Installation Guide

IM/EXFG–INT_6

Hazardous Area Zirconia Oxygen Systems

Interface Electronics Unit

ABB

The Company

EN ISO 9001:2000

Cert. No. Q05907

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.

EN 29001 (ISO 9001)

Lenno, Italy – Cert. No. 9/90A

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.

Stonehouse, U.K.

0255

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.

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.

CONTENTS

1 INTRODUCTION

1.1 Documentation – Fig. 1.1

Documentation for the EXFG Oxygen Analyzer System is shown in Fig. 1.1.

1.2 Certification

The EXFG Interface Electronics Unit is certified to the ATEX Directive and CENELEC Standards BS EN50014 and BS EN50018 flameproof II 2G EExd IIB T6 (T_{amb} –20ºC to +50ºC). Baseefa03ATEX0385.

Certificates are available for inspection and/or copies can be obtained on application to the Company.

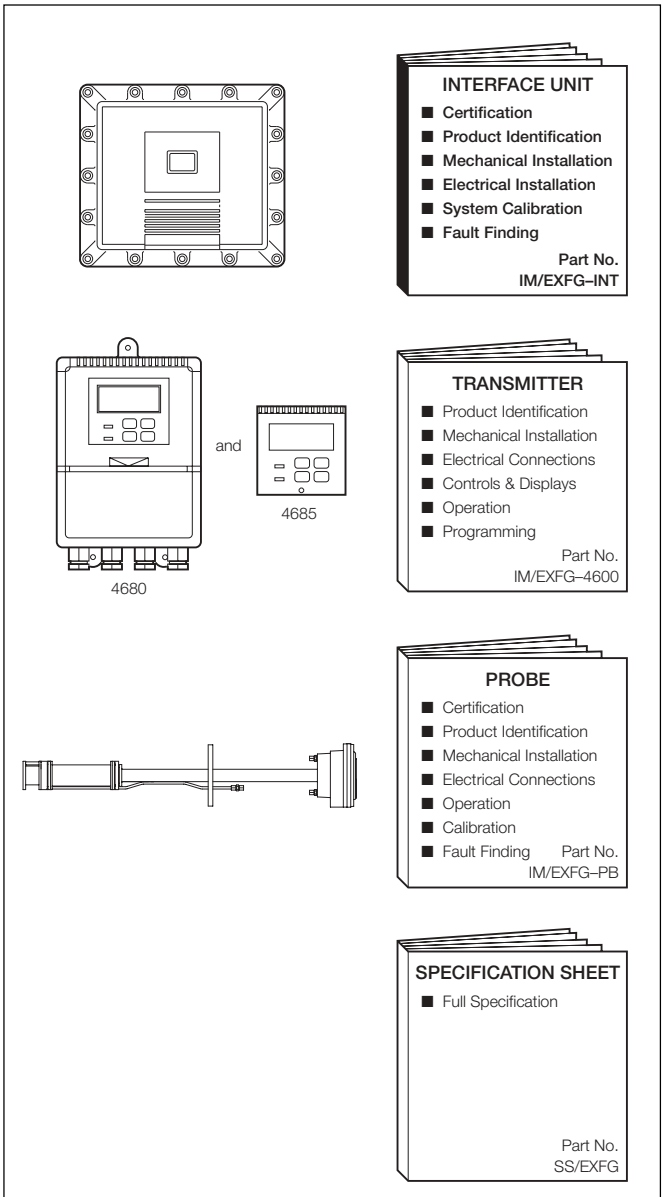


Fig. 1.1 System Documentation

1.3 System Overview – Fig. 1.2

The EXFG Interface Electronics Unit is an explosion-proof, wall mounted device designed specifically for use with EXFG Oxygen Probes.

It can be sited in an area in which explosive atmospheres are present in quantities that require special precautions for the construction and use of electrical apparatus.

The unit provides temperature control for the EXFG probe heater and incorporates a fail-safe over-temperature trip. It also converts millivolt signals received from the EXFG probe zirconia cell (25% to 0.25% O_2) into a 4 to 20mA output signal for retransmission to a 4680 or 4685 Series Transmitter. In addition, the unit is fitted with over-temperature and under-temperature alarm contacts which relate to fault conditions.

Span/zero calibration controls located at the side of the casting can be accessed and adjusted without infringing the flameproof integrity of the unit.

