User Guide

IM/C320_6

Booster Pump Controller

C320

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. Q5907

EN 29001 (ISO 9001)

Lenno, Italy – Cert. No. 9/90A

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

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.

GETTING STARTED

The COMMANDER 320 Booster Pump Controller acts as a differential pressure switch for use in the regeneration section of a pasteurizer. If the difference between pasteurized milk pressure and raw milk pressure falls below a preset level, the controller shuts down the raw milk booster pump or alternatively, channels the pasteurized milk into the divert flow.

The COMMANDER 320 has the following features:

- Two 4 to 20mA analog inputs.
- A transmitter power supply capable of powering the raw and pasteurized 2-wire pressure transmitters.
- A digital display of the raw and pasteurized product pressures.
- A bargraph display of the difference between the raw and pasteurized pressures.
- A deviation alarm to detect when the difference between the raw and pasteurized pressures falls below a preset minimum.
- A start-up alarm which allows the booster pump to remain off until the normal system operating back pressure is achieved.
- A manual override facility which allows the booster pump to be turned off using a digital input.
- Selectable pressure differential retransmission output.
- Three relay outputs: two for booster pump or divert valve control, one to operate a warning light or horn.

This manual is divided into 4 sections and contains all the information necessary to install, configure and operate the instrument.

Displays and Function Keys
- Displays and function keys
- LED Indication
- Error Messages

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- Security Access

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- Set Up Alarms
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- Set Up Display
- Scale Adjustment
- Security Code Set Up
- Commissioning

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- Siting
- Mounting
- Electrical connections

Symbol Identification and Contents of Sections

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Section Page

1 DISPLAYS AND CONTROLS

1.1 Introduction – Fig. 1.1

The Commander 320 front panel display, function keys and LED indicators are shown in Fig. 1.1

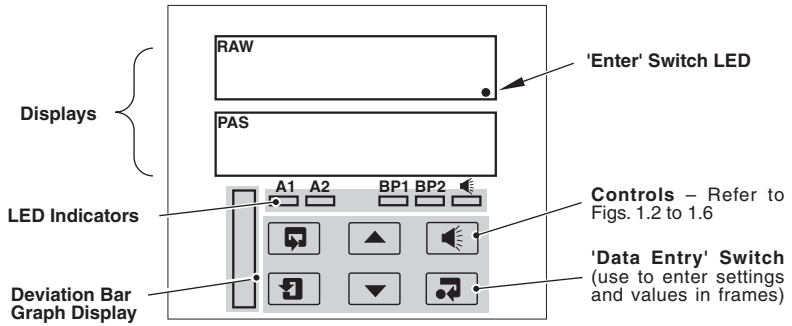


Fig. 1.1 Front Panel Display, Function Keys and LED Indicators

1.2 Use of Controls – Figs. 1.2 to 1.6

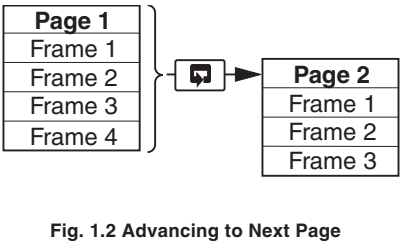


Fig. 1.2 Advancing to Next Page

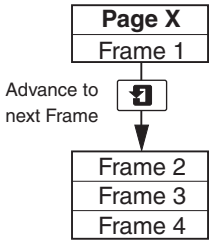
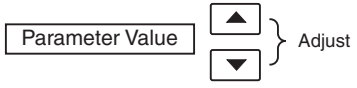


Fig. 1.3 Moving between Frames



Note. Continued pressure on the ▲ and ▼ switches causes the rate of change of the displayed value to increase. To make small adjustments operate the switches momentarily.

Fig. 1.4 Adjusting a Parameter Value

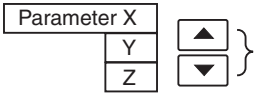


Fig. 1.5 Selecting a Parameter Choice

Used to acknowledge alarm A1 and de-energise relay 3

Fig. 1.6 Alarm Acknowledge Switch

1.3 Displays and LED Indicators

The displays, LED indicators and operation/programming controls are located on the faceplate on the front of the instrument. The displays comprise 2 rows of 6 characters.

A	A	**L**	L
B	b	**M**	-
C	C or c	**N**	N or n
D	d	**O**	O or o
E	E	**P**	P
F	F	**Q**	Q
G	G	**R**	r
H	H or h	**S**	S
I	I	**T**	t
J	J	**U**	U
K	K	**V**	V
		Y	y

Table 1.1 Character Set

1.3.1 LED Indications, Relay and Alarm States

LED indications, relay and alarm states are shown in Table 1.2. For electrical connections – see section 4.12.

LED	Display	Alarm/Relay State	Condition
A1	On	A1 Active and ackd.	Pasteurized I/P pressure: < Raw I/P pressure + divert trip level
	Flashing	A1 Active and unackd.	
	Off	A1 Inactive	Pasteurized I/P pressure: ≥ Raw I/P pressure + divert trip level
A2	On	A2 Active	Displayed on power up. Active until Pasteurized I/P pressure ≥ Start up trip level then remains inactive until power is switched off and on.
	Off	A2 Inactive	
BP1	Off	Relay 1 De-energised	Either A1 or A2 active
	On	Relay 1 Energised	A1 and A2 inactive
BP2	Off	Relay 2 De-energised	A1 active
	On	Relay 2 Energised	A1 inactive.
🔊	On	Relay 3 Energised	A1 active and unacknowledged.
	Off	Relay 3 De-energised	A1 acknowledged.

Table 1.2 LED Indications and Alarm States

1.3.2 Deviation Bargraph – Fig. 1.7

The deviation bargraph displays:

a) The difference between the raw pressure and pasteurized pressure inputs.
b) The deviation alarm trip value

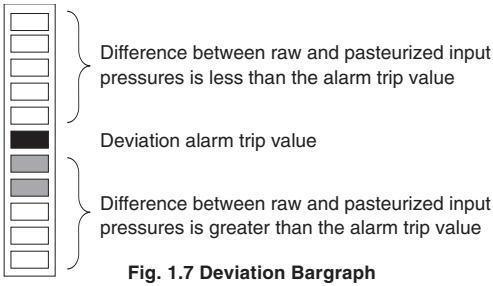
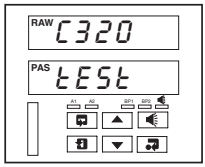


Fig. 1.7 Deviation Bargraph

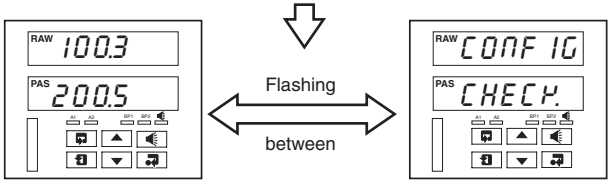
1.4 Instrument Power-up – Fig. 1.8

Caution. Ensure all connections, including the earth stud, are made correctly.

a) Check that the input sensors are installed correctly.
b) Switch on the supply to the instrument, any power-operated control circuits and the input signals.
c) The start-up sequence shown in Fig. 1.8 is displayed when the supply is first switched on.



Instrument Test identifies the instrument type, C320 – see *Table 4.1*



Normal Display

✳ **Configuration Check** indicates configuration error, acknowledged by pressing the switch.

Note. Acknowledging error clears the error but does not rectify the fault, check the configuration.

