User Guide

IM/SR250B_4

250mm Multipoint Strip Chart Recorder

SR250B

ABB

ABB

The Company

We are an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

The UKAS Calibration Laboratory No. 0255 is just one of the ten flow calibration plants operated by the Company, and is indicative of our dedication to quality and accuracy.

EN ISO 9001:2000

Cert. No. Q05907

EN 29001 (ISO 9001)

Lenno, Italy – Cert. No. 9/90A

Stonehouse, U.K.

0255

Electrical Safety

This equipment complies with the requirements of CEI/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:

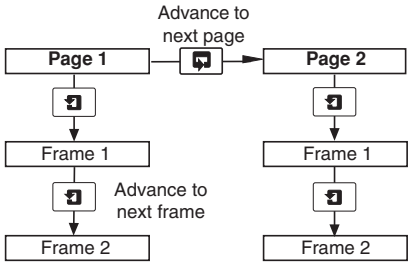
1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
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.

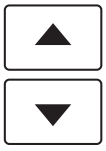
FRONT PANEL KEYS

Side Scroll Key

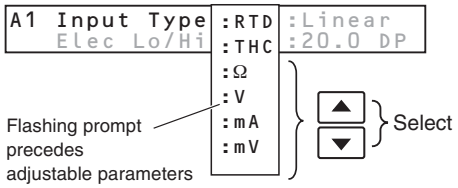
Down Scroll Key



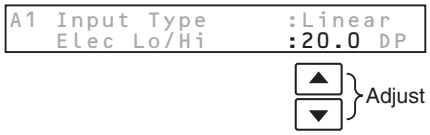
Up/Down Key



Adjusts
parameter values



or

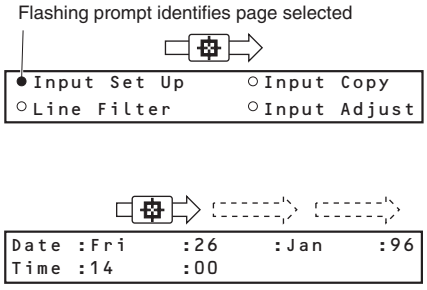


Cursor

Moves between
pages in menus

and...

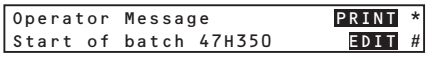
between
parameters
in a frame



Star Key

Hash Key

Multi-function keys.
The function is dependent upon the frame
displayed (e.g. Print, Edit, Acknowledge etc.)



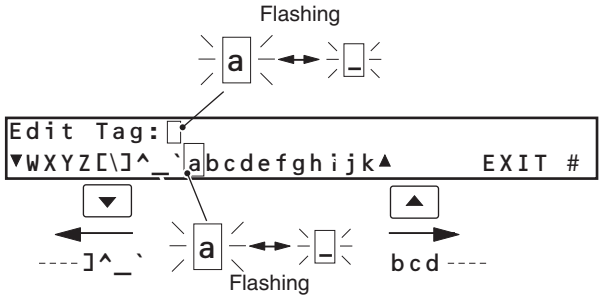
Pen
Lift/Lower Key

Lifts/lowers pen on alternate operations

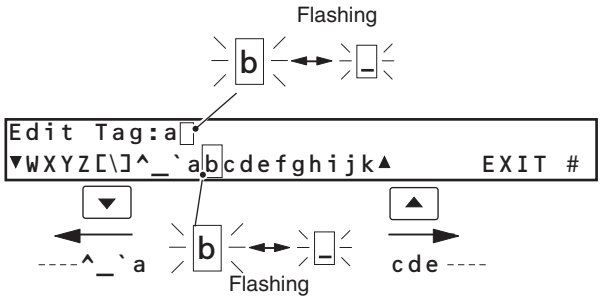
EDITING TEXT

① Enter the EDIT mode using the [⌗] key

② Select character using the [▲] and [▼] keys



③ Enter the character using the [⌗] key



④ Repeat ② and ③ until the message is complete.

⑤ Press the [⌗] key to exit the EDIT mode.

GETTING STARTED

This Multipoint Chart Recorder provides accurate and reliable recording of up to 12 process signals on a 250mm wide chart. In-built text printing capabilities give clear annotation on the chart of time, date, scales and other process information.

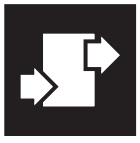
The simplicity of chart and pen replacement and the clear display of process status make the instrument easy to operate.

The recorder is designed for panel mounting and provides complete dust and water protection on the front face, making it suitable for use in very harsh environments.

The instrument can be configured for a wide range of input types and chart speeds and is ideal for most industrial recording applications.

This manual is divided into four Sections containing all the information required to install, configure and operate the multipoint chart recorder.

CHARTS AND PENS
- Chart Loading
- Fitting the Pen Capsule



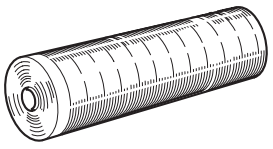
CONFIGURATION
- Security
- Input Configuration
- Alarm Configuration
- Chart Set Up

OPERATION
- Viewing Data
- Chart Speed Selection

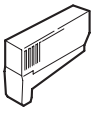
INSTALLATION
- Mounting
- Electrical Connection

Symbol Identification and Contents of Sections

Roll Chart

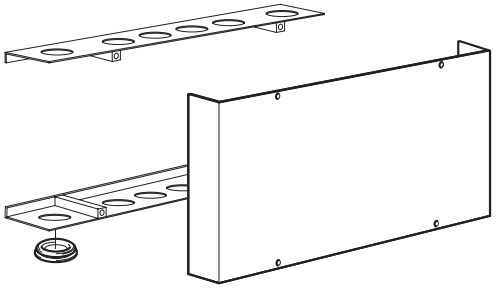


Pen Capsule

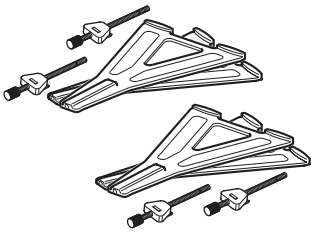


Shunt Resistor
(one per channel)

Quick Reference Guide
(IM/SR250–Q)



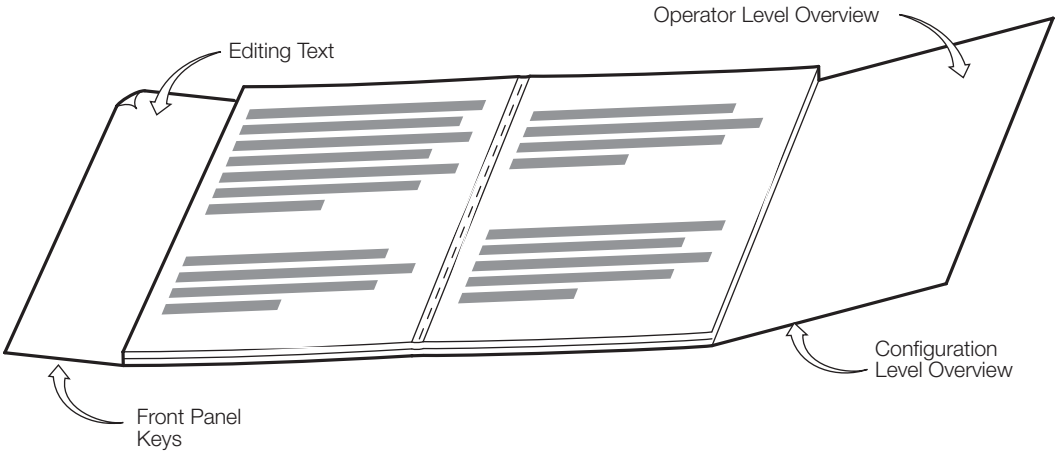
Optional Terminal Compartment
Extension and Cable Grommets



Mounting Clamps

Accessories

CONTENTS



Front and Back Fold-outs

1 CHARTS AND PENS

1.1 Loading a Chart

Warning.

- Channel values and text messages are not recorded during chart reloading and therefore cannot be printed when the chart reload is complete.
- All alarms and relays operate normally during chart reload.
- Do not operate the instrument without the chart cassette fitted.

Chart loading is a four-step procedure:

a) Select the **Chart Page** ..... This page – see Fig. 1.1

b) Start automatic rewind of the old chart ..... Page 4

c) Load the new chart ..... Page 5 – see Fig. 1.2

d) Advance the chart to an appropriate time line (if required) ..... Page 4

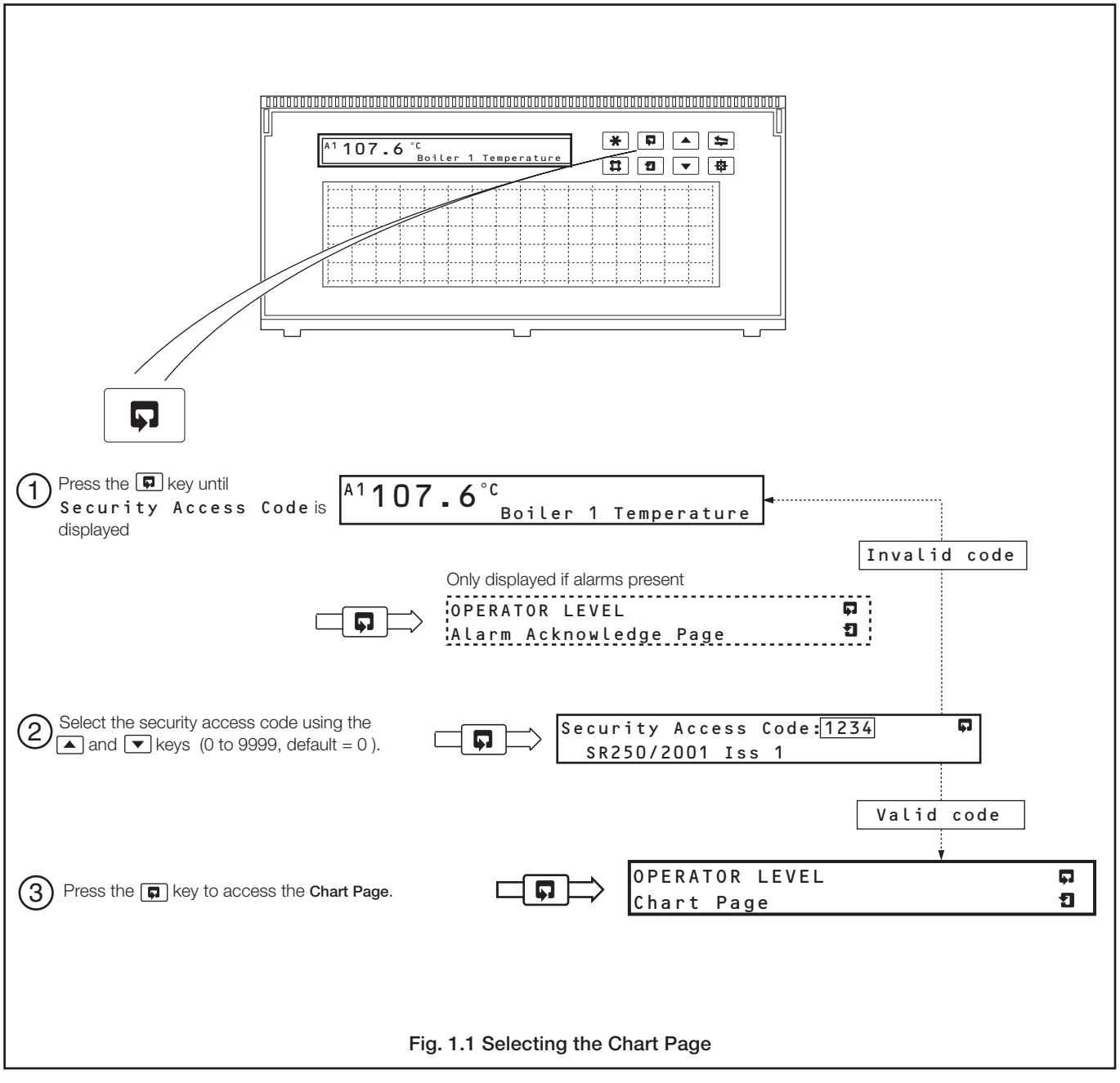
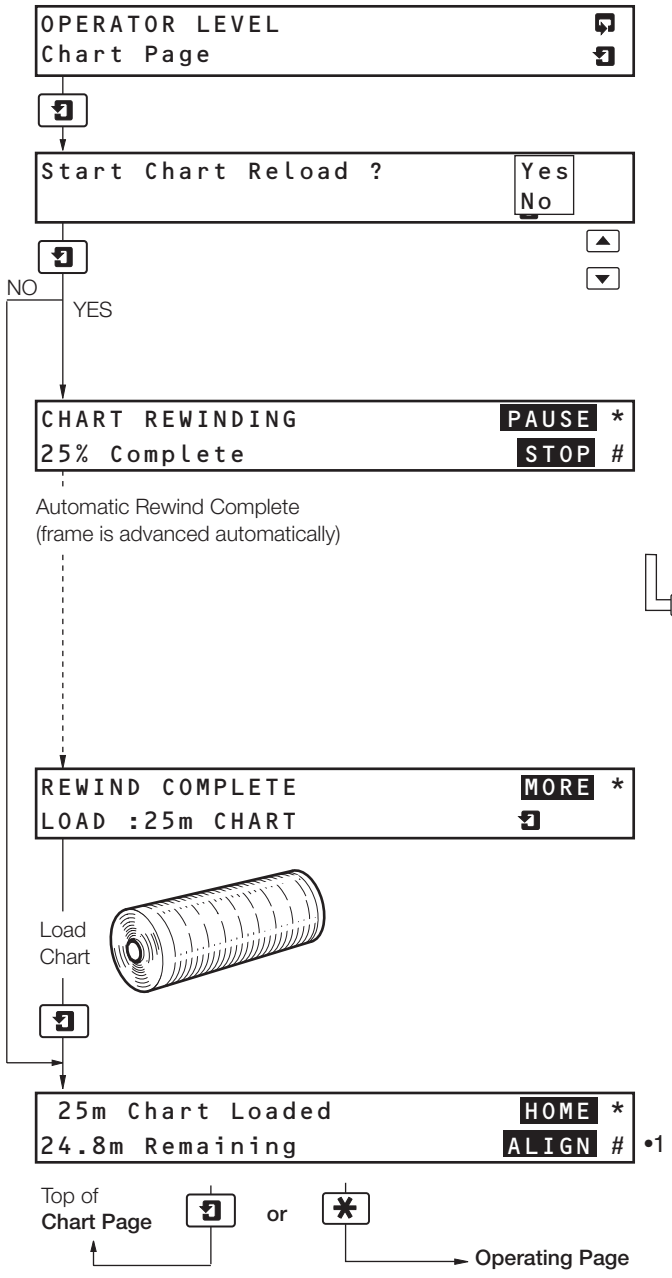


Fig. 1.1 Selecting the Chart Page

...1.1 Loading a Chart – Fig. 1.2



Select the **Chart Page** – see Fig. 1.1, previous page.

Start Chart Reload

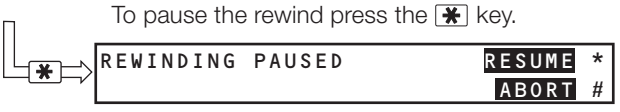
To load a chart, select 'Yes' using the ▲ key.

Press the ◨ key to start automatic rewind.

If the motor continues to drive when the chart paper is rewound, press the ⌗ (STOP) key.

⚠ **Warning.** Do not press the ⌗ key whilst the chart is winding. This action cancels automatic rewind and only manual rewind is available.

To pause the rewind press the ✱ key.



To abort the rewind and continue recording, press the ⌗ key while 'REWINDING PAUSED' is displayed.

Load a New Chart

Remove the old chart and load new chart paper – see Fig. 1.2.

If necessary, press the ✱ key until any remaining chart is rewound.

Refit the chart cassette then press the ◨ key to take up any slack in the chart and resume recording.

Completion

HOME: Press the ✱ key to go directly to the **Operating Page**.

or

ALIGN: Press the ⌗ key to start time alignment.

Time Alignment

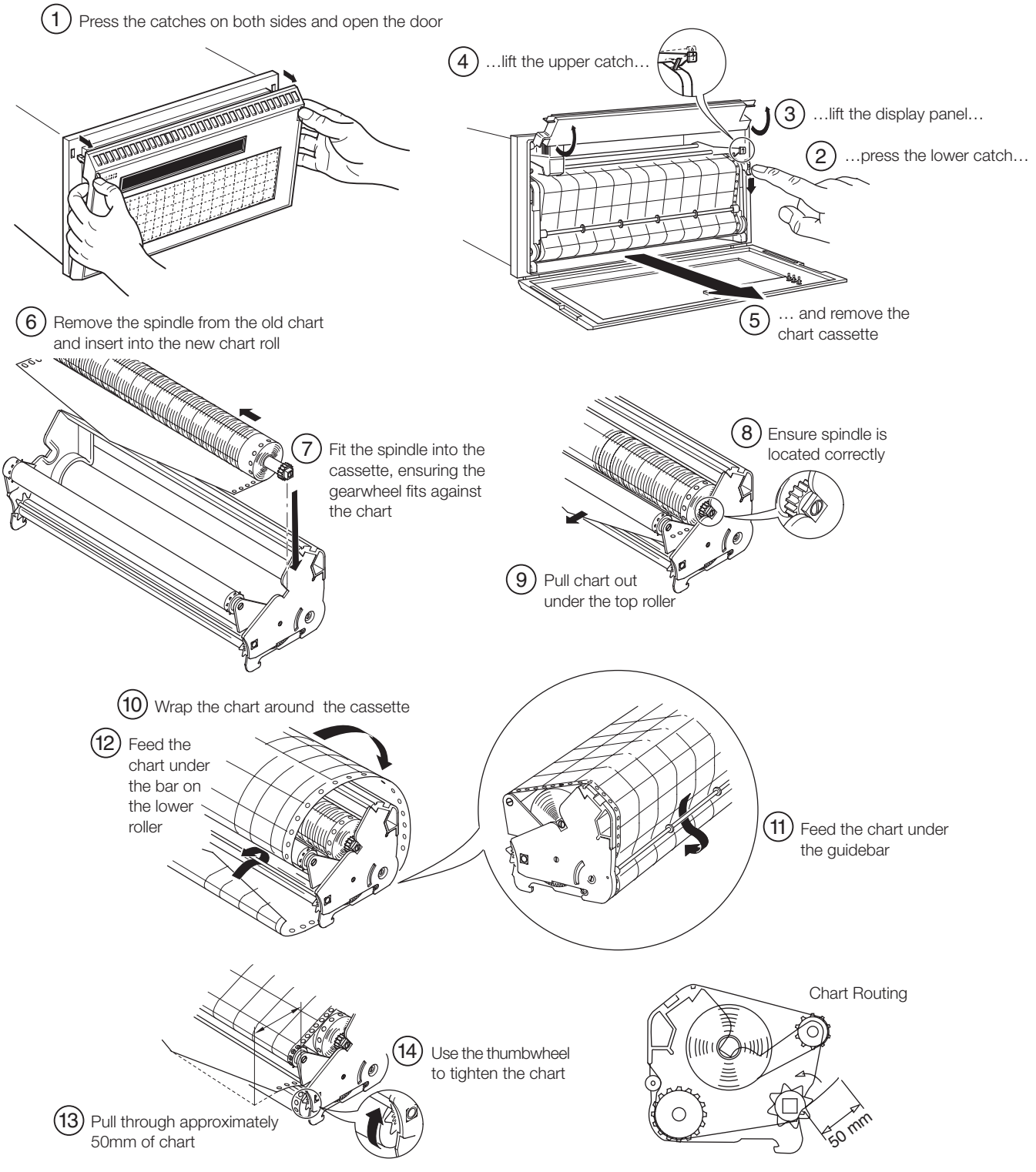
The chart can be advanced to ensure that the time is printed on major time lines (1 hour graduations).
Recording stops and the print head moves from side to side on the chart to enable precise adjustment onto a time line.

Press the ✱ key to advance the chart to a time line.

Press the ⌗ key to resume recording.

•1 The 'ALIGN' facility is displayed only if Time Alignment is enabled – see Section 3.4.1/ Chart Control Page/ Time Alignment.

…1.1 Loading a Chart – Fig. 1.2



Note. The chart paper is suitable for operation within the following environmental limits:
0°C to 40°C at 15 to 80% RH
40°C to 50°C at 25 to 80% RH

Fig. 1.2 Loading a Roll Chart

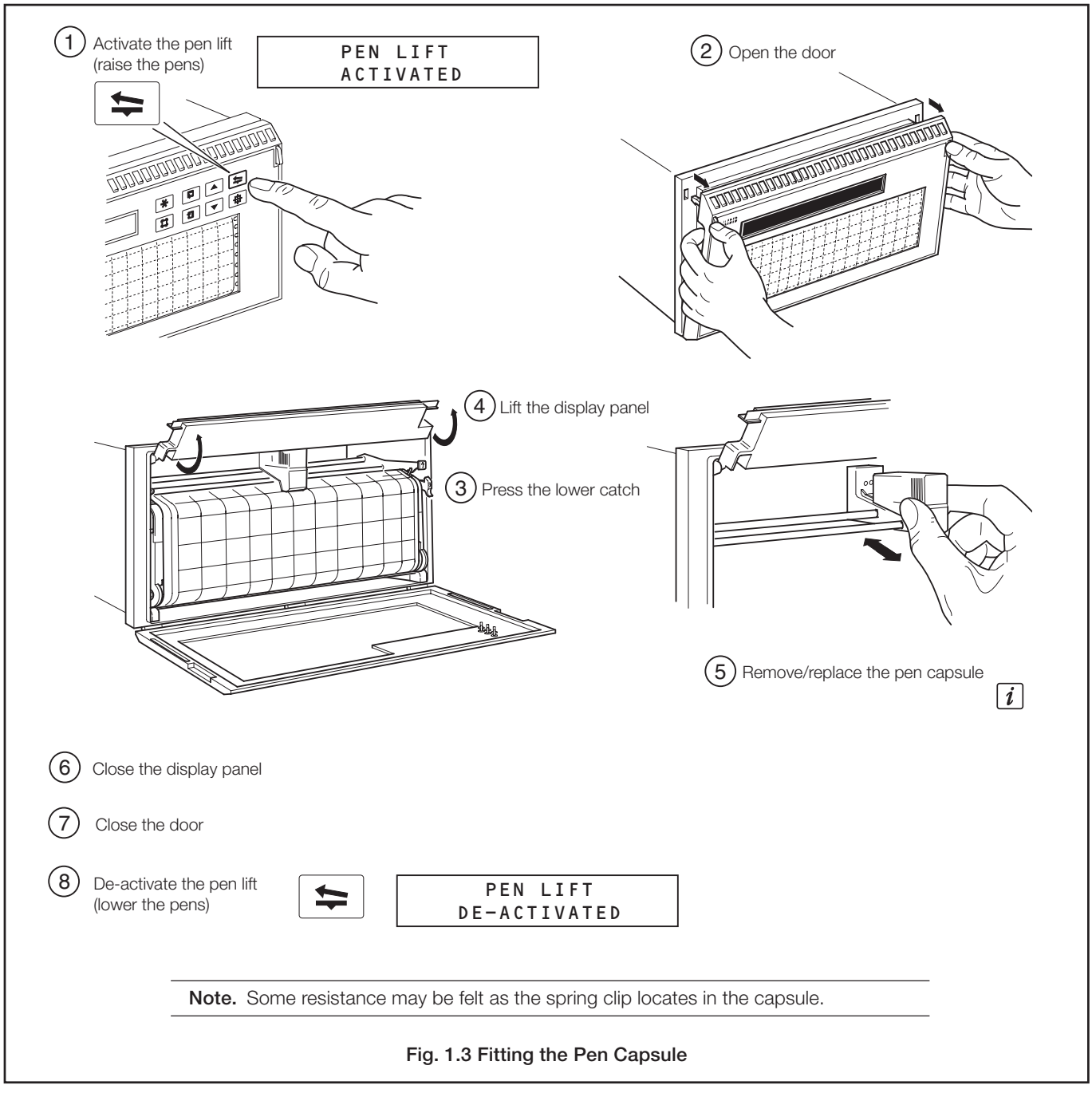
1.2 Fitting the Pen Capsule – Fig.1.3

a) Switch on the power supply.

b) Fit a new capsule as shown in Fig. 1.3.