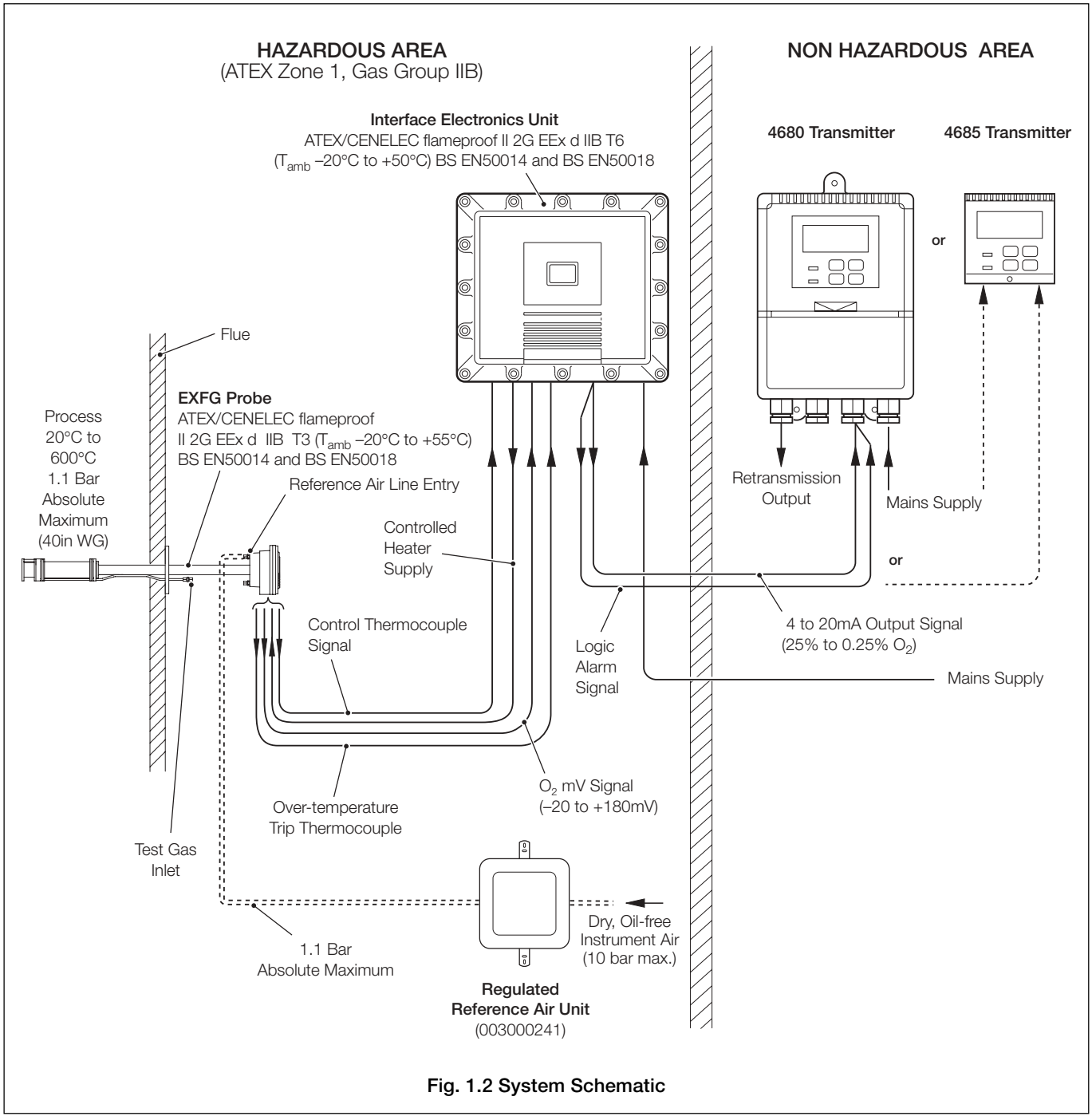


Fig. 1.2 System Schematic

2.1 Checking the Code Number – Fig. 2.1

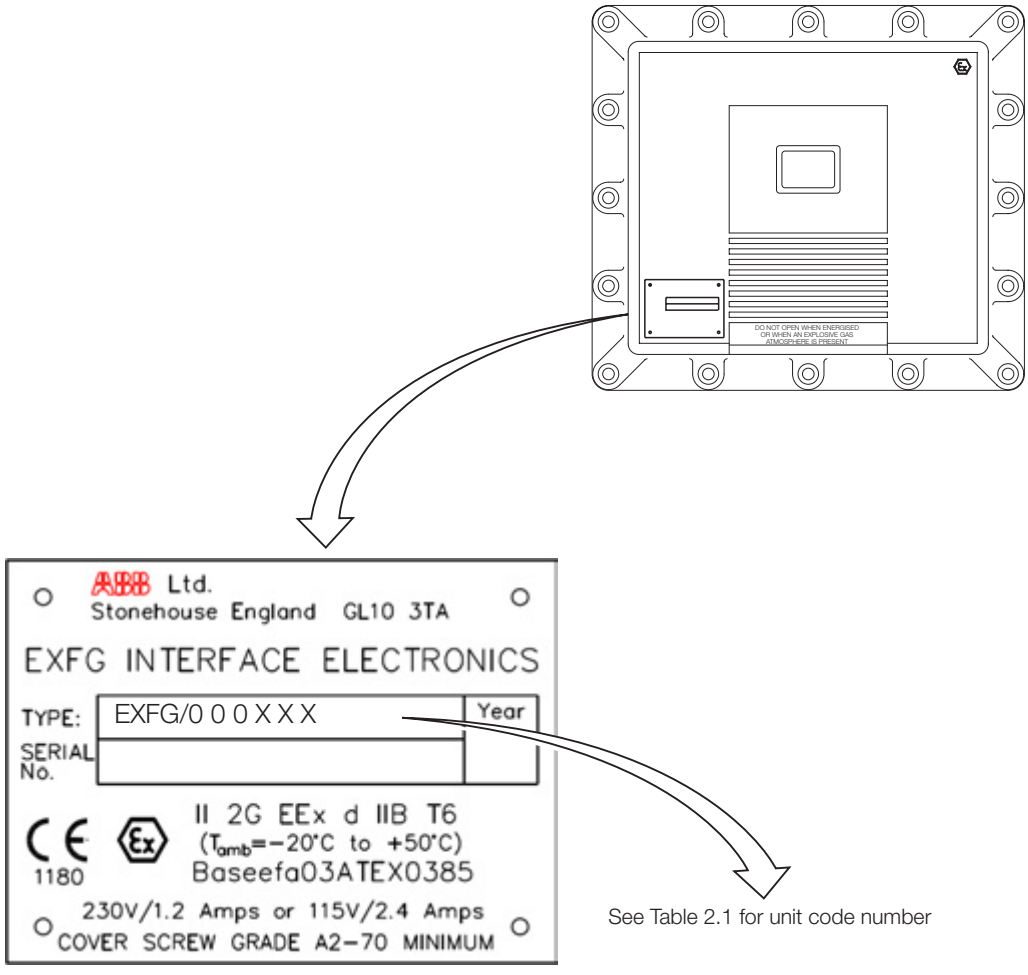


Fig. 2.1 Checking the Code Number

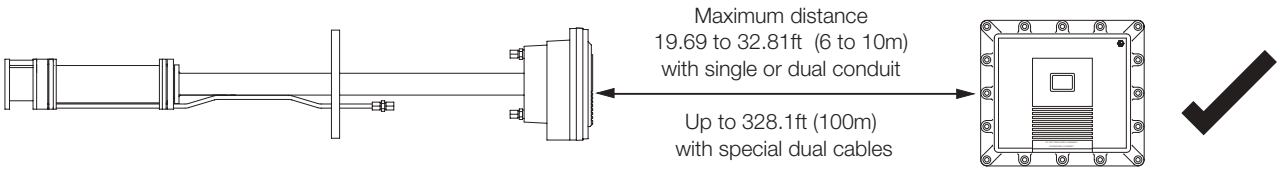
EXFG Interface Electronics Unit		EXFG/ 0 0 0	X	X	X
Interface Electronics	None For EXFG Probe		0 1		
Mains Supply	None 230V 50/60Hz 115V 50/60Hz			0 1 2	
Alarms	None None 4600 (if used without 4600 Transmitter) 4600 (Logic)				0 1 2

Table. 2.1 Code Number Interpretation

3 MECHANICAL INSTALLATION

3.1 Siting Requirements – Fig. 3.1

Caution. When siting the EXFG Interface Electronics Unit choose a location free from excessive vibration.



A – Maximum Distance of EXFG Interface Electronics Unit to EXFG Probe

B – Within Temperature Limits

C – Within Environmental Limits

Caution. 50°C is the certified maximum ambient temperature.

Fig. 3.1 Siting Requirements

3.2 Mounting – Figs. 3.2 and 3.3

Warning. Installation and repair must be carried out only by the manufacturer, authorized agents or persons conversant with the construction standards for hazardous area certified equipment.