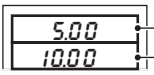
Fig. 1.8 Instrument Displays at Power-up

2 OPERATING LEVEL

2.1 Operating Page

Information. The instrument has a dedicated Operating page. This page is used for general monitoring of the process measurements and is not affected by the security system which inhibits access to the alarm set up and programming pages – see section 3

Operating Page



Pressure of raw product.
Pressure of pasteurized product.

If the difference between the two values falls below the required level, i.e. Alarm 1 becomes Active, both values flash ON and OFF.

2.2 Operating Page Messages

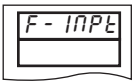
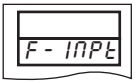
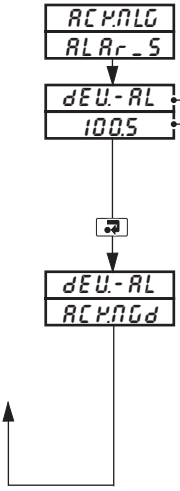
Message	Reason
	**Failed Input** – raw pressure input failure.
	**Failed Input** – pasturized pressure input failure.

Table 2.1 Input Error Messages Displayed in the Operating Page

2.3 Alarm Acknowledge Page



Page Header – **Acknowledge Alarms**

Upper Display
Shows the alarm identity and type when an alarm condition is present.

dEU.-AL – deviation alarm A1
SU-AL – start up alarm A2

Lower Display
Shows the trip level of the alarm identified in the upper display. When the alarm is acknowledged (↵ pressed), ACKNGd is displayed.

Note. If alarm A2 is active, SU-AL is displayed, but the alarm cannot be acknowledged.

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2.4 Security Access – Figs 2.1 and 2.2

A security system is used to prevent tampering with the program parameters by utilizing a security input together with an Alarm password and a Configuration password – see Figs. 2.1 and 2.2. Two levels of security are provided:

a) Security input **secure** – Alarm and configuration settings cannot be accessed. The security input may be protected by a tamper-proof seal – see Fig.2.3

b) Security input **insecure** – Alarm and configuration settings can be accessed by use of the correct password.

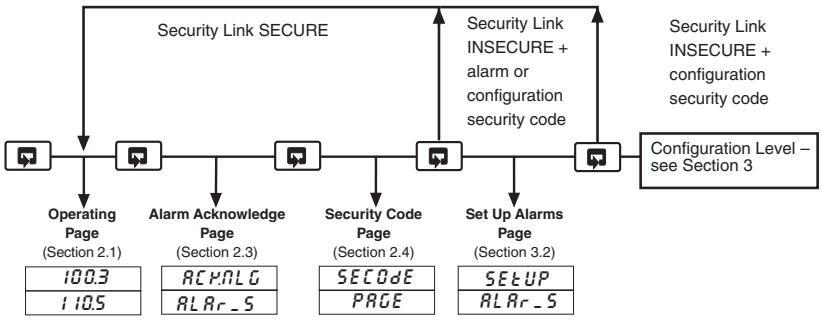


Fig. 2.1 Security Access

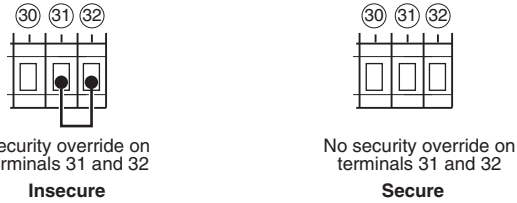


Fig. 2.2 Security Settings

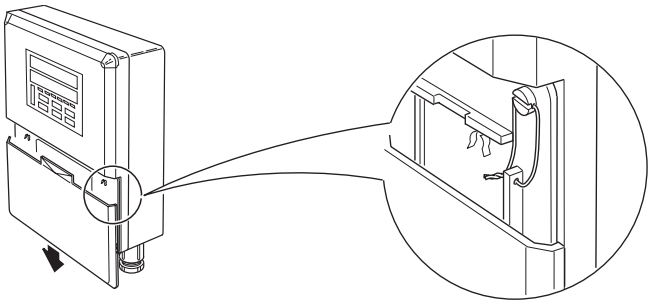
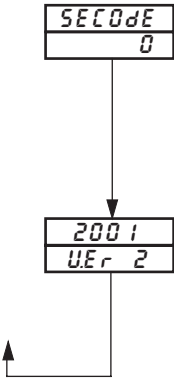


Fig. 2.3 Tamper-proof Seal

2.4.1 Security Code Page



Page Header **– Security Code Page**

Set the correct Alarm or Configuration password using the ▲ and ▼ switches and press the ↵ switch to enter the code.

The passwords are programmed in the **Access Page** – see Section 3.7.

Software version
The Upper display indicates the EPROM series.

The lower display indicates the version number.

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3 CONFIGURATION LEVEL

3.1 Preparation for Changes to the Parameters

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

Any change to the operating parameters are implemented using the ▲ or ▼ switches – see Section 2.

Note. The instrument responds instantly to parameter changes which are saved when the ↵ switch is pressed.

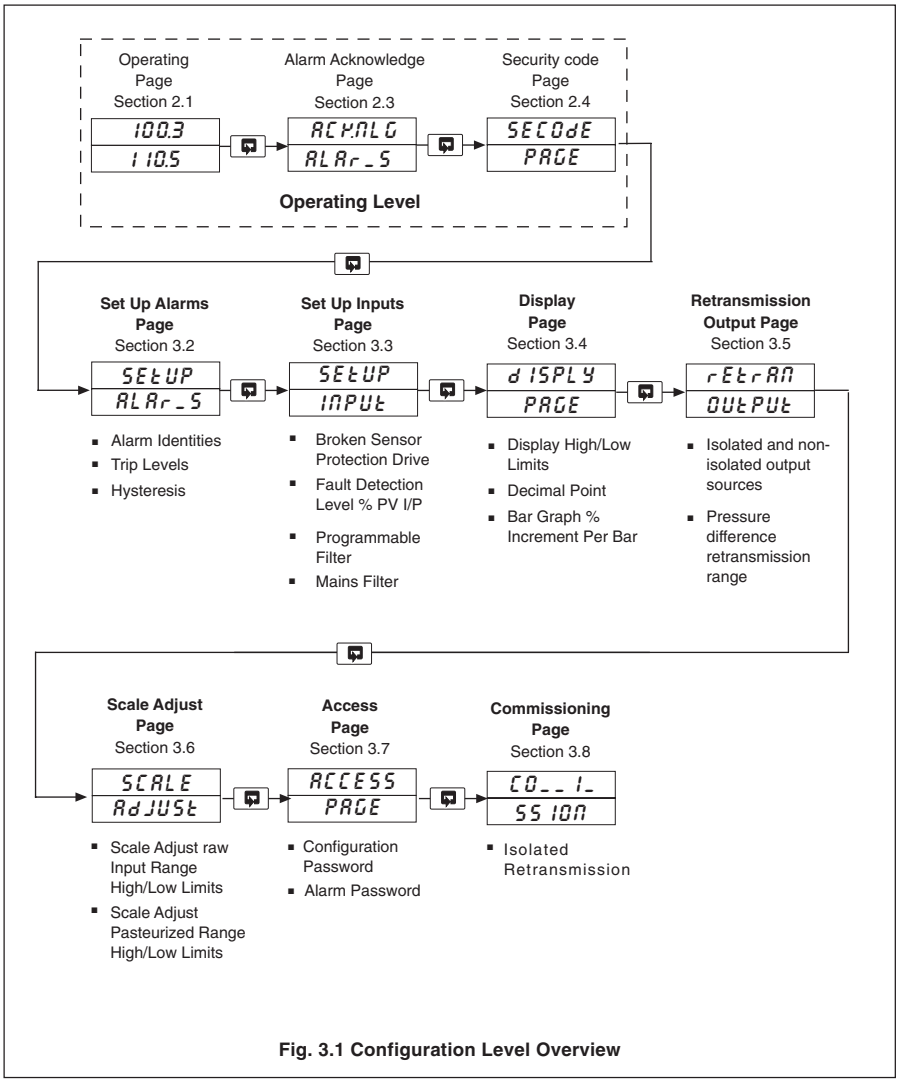


Fig. 3.1 Configuration Level Overview

3.2 Set Up Alarms Page

Information.
- Two alarms – identified A1 and A2 .
- Adjustable hysteresis value to prevent oscillation of alarm state.

