YEAR 2000 COMPLIANT

User's Guide

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CN3440 SERIES
Universal Temperature & Process Controllers

Installation Guide

WARRANTY/DISCLAIMER

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

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

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

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

RETURN REQUESTS / INQUIRIES

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

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

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

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

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

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

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

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CONTENTS

1 INTRODUCTION

The instrument documentation is shown in Fig. 1.1. The **Standard Manuals**, including the specification sheet, are supplied with all instruments. The **Modbus Supplement** is supplied with instruments configured for Modbus Serial Communication.

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

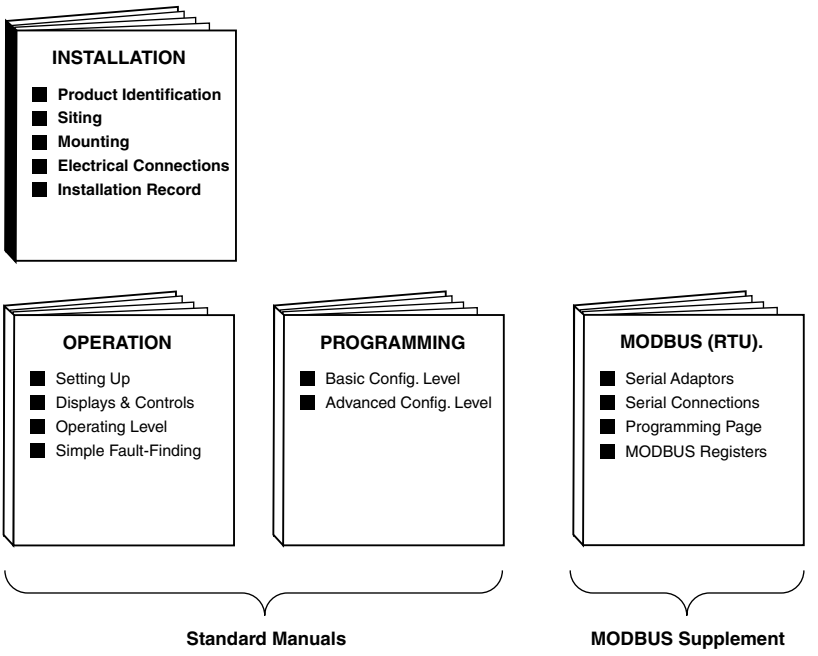


Fig. 1.1 Documentation

2 PREPARATION

2.1 Checking the Code Number – Fig. 2.1

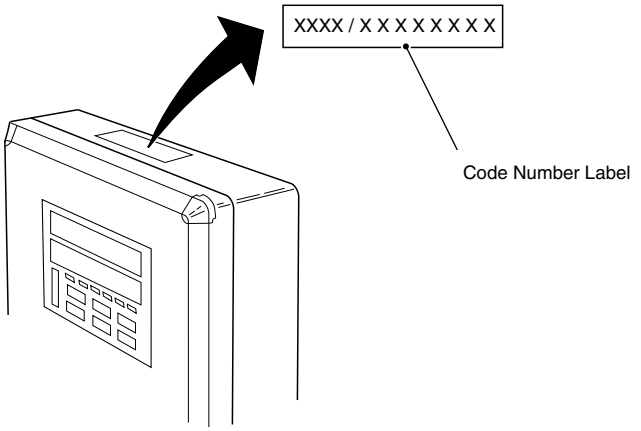


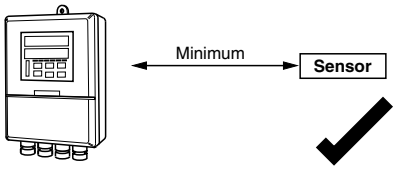
Fig. 2.1 Location of Code Number Label

3 MECHANICAL INSTALLATION

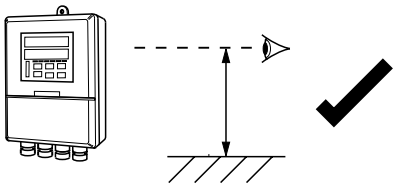
EC Directive 89/336/EEC

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.