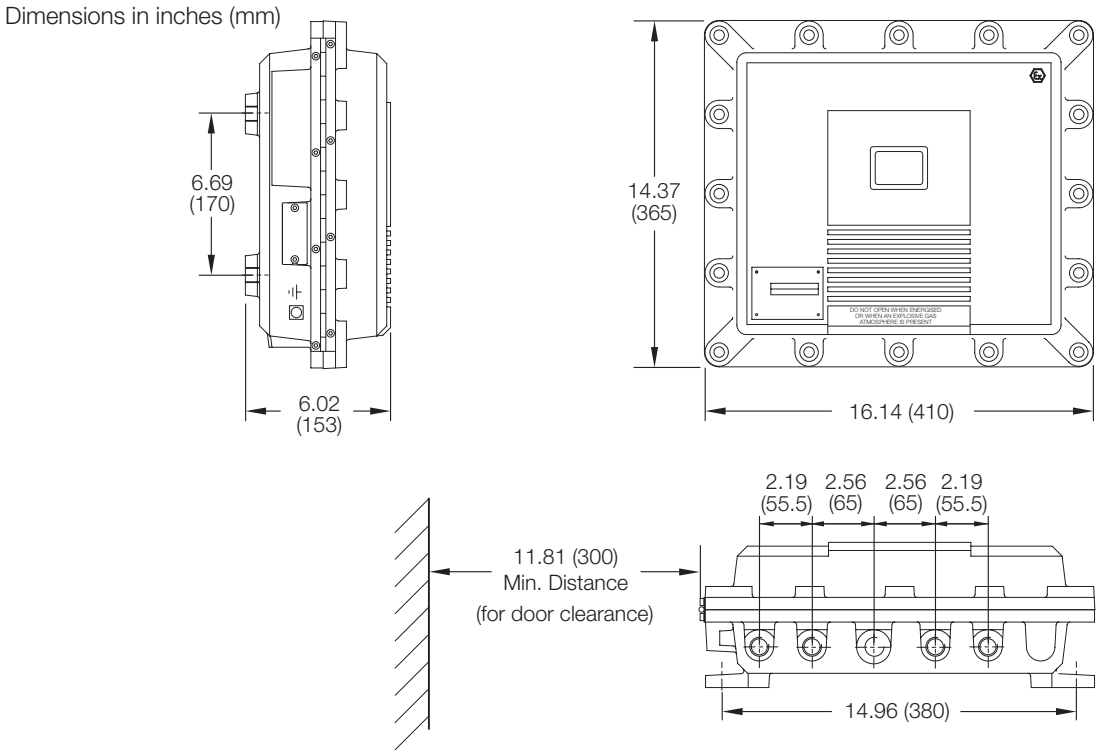


Fig. 3.2 Overall Dimensions

Note. Mount the unit at a level which allows easy access for connection and disconnection.

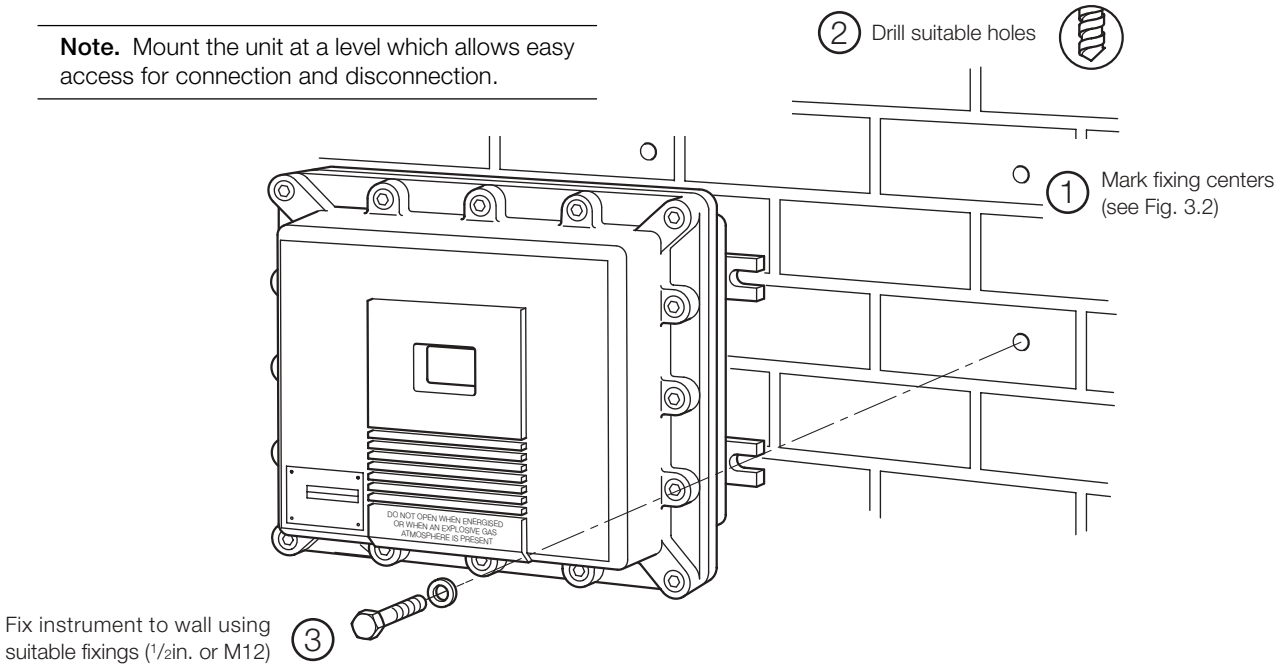


Fig. 3.3 Mounting

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.

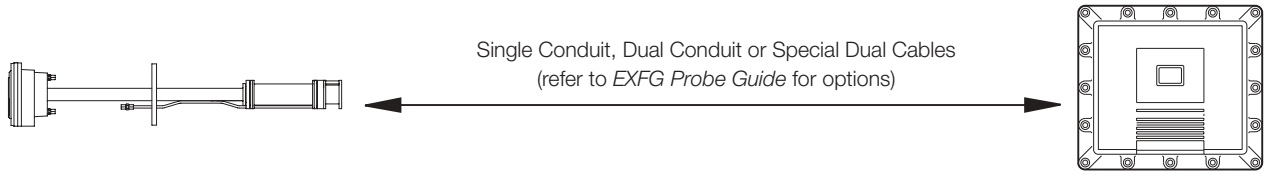
4.1 Conduit/Cable and Gland Specifications

4.1.1 EXFG Interface Electronics Unit to EXFG Probe

Refer to Table 4.1 for conduit, special cable and gland specifications.

Caution.

- Installation and repair must be carried out only by the manufacturer, authorized agents or persons conversant with the construction standards for hazardous area certified equipment. The specifications detailed in Table 4.1 are for system electrical requirements only.
- All cables must be suitable for flameproof 'd' type enclosures for mechanical construction.
- EEx d glands used on the Interface Electronics Unit must be of the EEx d 'Barrier Gland' type (because the enclosure is over 2 litres volume).



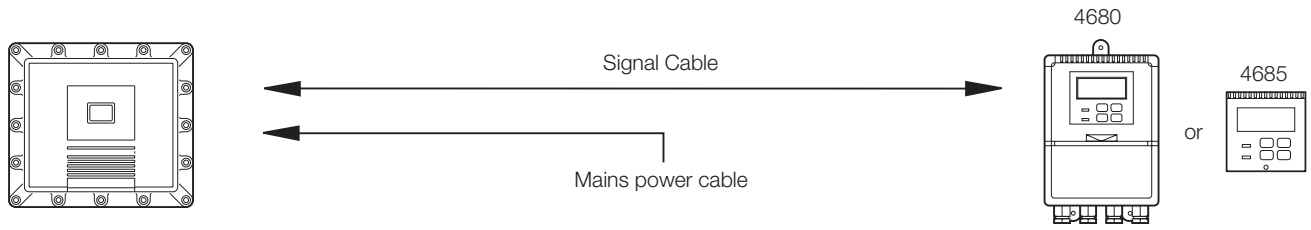
Single Conduit – combined signal and power	
19.68ft (6m) length	Signal/power conduit assembly fitted with M25 flameproof certified EEx d barrier glands each end (part no. EXFG/0060)
or	
32.81ft (10m) length	Signal/power conduit assembly fitted with M25 flameproof certified EEx d barrier glands each end (part no. EXFG/0061)
Dual Conduit – separate signal and power	
19.68ft (6m) length	Signal conduit assembly fitted with M25 flameproof certified EEx d barrier glands each end (part no. EXFG/0062)
	and
	power conduit assembly fitted with M20 flameproof certified EEx d barrier glands each end (part no. EXFG/0063)
or	
32.81ft (10m) length	Signal conduit assembly fitted with M25 flameproof certified EEx d barrier glands each end (part no. EXFG/0064)
	and
	power conduit assembly fitted with M20 flameproof certified EEx d barrier glands each end (part no. EXFG/0065)
Dual Cable – separate signal and power	
Length to order (maximum length 328.1ft (100m))	Special signal cable, steel-wire armoured (part no. EXFG/0194) supplied with M25 flameproof certified EEx d barrier glands for each end (part no. B11274)
	and
	special power cable, steel-wire armoured and screened, 3-core (part no. EXFG/0195) supplied with M20 flameproof certified EEx d barrier glands for each end (part no. B11275)

