g (1.1lb) approximate
### SPECIFICATION

#### Electrical

**Voltage**
- 85 to 265V AC (50/60Hz)
- 24V DC

**Power consumption**
- <6VA

**Power interruption protection**
- <60ms/<3 cycles, no effect
- >60ms/>3 cycles, instrument returns to operation after a controlled reset

#### Environmental

**Operating limits**
- 0 to 55°C (32 to 131°F)
- 5 to 95%RH non-condensing

**Temperature stability**
- <0.02% of reading or 2µV/°C (1µV/°F)

**Front face**
- IP66 (NEMA4X), rear IP20

#### EMC

**Emissions and Immunity**
- Meets requirements of IEC 61326 for an Industrial Environment

**Design and manufacturing standards**
- CE Mark

**Safety standards**
- EN61010 – 1
- UL 310 – 1
- FM 3810

SS/C250 Issue 6
Customer Support

We provide a comprehensive after sales service via our Worldwide Service Organization. Contact one of the following offices for details of your nearest Service and Repair Centre.

United Kingdom
ABB Limited
Tel: +44 (0)1480 475321
Fax: +44 (0)1480 217948

United States of America
ABB Inc.
Tel: +1 215 674 6000
Fax: +1 215 674 7183

Client Warranty

Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company’s published specification. Periodic checks must be made on the equipment’s condition.

In the event of a failure under warranty, the following documentation must be provided as substantiation:

1. A listing evidencing process operation and alarm logs at time of failure.
2. Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.

Company Standard settings are shown in the lower display

Instrument Serial Number: ____________
Product Code: C 250 / ___ ___ ___ / ___ ___
Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.