Notes.

- After fitting a new capsule the ink flow takes a short time to achieve full color density.
- More ink is used if the input signal being recorded changes rapidly. To prolong the life of the pen capsule do not select an input range which is oversensitive. If the input signal is noisy, use the digital filter to reduce the effect of the noise – see Section 3.2.1/ Input Set Up Page/ Filter Time.
- Two types of pen capsule are available, standard and high temperature. The high temperature capsule is designed for use by recorders operating at ambient temperatures consistently above 30°C (86°F).



Note. Some resistance may be felt as the spring clip locates in the capsule.

Fig. 1.3 Fitting the Pen Capsule

2 OPERATION

2.1 Introduction – Figs. 2.1 to 2.3

2.1.1 Operator Level Pages – Fig. 2.1

An overview of the operator level pages is contained on the Back Fold-out.

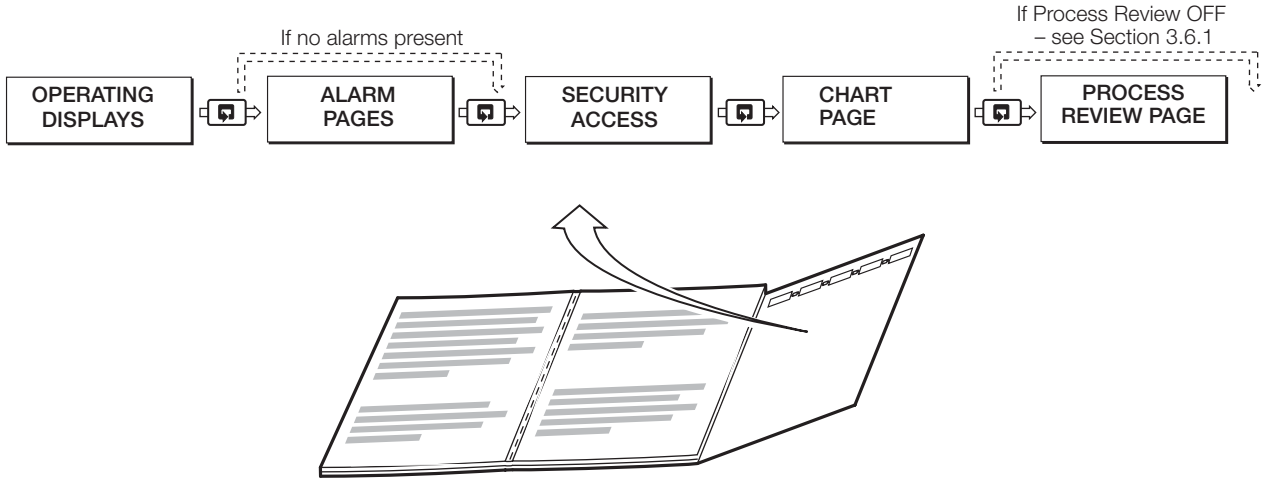


Fig. 2.1 Operating Level Pages

2.1.2 Operating Displays – Fig. 2.2

In the normal, day-to-day mode of the instrument, channel information is displayed seqentially (autoscroll active).

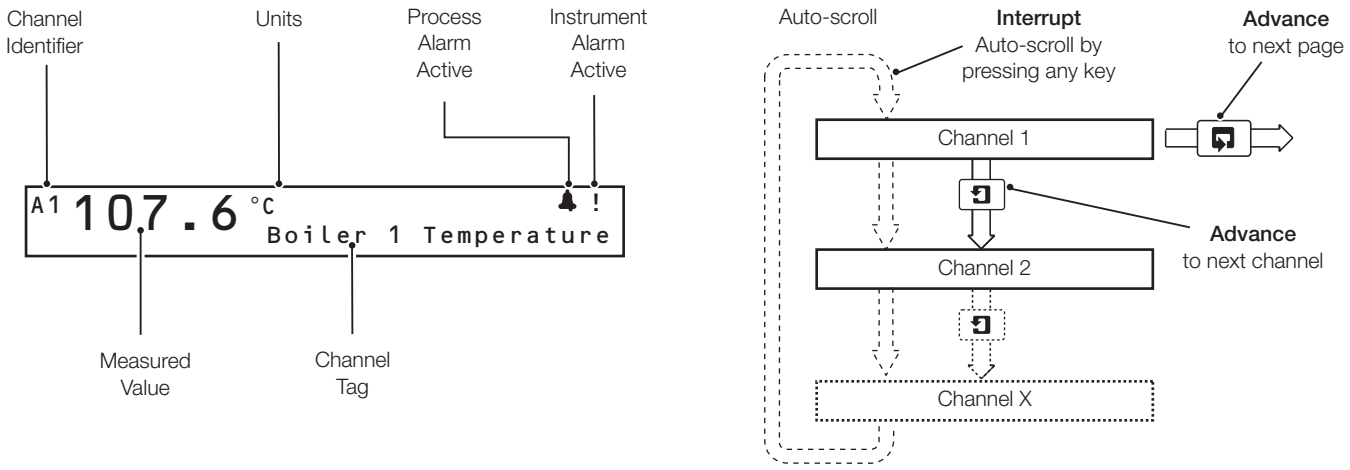
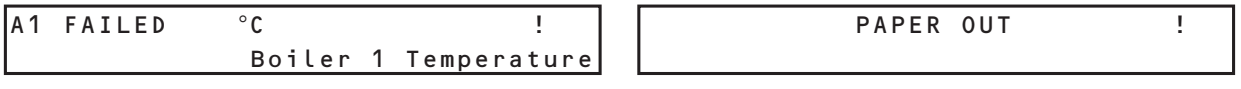


Fig. 2.2 Operating Displays

2.1.3 Warning Messages – Fig. 2.3

Warning messages provide instrument status and input warnings.



Channel input out of limits.

- Check input source
- Check input configuration (Section 3)
- Check the electrical connections (Section 4)

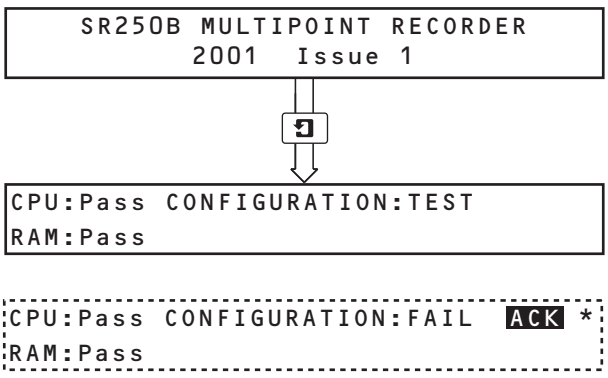
Less than 200mm of chart remains.

This display 'flashes' with the operating display.
Replace the chart as detailed in Section 1.1

Fig. 2.3 Warning Messages

2.2 Instrument Start-up – Fig 2.4

On power-up the instrument carries out an automatic test of the CPU, RAM and Configuration. On completion a 'PASS' or 'FAIL' message is displayed. If a 'FAIL' message occurs press the [*] key to acknowledge the error and proceed as Table 2.1



Initialization Frame (recording stopped).
Lower line shows Software version

'ACK' is only displayed following a configuration failure

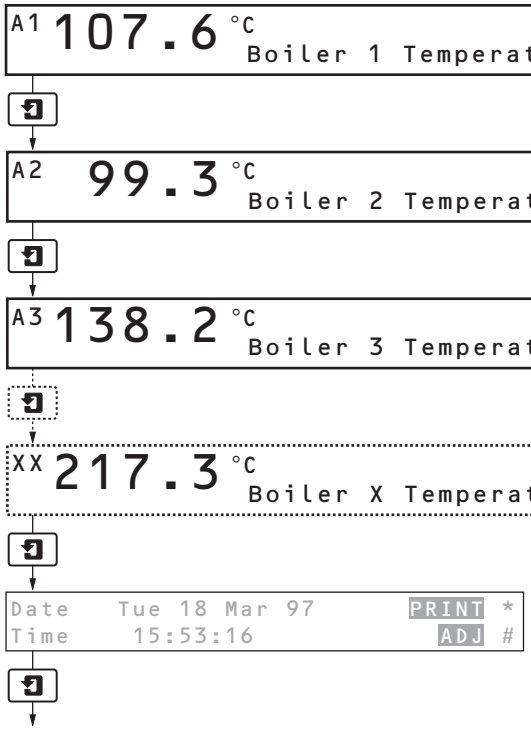
Fig. 2.4 Power-up Displays

Message	Action
CPU:Fail	Contact the local service organisation
RAM:Fail	
CONFIG : Fail	Power down and up. Press ACK * to clear the error. If message still displayed check the instrument configuration. If message still displayed contact the local service organisation.

Table 2.1 Start-up Error Messages

2.3 Viewing the Measured Values

In the normal, day-to-day mode of the instrument, information for each channel is displayed seqentially (autoscroll active). Press any key to interrupt the autoscroll sequence. To return to autoscroll, press the [*] key.



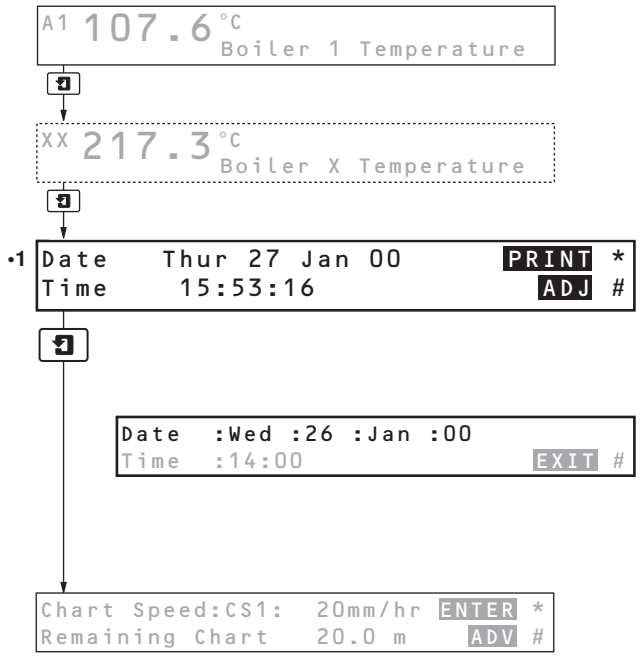
Input A1
Channel 1 measured value, units and channel tag.

Input A2
Channel 2 measured value, units and channel tag.

Input A3
Channel 3 measured value, units and channel tag.

Input XX
Channel X measured value, units and channel tag.

2.4 Viewing the Date and Time



Press any key to interrupt the autoscroll sequence.

Press the ◨ key to select the Date/Time frame.

Date/Time
The current date and time are displayed.

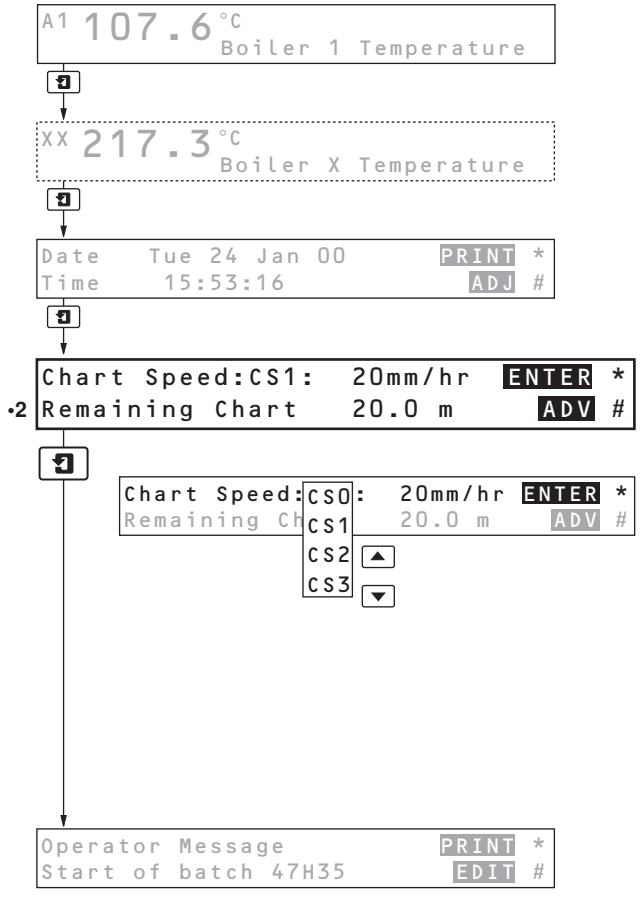
Press the ✱ key to print the date and time on the chart.
Press the ⌗ key to access the adjustment frame.

Adjusting the Date and Time
Use the ▲ and ▼ keys to adjust each parameter.

Press the ⌗ key to advance to the next parameter.
Press the ⌗ key to exit the adjustment frame.

•1 The 'Print' facility is available only if enabled – see Section 3.6.1/Operator Contents Page/ Operator Printing Enable.

2.5 Selecting the Chart Speed



Press the ◨ key to select the Chart Speed frame.

Chart Speed and Remaining Chart
The chart speed and length of chart remaining are displayed.

Use the ▲ and ▼ keys to select a preset chart speed.
The chart speeds are set up in the Configuration Level – see Section 3.4.1/ Setting the Chart Speed.
Press the ✱ key to enter the selection.

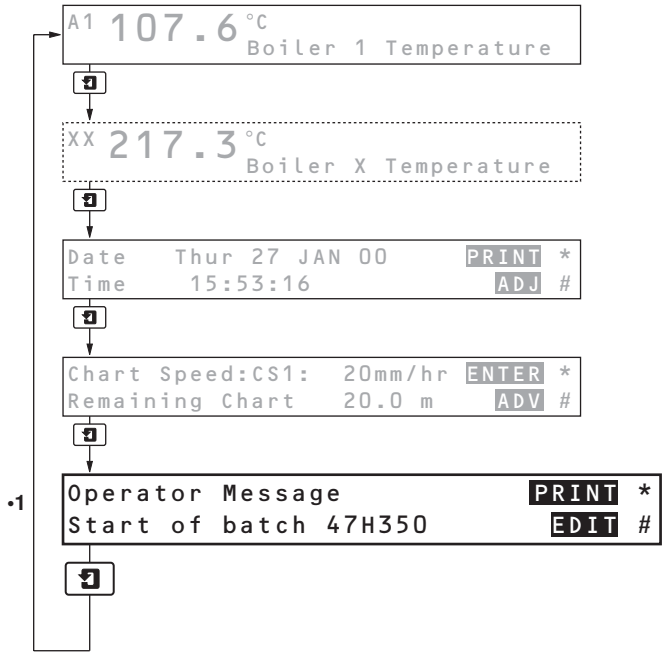
Note. If CS0 is selected, 'Chart Stopped' is printed on the chart, with the date and time. If another chart speed is selected and set to 0mm/hr, then 0mm/h is printed.

Chart Advance
If required, the chart can be wound forward to create a separation space, e.g. between batches.

Press and hold the ⌗ key to advance the chart.

•2 The 'Advance' facility is available only if enabled – see Section 3.4.1/Chart Control Page/ Paper Advance, and does not operate during text printing.

2.6 Operator Messages



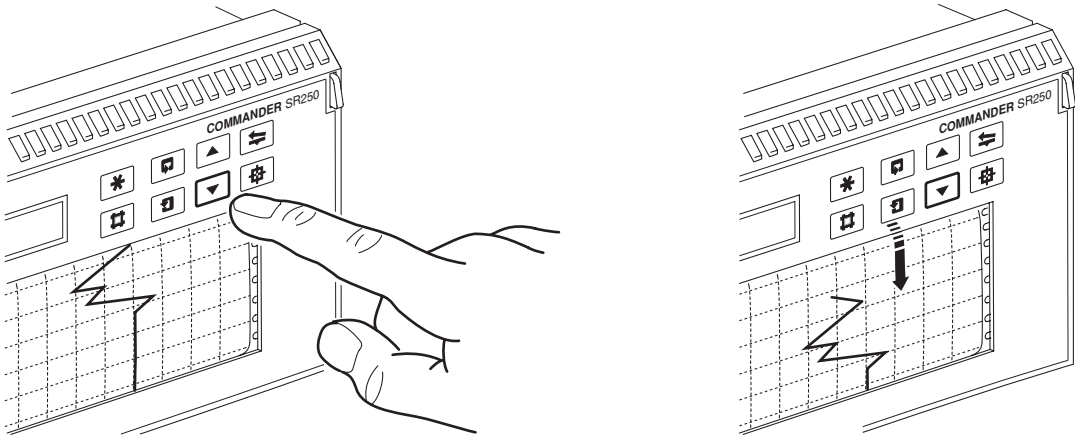
Press the ⏎ key to access the **Operator Message** frame.

Operator Message
The operator message is displayed.
Press the ✱ key to print the displayed message on the chart.
Press the ⌗ key to edit the message – see Front Fold-out.

•1 The 'Print' facility is available only if enabled – see Section 3.6.1/Operator Contents Page/ Operator Printing Enable.

2.7 Using 'Easy View' – Fig. 2.5

''Easy View' allows the operator to view the most recently printed area of the chart. To use the 'Easy View' facility, the autoscroll sequence must first be interrupted by pressing any key. With autoscroll interrupted, press the ▼ key. The chart is wound forward for a short distance and returns automatically to its original position a few seconds later. Channel values and text messages are buffered during 'Easy View' and are printed out when recording is resumed. To return to autoscroll, press the ✱ key.



Notes.

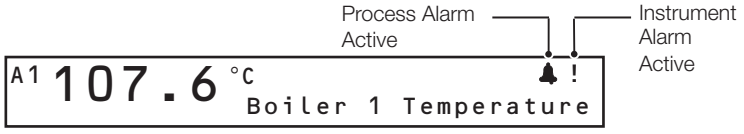
- The 'Easy View' facility can be disabled – see Section 3.4.1/ Chart Control Page/ Easy View.
- 'Easy View' operates only when autoscroll is inactive – press any key to interrupt autscroll. Press the ✱ key to return to autoscroll.
- 'Easy View' operates only at chart speeds of 120mm/h or less.
- 'Easy View' operates only in the **Operator Page**.

Fig 2.5 Using 'Easy View'

2.8 Viewing and Acknowledging Alarms

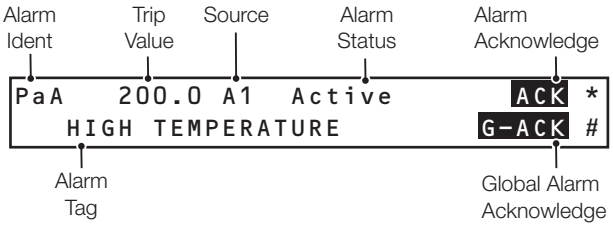
Individual alarms are viewed in the **Alarm Acknowledge Page**. This page is displayed only when active or unacknowledged alarms are present.

There are 3 types of alarm – Process, Real Time and Instrument.



2.8.1 Process Alarms

Process alarms can be assigned to any analog input and are activated when a pre-defined trip level is exceeded – see Section 3.3.1/ Process Alarms Page. Up to 24 alarms can be configured (PaA to PaZ excluding I and O).



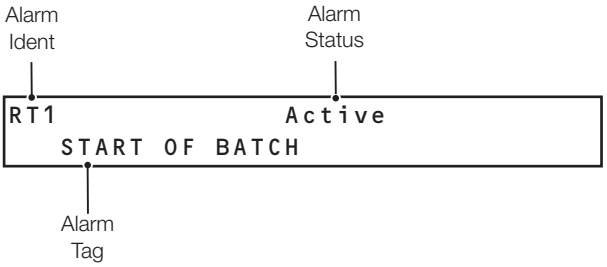
There are five types of alarm state:

Display State	Alarm Acknowledged	Alarm Condition Present	Notes
Active	No	Yes	–
Latched	No	No	Only if the acknowledge type is set to 'Latched'.*
Unack	No	No	Only if the acknowledge type is set to 'Normal'.*
Acknlg	Yes	Yes	–
Clear	Yes	No	Only if the alarm is displayed at the time it becomes inactive.