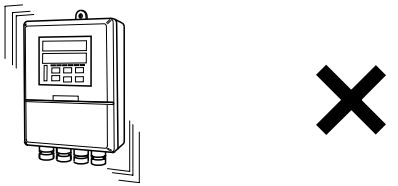
3.1 Siting – Figs. 3.1 and 3.2



A – Close to Sensor

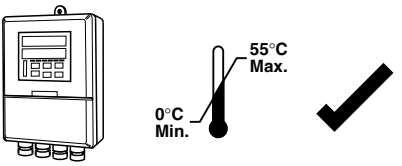


B – At Eye-level Location

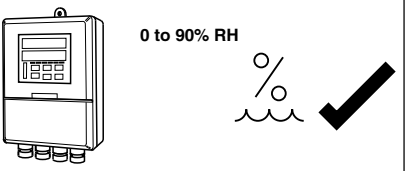


C – Avoid Vibration

Fig. 3.1 General Requirements

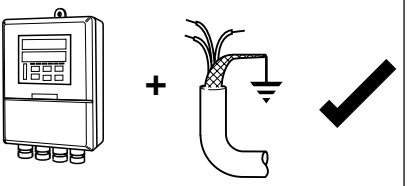


A – Within Temperature Limits



B – Within Humidity Limits

C – Within Protection Rating 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.

D – Use Screened Cables

Fig. 3.2 Environmental Requirements

3.2 Mounting – Figs. 3.3 and 3.4

The instrument is designed for wall-/pipe-mounting – see Fig. 3.4. Overall dimensions are shown in Fig. 3.3.

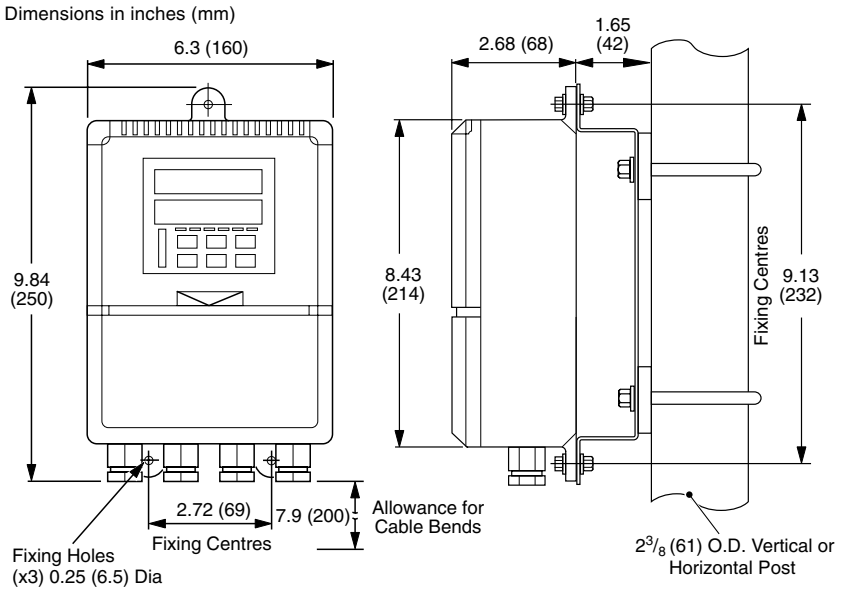


Fig. 3.3 Overall Dimensions

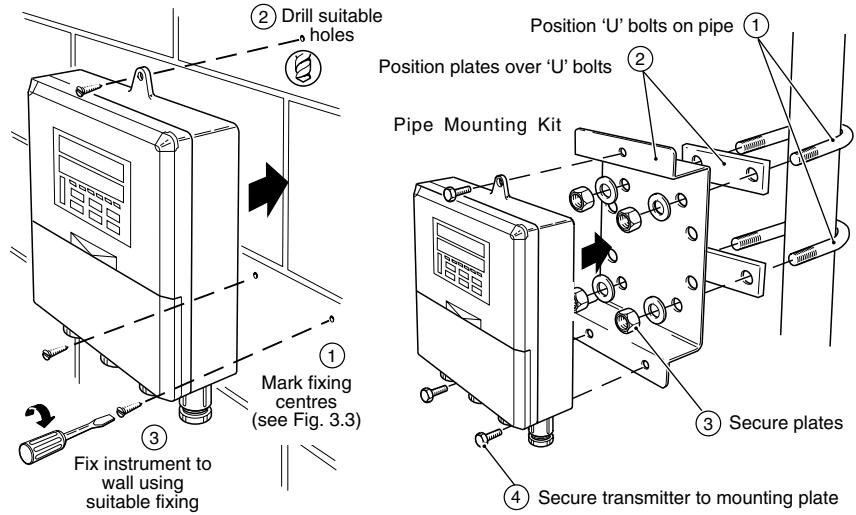


Fig. 3.4 Wall-/Pipe-mounting Details

4 ELECTRICAL INSTALLATION

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).

4.1 Access to Terminals – Fig. 4.1

For access to terminals – refer to Fig. 4.1, steps ① to ③.