Table 4.1 Conduit/Cable and Gland Specifications – EXFG Interface Electronics Unit to EXFG Probe

…4.1 Conduit/Cable and Gland Specifications

4.1.2 EXFG Interface Electronics Unit to EXFG 4600 Transmitter Unit

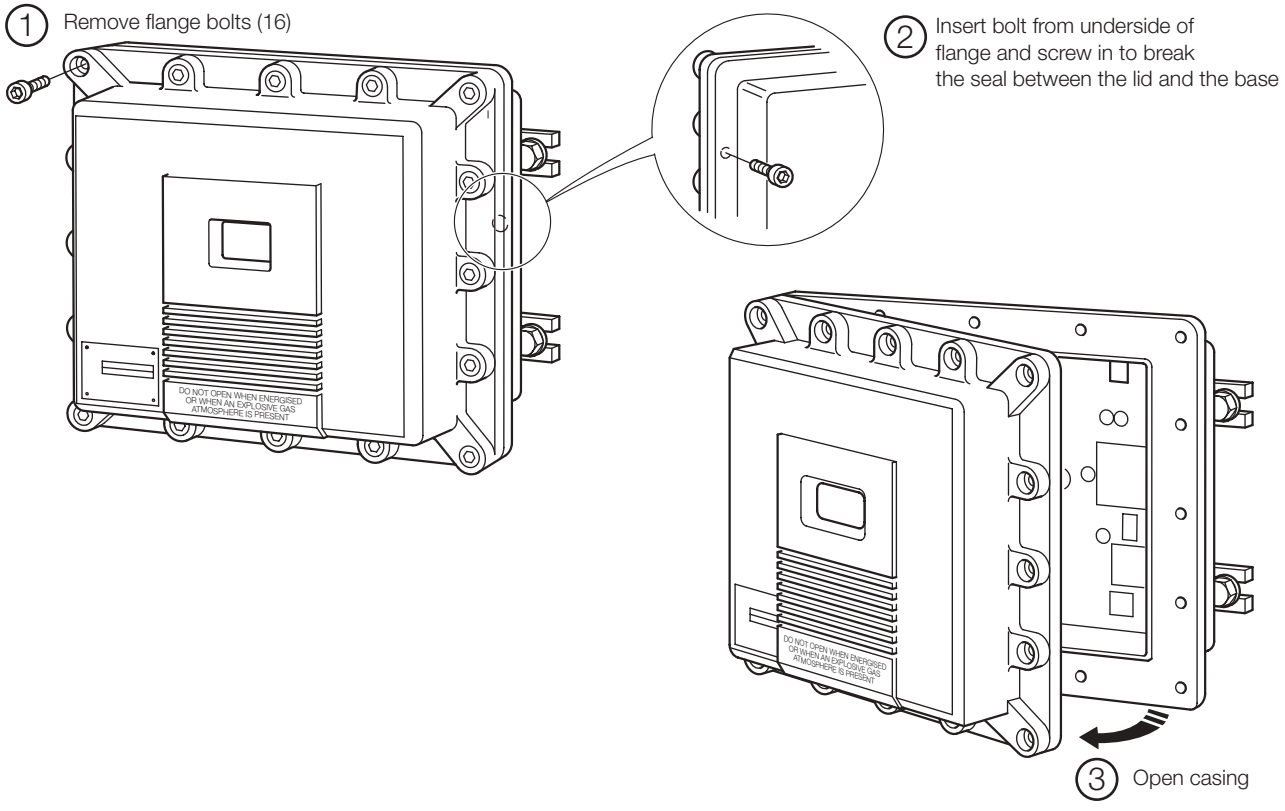
Refer to Table 4.2 for cable and gland specifications.



Gland Specification	Cable Specifications		Gland Specification	
M20 flameproof certified EEx d barrier gland (not supplied)	**Signal cable** (not supplied)	16/0.2, 4-core copper, overall screened, flameproof (two pairs) Max. loop resistance750Ω	**4680** M20 Uncertified (fitted)	**4685** No gland required
M20 flameproof certified EEx d barrier gland (not supplied)	**Mains power cable** (not supplied)	3-core, 0.5mm^2 copper (min.)	**4680** M20 Uncertified (fitted)	**4685** No gland required

Table 4.2 Cable and Gland Specifications – EXFG Interface Electronics Unit to EXFG 4600 Transmitter

4.2 Access to Terminals – Fig. 4.1



Warning. The flange faces are flameproof paths and must be free from damage. If faces are damaged in any way the EXFG Interface Electronics Unit must be returned to the manufacturer for replacement.