* See Section 3.3.3/ Alarm Acknowledge Page/ Acknowledge Type

2.8.2 Real-time Alarms

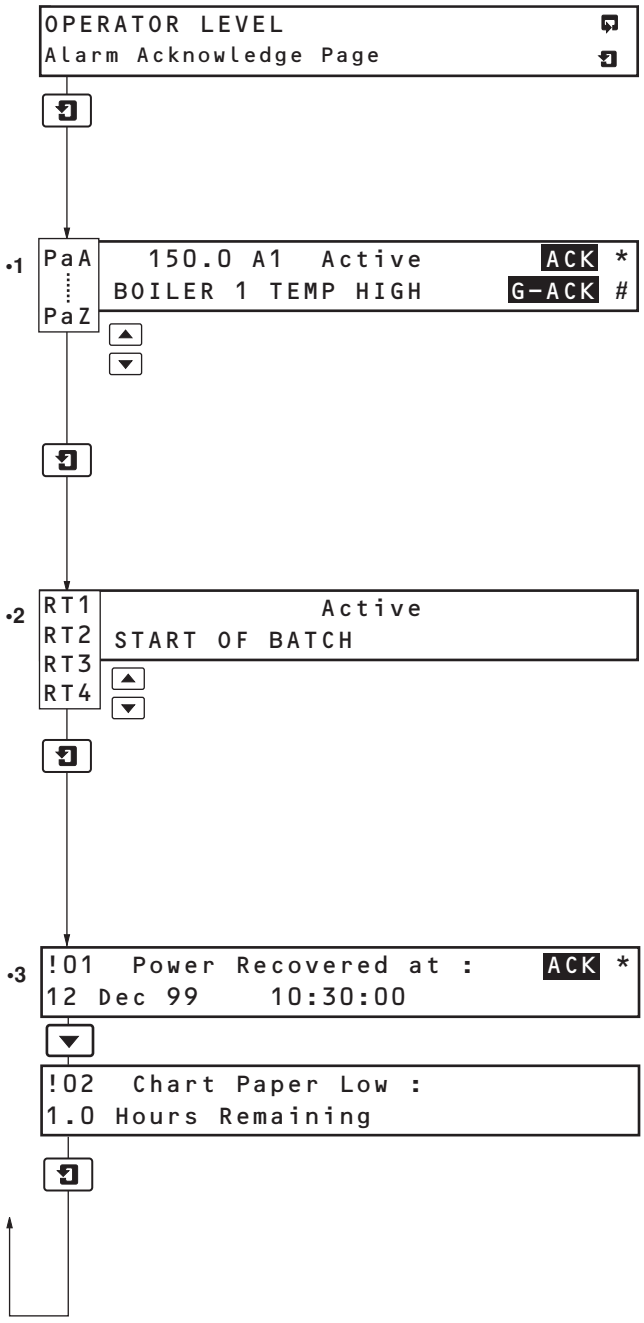
Four real-time alarms can be configured to activate at a pre-defined time – see Section 3.3.2/ **Real Time Alarms Page**. These alarms can be configured to activate on an hourly or daily basis.



2.8.3 Instrument Alarms

Instrument alarms are generated to indicate a failure (or impending failure) within the instrument system, e.g. Paper out, Paper low.

2.8.4 Alarm Acknowledgement



Press the ↩ key to access the **Alarm Acknowledge Page**.

Process Alarms
Press the ↵ key to display the first active or latched process alarm.

Press the ✱ key to acknowledge the displayed alarm or press # to acknowledge all active or latched process alarms. The alarm status changes to 'Acknlg' or 'Clear'.

Press ▼ or ▲ to display successive active or latched process alarms, if any.

Real-time Alarms
Press the ↵ key to display the first active real-time alarm.

Note. Real-time alarms cannot be acknowledged.

Press ▼ or ▲ to display successive active or latched real-time alarms, if any.

Instrument Alarms
Press the ↵ key to display the first or successive active instrument alarm.

Power Up following Power Failure
Press the ✱ key to acknowledge the alarm.

Chart Paper Low
Less than 5 hours chart running time remaining.
Replace the chart – see Section 1.1/ Loading a Chart.

If there are no alarms the display returns to the top of the **Alarm Acknowledge Page**.

•1 If there are no active process alarms the display shows the first active real-time or instrument alarm.

•2 If there are no active real-time alarms, the display either shows any active instrument alarms or reverts to the **Alarm Acknowledge Page**.

•3 This frame is not displayed if 'Power Failure Indication' is set to 'Off' – see Section 3.3.4/ Power Failure Page/ Power Failure Indication.

2.9 Security Access – Fig. 2.6

Entry into the Process Review Page is protected by a Security Access Code. The code is set in Section 3.6.2/ Security Page.

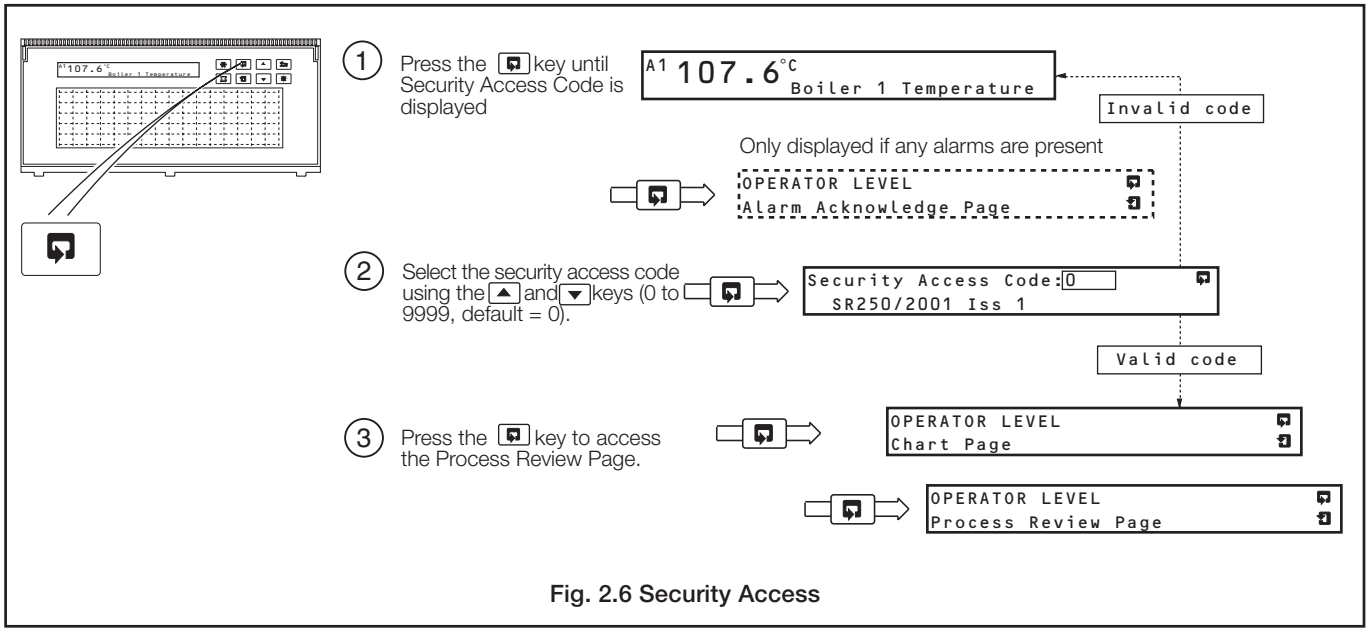
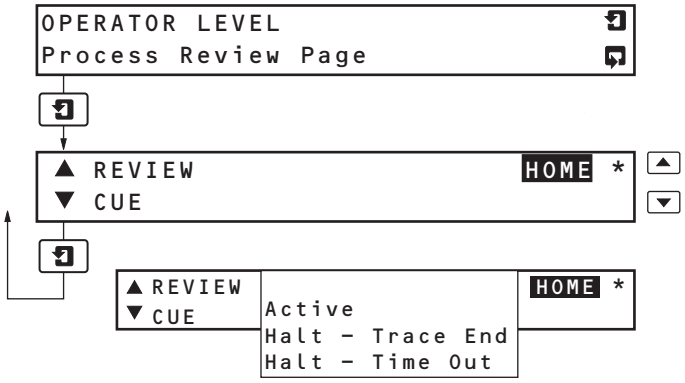


Fig. 2.6 Security Access

2.10 Process Review Page

The chart can be advanced (cue) or rewound (review) to examine a specific occurrence.

This page can be disabled – see Section 3.6.1/ Operator Contents Page/ Process Review Page.



Enter the Level 2 Security Password and advance to the **Process Review Page** – see Fig. 2.6

Press the key to access the page.

Cue/Review

Press the and keys to stop recording and cue/review the chart.

' '	– Cue/Review not active.
Active	– Cue/Review active.
Halt – Trace End	– The chart is wound further than the last recorded information.
Halt – Time Out	– Use of the Cue/Review facility is not recommended for long periods. The facility automatically times out after approximately 5 minutes of continuous operation.

Press the key to return to the top of the **Process Review Page**.

Press the (HOME) key to return to the top of **Operating Page 1**.

•1 When Cue/Review is terminated, the chart is wound forward approximately 10mm and the current date and time is printed. Channel data is not buffered during Cue/Review and cannot be printed when recording is resumed.

2.11 Chart Format – Fig. 2.7

In addition to displaying up to 12 traces, text messages can be printed on the chart at regular intervals such as date/time and scale, or as events occur such as process alarms.

Note. When less than 2m (78 in.) of unused chart remains a colored stripe is visible along the left-hand edge of the chart. When the instrument has calculated that less than 200mm (7.87 in.) of unused chart remains, tracing of input channel values is suspended until a new chart has been fitted. The remaining chart is used for printing of alarm messages.

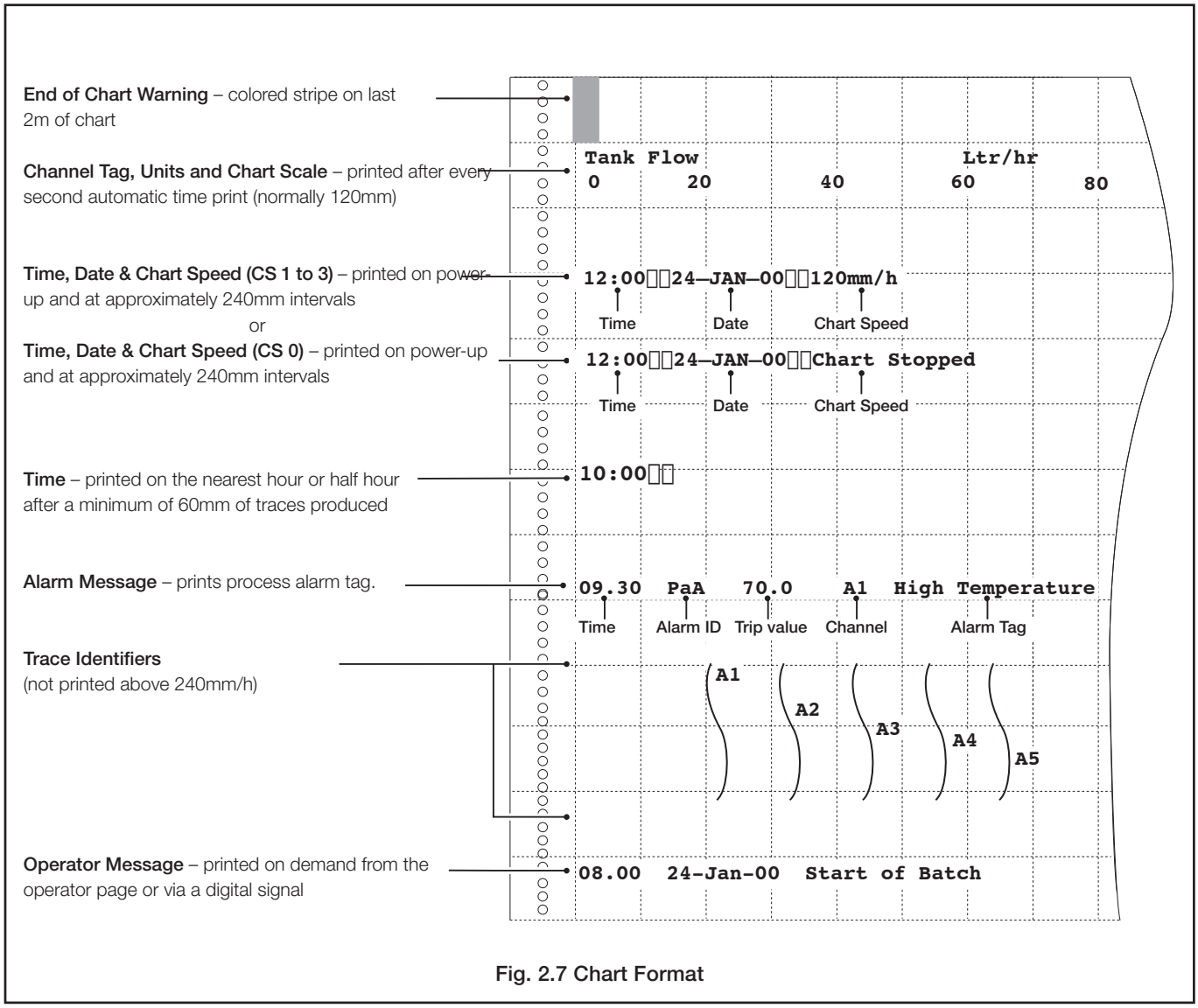


Fig. 2.7 Chart Format

3 CONFIGURATION

3.1 Introduction – Fig. 3.1

This Section contains information on the Configuration level programming of the SR250. An overview of the Configuration Level pages is contained on the Back Fold-out. Configuration can also be achieved via a computer using the PC configurator package.

3.1.1 Entering Changes

Tags and messages are entered at set parameters within the Configuration Level pages – see Front Fold-out.
Changes to parameter values are saved automatically by advancing to the next frame.

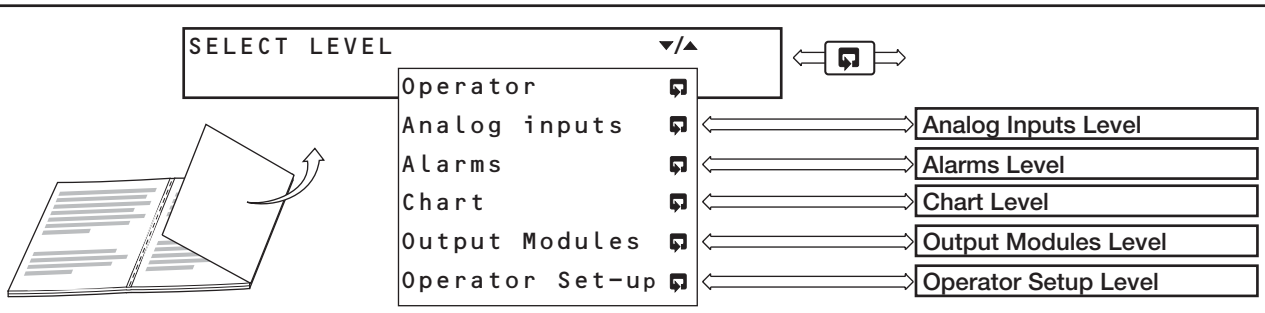


Fig. 3.1 Configuration Level Overview

3.1.2 Security Access – Fig. 3.2

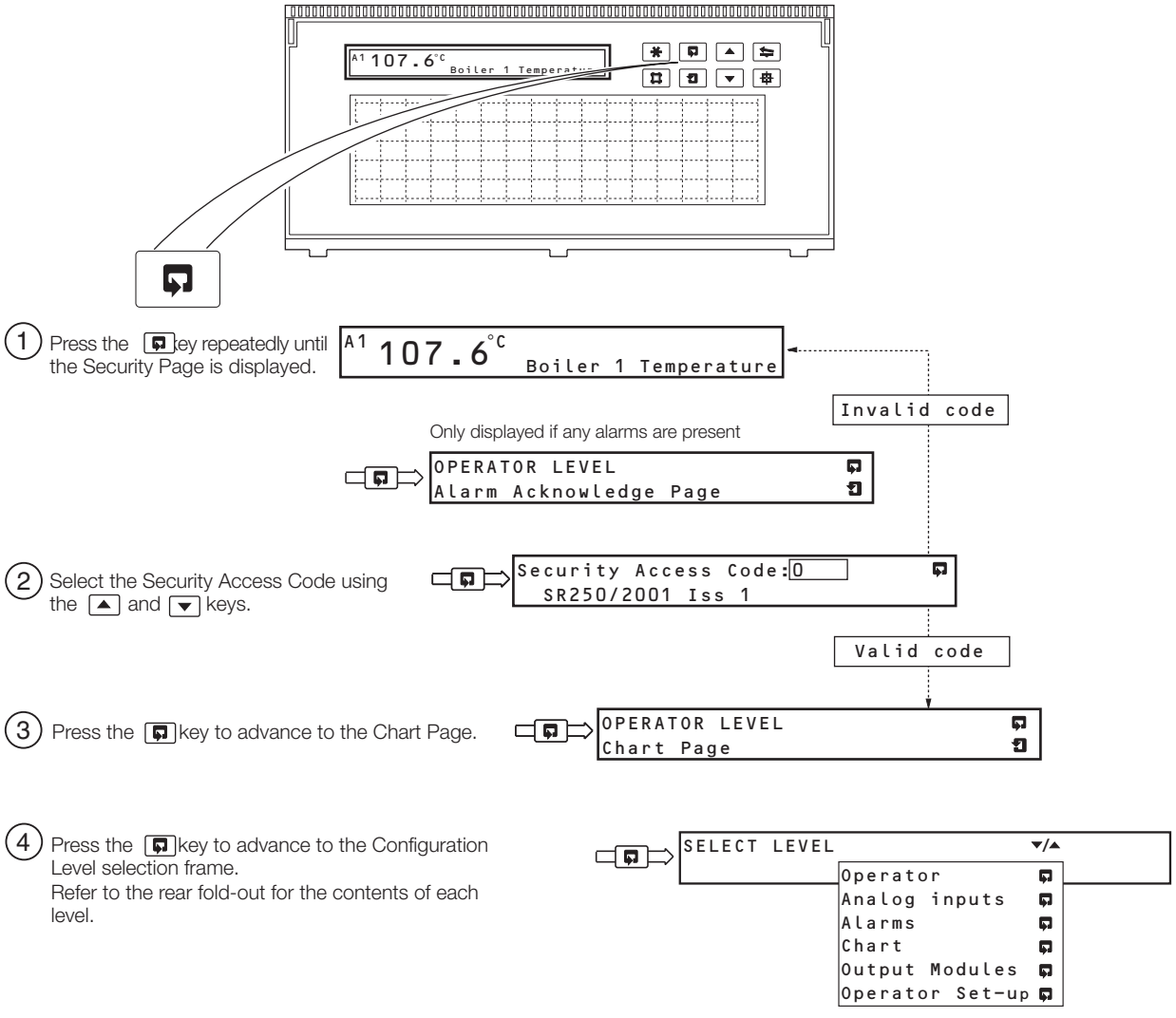


Fig. 3.2 Accessing the Configuration Level

3.2 Analog Inputs

3.2.1 Input Set Up Page

To set up the analog inputs, carry out the appropriate procedures detailed in Table 3.1.

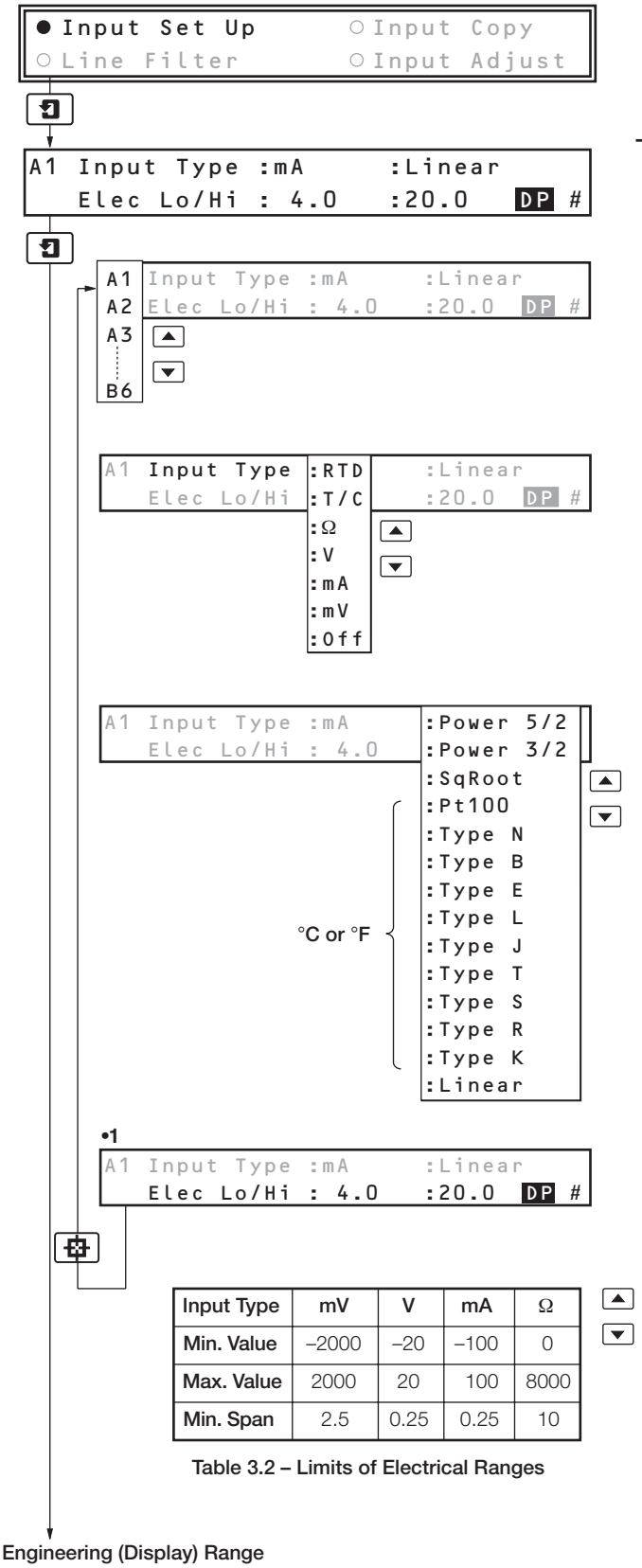
Where two or more channels use the same set up data, the Channel Copy facility can be used to configure multiple channels simultaneously – see Section 3.2.2/ Input Copy Page.

Input Type	Make Input Connections	Fit Shunt Resistor	Set Links	Select Input Type	Set Linearizer	Set Electrical Range	Set Engineering Range
Page Reference	*43/44*	*44*	*45*	*17*	*17*	*17*	*18*
RTD	✓	✗	Standard	✓	✓	—	✓
T/C	✓	✗	Standard	✓	✓	—	✓
Ω	✓	✗	Standard	✓	✓*	✓	✓
V	✓	✗	Voltage	✓	✓*	✓	✓
mA	✓	✓	Standard	✓	✓*	✓	✓
mV	✓	✗	Standard	✓	✓*	✓	✓
OFF	—	—	—	✓	—	—	—

✓* = Optional procedure

Table 3.1 Input Set Up Requirements

...3.2.1 Input Set Up Page



Input Type	mV	V	mA	Ω
Min. Value	–2000	–20	–100	0
Max. Value	2000	20	100	8000
Min. Span	2.5	0.25	0.25	10

Table 3.2 – Limits of Electrical Ranges

Engineering (Display) Range

Press the ⊞ key to select 'Input Set Up' from the Analog Inputs menu.

Press the ⊡ key to access the page.

Input Set Up

Channel Selection
Select the channel to be set.