4.2 Setting the Input Selector Links – Fig. 4.2A

Plug-in links on the microprocessor p.c.b. are positioned according to the type of Process Variable Input, Remote Set Point Input and Valve Position Feedback Inputs used.

Remove the instrument front panel – see Fig. 4.1, steps ① to ⑥.

Referring to Fig. 4.2A, set the link positions for the input type required.

4.3 Setting the Isolated Output Link – Fig. 4.2B

A plug-in link (PL7) on the microprocessor p.c.b. is positioned according to the isolated output required, either a current proportioning control output (programmable in range 0 to 20mA) or a 12V logic output (minimum load 400Ω). Referring to Fig. 4.2B – steps ① and ②, set the link for the output type required.

To use a 12V logic output, the control type must be set to Time Proportioning Control – see Fig. 3.1 *of the Programming Guide*.

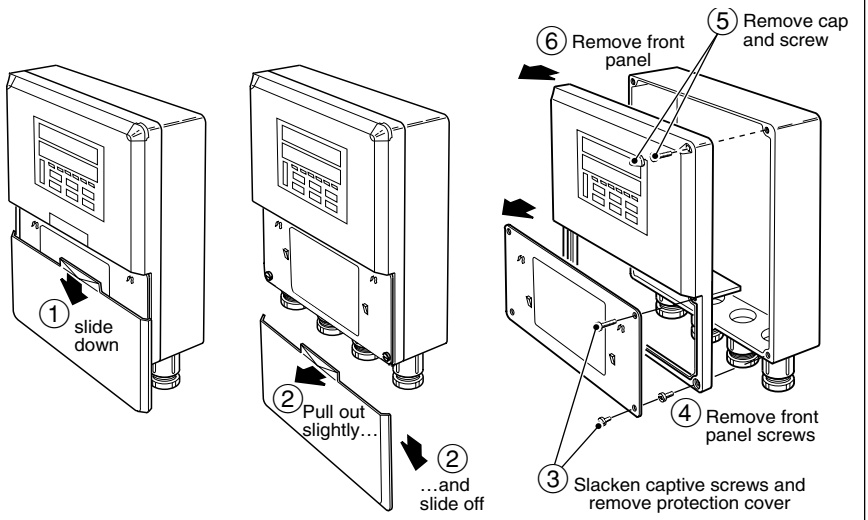


Fig. 4.1 Access to Terminals and Processor Board

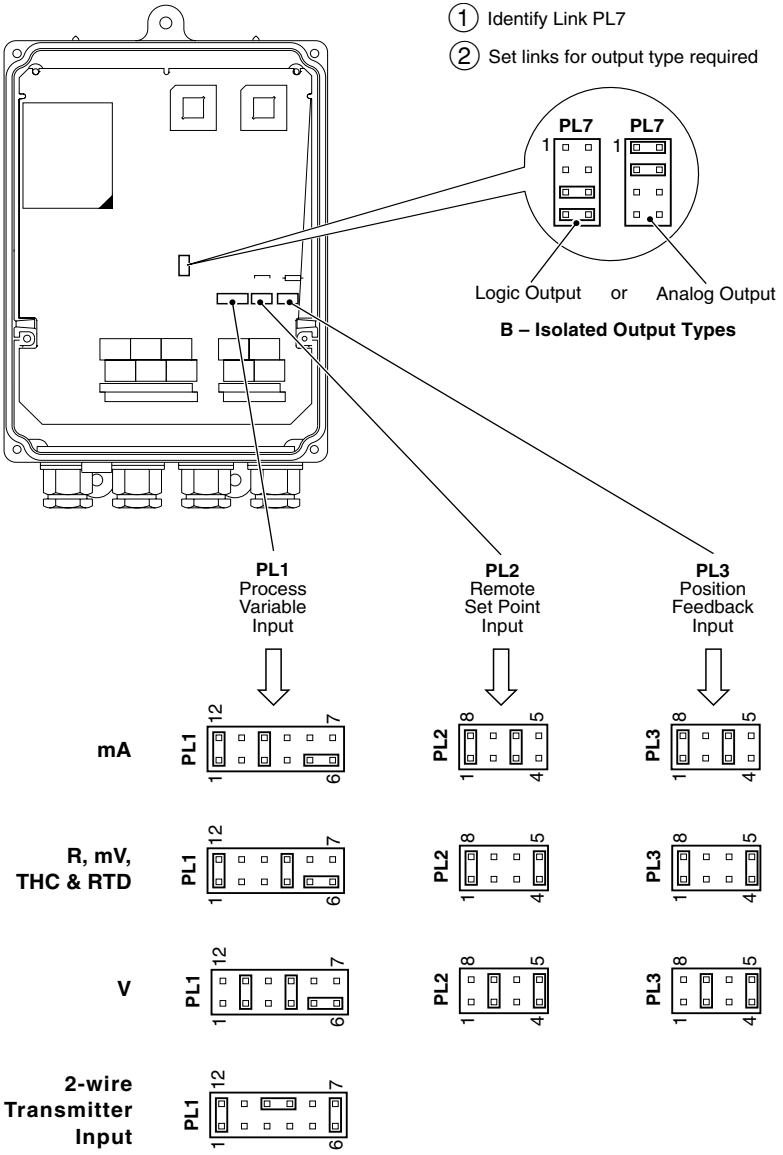


Fig. 4.2 Setting the Selector Links

4.4 Cable Glands and Conduit Fixings

4.4.1 Cable Glands (IEC – 20mm) – Fig. 4.3

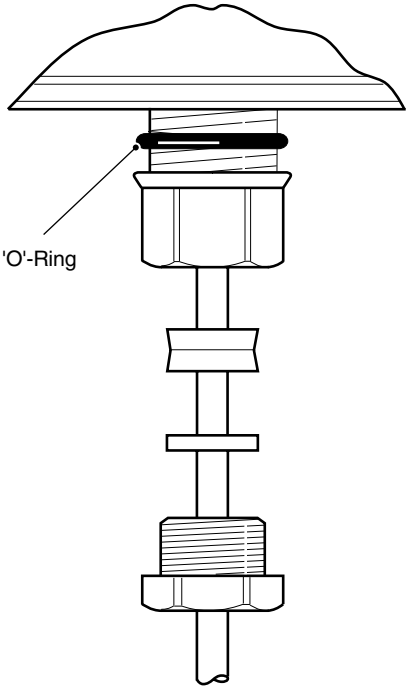


Fig. 4.3 Cable Gland (Supplied as standard)

4.4.2 Conduit Adaptors (N. American – 0.5in) – Fig. 4.4

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.

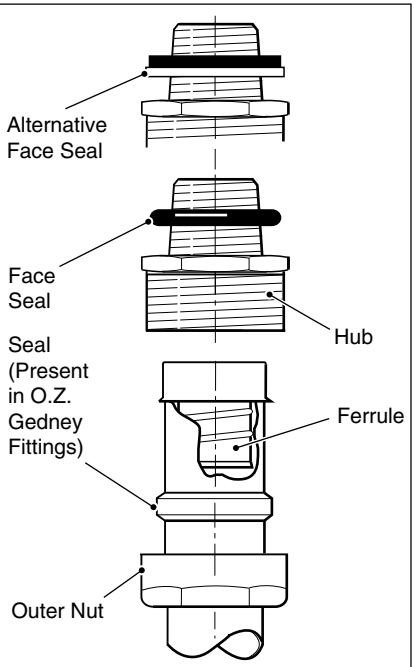


Fig. 4.4 Conduit Adaptors

4.4.3 Cable Glands (N. American – 0.5in) – Fig. 4.5

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.

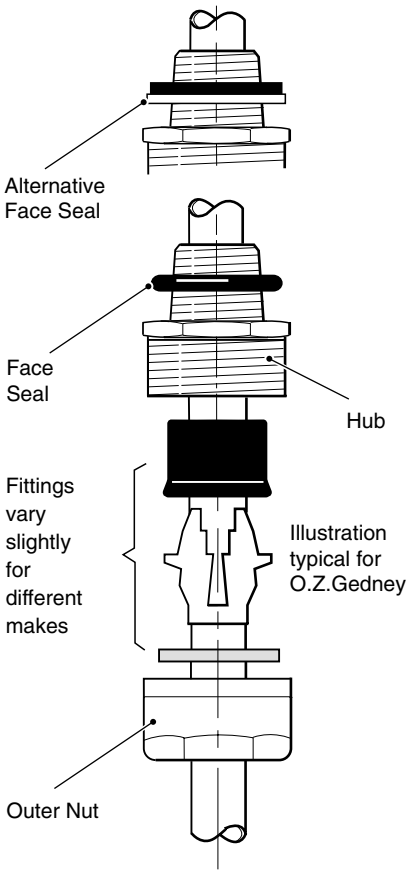


Fig. 4.5 Cable Glands

4.5 Connections Summary – Fig. 4.6

Information.
Input impedances:
Low voltage(mV) >10MΩ
Voltage >10MΩ
Current 10Ω.