Fig. 4.1 Access to Terminals

4.3 Conduit and Cable Connections

4.3.1 Single Conduit Connections – Fig. 4.2

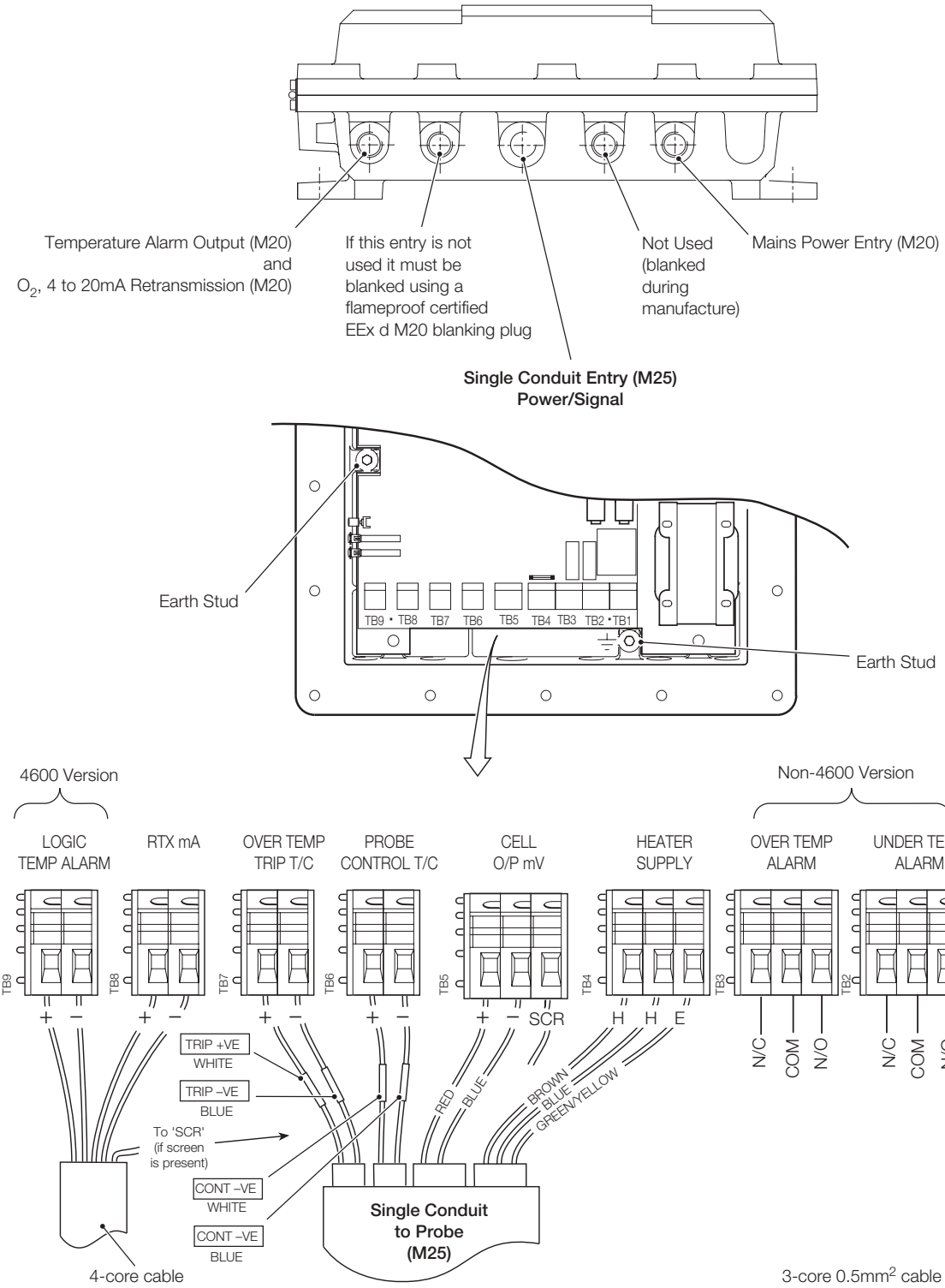


Fig. 4.2 Single Conduit Connections

…4.3 Conduit and Cable Connections

4.3.2 Dual Conduit Connections – Fig. 4.3

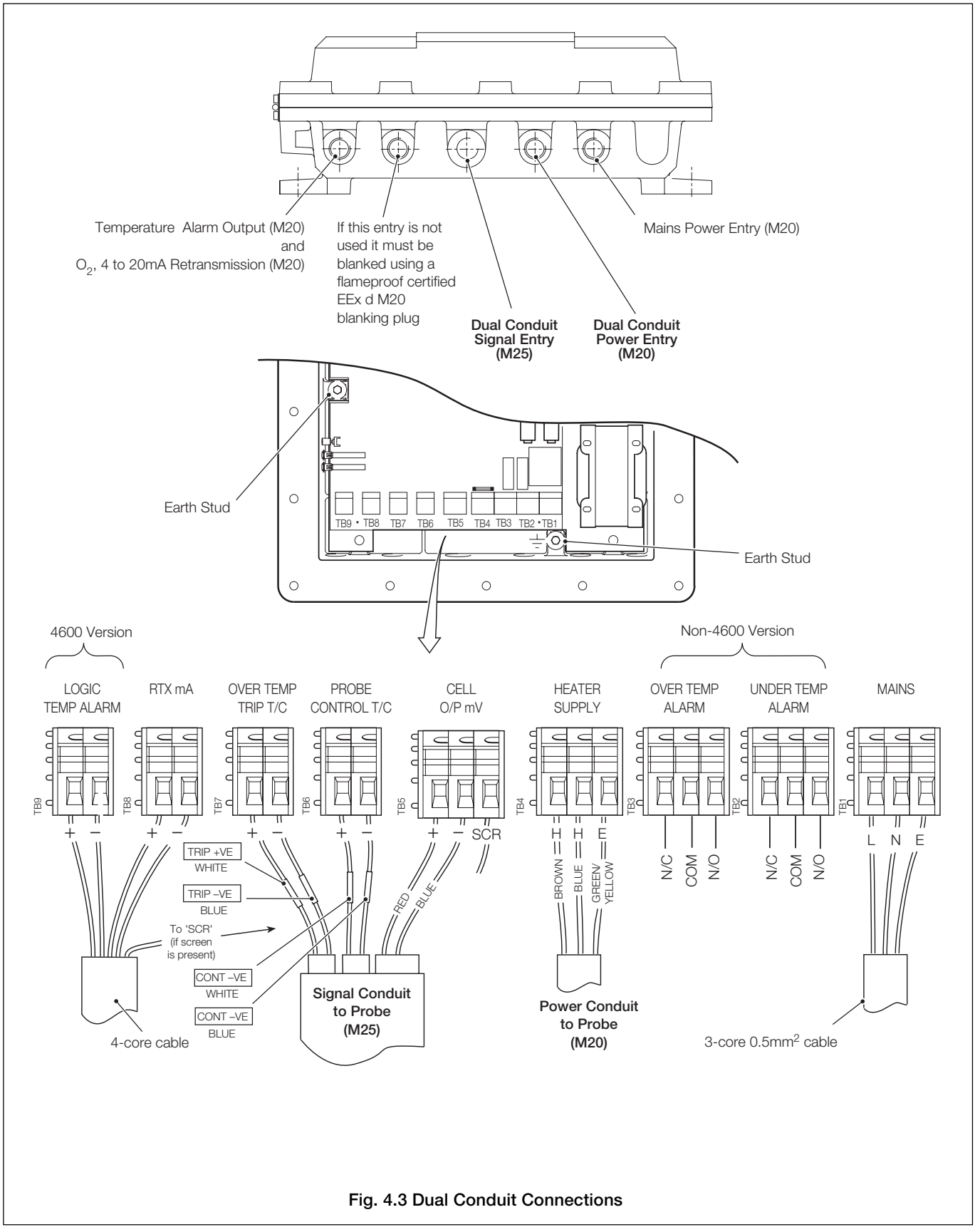


Fig. 4.3 Dual Conduit Connections

…4.3 Conduit and Cable Connections

4.3.3 Dual Cable Connections – Fig. 4.4

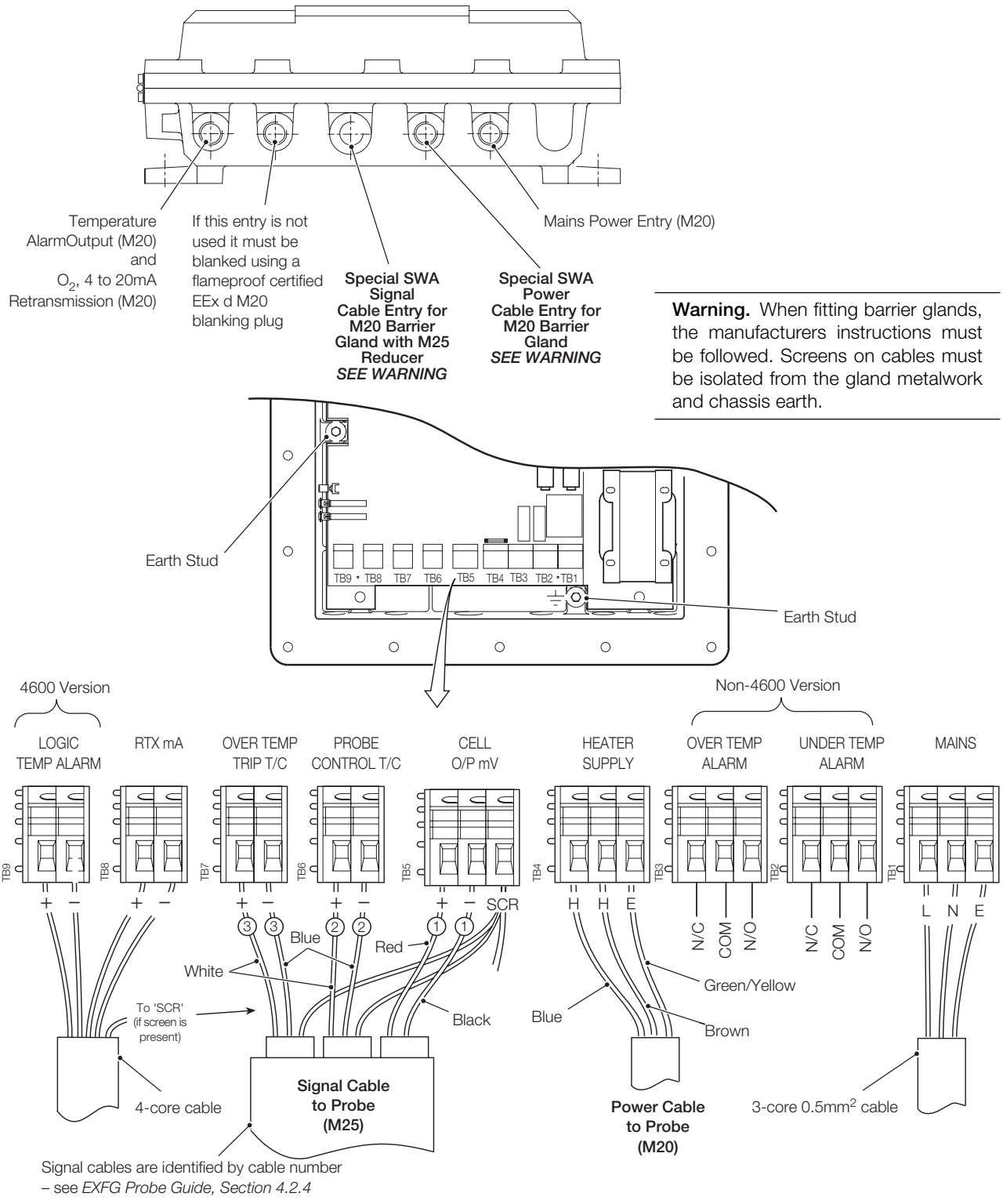


Fig. 4.4 Dual Cable Connections

4.4 Selecting the Mains Voltage – Fig. 4.5