Press the ⊞ key to advance to the next parameter.

Input Type
Select the Input Type required.
('Off' is not applicable to channel A1).

Note. For thermocouple applications using an external fixed cold junction, select 'mV' input type.

Press the ⊞ key to advance to the next parameter.

Linearizer Type
Select the Linearizer Type required.

Press the ⊞ key to advance to the next parameter.

Electrical Input Range Low and High – Table 3.2

Press the ⊞ key to set the number of decimal places, (low and high values are set simultaneously).

Set the minimum (Lo) value of the electrical input signal within limits – see Table 3.2.

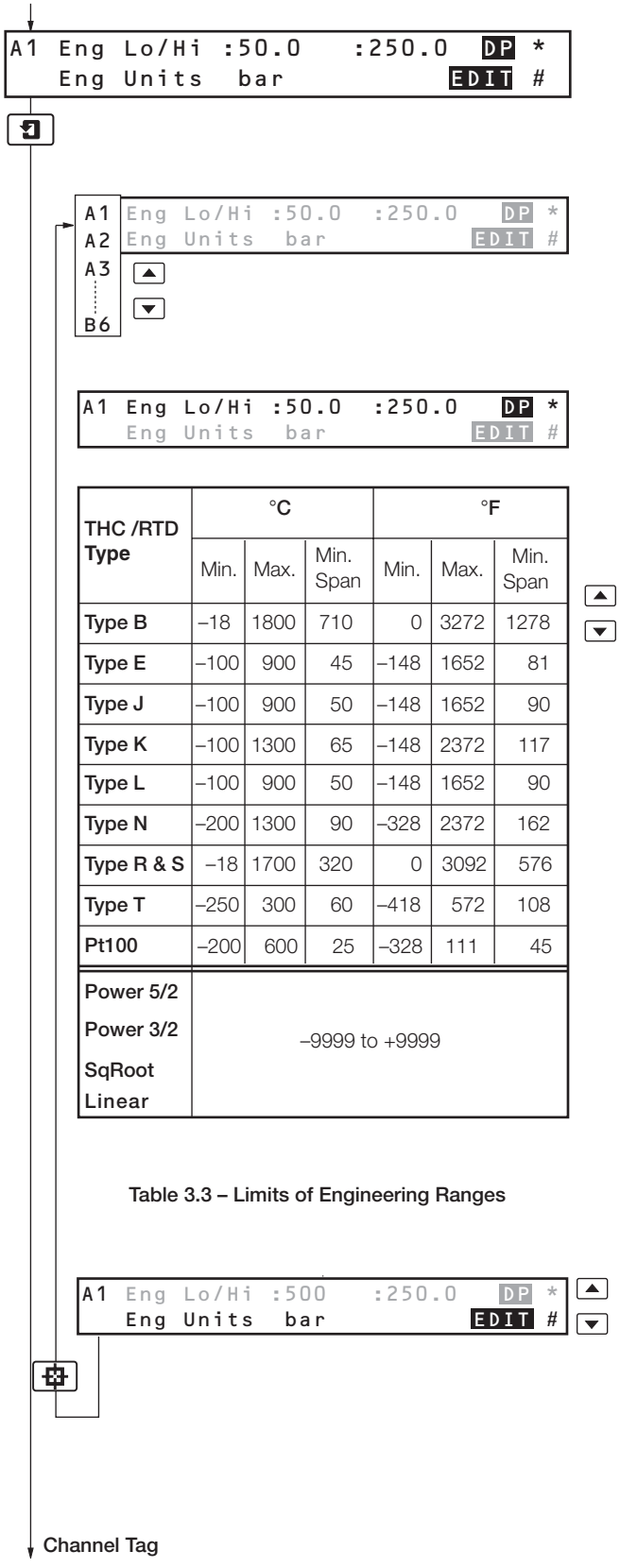
Press the ⊞ key to advance to the next parameter.

Set the maximum (Hi) value of the electrical input signal within limits – see Table 3.2.

Press the ⊞ key to set the next channel.
Press the ⊡ key to advance to the next frame.

•1 This frame is not displayed if input type RTD or T/C are selected.

…3.2.1 Input Set Up Page



Engineering (Display) Range

Channel Selection
Select the channel to be set up.

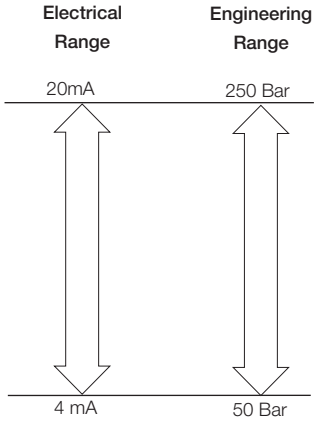
Press the ⊞ key to advance to the next parameter.

Engineering Range Low and High Values – Table 3.3

Press the ✱ key to set the number of decimal places. (Low and high values are set simultaneously).

Enter the values which represent the minimum and maximum process input signal, within the limits specified in Table 3.3. The values set will also define the upper and lower limits of the chart scale.

Example – for an input range of 4.0 to 20.0 mA, representing a pressure range of 50 to 250 bar, set the 'Eng Lo' value to 50.0 and the 'Eng Hi' value to 250.0



THC /RTD Type	°C			°F		
	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
Pt100	–200	600	25	–328	111	45
Power 5/2 Power 3/2 SqRoot Linear	–9999 to +9999					

Table 3.3 – Limits of Engineering Ranges

Press the ⊞ key to advance to the next parameter.

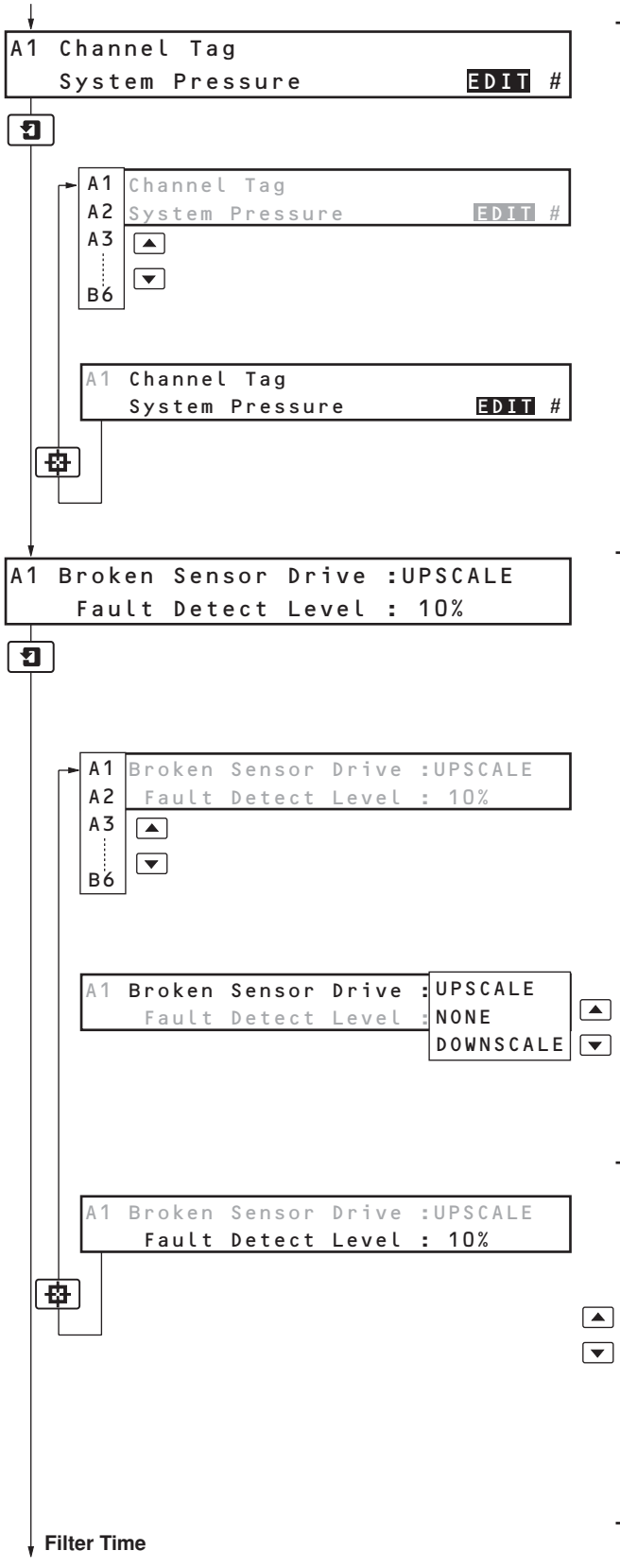
Engineering Units
Press the ⊞ key to set the engineering units of the displayed value. e.g. °C, l/h, bar.

Units of up to six characters can be set – see Front Fold-out.

Press the ⊞ key to set the next channel.

Press the ⊞ key to advance to the next frame.

...3.2.1 Input Set Up Page



Channel Tag

Channel Selection
Select the channel to be set up.

Press ⌗ to enter a description of the quantity being measured, e.g. system pressure.
Up to twenty characters can be used – see Front Fold-out.

Press the ⌗ key to set up the next channel.
Press the ⏎ key to advance to the next frame.

Broken Sensor Drive
In the event of a fault being detected on the input, the recorder can be set to drive upscale, downscale or in the direction of the failure.

Select the channel to be set up.

Press the ⌗ key to advance to the next parameter.

Select the direction required:
UPSCALE – Channel value driven beyond Full Scale.
NONE – Channel value driven indirection of failure.
DOWNSCALE – Channel value driven below zero.
Press the ⌗ key to advance to the next parameter.

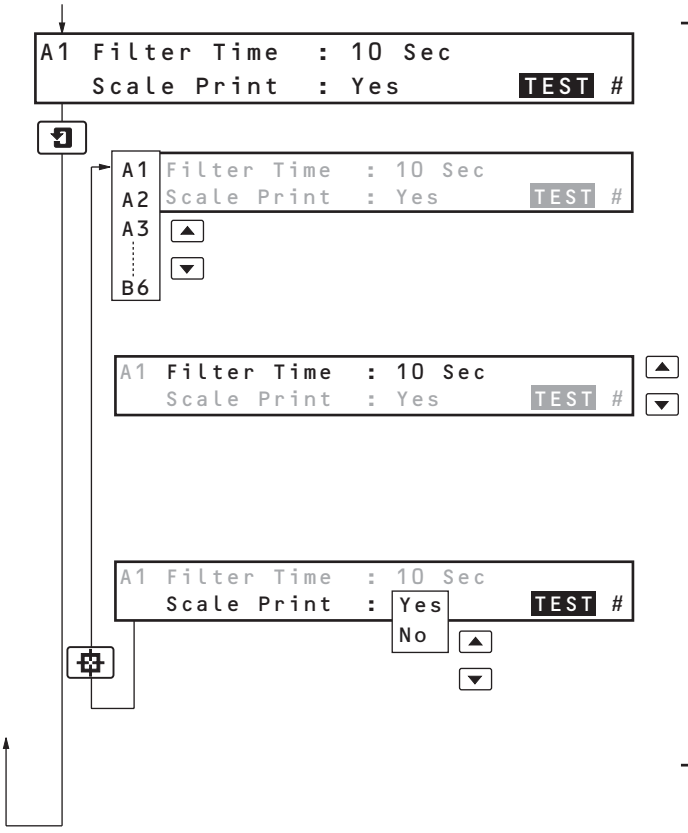
Fault Detection Level
A fault tolerance level can be set to allow for deviations above or below the input span.

Set the value required, between 0 and 100% of the display range in 1% increments (default setting = 10%).

Example – setting the fault detection level to 10% on an input range of 50 to 250 bar causes a fault to be detected below 30 and above 270 bar. The resulting 'Analog Input Failure' signal can be assigned to an alarm – see Section 3.3.3/ Alarm Acknowledge Page/ Table 3.4.

Press the ⌗ key to set up the next channel.
Press the ⏎ key to advance to the next frame.

...3.2.1 Input Set Up Page



Filter Time

Channel Selection
Select the channel to be set up.

Press the ⌗ key to advance to the next parameter.

Filter Time
The input filter averages the process variable input values over the time period set.
Enter the time required (5 to 60 seconds or 'Off').

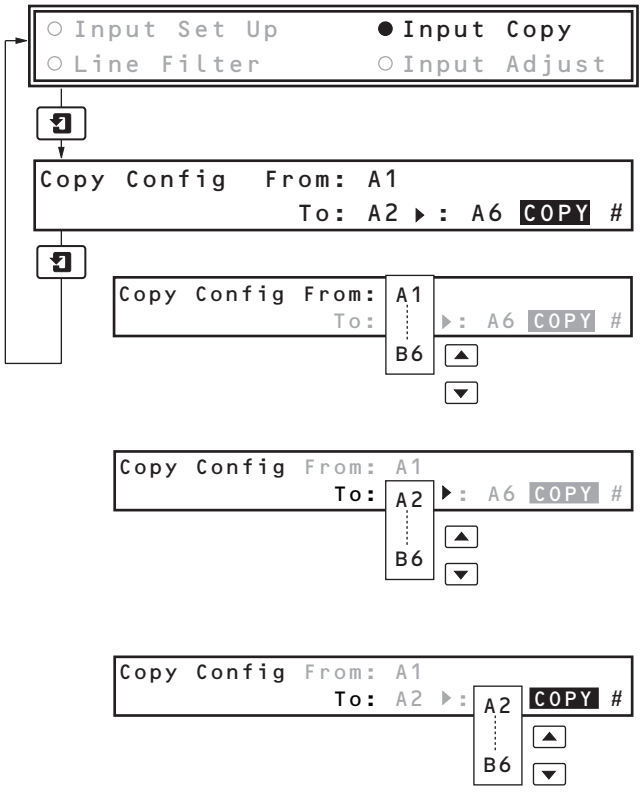
Press the ⌗ key to advance to the next parameter.

Scale Print
Select 'Yes' to enable scale printing on the chart. The scale is set up automatically from the engineering ranges.
Press the ⌗ key to print a test sample of the scale.

Press the ⌗ key to set the next channel.
Press the ↩ key to return to the Analog Inputs menu.

3.2.2 Input Copy Page

The Input Copy facility allows the configuration data and channel tag for any channel to be copied to any other analog input channel.



Press the [#] key to select 'Input Copy' from the Analog Inputs menu.

Press the [↵] key to access the page.

Copying the Configuration

Copy Source Channel
Select the channel configuration to be copied.

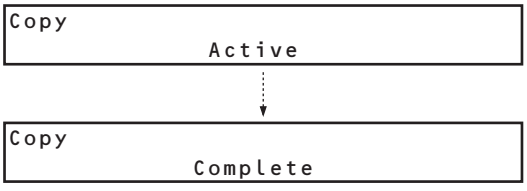
Press the [#] key to advance to the next parameter.

Copy Destination Channel
Select the channel to which the configuration is to be copied (or the lowest channel number in a range).

Press the [#] key to advance to the next parameter.

Select the highest channel number to which the configuration is to be copied.

Press the [⌗] key to activate the copy sequence.

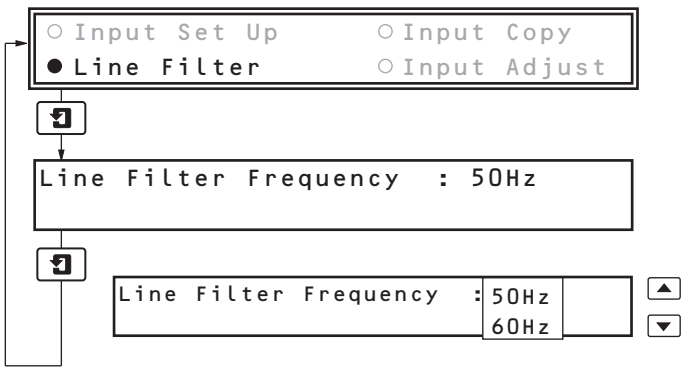


The 'Active' frame is displayed for a short time whilst the copy sequence is carried out.

Press the [↵] key to return to Analog Inputs menu.

3.2.3 Line Filter Page

The Line Filter is used to reject mains frequency pick-up on the input lines.



Press the [#] key to select 'Line Filter' from the Analog Inputs menu.

Press the [↵] key to access the page.

Line Filter Frequency

Select the rejection frequency required, 50 or 60 Hz.

Press the [↵] key to return to Analog Inputs menu.

3.2.4 Input Adjust Page

Notes.

- Enables fine tuning of the displayed value and calibration of the input.
- System offset errors – removed using Offset Adjustment.
- System scale errors – removed using Span Adjustment.
- Offset/Span Adjustment – used when carrying out a spot calibration.
- Analog inputs do not require re-calibrating when the input type or range is changed.
- Reset – removes any previously programmed offset or scale adjustment settings.

Calibration

a) Switch off the power supply to the instrument.

b) Remove the analog input to be adjusted and connect an accurate signal source, suitable for simulation over the entire input range.

Note. For thermocouple inputs, connect the millivolt source using appropriate compensating cable – see Section 4.5, Table 4.1 For 2-lead resistance thermometers, connect the resistance box at the sensor end of the leads or the resistance must be added to the calibration values.

c) Switch on the power supply to the instrument.

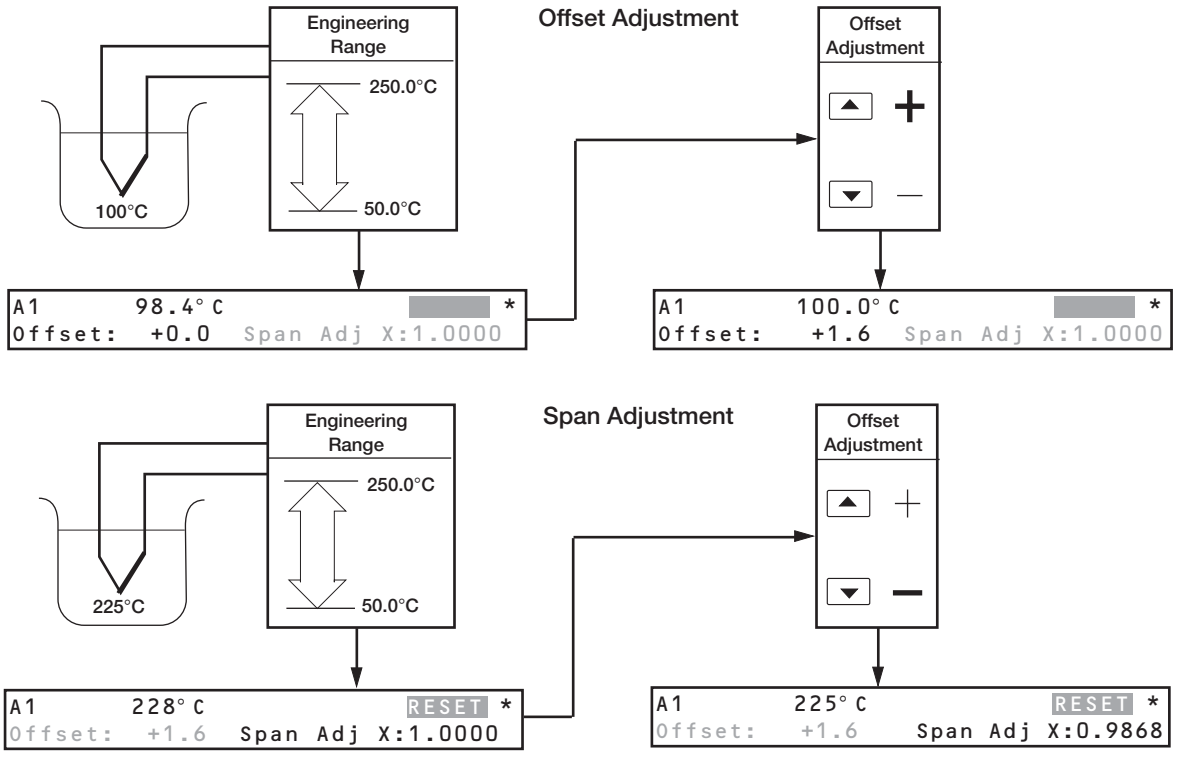
d) Select the spot calibration point. As a general rule use:

Offset Adjustment for a spot calibration at < 50% of engineering range span.

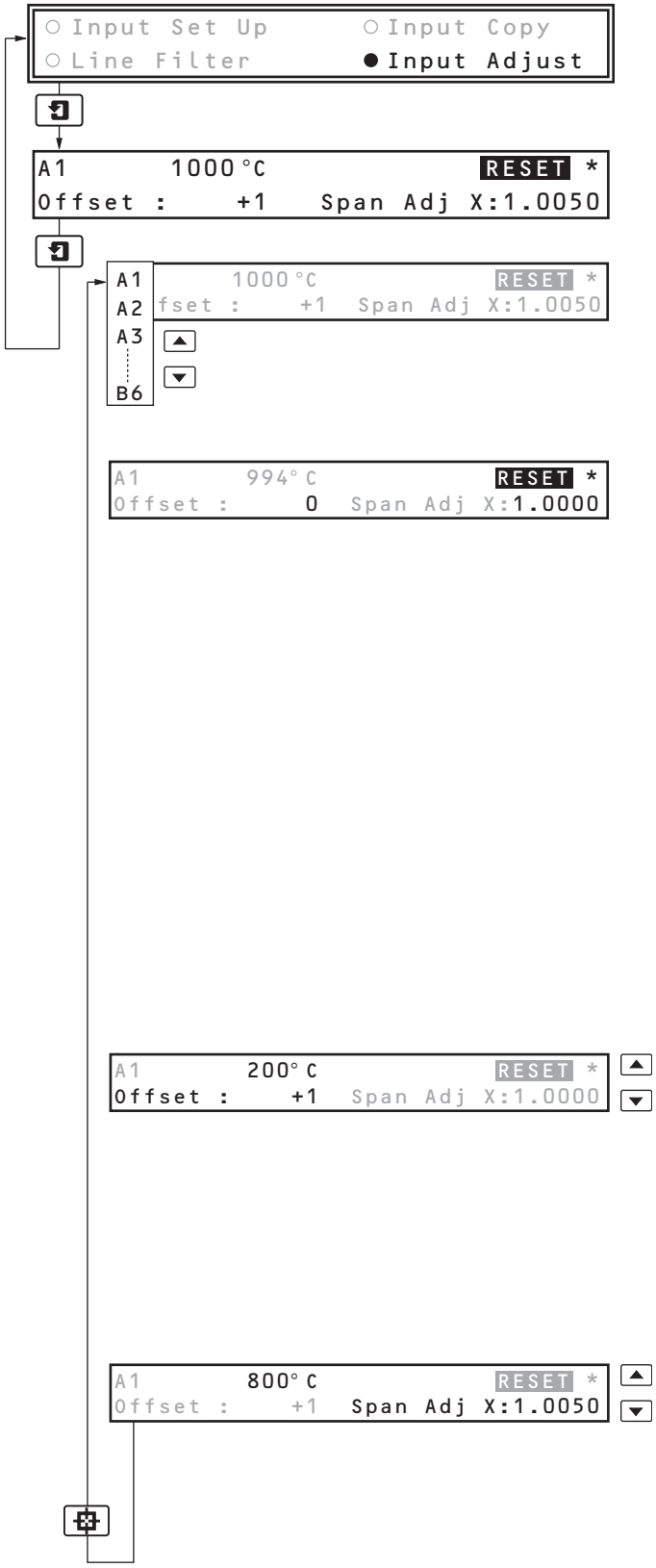
Span Adjustment for a spot calibration at > 50% of engineering range span.