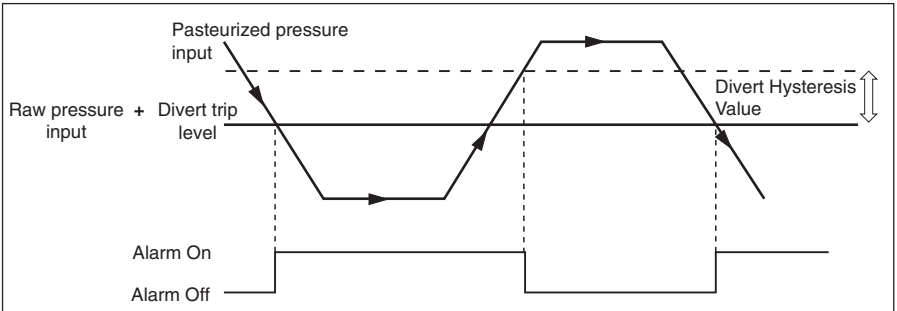
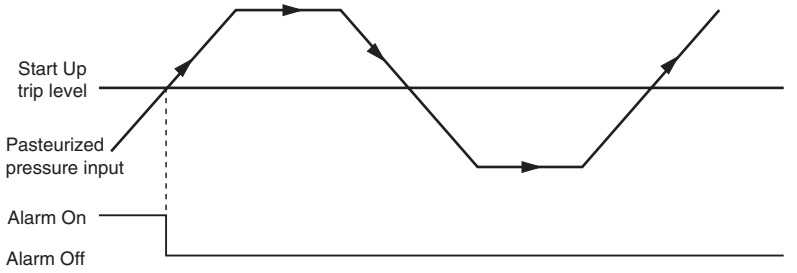


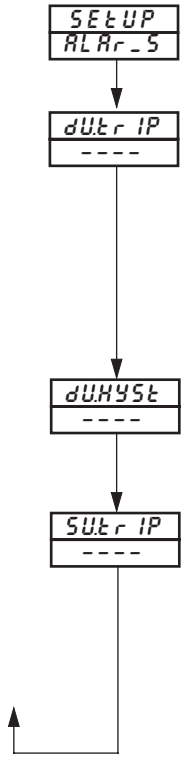
Fig. 3.2 Deviation Alarm A1



Information. From power up the alarm remains ACTIVE until the trip value is exceeded. The alarm then remains OFF until the controller is powered down and up again.

Fig. 3.3 Start Up Alarm A2

...3.2 Set Up Alarms Page



Page Header – **Set Up Alarms.**

Divert Trip Level
Set the trip level for alarm A1 in engineering units.

Note.
When alarm A1 is active, relays 1 and 2 are de-energised.
Alarm A1 can be acknowledged by the operator.
When A1 is active and unacknowledged relay 3 is energised.
When A1 is acknowledged relay 3 is de-energised.

Divert Hysteresis Level
Set the hysteresis level for alarm A1 in engineering units.

Start Up Trip Level
Set the trip level for alarm A2 in engineering units.

Note.
When alarm A2 is active, relay 1 is de-energised.
Alarm A2 cannot be acknowledged by the operator.

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3.3 Set Up Inputs – Fig. 3.4

Information.
- All changes made apply to both the raw and pasteurized pressure inputs.
- Both inputs are fixed, 4 to 20mA
- Programmable fault levels and actions.
- Digital filter reduces the effect of noise on inputs.

Example – mA input, range 0 to 100 with 10% fault detection levels.

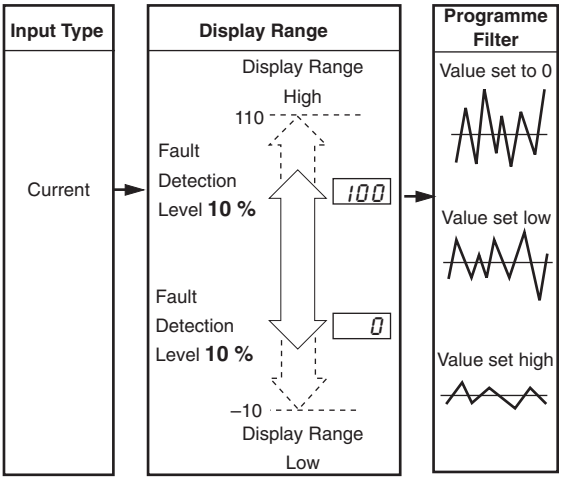
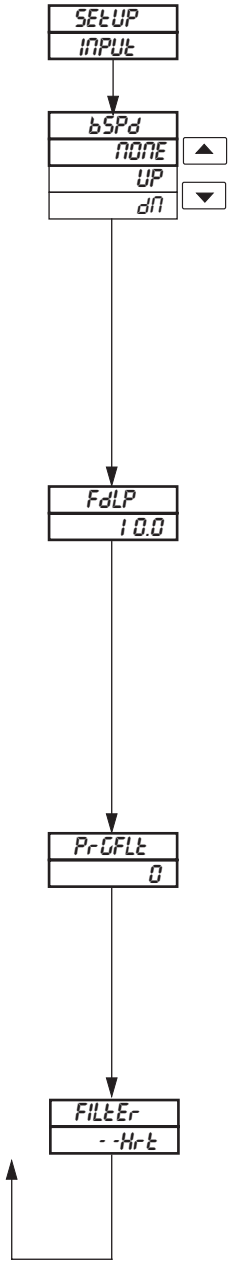


Fig. 3.4 Setting Up the Input

...3.3 Set Up Input Page



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

Broken Sensor Protection Drive
In the event of a fault being detected on the input, the displayed value is driven in the direction of the mode selected.

Select the broken sensor drive required:

nonE	–	No drive
UP	–	Upscale drive
dn	–	Downscale drive.

Note. When a broken input sensor is detected, the unit switches to Divert Mode and turns the booster pump OFF.

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

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

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

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

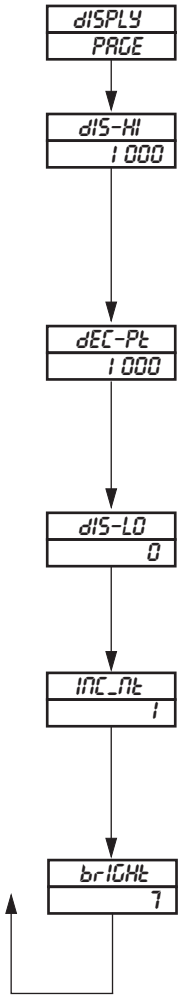
Set value required, between 0 and 60 in 1 second increments.