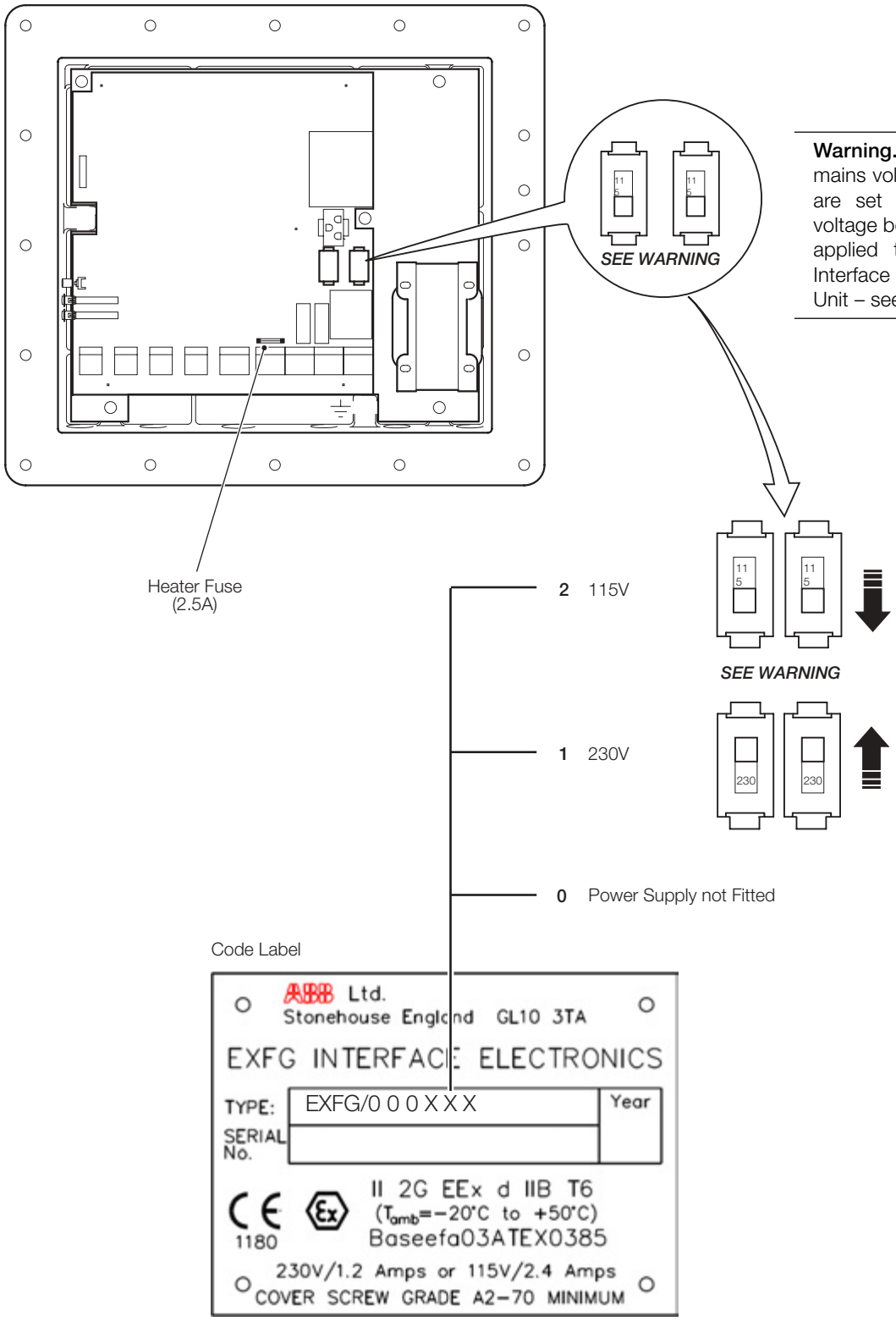


Fig. 4.5 Selecting the Mains Voltage

4.5 Re-sealing the Cover after Connection – Fig. 4.6

Warning. Ensure all electrical connections have been made correctly before re-sealing and securing the cover. Do not switch on mains power until the cover has been re-sealed and secured with all 16 (SS Grade A2–70) cover bolts tightened evenly to approx. 10Nm. There should be no visible gap in the joint between lid and base. If in doubt check that a 0.2mm feeler gauge does not fit into the gap at any point.