Fine Tuning

Use the Offset and Span adjustments to tune the instrument until the required value is displayed.



...3.2.4 Input Adjust Page



Press the ⊞ key to select 'Input Adjust' from the Analog Inputs menu.

Press the ⊡ key to access the page.

Input Adjust

Channel Selection
Select the channel to be adjusted (A1 to B6 depending on the number of inputs fitted).

On entry the default is 'A1'.

Resetting the Input Signal
Press the ✱ key to reset the input offset and input span readings to their nominal values.

Electrical and resistance thermometer input
Apply an input signal corresponding to the spot calibration required.
For RTD inputs, use resistance values obtained from standard tables.

Thermocouple input

a) Measure the ambient temperature at the output terminals of the input signal source.
b) Using thermocouple tables, look up the millivolt equivalent of this temperature (1), and of the spot calibration temperature (2).
c) Subtract (1) from (2) and set the input signal source to this value.

Press the ⊞ key to advance to the next parameter.

Offset Adjustment
Apply the input value corresponding to the spot calibration point and adjust the display to read the spot calibration point.

Example – If the display range is 0°C to 1000°C and a spot calibration is required at 200°C, set the input source equivalent to 200°C and adjust the display to read 200°C.

Press the ⊞ key to advance to the next parameter.

Span Adjustment
Apply the input value corresponding to the spot calibration point and adjust the display to read the spot calibration point.
Example – If the display range is 0°C to 1000°C and a spot calibration is required at 800°C, set the input source equivalent to 800°C and adjust the display to read 800°C.

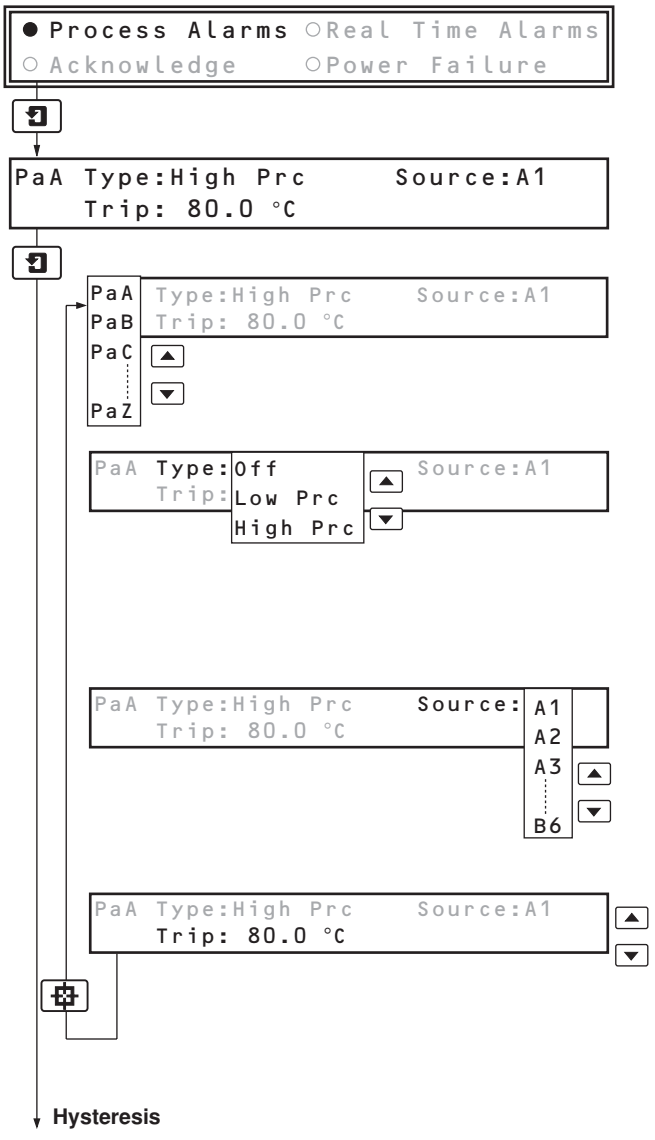
Press the ⊞ key to set up the next channel.
Press the ⊡ key to return to the Analog Inputs menu.

3.3 Alarm Configuration

3.3.1 Process Alarms Page

Notes.

- 24 Process alarms – identified PaA to PaZ (excluding I and O).
- High/low process alarms.
- Alarms assignable to any analog input.
- Adjustable level and time hysteresis values – to prevent oscillation of alarm state.
- 20-Character alarm tags can be printed on the chart as the alarm becomes active.



Press the ⊞ key to select 'Process Alarms' from the Alarms menu.

Press ⏎ to access the page.

Process Alarm Selection

Select Alarm
Select the process alarm to configure. Up to 24 alarms (PaA to PaZ, excluding I and O) can be configured.

Press the ⊞ key to advance to the next parameter

Alarm Type

`Off` – Sets alarm to OFF.
`Low Prc` – Low Process, activated when input signal falls below trip level.
`High Prc` – High Process, activated when input signal rises above trip level.

Press the ⊞ key to advance to the next parameter.

Alarm Source
Select the alarm source from analog inputs A1 to A6 and B1 to B6 (depending on the options fitted).

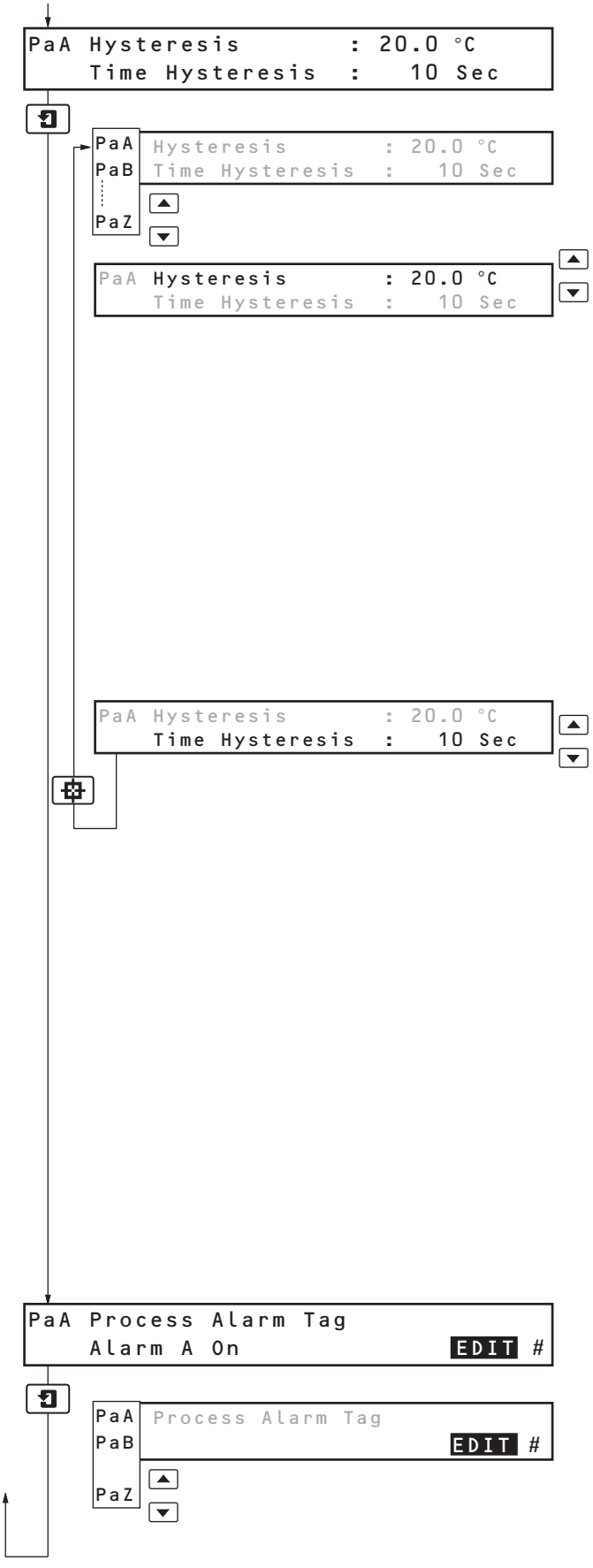
Press the ⊞ key to advance to the next parameter.

Trip Level
Set the trip level.

The engineering units are set in the Input Set Up Page – see Section 3.2.1/ Input Set Up Page/ Engineering Units.

Press the ⊞ key to set up the next alarm.
Press the ⏎ key to advance to the Hysteresis frame.

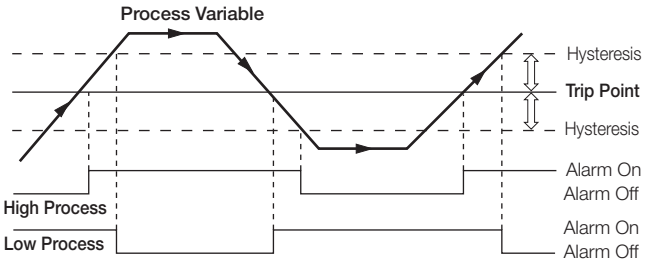
...3.3.1 Process Alarms Page



Hysteresis

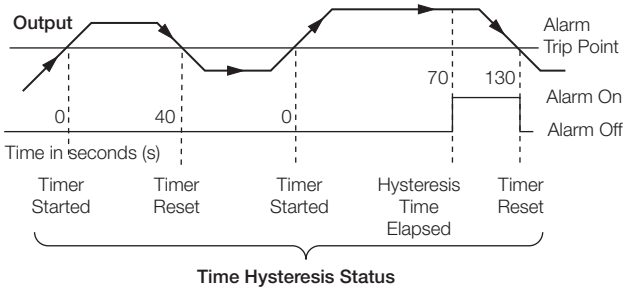
Select Alarm
Select the alarm to configure.
Press the ⊞ key to advance to the next parameter.

Setting the Hysteresis Value
Set the hysteresis value in engineering units. The alarm is activated at the trip level but is only de-activated after the signal has moved into the safe region by an amount equal to the hysteresis value.



Use the ⊞ key to advance to the next parameter.

Setting the Time Hysteresis Value
Set the hysteresis value between 0 and 9999 seconds.
The alarm is activated when the input signal has been in an alarm condition continously for a time greater than the 'Time Hysteresis' value.
The alarm is de-activated as soon as the input signal moves into the safe region – the time hysteresis value has no effect during alarm de-activation.



Time hysteresis set to 70s, with a high process alarm

Press the ⊞ key to set up the next alarm.
Press the ⏎ key to advance to the next frame.

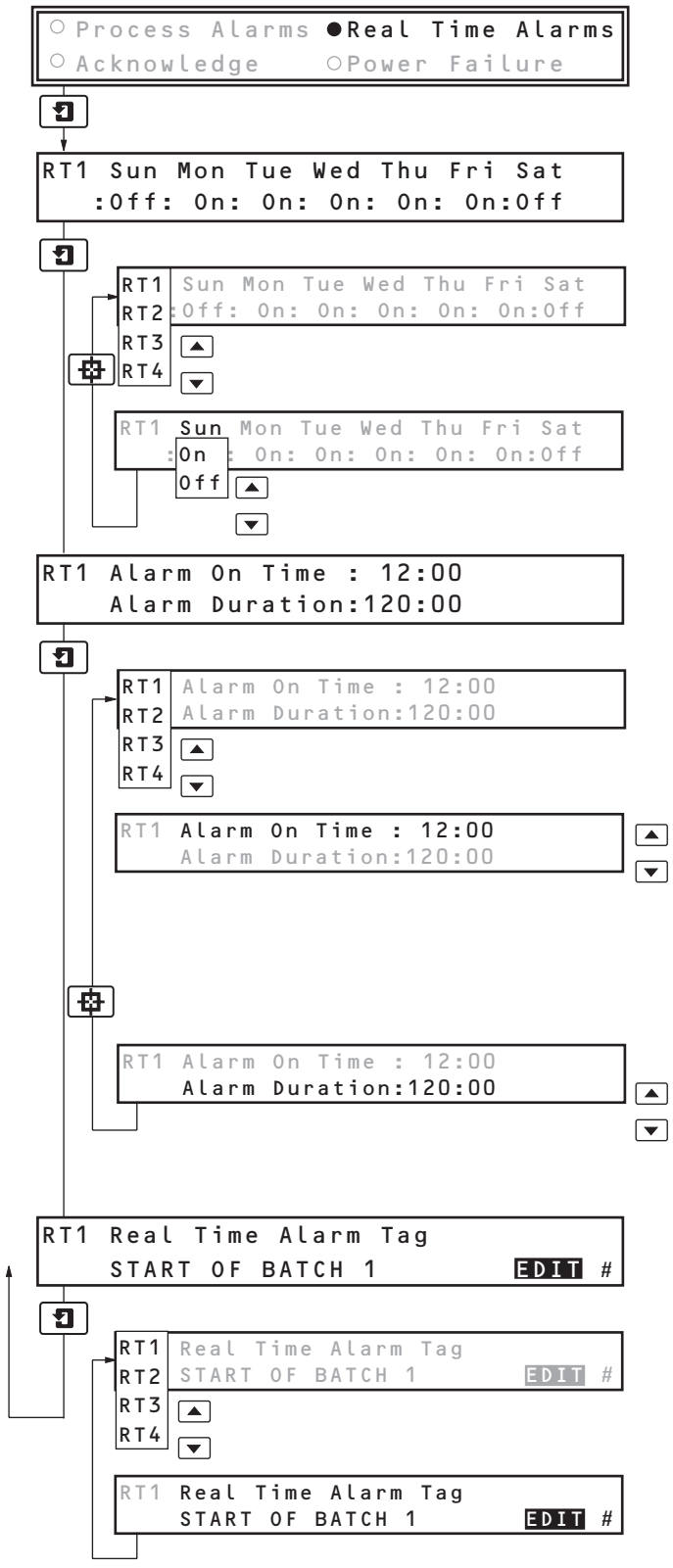
Process Alarm Tag
Select the alarm to configure.

Set an alarm description of up to 20 characters – see Front Fold-out.

Press the ⊞ key to set up the next alarm.
Press the ⏎ key to return to the Alarms menu.

3.3.2 Real Time Alarms Page

Notes.
- Four programmable real-time alarms.
- Programmable start times and durations.



Press the ⊞ key to select 'Real Time Alarms' from the Alarms menu.

Press the ⏎ key to access the page.

Real Time Alarms

Alarm To Configure
Up to four alarms (RT1 to RT4) can be configured, each with assigned 'On' days, 'On' time and duration.
Press the ⊞ key to advance to the next parameter.

Alarm On Days
Select which days the alarm is required to be active.
Press the ⊞ key to move between days.
Press the ⊞ key to set up the next alarm.
Press the ⏎ key to advance to the next frame.

Alarm On Time and Duration
The last alarm to be configured is displayed.

Select Alarm
Select the alarm to configure.

Press the ⊞ key to advance to the next parameter.

Alarm On Time
Set the alarm on time between 00:00 and 23:59.
Alternatively, hours can be set to ** allowing the alarm to be activated at a specific minute each hour.
Example – to activate the alarm at 15 minutes past each hour set to **:15

Press the ⊞ key to advance to the next parameter.

Alarm Duration
Set the alarm duration between 00:00 and 167:59 (hr:min)

Press the ⊞ key to set up the next alarm.
Press the ⏎ key to advance to the next frame.

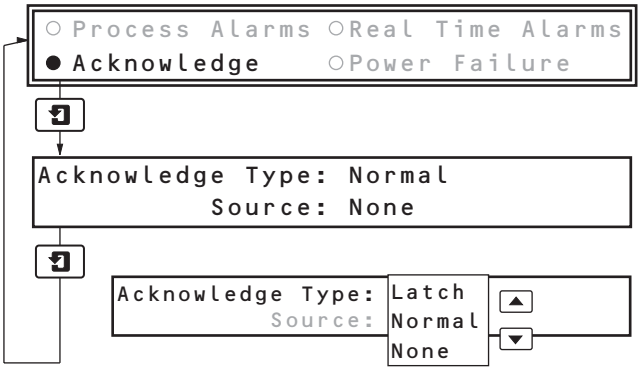
Real Time Alarm Tag
The last alarm to be configured is displayed.

Select Alarm
Press the ▲ and ▼ keys to select Alarm Tag to edit.

Real Time Alarm Tag
Press the ⌗ key to enter an alarm description of up to 20 characters – see Front Fold-out.
Press the ▲ and ▼ keys to set up the next alarm.
Press the ⏎ key to return to the Alarms menu.

3.3.3 Alarm Acknowledge Page

Notes.
- Three operator acknowledge options for Process alarms.
- Global alarm acknowledgement – from internal or external digital source.



Press the ⊛ key to select 'Acknowledge' from the Alarms menu.

Alarm Acknowledge

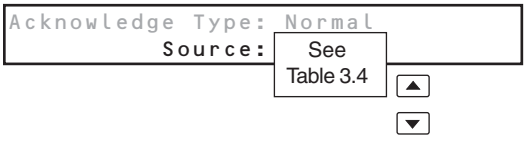
Acknowledge Type
Select the type of alarm acknowledge facility required:

`Latch` – Alarm condition is latched and the alarm state remains active until acknowledged in the **Operator Level Alarm Ack Page** and the alarm condition is cleared.

`Normal` – Alarm state remains active until the condition is removed. Acknowledge facility available.

`None` – Alarm state remains active until the condition is removed. Acknowledge facility not available.

Press the ⊛ key to advance to the next parameter.



Global Acknowledge Source
Select the source to be used to acknowledge all alarms – see Table 3.4.

Press the ⏎ key to return to the Alarms menu.

…3.3.3 Alarm Acknowledge Page

Source	Description
Digital Inputs **	
"NONE"	-
" DA1"	DA1
"!DA1"	NOT DA1
" DB1"	DB1
"!DB1"	NOT DB1
** see Section 4.4 for input designation	
Process Alarms	
"PaA"	A
"!PaA"	NOT A
"PaB"	B
"!PaB"	NOT B
"PaC"	C
"!PaC"	NOT C
"PaD"	D
"!PaD"	NOT D
"PaE"	E
"!PaE"	NOT E
"PaF"	F
"!PaF"	NOT F
"PaG"	G
"!PaG"	NOT G
"PaH"	H
"!PaH"	NOT H
"PaJ"	J
"!PaJ"	NOT J
"PaK"	K
"!PaK"	NOT K
"PaL"	L
"!PaL"	NOT L
"PaM"	M
"!PaM"	NOT M
To	
"PaZ"	Z
"!PaZ"	NOT Z

Source	Description
Process Alarm Combinations *	
"PaA+F"	OR of Process Alarms A, B, C, D, E, F
"!PaA+F"	NOR of Process Alarms A, B, C, D, E, F
"PaG+M"	OR of Process Alarms G, H, J, K, L, M
"!PaG+M"	NOR of Process Alarms G, H, J, K, L, M
"PaN+T"	OR of Process Alarms N, P, Q, R, S, T
"!PaN+T"	NOR of Process Alarms N, P, Q, R, S, T
"PaU+Z"	OR of Process Alarms U, V, W, X, Y, Z
"PaU+Z"	NOR of Process Alarms U, V, W, X, Y, Z
"PaA+Z"	OR of all Process Alarms
"!PaA+Z"	NOR of all Process Alarms
"PaA&F"	AND of Process Alarms A, B, C, D, E, F
"!PaA&F"	NAND of Process Alarms A, B, C, D, E, F
"PaG&M"	AND of Process Alarms G, H, J, K, L, M
"!PaG&M"	NAND of Process Alarms G, H, J, K, L, M
"PaN&T"	AND of Process Alarms N, P, Q, R, S, T
"!PaN&T"	NAND of Process Alarms N, P, Q, R, S, T
"PaU&Z"	AND of Process Alarms U, V, W, X, Y, Z
"PaU&Z"	NAND of Process Alarms U, V, W, X, Y, Z
"PaA&Z"	AND of all Process Alarms
"!PaA&Z"	NAND of all Process Alarms
Real Time Alarms	
"RT1"	1
"!RT1"	NOT 1
"RT2"	2
"!RT2"	NOT 2
"RT3"	3
"!RT3"	NOT 3
"RT4"	4
"!RT4"	NOT 4

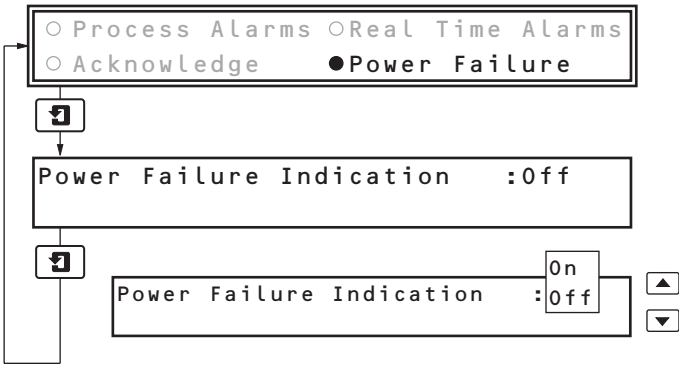
Source	Description
Analog Input Failure	
"AA1"	A1 Fail
"AA2"	A2 Fail
"AA3"	A3 Fail
"AA4"	A4 Fail
"AA5"	A5 Fail
"AA6"	A6 Fail
"AB1"	B1 Fail
"AB2"	B2 Fail
"AB3"	B3 Fail
"AB4"	B4 Fail
"AB5"	B5 Fail
"AB6"	B6 Fail
Operator and Warning Messages	
"CS 0"	Chart speed 0 selected
"CS 1"	Chart speed 1 selected
"CS 2"	Chart speed 2 selected
"CS 3"	Chart speed 3 selected
"P Out"	Paper Out
"P Low"	Paper Low
"Pwr F"	Power Failed
"Clkbat"	Clock battery low
"Modbus"	Modbus Digital Input
"Penlft"	Pen lift activated
Modbus Digital Inputs	
"MDB–01"	Modbus Digital Input 1
"MDB–02"	Modbus Digital Input 2
To	
"MDB–24"	Modbus Digital Input 24

* Process Alarms set to OFF are not included in the combination when the equation is calculated.