Mains Filter
Set the frequency of the mains supply used (50 or 60Hz).

Return to top of page.

3.4 Set Up Display Page

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



Page header – **Display Page.**

Display Full Scale
Set the display value which represents the maximum pressure input signal, between –9999 and +9999.

Example – For an input range of 4 to 20mA representing a pressure range of 0.0 to 20.0 psi,, set 200. The decimal point position is set at the next parameter.

Decimal Point Position
Set the required number of decimal places for both the display full scale and display zero values. In the example shown above, set the decimal point position to show increments of 0.1 psi, i.e. 200.0.

Display Zero
Set the display value which represents the minimum pressure input signal, between –9999 and +9999.
In the example shown above, set 0.0. The decimal point position is set automatically.

Increment Per Bar (Bargraph)
This frame sets the deviation from the deviation alarm trip value that each bar of the **Deviation Bargraph** represents. Set the value required, in engineering units.

The decimal point position is set automatically

Brightness Adjustment
Select the required display brightness between 4 and 7.

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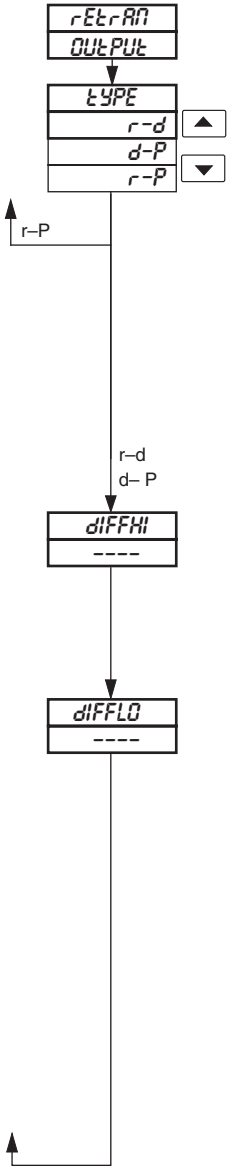
3.5 Retransmission Output Page

Information.
- Retransmission types – allows retransmission of any two signals, i.e. raw product pressure, pasteurised product pressure, pressure difference.
- Adjustable pressure difference output range.
- 4 to 20mA outputs.



Page header – **Retransmission Output Page.**

Retransmission Types
Select the retransmission signals required.

Type	Non-isolated O/P	Isolated O/P
Outputs not interchanged (NO) see page 19		
r – d	Raw Product Pressure	Calculated Pressure Difference
d – P	Calculated Pressure Difference	Pasteurized Product Pressure
r – P	Raw Product Pressure	Pasteurized Product Pressure
Outputs interchanged (YES) see page 19		
r – d	Calculated Pressure Difference	Raw Product Pressure
d – P	Pasteurized Product Pressure	Calculated Pressure Difference
r – P	Pasteurized Product Pressure	Raw Product Pressure

Pressure Difference Output High Value
Set the level of pressure difference at which 20mA output is required (see Note).

Set the value in engineering units between –9999 and 9999 (the decimal point position is set automatically).

Pressure Difference Output Low Value
Set the level of pressure difference at which 4mA output is required (see Note).

Set the value in engineering units between –9999 and 9999 (the decimal point position is set automatically).

Note. The pressure difference is calculated as: pasteurized product pressure – raw product pressure.

Therefore, a positive value = pasteurized product pressure > raw product pressure.

A negative value = raw product pressure > pasteurized product pressure.

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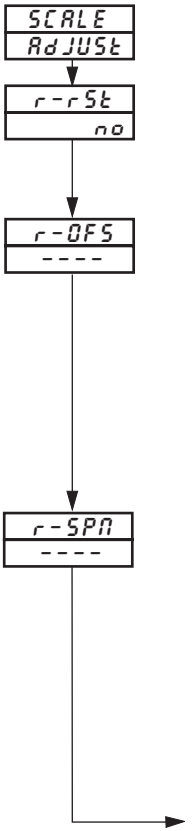
3.6 Scale Adjustment Page

Information.
- Scale Adjustment Reset – removes any previously programmed offset or scale adjustment settings.
- System offset errors – can be removed using Offset Adjustment.
- System scale errors – can be removed using Span Adjustment.
- Offset/Span Adjustment – can be used to perform spot calibration.

Switch off the power supply. Connect accurate signal sources, suitable for simulation over the entire input ranges, in place of the raw product process connections (terminals 13 and 14) and pasteurized product process connections (terminals 16 and 17).

As a general rule, spot calibration values should be:
< 50% of range span value when using Offset Adjustment parameters.
> 50% of range span value when using Span Adjustment parameters.



Page header – **Scale Adjustment**

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

Raw Input Offset Adjustment
Apply the correct input for the spot calibration required.

Note. The displayed units are engineering units.
Set the value required. The decimal point position is set automatically.

Example – If the display range is 0.0 to 20.0 and a spot calibration is required at 5.0 and 15.0, inject a signal equivalent to 5.0 and set the display to 5.0.

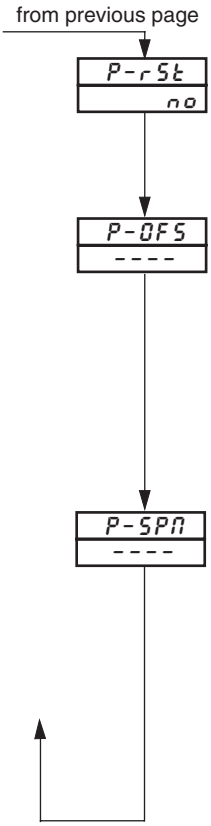
Raw Input Span Adjustment
Proceed as for **Raw Input Offset Adjustment** and apply the correct input for the spot calibration required. Engineering units are displayed.

Set the value required. The decimal point position is set automatically.

For the Example above inject a signal equivalent to 15.0 and set the display to 15.0.

Continued on next page.

...3.6 Scale Adjustment Page



Pasteurized Input Scale Adjustment Reset
Select YES and press ↵ to reset the process variable offset and span values to their nominal values. dONE is displayed to indicate that these parameters have been reset.

Pasteurized Input Offset Adjustment
Apply the correct input for the spot calibration required.

Note. The displayed units are engineering units.
Set the value required. The decimal point position is set automatically.

Example – If the display range is 0.0 to 20.0 and a spot calibration is required at 5.0 and 15.0 inject a signal equivalent to 5.0 and set the display to 5.0.

Pasteurized Input Span Adjustment
Proceed as for **Raw Input Offset Adjustment** and apply the correct input for the spot calibration required. Engineering units are displayed.

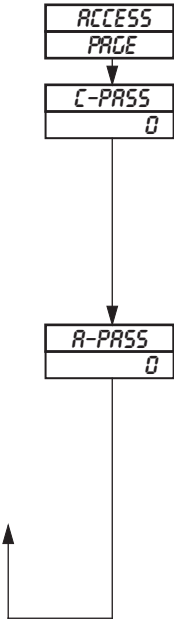
Set the value required. The decimal point position is set automatically.

For the Example above inject a signal equivalent to 15.0 and set the display to 15.0.

Return to top of page.

3.7 Access Page

Information.
- **Alarm Password** – protects the alarm settings.
- **Configuration Password** – protects the controller configuration setup.



Page Header – **Access Page.**

Configuration Password
The configuration password enables access to all programming pages (Security Level 2).

Note. The password has no effect if the security link is in the 'secure' position – see Section 2.4

Set the required password, between 0 and 1999.