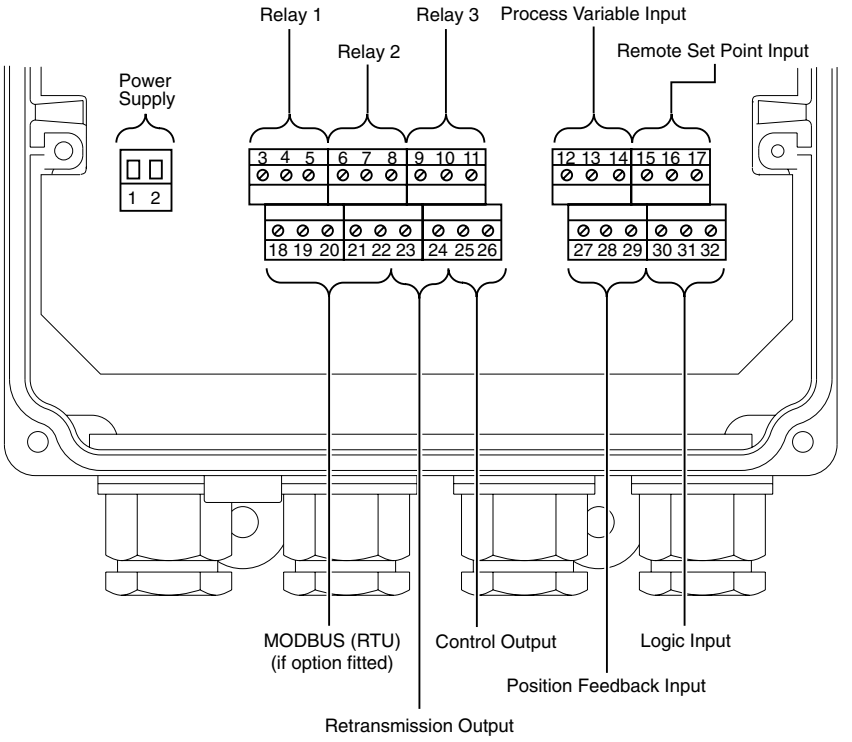


Fig. 4.6 Terminal Block Identification

Terminal Number		
	AC Supply	
1 2	L N	24V, 115V or 230V a.c. – see Fig. 4.22
3 4 5	N/O C N/C	Relay 1 Output – see Fig. 4.17 — Motorized Valve Control Relay (open) – see Fig. 4.19A
6 7 8	N/O C N/C	Relay 2 Output – see Fig. 4.17 — Motorized Valve Control Relay (close) – see Fig. 4.19A
9 10 11	N/O C N/C	Relay 3 Output – see Fig. 4.17 — Alarm Relays
12 13 14	3rd lead/2-wire TX Input 1+ Input 1–	Process Variable Input – see Figs. 4.7 to 4.9, 4.12 and 4.14 or 2-wire Tx Power Supply – see Fig. 4.13
15 16 17	3rd lead Input 2+ Input 2–	Remote Set Point Input – see Figs. 4.7 to 4.12 and 4.14
18 19 20 21 22	Tx+ Tx– Common Rx+ Rx–	RS 485 Modbus Serial Communications Option 1 only – see *Modbus (RTU) Communications Supplement*
23 24	+ –	Retransmission Output/Cool Output – see Fig. 4.15
25 26	+ –	Current Proportioning Control Output/Heat Output Fig. 4.15 or 12V Logic Control Output Fig. 4.16
27 28 29	3rd lead Input 3+ Input 3–	Position Feedback Input – see Figs. 4.18 , 4.19A and 4.19B
30 31 32		Logic Input 1 – see Figs. 4.20 and 4.21 Logic Input 2 – see Figs. 4.20 and 4.21 Common

Table 4.1 Electrical Connections

4.6 Input Connections

Make connections to each input, as shown in Figs 4.4 to 4.14, first removing any factory-fitted wire links not required.

4.6.1 Thermocouple (THC) Inputs – Fig. 4.7

✶ **Note.** Automatic Cold Junction Compensation (ACJC) is active when an input is programmed for use with thermocouples. Use the correct compensating cable between the THC and the terminals – see Table 4.2.
If an external fixed cold junction is used, the connections to the instrument must be made with copper cable. The input must be programmed for mV input signals and the appropriate THC linearizer selected – see Sections 4.5 and 4.6 of the *Programming Guide.*

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

Table 4.2 Thermocouple Compensating Cables

4.6.2 3-lead Resistance Thermometer (RTD) Inputs – Fig. 4.8

The three leads must have equal resistance, not exceeding 50Ω each.

4.6.3 2-lead Resistance Thermometer (RTD) Inputs – Fig. 4.9

If long leads are necessary it is preferable to use a 3-lead RTD. If the RTD is to be used in a hazardous area a 3-lead RTD must be used.