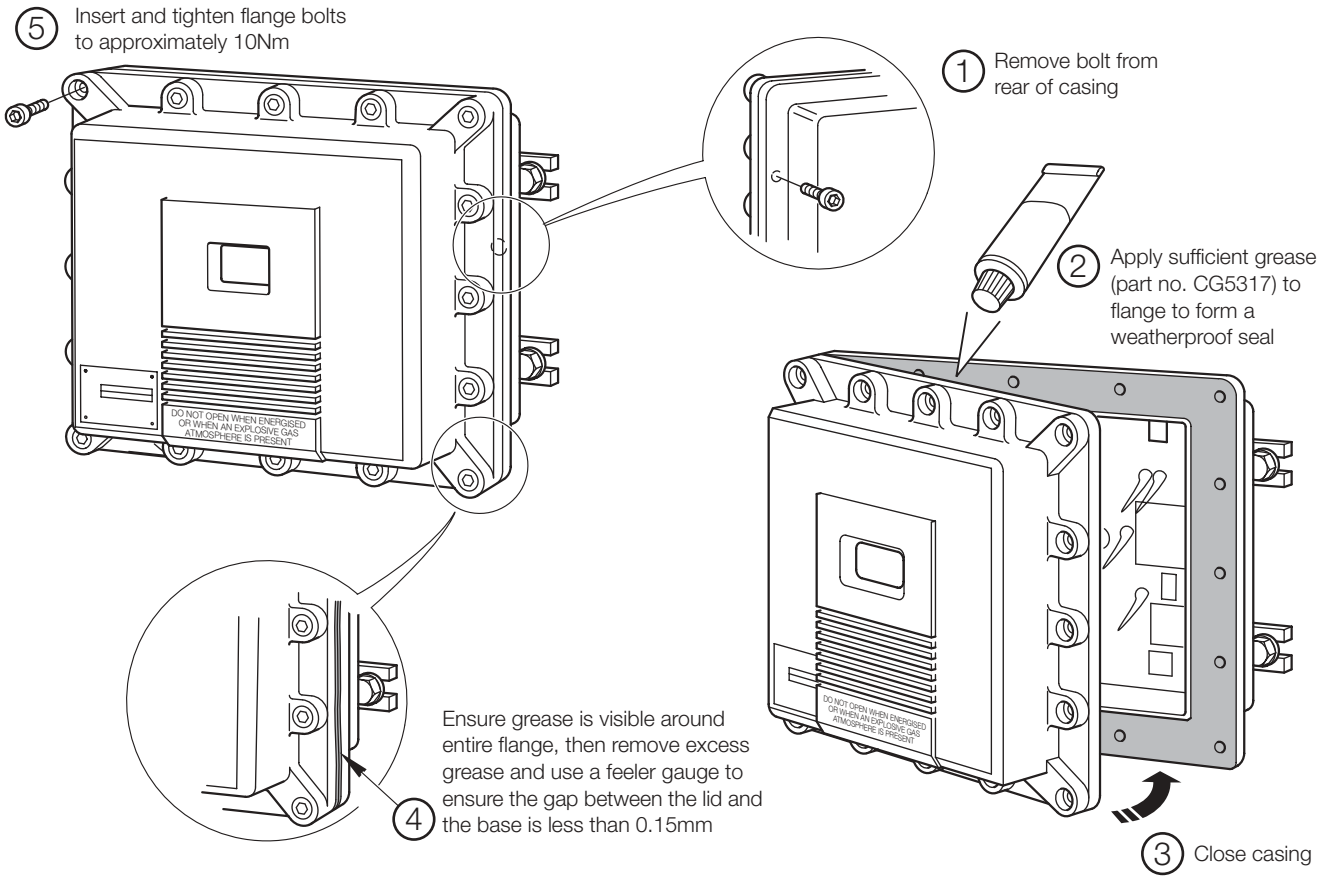


Fig. 4.6 Securing the Cover

4.6 Switching Power On – Fig. 4.7

Information.

- Ensure the Probe has been installed and connected correctly – see *Sections 3 and 4* of the *EXFG Probe Guide*.
- If a 4680 or 4685 Transmitter is used, ensure that it has been installed and connected correctly as detailed inSections 3 and 4 of the *EXFG Transmitter Guide*. Before switching the transmitter on, refer to *Section 5* for *Controls and Displays* and *Section 6* for *Operation (Instrument Start-up)*.
- The EXFG Interface Electronics Unit has no independent ON/OFF switch and must be powered-up from the mains switch.

After switching power on, allow the probe to operate for a minimum of 1 hour to reach the correct operating temperature.

In normal operation, the power LED illuminates within approximately 15 minutes of switching on (according to the local temperature at the probe heater) and the heater LED flashes evenly.

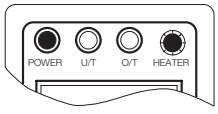


Fig. 4.7 LED Indication of Operating Temperature

5 SYSTEM CALIBRATION

It is recommended that an air-based calibration is carried out when commissioning the system. An additional span calibration provides the ultimate system accuracy, but is only necessary if span errors are suspected. The EXFG system can be calibrated in situ by applying test gasses to the test gas inlet on the EXFG Probe and adjusting the reading on the EXFG Interface Electronics Unit display to give the correct ouput.

Note. It is not necessary to open the flameproof enclosure on either the EXFG Probe or the EXFG Interface electronics Unit to calibrate the system.

To calibrate the EXFG system carry out the following procedures:

a) Switch power on and allow the probe to operate for a minimum of 1 hour to stabilize – see Fig.4.7.
b) Remove the cover plate to allow access to the Zero and Span controls – see Fig. 5.1.
c) Carry out an air based calibration as described in Fig. 5.2.
d) If necessary, carry out a span gas calibration as described in Fig. 5.3.
e) Refit the cover plate over the Zero and Span controls – see Fig. 5.1.
f) Refit the test gas blanking plug – see Fig. 5.2. The test gas blanking plug must be a gas tight fit to prevent incorrect probe readings.

5.1 Tools Required

Medium crosshead screwdriver
M4 Allen key
Zero (air) and span test gases (3000cc/min flow rate)