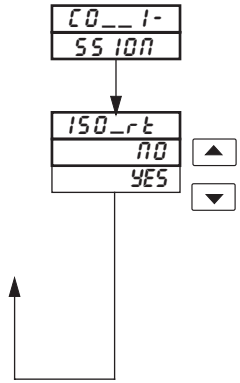
Alarm Password
The alarm password enables access to the **Alarm Set Up page** in addition to the **Operating Page** (Security Level 1).

Note. The password has no effect if the security link is in the 'secure' position – see Section 2.4

Set the required password, between 0 and 1999.

Return to top of page.

3.8 Commissioning



Page header – **Commissioning**

Isolated Retransmission Output
Allows the isolated and non-isolated retransmission outputs to be inter-changed.

NO – Outputs not interchanged (see table on page 15).

YES – Outputs interchanged (see table on page 15 – isolated and non-isolated output sorces are reversed).

Return to top of page.

4.1 Checking the Code Number – Fig. 4.1

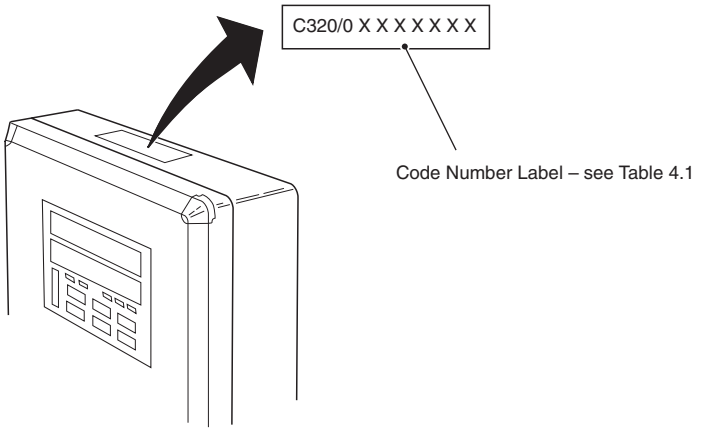


Fig. 4.1 Location of Code Number Label

COMMANDER 320 Booster Pump Controller		**C320/**	**0X**	**X**	**X**	**XXXX**
Option Board	None		**0**			
Power Supply	115V AC * 230V AC 24V AC			**1** **2** **3**		
Build	Standard				**0**	
Configuration Special Features	Configured to Factory Standards Configured to Customers Details Agreed Special Feature					**STD** **CUS** **SPXX**

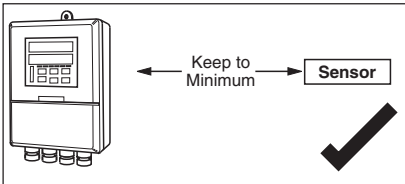
* 115V AC versions are fitted with 0.5in NPT gland entry fixings – see section 4.7.2

Table 4.1 Identification of Instrument Code Number

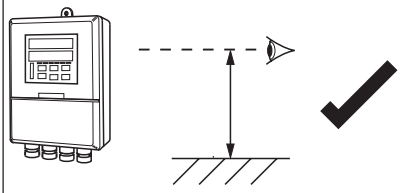
EC Directive 89/336/EEC

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.

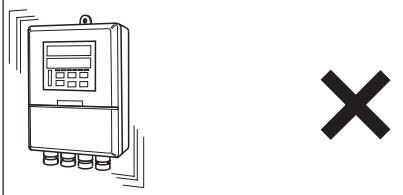
4.2 Siting – Figs. 4.2 and 4.3



A – Close to Sensor

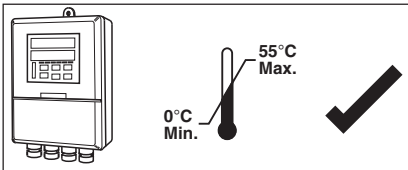


B – At Eye-level Location

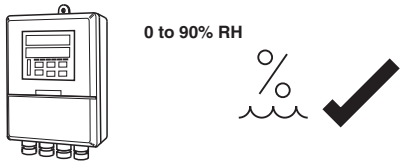


C – Avoid Vibration

Fig. 4.2 General Requirements



A – Within Temperature Limits



B – Within Humidity Limits

Caution. Select a location away from strong electrical and magnetic fields. If these cannot be avoided, particularly in applications where 'walkie talkies' are used, connect using screened cables within earthed metal conduit.

C – Use Screened Cables

Fig. 4.3 Evironmental Requirements

4.3 Mounting – Figs. 4.4 and 4.5

The instrument is designed for wall-/pipe-mounting – see Fig. 4.5. Overall dimensions are shown in Fig. 4.4.

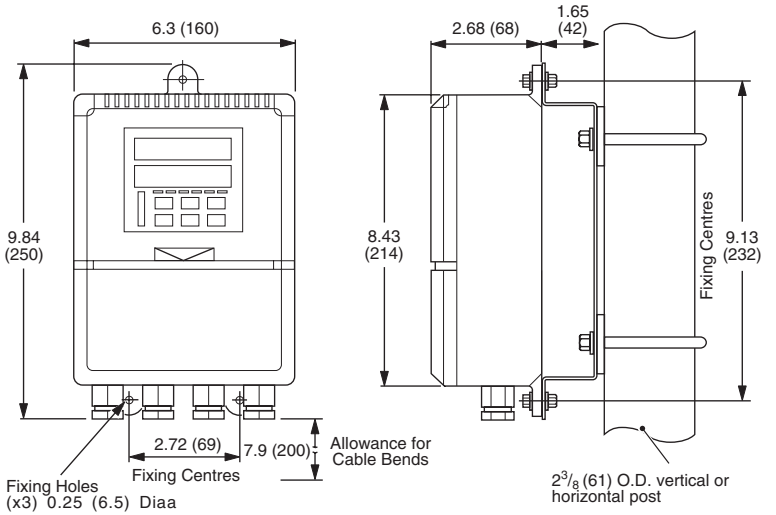


Fig. 4.4 Overall Dimensions

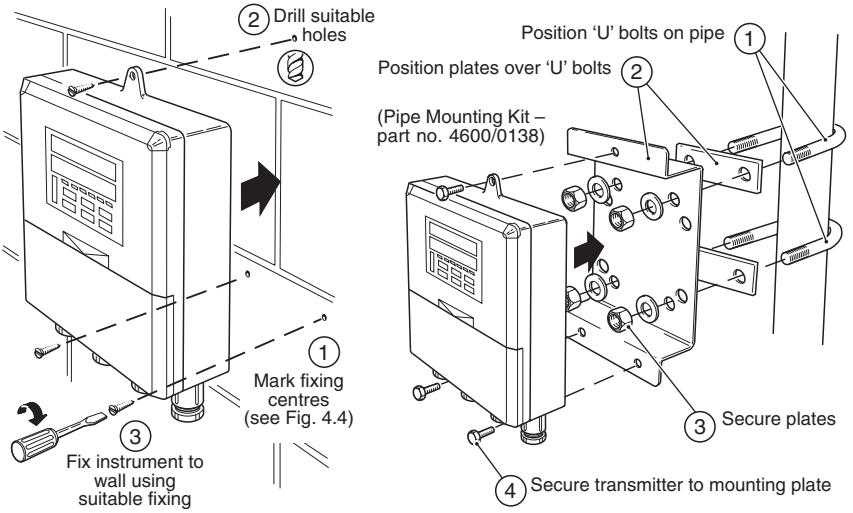


Fig. 4.5 Wall-/Pipe-mounting Details

Warning. Before making any connections, ensure that the power supply, any high voltage-operated control circuits and high common mode voltages are switched off.