Table 3.4 Digital Inputs and Sources

3.3.4 Power Failure Page

This page allows the power failure indication to be displayed in the Operator Pages.



Press the [#] key to select 'Power Failure' from the Alarms menu.

Power Failure Indication

Select 'On' to enable display of the Power Failure alarm in the **Alarm Acknowledge Page** and an instrument alarm in the **Operating Page**.

Press the [↵] key to return to the Alarms menu.

3.4 Chart Level

3.4.1 Chart Control Page

Notes.

- Set up to three independent chart speeds (plus chart speed 0 – stopped) – selectable from the Operating Level or by digital signal.
- Enable/disable automatic printing of text, enable/disable alarm printing.
- Selectable text print speed, fast or slow.
- Auto pen-drop – returns the pen capsule to an operating state after a 5 minute delay to ensure recording is not inadvertently left disabled.
- 'Easy View' feature – allows quick access of latest printed information.
- 'Time Alignment' feature – allows easy adjustment to the time line.

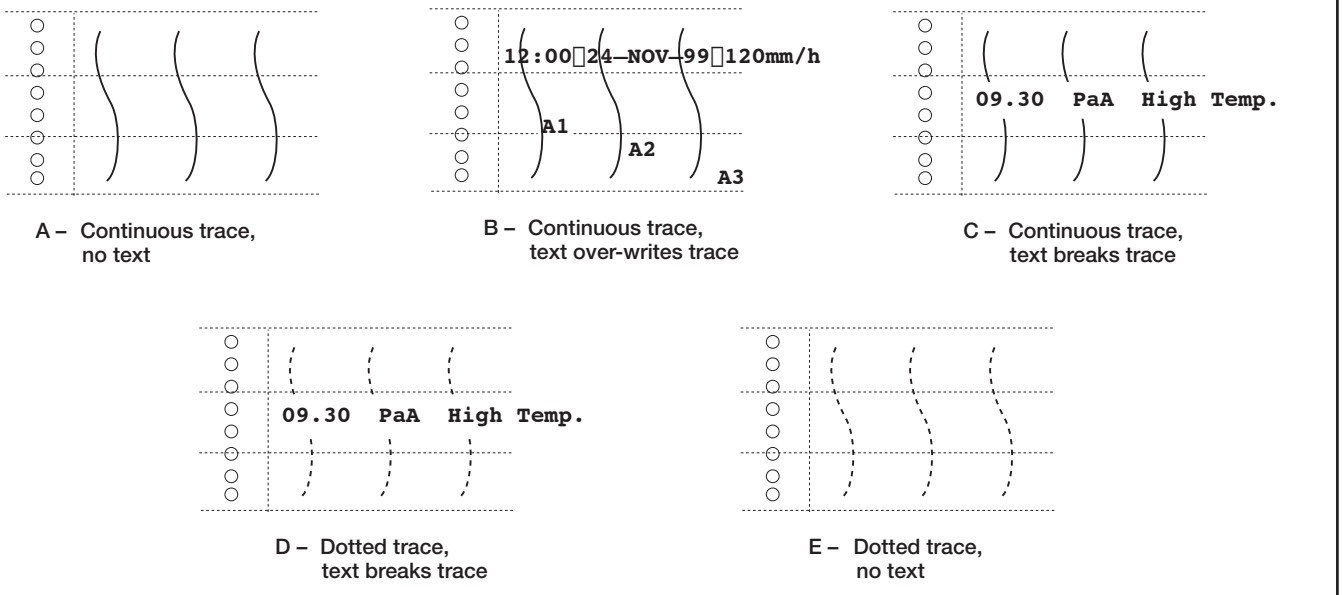
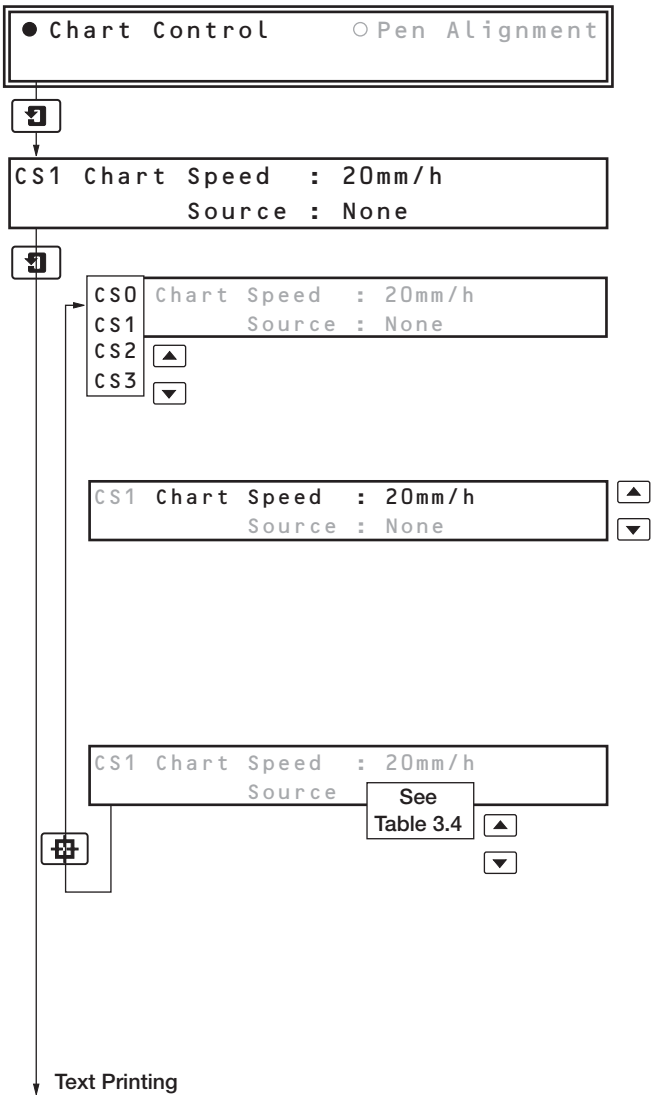


Fig 3.3 Examples of Text /Trace Printing

Print Mode	Chart Speed (mm/h)		
	0 to 240	241 to 500	501 to 1500
A – Continuous trace No Text	Auto print: OFF Alarm print: OFF	Auto print: OFF Alarm print: OFF	—
B – Continuous traces Text overwrites trace	Print speed: Slow	—	—
C – Continuous trace Text breaks trace	Print speed: Fast	Print speed: Fast	—
D – Dotted trace Text breaks trace	—	—	Print speed: Fast
E – Dotted trace No Text	—	—	Auto print: OFF Alarm print: OFF

Table 3.5 Text Printing Options

...3.4.1 Chart Control Page



Press the ⊞ key to select 'Chart Control' from the Chart menu.

Press the ⏎ key to access the page.

Chart Control Page

Selecting the Chart Speed
Select a chart speed (CS0,CS1,CS2 or CS3).
(Chart speed CS0 is preset to 0mm/h and 'Chart Stopped' is printed on the chart with the Date and Time).

Press the ⊞ key to advance to the next parameter.

Setting the Chart Speed
Set a speed between 0 and 1500mm/hr.

Note. If the selected chart speed (other than CS0) is set to 0mm/hr, then '0mm/h' is printed with the date and time.

Press the ⊞ key to advance to the next parameter.

Chart Speed Source
Select the source required to initiate a change to the chart speed set above – see Section 3.3.3/ Table 3.4.

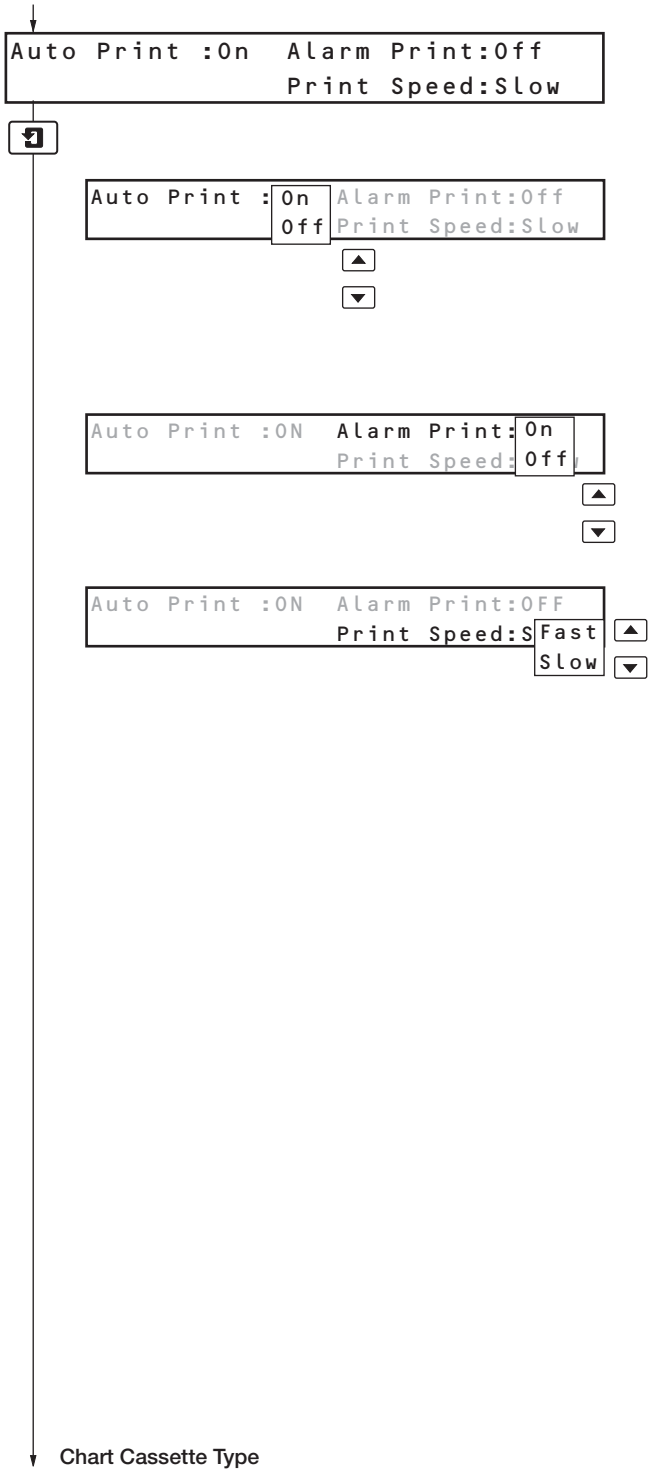
Press the ⏎ key to advance to the Text Printing frame.

Example.
If a chart speed of 120mm/hr is required when digital input DA1 is active, and at all other times, the required chart speed is 20mm/hr:

- Set chart speed 1 to 20mm/hr
- Set chart speed 1 source to '!DA1' (NOT DA1)
- Set chart speed 2 to 120mm/hr
- Set chart speed 2 source to 'DA1'

Select chart speed 1 and start recording. When DA1 becomes active the chart speed changes to 120 mm/hr. When DA1 becomes inactive the chart speed returns to 20mm/hr.

...3.4.1 Chart Control Page



Text Printing

Auto Print
Select the Auto Print mode required:

`ON` – Enables automatic printing of time/date, chart speeds, scales and channel Identifiers.

`OFF` – Disables automatic printing.

Press the ⊞ key to advance to the next parameter.

Alarm Print
Select 'On' to enable the printing of alarm messages.

Press the ⊞ key to advance to the next parameter.

Alarm and Operator Message Print Speed
With chart speeds ≤240mm/h the selections have the following effect:

`Fast` – Interrupts chart traces to print alarms or operator message.

`Slow` – Prints alarms or operator message during chart traces.

Print speed options:

Parameter to Print	Chart Speed (mm/h)	
	1 to 240	241 to 1500
Process Alarms	Slow/Fast	Fast
Real Time Alarms	Slow/Fast	
Scales (Test Print)	Fast	
Operator Message	Slow/Fast	

The print speed for messages in autoprint (i.e. Time, Date, Scales, Chart speed change and Trace Identifiers) is predefined and cannot be selected, i.e.

Slow ≤ 240mm/H
Fast > 240mm/H

Trace identifiers are not printed at speeds >240mm/h

Press the ⏎ key to advance to the **Chart Cassette Type** frame.

...3.4.1 Chart Control Page

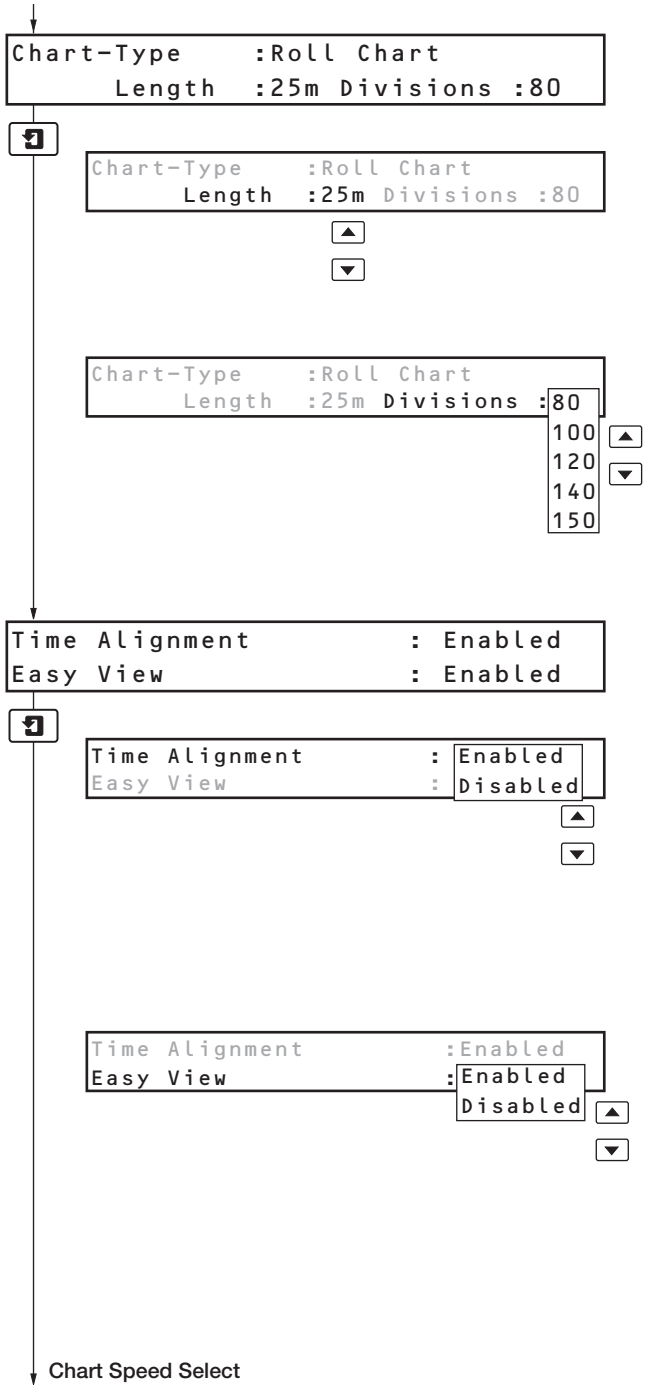


Chart Settings
The Chart type, length and number of divisions is displayed.

Chart Length
Enter the required chart length in 1m increments. For roll chart cassettes, the standard length is 25m.

Press the ⊞ key to advance to the next parameter.

Chart Divisions
Select the number of divisions on the chart width.

Press the ↵ key to advance to the next frame.

Chart Functions

Time Alignment
After loading a new chart, the Time Alignment function enables the chart to be advanced to a time line before commencing recording.

Select 'Enabled' to display the Time Alignment function in the **Chart Page** – see Section 1.1/ Time Alignment.

Press the ⊞ key to advance to the next parameter.

'Easy View'
'Easy View' winds the chart forward a small distance to allow the latest information to be viewed. The chart is then returned automatically to the recording position where any buffered data is printed.

Select 'Enabled' to display the 'Easy View' function in the Operator Page – see Section 2.7.

Note. 'Easy View' only operates with chart speeds of ≤120mm/h.

Press the ↵ key to advance to the Chart Speed Select frame.

...3.4.1 Chart Control Page

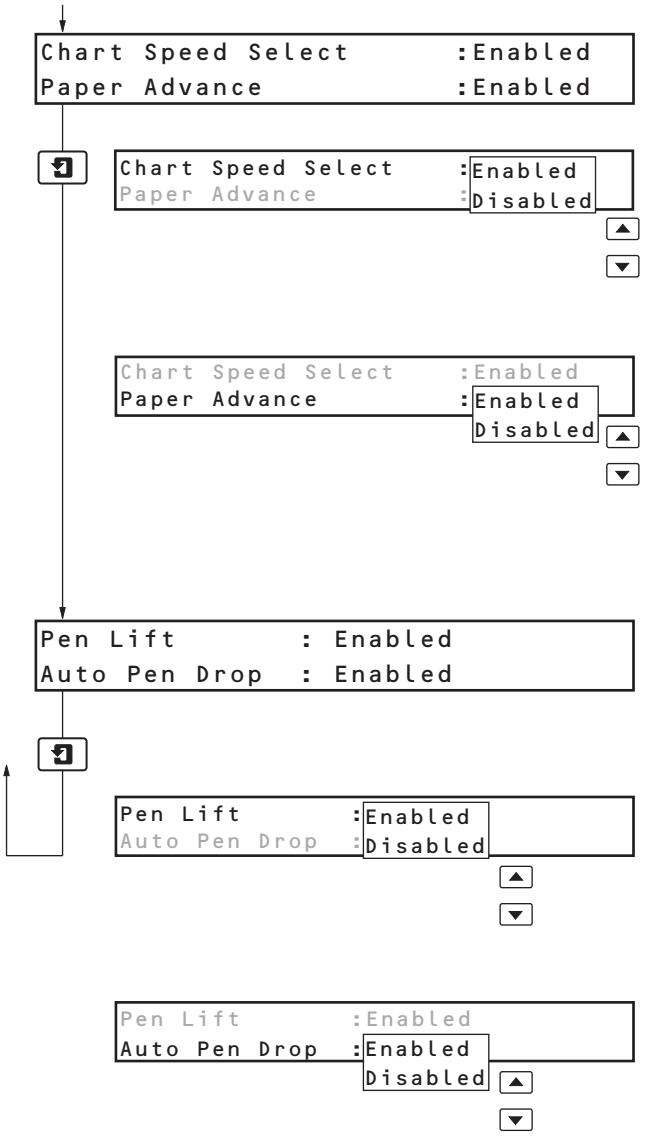


Chart Settings

Chart Speed Select
Select 'Enabled' to allow the chart speed to be selected in the operator pages.

Press the [#] key to advance to the next parameter.

Paper Advance
Select 'Enabled' to allow the chart to be wound forward manually in the operator pages.

Press the [⏎] key to advance to the next frame.

Pen Lift/Drop Settings

Pen Lift
Select 'Enabled' to allow use of the [⇆] key on the front panel (Pen lift).

Press the [#] key to advance to the next parameter.

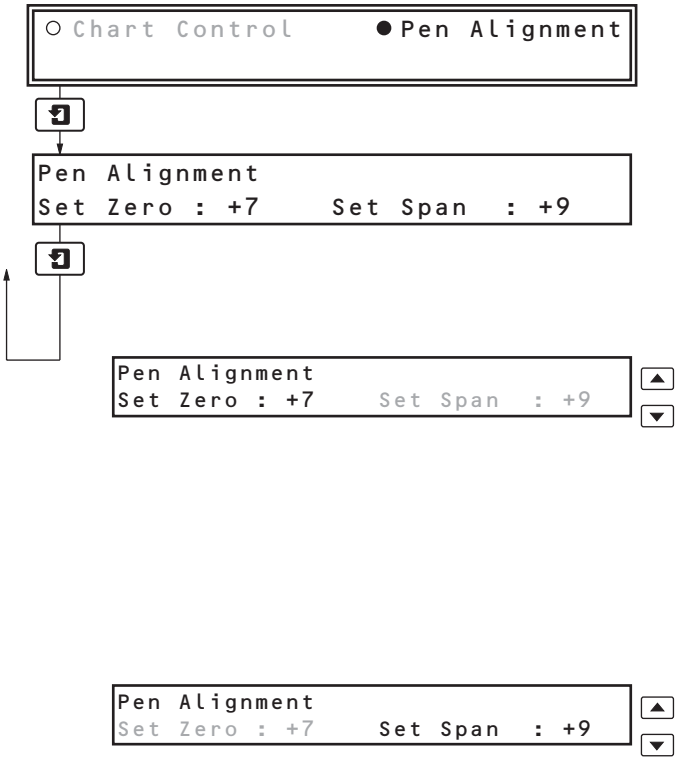
Auto Pen Drop
The Auto Pen Drop facility returns the pen capsule to an operating state approximately five minutes after the pen lift has been activated.

Select 'Enabled' to activate the Auto Pen Drop facility.

Press the [⏎] key to return to the Chart menu.

3.4.2 Pen Alignment Page

Notes.
- Allows accurate adjustment of pen position on the chart.
- Can be used to remove the effect of inconsistencies in chart manufacture.



Press the ⊛ key to select 'Pen Alignment' from the Chart menu.

Press the ↵ key to access the page.

Pen Alignment Settings
On accessing the Pen Alignment Page…

```
Recording Stopped
```

…is displayed momentarily.

Set Pen Zero
When the Pen Alignment Page is selected the chart is advanced at 'fast' speed and the magenta pen marks the chart at its zero position.

Use the ▲ and ▼ keys to adjust the pen to the zero position. A 'Set Zero' displacement figure between –10 and +10 is displayed.

Press the ⊛ key to advance to the next parameter.

Set Pen Span
The chart continues to advance at 'fast' speed and the pen moves to its full scale position.

Use the ▲ and ▼ keys to adjust the pen to the full scale position. A 'Set Span' displacement figure between –10 and +10 is displayed.