4.6.4 Links for Unused Inputs

To reduce susceptibility to electro-magnetic interference, ensure that the three terminals on each unused input are shorted together with sleeved wire links.

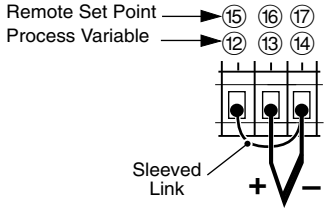


Fig. 4.7 Thermocouple Input Connections

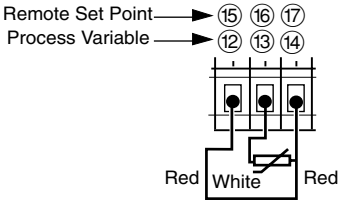


Fig. 4.8 3-lead Resistance Thermometer Input Connections

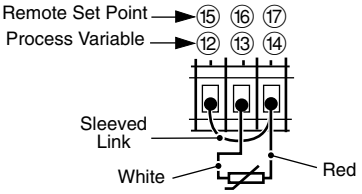


Fig. 4.9 2-lead Resistance Thermometer Input Connections

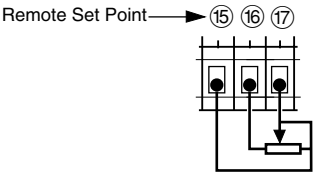


Fig. 4.10 3-lead Resistance Remote Set Point Input Connections

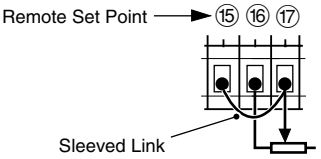


Fig. 4.11 2-lead Resistance Remote Set Point Input Connections

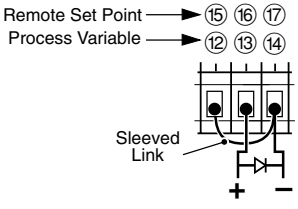


Fig. 4.12 Current Input Connections

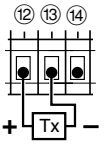


Fig. 4.13 2-wire Transmitter Power Supply Input Connections

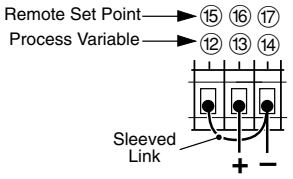


Fig. 4.14 Voltage Input Connections

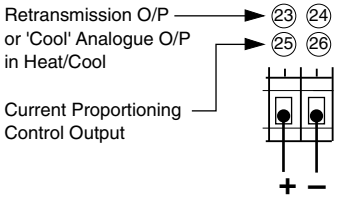


Fig. 4.15 Current Proportioning Control and Retransmission Output Connections

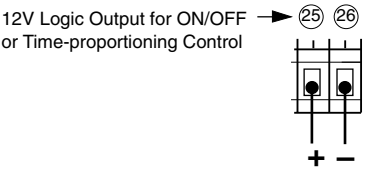


Fig. 4.16 Logic Control Output Connections

4.7 Output Connections

Make connections as shown in Figs 4.15 and 4.16.

4.8 Relay Connections – Fig. 4.17

For relay functions refer to the following table.

	Relay 1	Relay 2	Relay 3
On/Off Control	✓	—	—
Time Prop.(Heat)	✓	—	—
Time Prop.(Cool)	—	✓	—
Motorized Valve	Open	Close	—
Alarm	✓	✓	✓

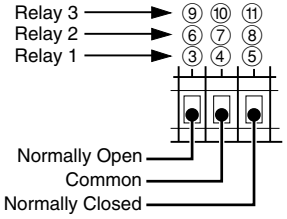


Fig. 4.17 Relay Connections

4.9 Motorized Valve Connections – Figs. 4.18 and 4.19

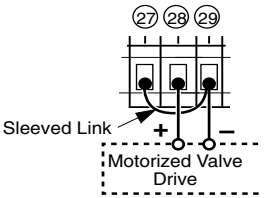
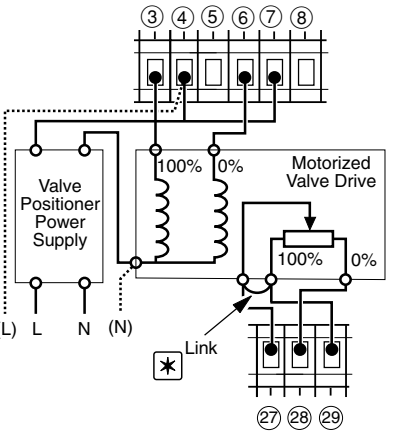
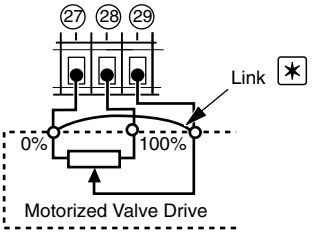


Fig. 4.18 Motorized Valve Feedback Connections (using V, I or mV feedback)



A – Standard Feedback Slidewire Configuration



B – Alternative Feedback Slidewire Configuration

Note. Link must be connected at the motorized valve drive terminals and not the Controller terminals.