Note.
- Always route signal leads and power cables separately, preferably in earthed metal conduit.
- It is strongly recommended that screened cable is used for signal inputs and relay connections. Connect the screen to the ground stud.

Information. Use cable appropriate for the load currents. The terminals accept cables up 12AWG (2.5mm^2).

4.4 Access to Terminals – Fig. 4.6

For access to terminals – refer to Fig. 4.6, steps ① to ③.

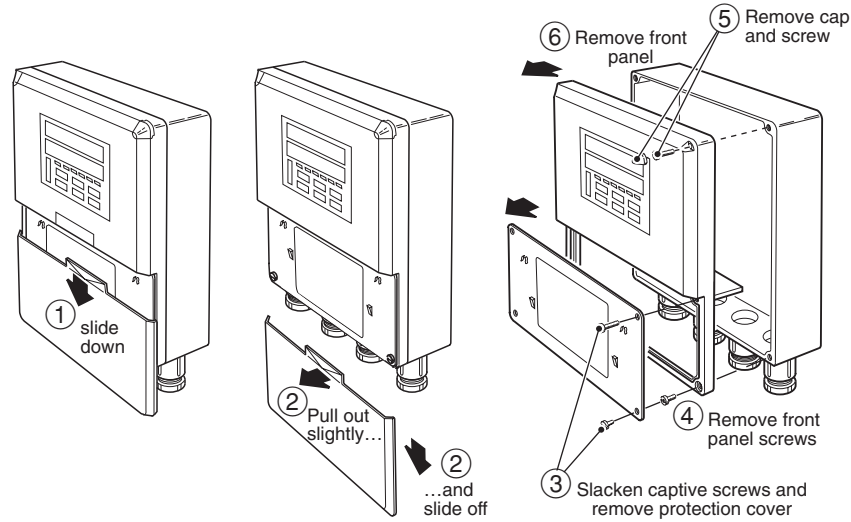


Fig. 4.6 Access to Terminals and Processor Board

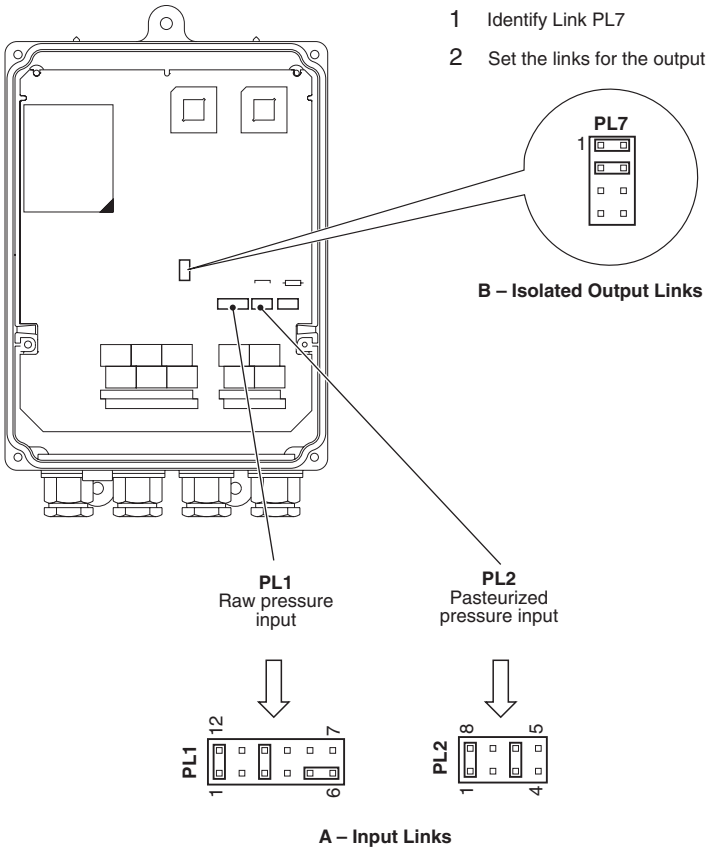
4.5 Setting the Input Selector Links – Fig. 4.7

Remove the instrument front panel – see Fig. 4.6, steps ① to ⑥.

The positions of the input links is shown in Fig. 4.7 detail A.

4.6 Setting the Isolated Output Link – Fig. 4.7

The positions of the isolated output links is shown in Fig. 4.7 detail B.



Note. The links are factory set and should not be moved from these positions.

Fig. 4.7 Setting the Input and Output Links

4.7 Cable Glands and Conduit Fixings

4.7.1 Cable Glands (IEC – 20mm) – Fig. 4.8

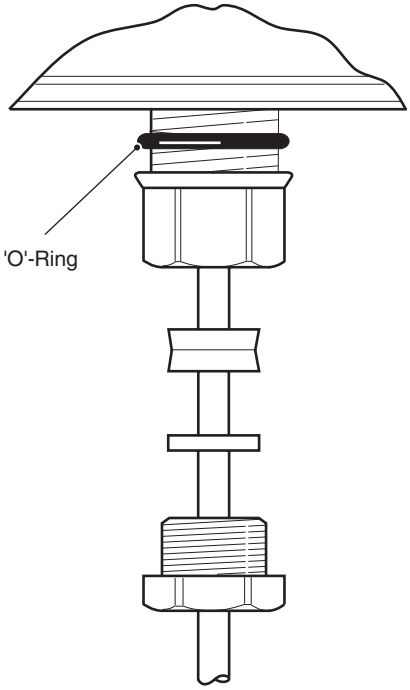


Fig. 4.8 Cable Gland (Supplied as Standard)

4.7.2 Conduit Adaptors (N. American – 0.5in) – Fig. 4.9

Warning.
- Rigid conduit must NOT be fitted to the controller.
- Controller adaptors must incorporate a face seal.
- Torque settings for the hubs and outer nuts on the specified adaptors is 20ft. lbs minimum, 25ft. lbs. maximum.

Information.
- Suitable adaptors for controller (mandatory for FM installations):
  APPLETON
  ST-50 PLUS STG-50 or STB-50 PLUS STG-50.
  Reusable ONLY with replacement ferrule STF-50.
  O.Z. GEDNEY
  4Q-50, 4Q50T or 4Q-50TG.

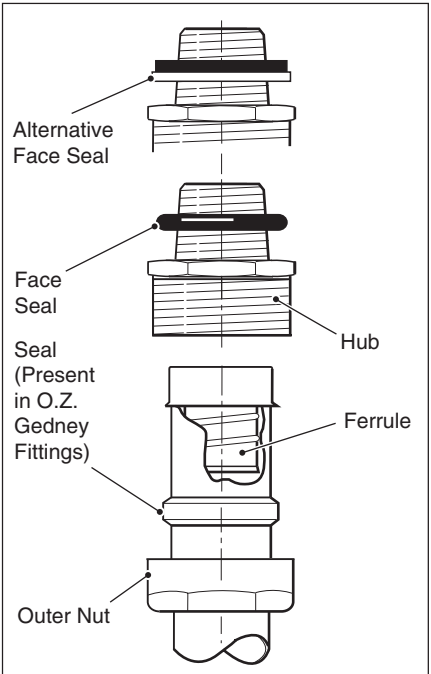


Fig. 4.9 Conduit Adaptors

4.7.3 Cable Glands (N. American – 0.5in) – Fig. 4.10

Warning.
- Controller glands must be fitted with a face seal.
- Torque settings (hubs only) – 20ft. lbs minimum, 25ft. lbs. maximum.
- Outer nuts – hand tight plus a half turn only.