Press the ↵ key to return to the Chart menu…

```
Recording Restarted
```

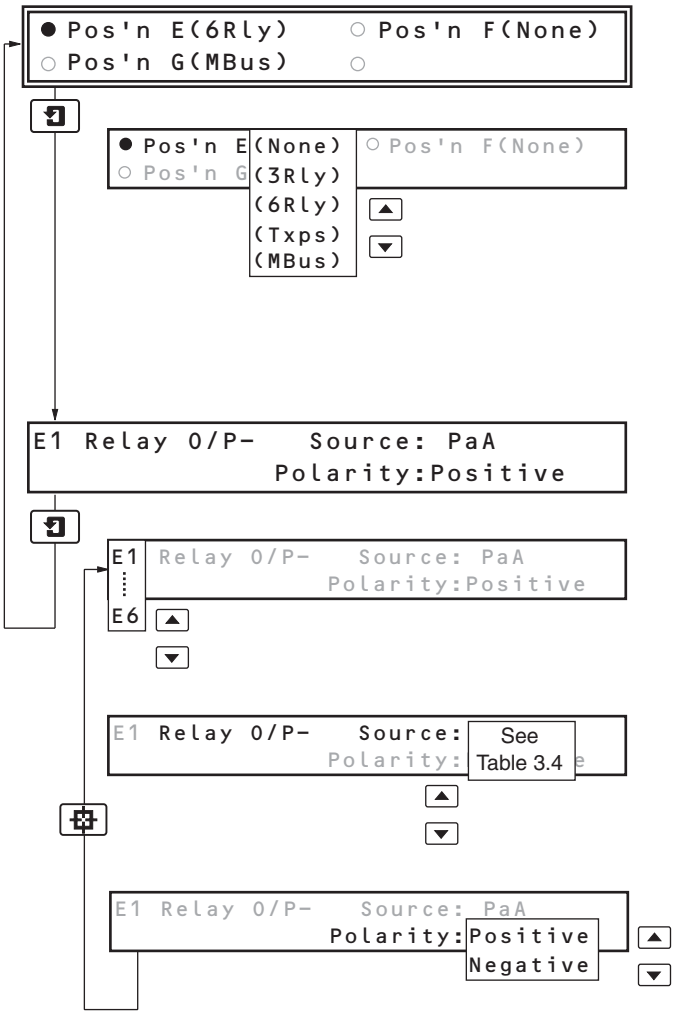
…is displayed momentarily and the time that recording was stopped is printed on the chart.

Press the ↵ key to return to the Chart menu.

3.5 Output Modules

Notes.

- Module types – 3 Relay, 6 Relay, Transmitter PSU or Modbus serial communications.
- Automatic detection of module type fitted.
- Programmable sources and polarity of relay outputs.



Select Module Position
Press the ⊞ key to select the module to be configured.

The type of module fitted in each position is displayed automatically:
None – No module fitted (No configuration required).
3Rly – 3-relay outputs.
6Rly – 6-relay outputs.
Txps – Transmitter PSU (No configuration required).
MBus – Modbus serial communications
– see IM/SR250–MOD

Press the ⊡ key to configure the module selected .

Relay Output Module

Select Relay Output
Select the relay output to be configured (1 to 3 or 1 to 6, depending on the module fitted).

Press the ⊞ key to advance to the next parameter.

Select Output Source
Select the source which activates the relay output – see Section 3.3.3/ Table 3.4.

Press the ⊞ key to advance to the next parameter.

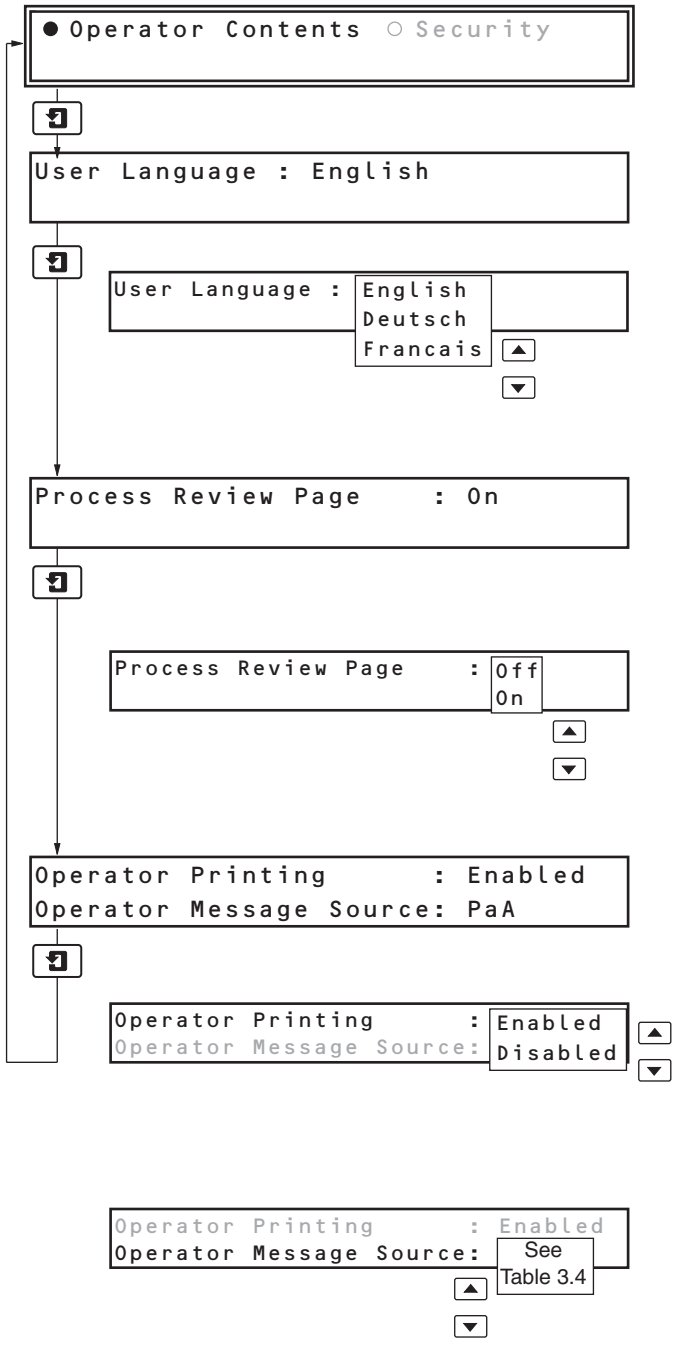
Select Output Polarity
The relay output can be set to energize for either an active or in-active digital signal:
Positive – If source is active, relay is energized.
Negative – If source is inactive, relay is energized.

Press the ⊞ key to set up the next relay output.
Press the ⊡ key to return to the Modules menu.

3.6 Operator Set Up

3.6.1 Operator Contents Page

Notes.
- English, French or German language options.
- Operator Level Pages which are not required can be turned off.



Press the ⊞ key to select 'Operator Contents' from the Operator menu.

Press the ⏎ key to access the page.

Operator Page

User Language
The instrument can be configured to display data in English, French or German.

Select the language to be displayed.
Press the ⏎ key to advance to the next frame.

Process Review Page

Note. Disabling the **Process Review Page** will also disable the **Cue/Review** facility.

Select 'On' to enable the Process Review Page in the Operator Level.

Operator Printing Enable/Disable

Select 'Enabled' to allow the Operator Message to be set up and printed (the message is set up in the operator level), and to allow the operator to activate printing of the date and time.

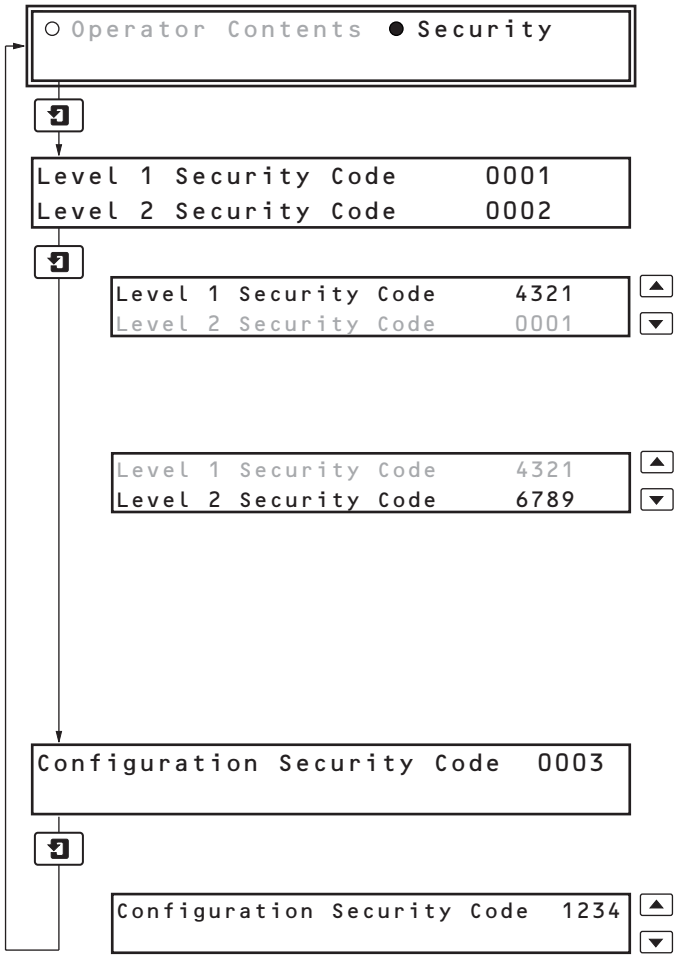
Press the ⊞ key to advance to the next parameter

Operator Message Source
Select the digital source required to activate printing of the Operator Message – see Section 3.3.3/ Table 3.4.

Press the ⏎ key to return to the Operator menu.

3.6.2 Security Page

This page is used to set the security codes for access to chart loading and configuration functions.



Press the ⊞ key to select 'Security' from the Operator menu.

Press the ↵ key to access the page.

Set Level 1 Security Code
The Level 1 Security Code allows access to the Chart Page.

Set the code to any number between 0000 and 9999. (Setting 0000 disables the security and allows unrestricted access to Level 1).

Press the ⊞ key to advance to the next parameter.

Set Level 2 Security Code
The Level 2 Security Code allows access to the Chart Page and the Process Review Page.

Set the code to any number between 0000 and 9999. (Setting 0000 disables the security and allows unrestricted access to Levels 1 and 2).

Press the ↵ key to advance to the next frame.

Set Configuration Level Security Code
The Configuration Security Code allows access to Level 1, Level 2 and the Configuration Level.

Set the code to any number between 0000 and 9999. (Setting 0000 disables the security and allows unrestricted access to all levels).

Press the ↵ key to return to the Operator menu.

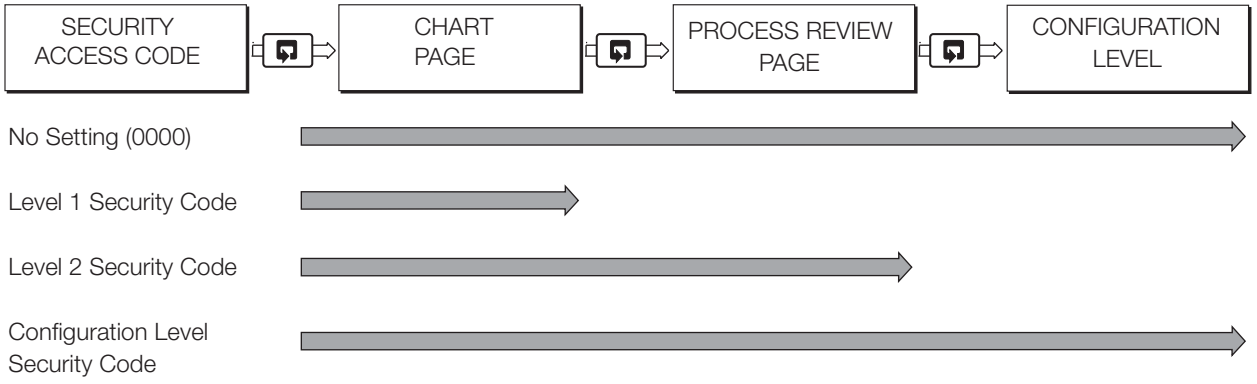


Fig. 3.4 Security Codes

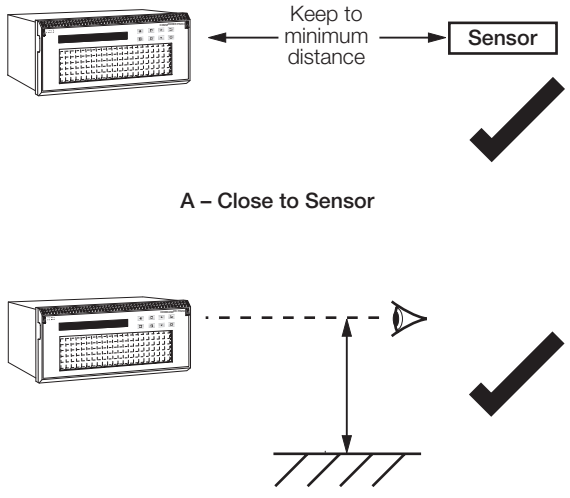
4 INSTALLATION

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.

Cleaning
Clean the front panel only, using warm water and a mild detergent.

Warning. Before making any connections, ensure that the power supply, any powered control circuits and high common mode voltages connected to the instrument are switched off.

4.1 Siting – Figs. 4.1 and 4.2

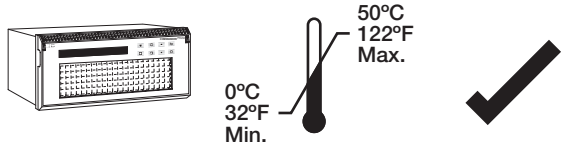


A – Close to Sensor

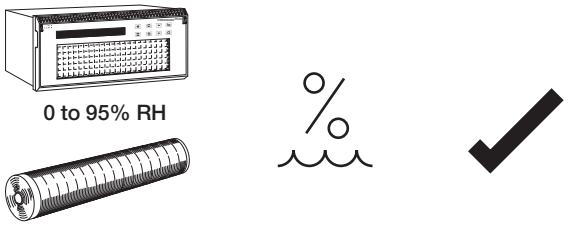
B – At Eye-level Location

C – Avoid Vibration

Fig. 4.1 General Requirements

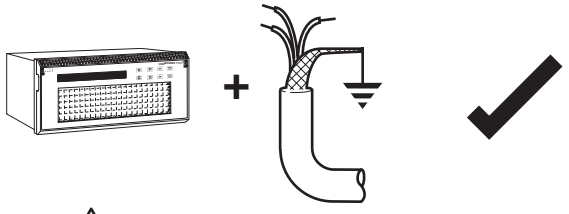


A – Within Temperature Limits



B – Within Humidity Limits

C – Environmental Limits



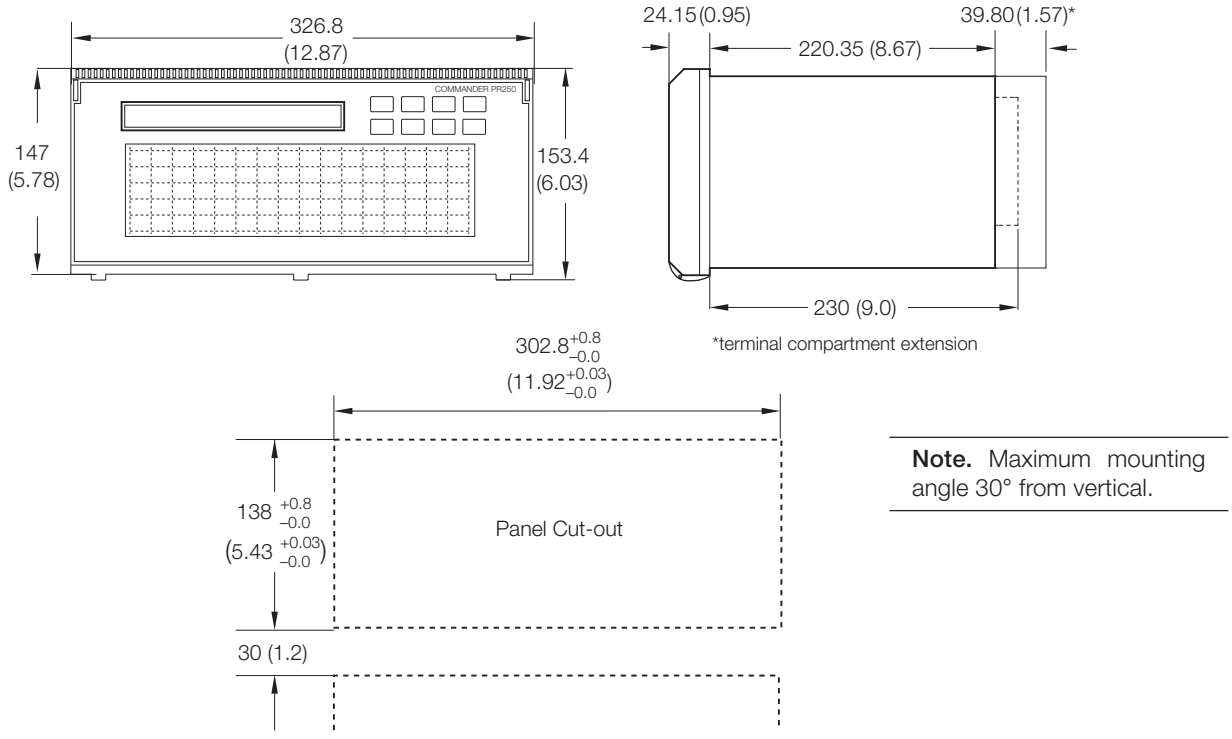
Warning. Select a location away from strong electrical and magnetic fields. If this is not possible, particularly in applications where mobile communications equipment is expected to be used, screened cables within earthed metal conduit must be used.

D – Use Screened Cable

Fig. 4.2 Environmental Requirements

4.2 Mounting – Figs. 4.3 and 4.4

Dimensions in mm (in.)



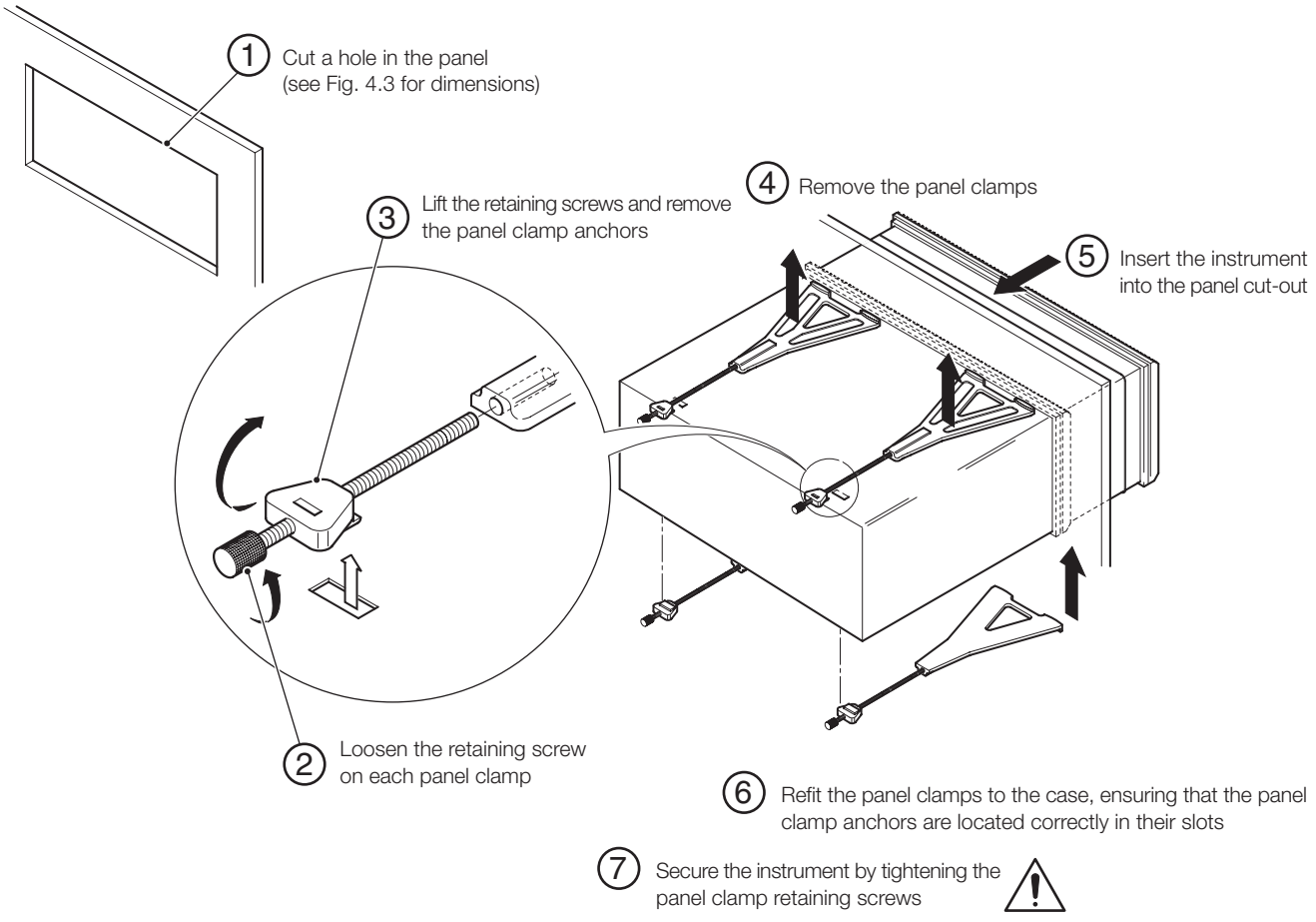
Note. Maximum mounting angle 30° from vertical.

Fig. 4.3 Overall Dimensions

…4.2 Mounting – Figs. 4.3 and 4.4

Note. For IP65 protection, a minimum panel thickness of 3mm (0.12 in.) is recommended.

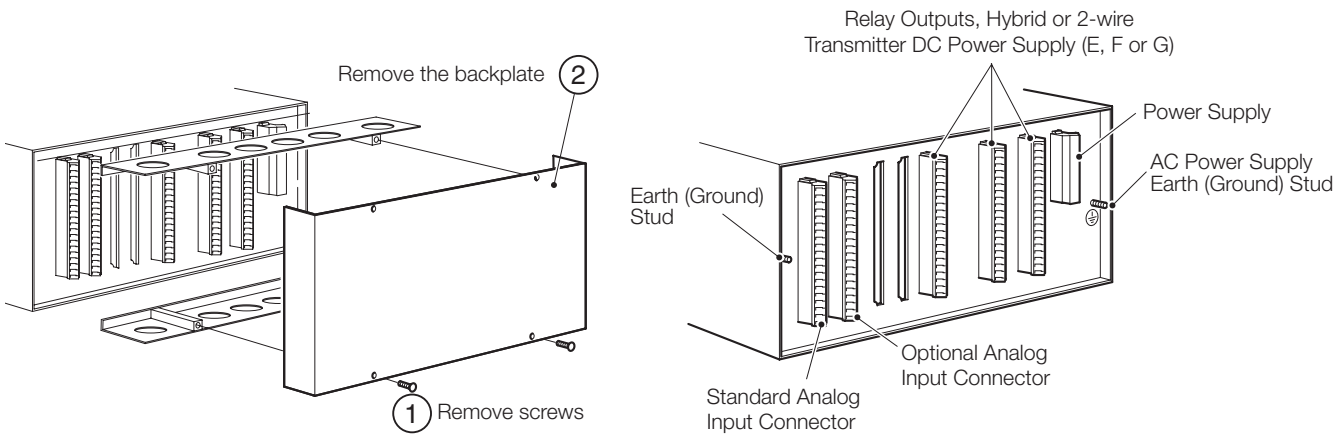
Note. The portable case is supplied with the panel hole already cut, otherwise the fitting procedure is the same.