Fig. 4.19 Motorized Valve Connections (using feedback slidewire)

4.10 Logic Input Connections – Figs. 4.20 and 4.21

Each logic input can be programmed to perform one of a number of functions – see Section 3.10 of the *Programming Guide*.

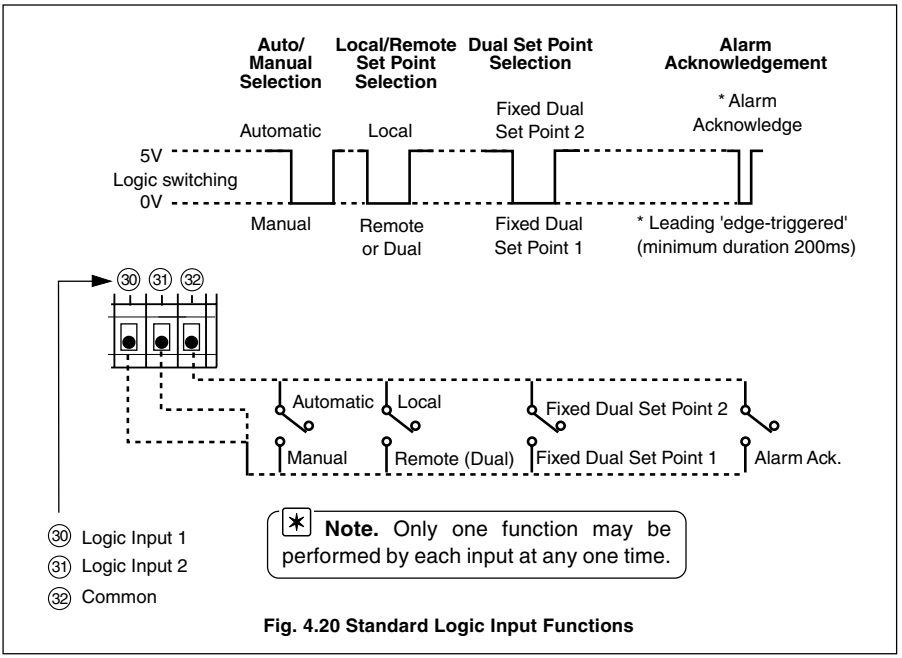


Fig. 4.20 Standard Logic Input Functions

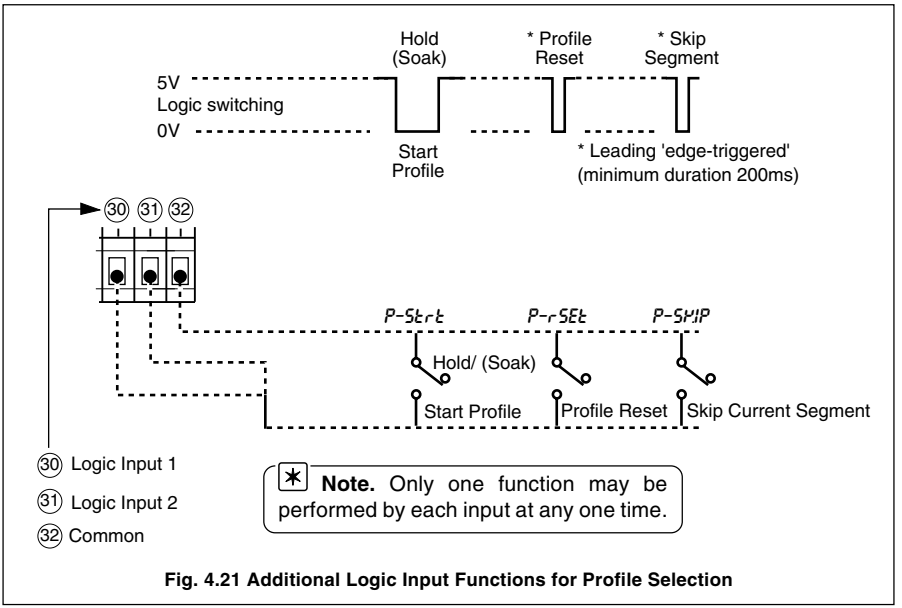
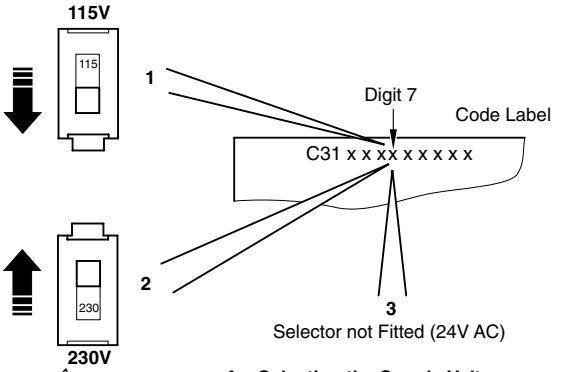
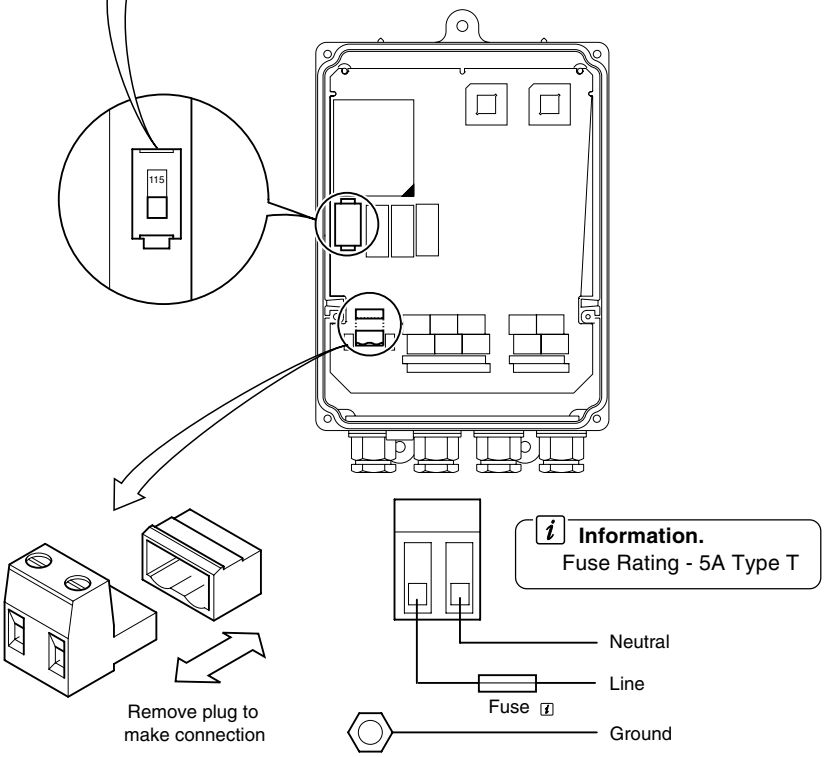


Fig. 4.21 Additional Logic Input Functions for Profile Selection

4.11 Power Supply Selection and AC Connections – Fig. 4.22



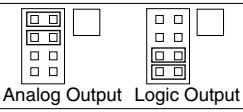
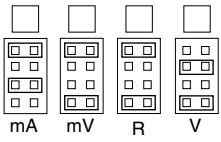
A – Selecting the Supply Voltage



B – Power Supply Connections

Fig. 4.22 Power Supply Selection and AC Connections

Connection/Terminal Number			
Power Supply	1 2	L N	**Power Supply** *(Tick Box)* 230V AC ☐ 24V AC ☐ 115V AC ☐
Relay 1 Output	3 4 5	NO C NC	**Output Type:** **Output Function:**
Relay 2 Output	6 7 8	NO C NC	**Output Type:** **Output Function:**
Relay 3 Output	9 10 11	NO C NC	**Output Type:** **Output Function:**
Process Variable Input	12 13 14	3rd + –	**Link Positions** *(Tick Box)* mA mV/THC/RTD V 2-wire Tx
Remote Set Point Input	15 16 17	3rd + –	**Link Positions** *(Tick Box)* mA mV/THC/RTD V
Modbus Serial Communications Option 1 only	18 19 20 21 22	Tx+ Tx– Common Rx+ Rx–	**Termination Resistors** *(Tick Box)* Linked-out Linked-in
Retransmission Output	23 24	+ –	**Output Type:** **Output Function:**

Connection/Terminal Number			
Control Output	25 26	+ –	 **Link Positions** *(Tick Box)*
Position Feedback Input	27 28 29	3rd + –	 **Link Positions** *(Tick Box)*
Logic Input 1	30		
Logic Input 2	31		
Common	32		

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