Information.
- Suitable Cable Glands: (mandatory for FM installations):
  O.Z. GEDNEY
  SR-50-375 or SR-504
  APPLETON
  CG 3150 or CG-3150S (and STG-50 sealing ring).
  THOMAS & BETTS
  2521.
- When fitting cable glands to the controller, start with an outer gland and also temporarily fit a gland at the opposite end, to aid location of the transmitter gland plate. Fit and tighten glands consecutively from initial gland.

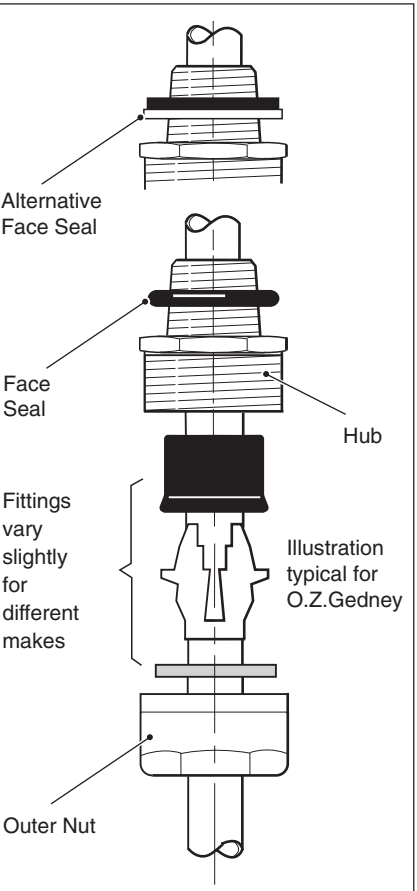


Fig. 4.10 Cable Glands

4.8 Connections Summary – Fig. 4.11

Information.
Input impedance: Current 10Ω.

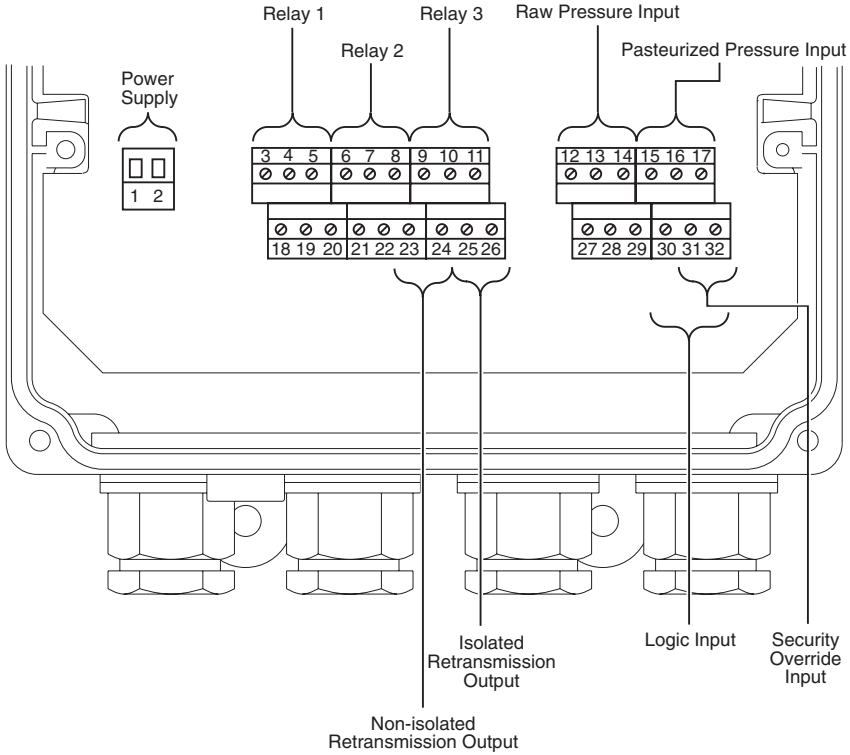


Fig. 4.11 Terminal Block Identification

Terminal Number			
	AC Supply		
1 2	L N	24V, 115V or 230V a.c.	– see Fig. 4.17
3 4 5	N/O C N/C	Relay 1 Output – see Fig. 4.14	Booster pump or divert valve
6 7 8	N/O C N/C	Relay 2 Output – see Fig. 4.14	Booster pump or divert valve
9 10 11	N/O C N/C	Relay 3 Output – see Fig. 4.16	Alarm Annunciator
12 13 14	2-wire TX Input 1+ Input 1–	Raw pressure Input – see Figs. 4.12 and 4.13	
15 16 17	Input 2+ Input 2–	Pasteurized pressure Input – see Figs. 4.12 and 4.13	
18 19 20 21 22			
23 24	+ –	Non-isolated 4 - 20mA Retransmission Output – see Fig 4.14	
25 26	+ –	Isolated 4 - 20mA Retransmission Output – see Fig 4.14	
27 28 29			
30 31 32	Logic Input 1 Security Override Input Common for Logic Input and Security Override Input	see Fig. 4.15 see Fig. 2.2	

Table 4.2 Electrical Connections

4.9 Input Connections

4.9.1 Current Input – Fig. 4.12

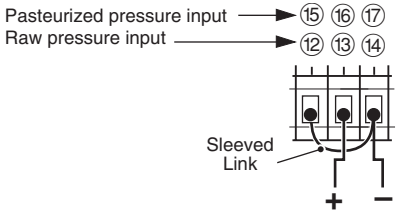


Fig. 4.12 Current Input Connections

4.9.2 2-wire Transmitter – Fig. 4.13

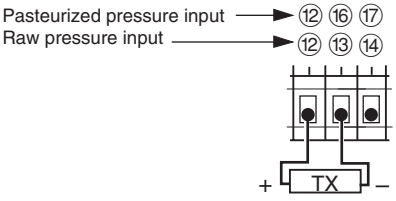
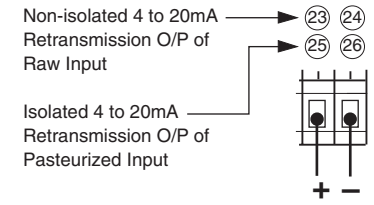


Fig. 4.13 2-wire Transmitter Connections

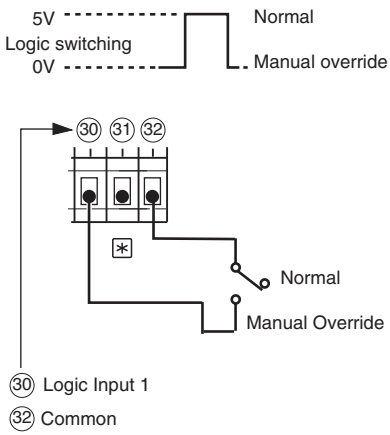
4.10 Output Connections – Fig. 4.14



Information.
The isolated and non-isolated outputs may be interchanged – see section 3.7

Fig. 4.14 Retransmission Output Connections

4.11 Logic Input Connection – Fig. 4.15



Note. The manual override de-energises Relay 1 allowing the operator to turn the booster pump off manually.

Fig. 4.15 Logic Input Functions

4.12 Relay Connections – Fig. 4.16

See Table 4.3 for relay and alarm states.