Warning. The clamp must fit flat on the instrument casing. If the clamp is bowed, the securing screw is overtight and sealing problems may occur.

Fig. 4.4 Mounting

4.3 Access to Terminals and Connections – Fig. 4.5



Note. The terminal compartment extension used for anchoring cable conduits is an optional fitting.

Fig. 4.5 Access to Terminals

4.4 Electrical Connections – Fig 4.6

Warnings.

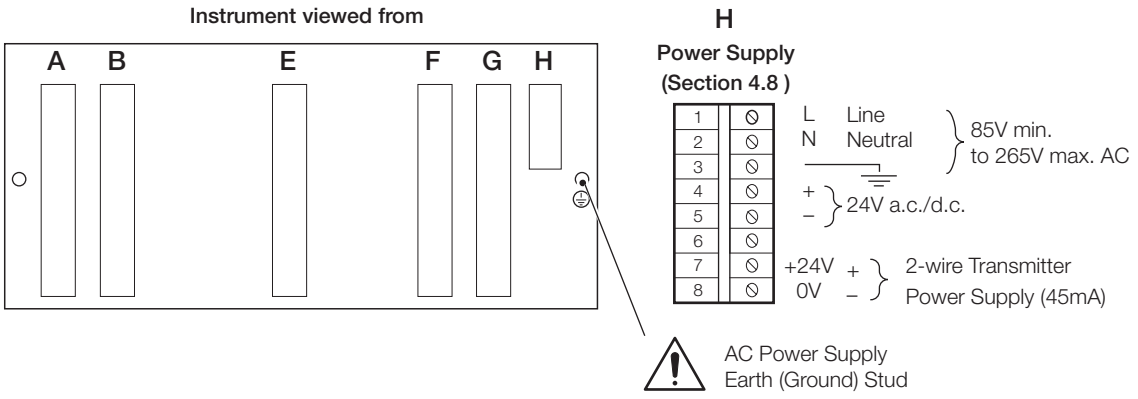
- The instrument is not fitted with a switch therefore a disconnecting device such as a switch or circuit breaker conforming to local safety standards must be fitted to the final installation. It must be fitted in close proximity to the instrument within easy reach of the operator and must be marked 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 (2.5mm^2).
- The instrument conforms to Mains Power Input Insulation Category II. All other inputs and outputs conform to Category II.
- 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).

Notes.

- 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. Connect the screen to the earth (ground stud) – see Fig. 4.6.
- Replacement of the internal battery (Varta type CR1/2AACD or Saft LS3CNA 3.6V lithium cell) must be carried out by an approved technician only.

...4.4 Electrical Connections – Fig. 4.6

Warning. The AC power supply earth (ground) cable must be connected to the earth (ground) stud ⏚.



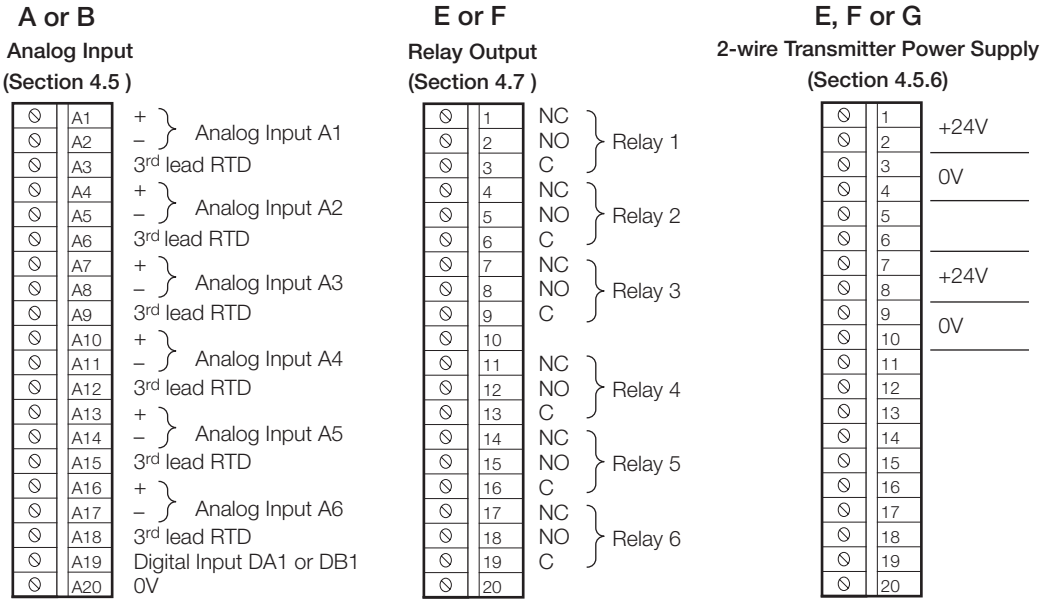
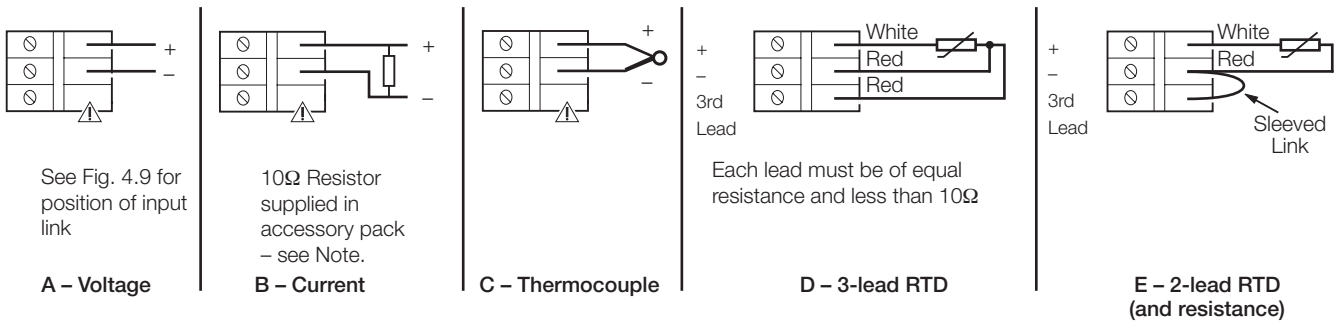


Fig. 4.6 Electrical Connections

4.5 Analog Input Connections – Fig. 4.7



Warning. Under no circumstances must the spare input terminal be linked to the negative.

Note. Refer also to Fig. 4.6 for terminal numbers.

Fig. 4.7 Analog Input Connections

4.5.1 Current and Voltage – Fig 4.7

Warning.

- To avoid damage to multi–channel instruments, highcommon mode voltages up to 250V r.m.s. max. must be present on all channels, or not at all.
- The maximum channel–to–channel voltage (between any two channels) must not exceed 12.5V or permanent damage to the instruments input circuitry may occur. To prevent such damage link the negative terminals on all inputs. For applications where the available 12.5V isolation is required, this link should not be fitted.

4.5.2 Thermocouple – Fig. 4.7

Use the correct compensating cable between the thermocouple and the terminals – see Table 4.1.

Automatic cold junction compensation (ACJC) is incorporated but an independent cold (reference) junction may be used.

4.5.3 Resistance Thermometer (RTD) – Fig. 4.7

On applications requiring long leads it is preferable to use a 3-lead resistance thermometer.

If 2-lead resistance thermometers are used, each input must be calibrated to take account of the lead resistance.

Type of Thermocouple	Compensating Cable											
	BS1843			ANSI MC 96.1			DIN 43714			BS4937 Part No.30		
	+	–	Case	+	–	Case	+	–	Case	+	–	Case
Ni-Cr/Ni-Al (K)	Brown	Blue	Red	Yellow	Red	Yellow	Red	Green	Green	Green	White	Green *
Ni-Cr/Cu-Ni (E)		—			—			—		Violet	White	Violet *
Nicrisil/Nisil (N)	Orange	Blue	Orange	Orange	Red	Orange		—		Pink	White	Pink *
Pt/Pt-Rh (R and S)	White	Blue	Green	Black	Red	Green	Red	White	White	Orange	White	Orange *
Pt-Rh/Pt-Rh (B)		—			–			–		Grey	White	Grey *
Cu/Cu-Ni (T)	White	Blue	Blue	Blue	Red	Blue	Red	Brown	Brown	Brown	White	Brown *
Fe/Con (J)	Yellow	Blue	Black	White	Red	Black	Red	Blue	Blue	Black	White	Black *
* Case Blue for intrinsically safe circuits												
Fe/Con (DIN 43710)	—			—			DIN 43710 Blue/red	Blue	Blue	—		

Table 4.1 Thermocouple Compensating Cable

4.5.4 Accessing the Analog Input Links – Fig. 4.8

To gain access to the analog input links the chassis must be removed.

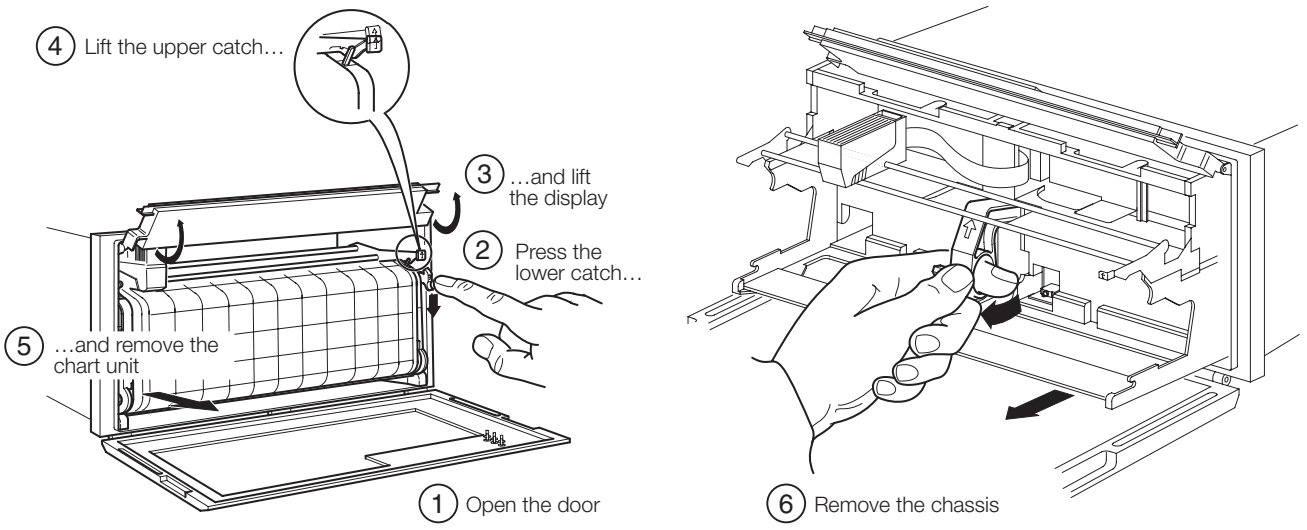


Fig. 4.8 Removing the Chassis

4.5.5 Setting Analog Input links – Fig. 4.9

The analog inputs must be set up for the input type required.

Warning. Static electricity can seriously damage components. Wear an earth strap and/or use an anti-static bench when dismantling the instrument.

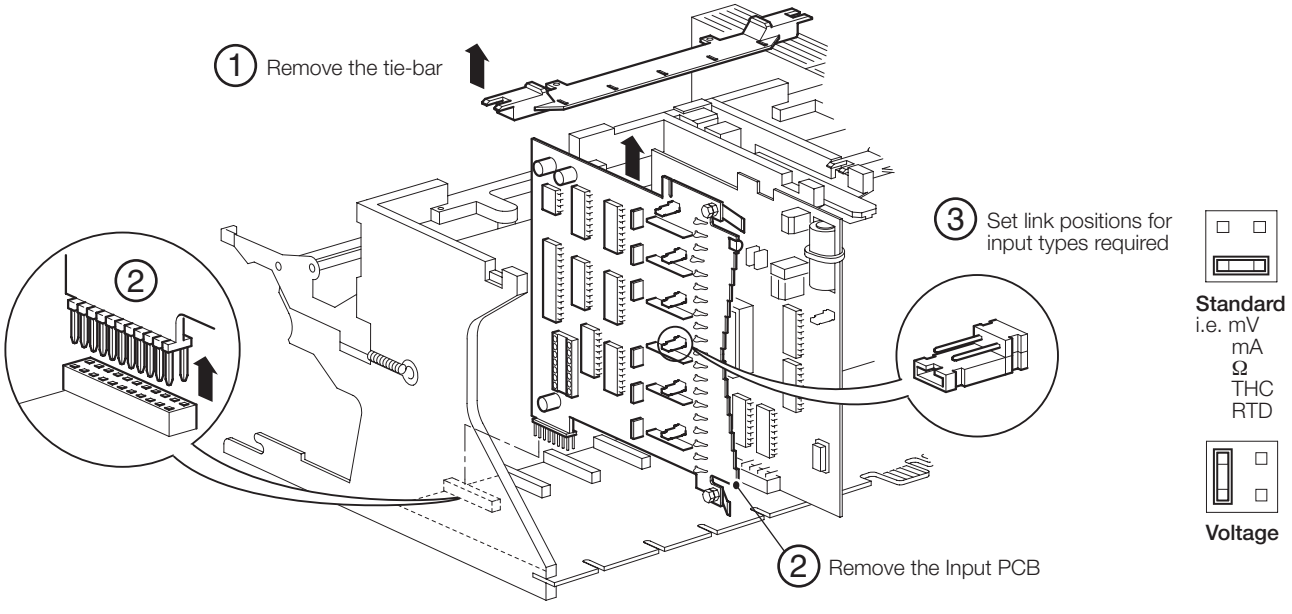


Fig. 4.9 Selecting the Analog Input Type

4.5.6 Transmitter Power Supply Connections – Fig. 4.10

Note. The power supply board provides a 24V supply capable of driving two 2-wire transmitters. Two additional 24V power supplies are provided on the transmitter power supply module boards, each of which is capable of driving two 2-wire transmitters.

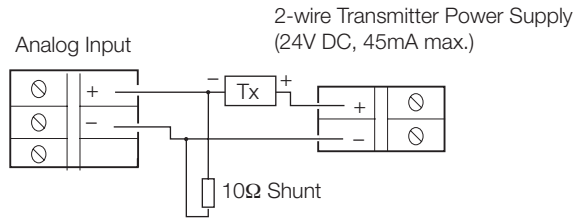


Fig 4.10 Transmitter Power Supply

4.6 Digital Input Connections – Fig 4.11

A digital input is provided on each input board.

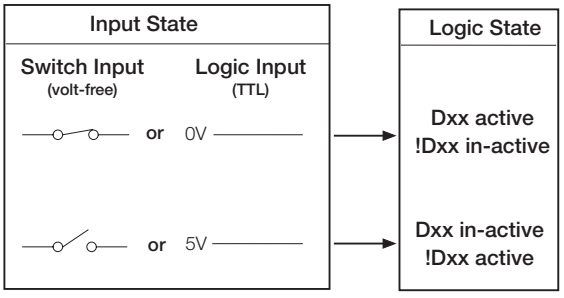
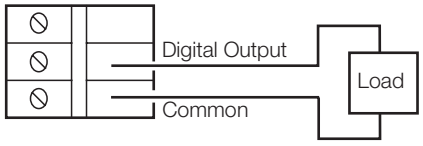


Fig. 4.11 Digital Input

4.7 Relay Output Connections – Fig. 4.12



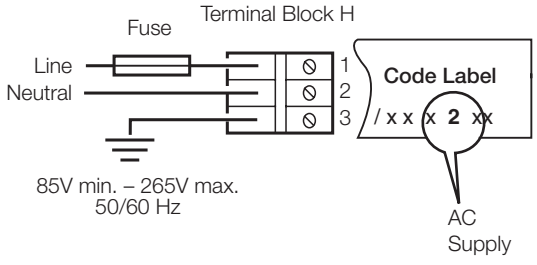
Notes.

- The maximum total combined current flowing through the relays is 36A. The maximum individual relay current is 5A.
- The polarity is set in the Configuration Level – see Section 3.5/ Output Modules/ Output Polarity.

Fig. 4.12 Output Connections

4.8 Power Supply Connections

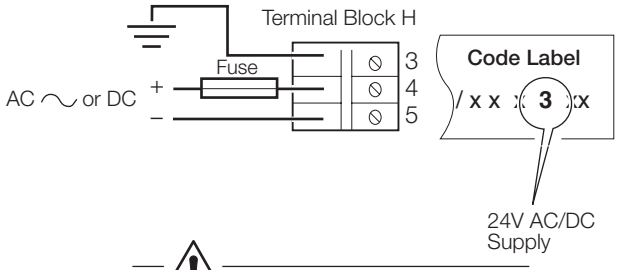
4.8.1 AC Mains Connections – Fig. 4.13



Warning.
Use fuse rating – 1A (max.) type T

Fig. 4.13 AC Mains

4.8.2 24V AC/DC Supply Connections – Fig. 4.14



Warning.
Use fuse rating – 3A (max.) type T

Fig. 4.14 24V AC/DC Supply

5 SPARES LIST

5.1 Consumables

Item	Part No.
Roll Chart	
80 division	PR250–9007R
100 division	PR250–9006R
120 division	PR250–9008R
140 division	PR250–9009R
150 division	PR250–9010R
Pen Capsule	
Six color	PR100–0211
Six color (high temperature)	PR100–0230

INDEX

NOTES

OPERATOR LEVEL OVERVIEW

* Only displayed if enabled – see Section 3.6.1/ Operator Page/ Process Review Frame

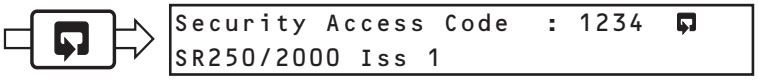
OPERATING DISPLAYS (Section 2.1)

- Channel reading, tag & units
- System date & time
- Chart speed
- Remaining chart
- Operator message

ALARM PAGES (Section 2.8)

- Displays all active alarms.
- Individual/global process alarm acknowledge

SECURITY ACCESS (Section 2.9)



- Protected access to:
  Chart page
  Configuration level

CHART PAGE (Section 1.1)

- Chart reload
- Automatic/manual rewind
- Time line advance
- Advance chart

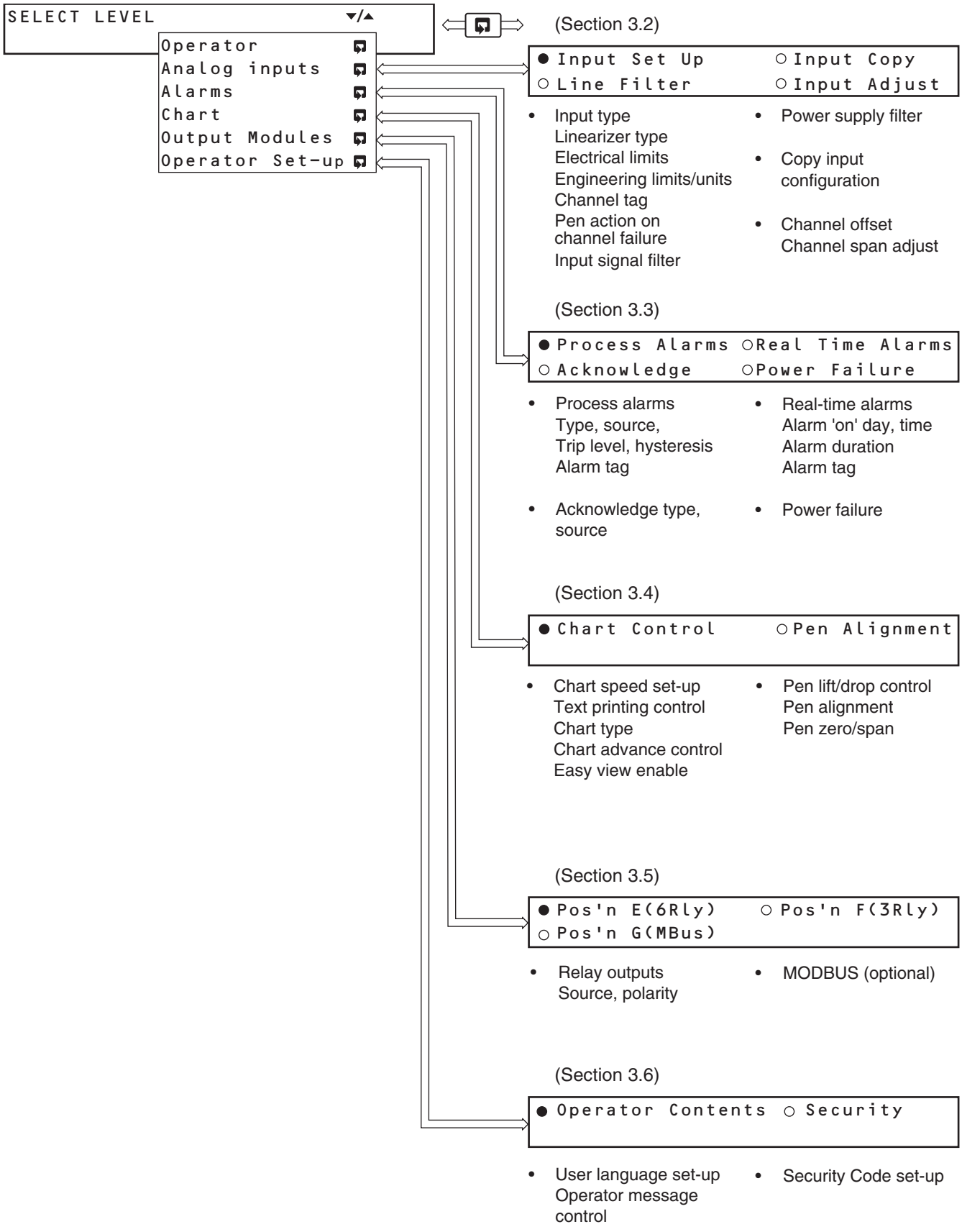
PROCESS REVIEW PAGE (Section 2.10)

- Cue and Review

CONFIGURATION (see overleaf)

- Analog input configuration
- Alarm configuration
- Output module configuration
- Chart control
- Operator Set-up

CONFIGURATION LEVEL OVERVIEW



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- *Level*
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- *Actuators*
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ABB Inc.
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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.

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