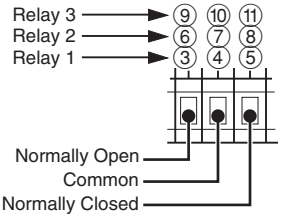


Fig. 4.16 Relay Connections

	Deviation Alarm (A1)	Start-up Alarm (A2)	Logic Input 1	Relay state
Relay 1 for booster pump or divert valve control	Active X X Inactive	X Active X Inactive	X X Manual override Normal	De-energised De-energised De-energised Energised
Relay 2 for booster pump or divert valve control	Active Inactive	X X	X X	De-energised Energised
Relay 3 for warning light or horn	Active & Unack Active & ack Inactive	X X X	X X X	Energised De-energised De-energised

* X = Don't care

Table 4.3 Relay and Alarm States

4.13 Power Supply Selection and AC Connections – Fig. 4.17

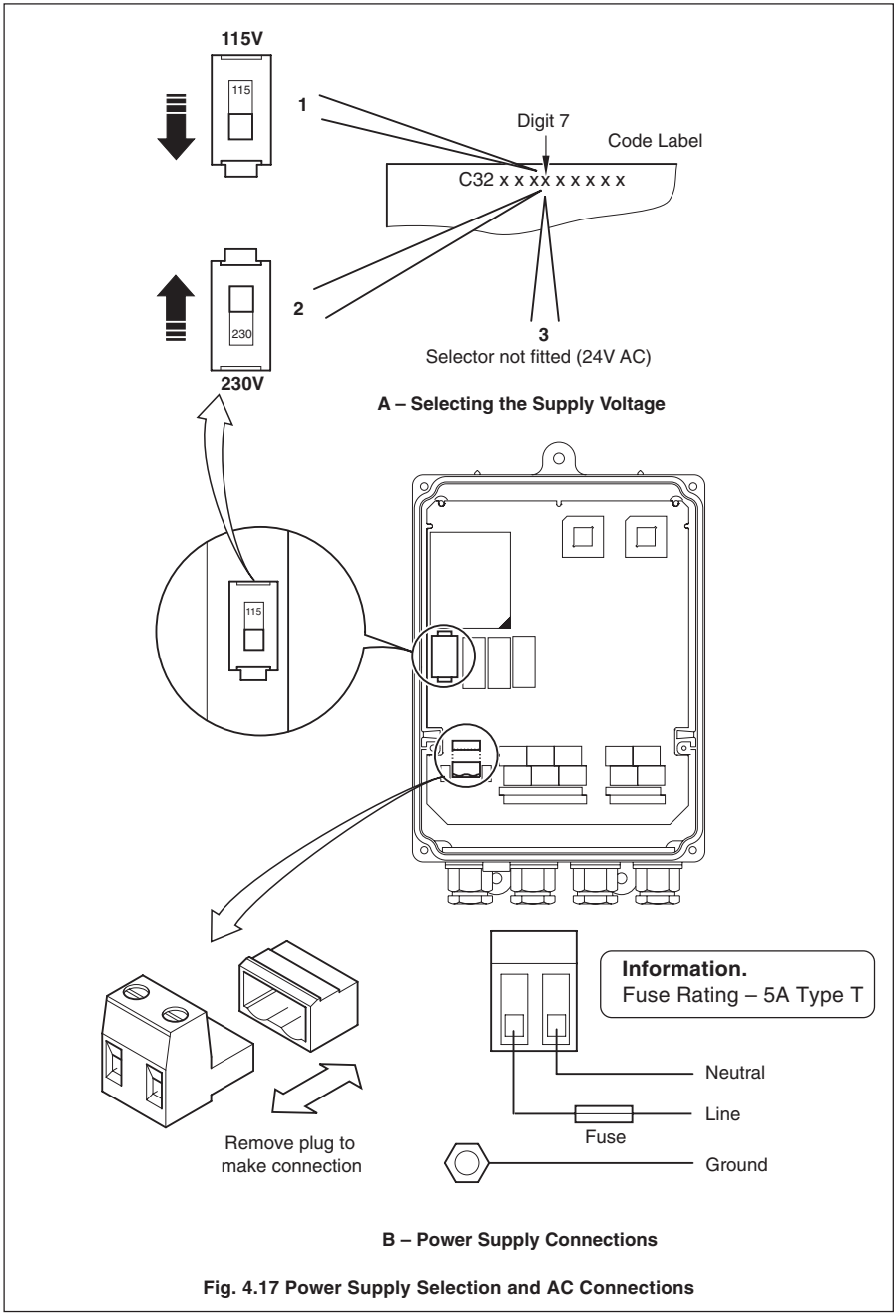


Fig. 4.17 Power Supply Selection and AC Connections

SPECIFICATION

Summary

C320 Booster Pump Controller

Two analog inputs

Three relays

Two analog outputs

IP66 (NEMA 4X) housing

Operation

Display

High-intensity, 7-segment, 0.56 in. (14mm), 2 x 6 red LED display

11-element l.e.d. deviation bargraph

Configuration

User-defined via front panel

Analog Inputs

Number

Two 4 to 20mA signals

Input sampling rate

160ms per channel

Input impedance

10Ω

Broken sensor protection

Programmable Up/Downscale or None

Input noise rejection

Common mode rejection	>140dB at 50/60Hz with 500Ω imbalance
Series mode rejection	>60dB at 50/60Hz

Accuracy

Measurement error	<±0.2% of reading or ±0.5μA
Display range	–9999 to +9999

Transmitter power supply

24V 60mA max. powers two loops, fitted as standard

Outputs/Inputs

Relay outputs

Three relays – SPDT 5A 120/240V AC normally open or normally closed:

Relay 1 – for booster pump or bypass valve control

Relay 2 – for booster pump or bypass valve control

Relay 3 – for warning light or horn

Retransmission

4 to 20mA for Raw and Pasteurized Product or pressure differential

Max. load	15V (750Ω at 20mA)
Accuracy	≤0.1% of span

Logic input – for manual switching of Pump or Valve

TTL or Volt-free

Minimum pulse 250ms

Electrical

Voltage

115V ±15% or 230V ±15% 50/60Hz (link selectable)

Power consumption

<10VA

Power interruption protection

<60ms/<3 cycles, no effect

>60ms/>3 cycles, controlled reset

Environmental

Operating limits

14° to 131°F (–10° to 55°C), 0 to 95%RH non-condensing

Temperature stability

<0.02% of reading or 0.5μV/°F (1μV/°C)

Housing dust/water protection

IP66 (NEMA 4X)

EMC

Emissions and Immunity

Meets requirements of IEC 61326 for an Industrial Environment

CE marked

SS/C320 Issue 5

PRODUCTS & CUSTOMER SUPPORT

Products

Automation Systems

- ***for the following industries:***
  - Chemical & Pharmaceutical
  - Food & Beverage
  - Manufacturing
  - Metals and Minerals
  - Oil, Gas & Petrochemical
  - Pulp and Paper

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- ***Drive systems***
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- ***Paperless Recorders***
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- ***Level***
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- ***Positioners***

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- ***pH, conductivity, and dissolved oxygen transmitters and sensors***
- ***ammonia, nitrate, phosphate, silica, sodium, chloride, fluoride, dissolved oxygen and hydrazine analyzers.***
- ***Zirconia oxygen analyzers, katharometers, hydrogen purity and purge-gas monitors, thermal conductivity.***

Customer Support

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

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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.

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The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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