5.2 Access to the Zero and Span Controls – Fig. 5.1

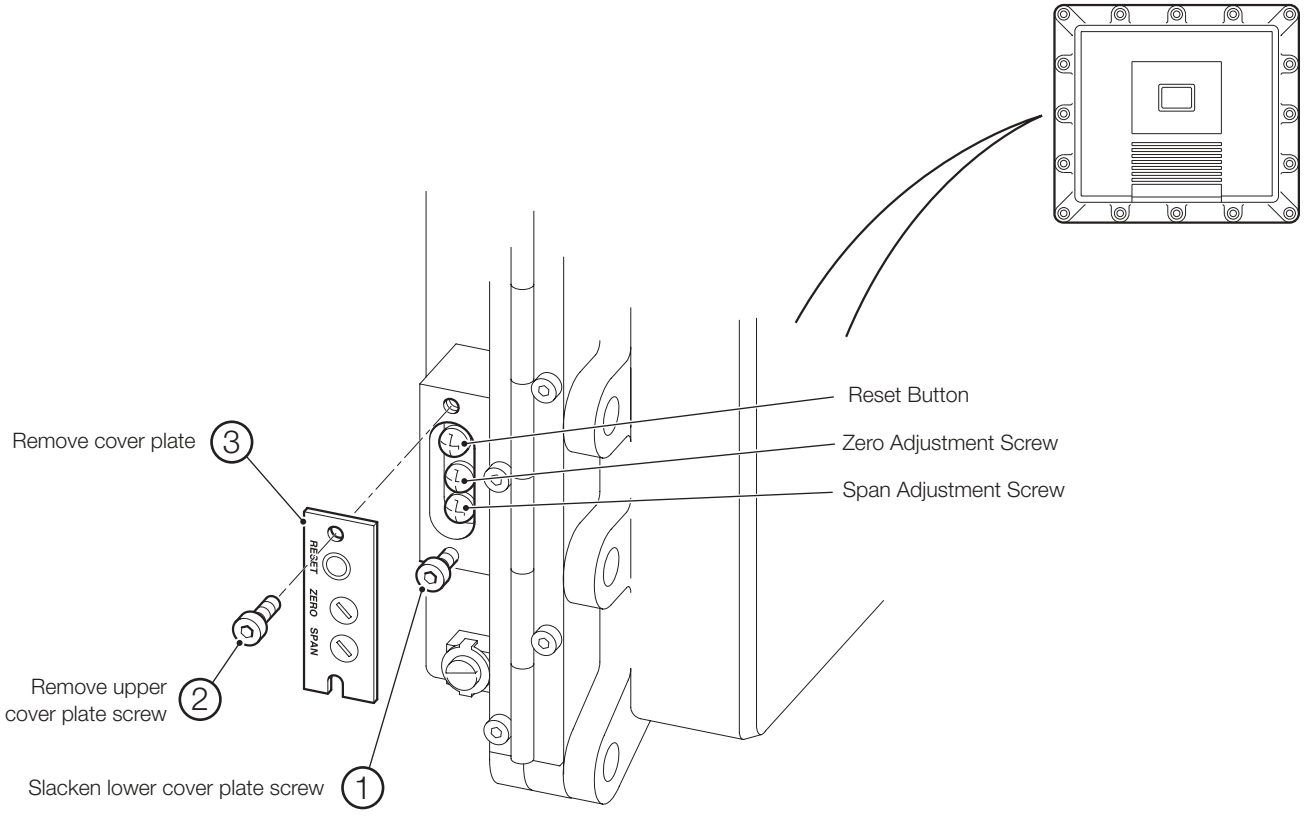


Fig. 5.1 Access to the Zero and Span Controls

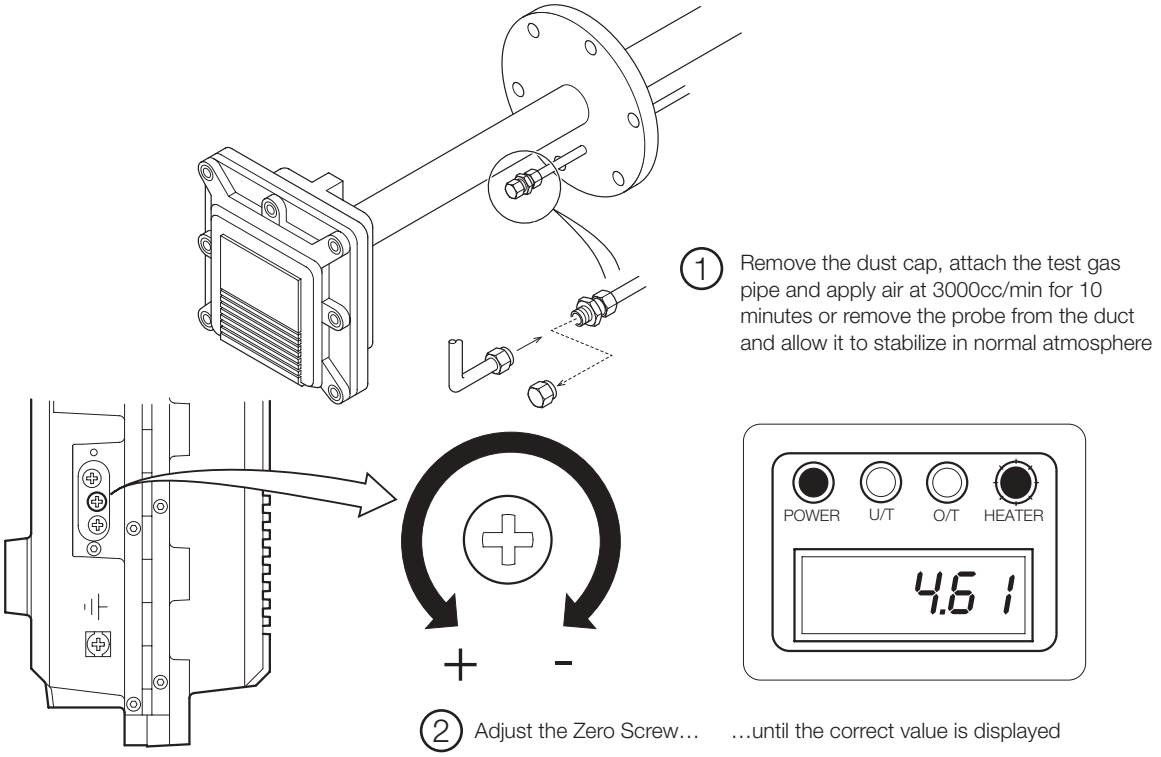


Fig. 5.2 Zero Calibration

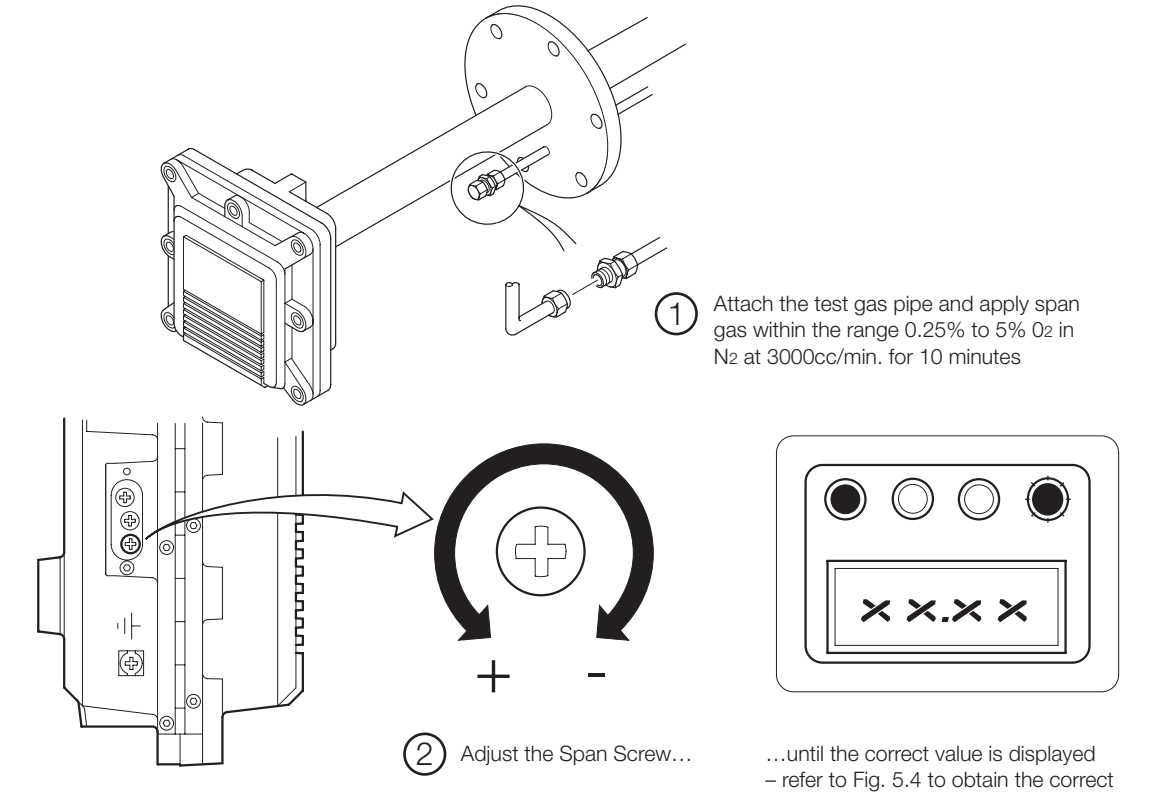


Fig. 5.3 Span Calibration

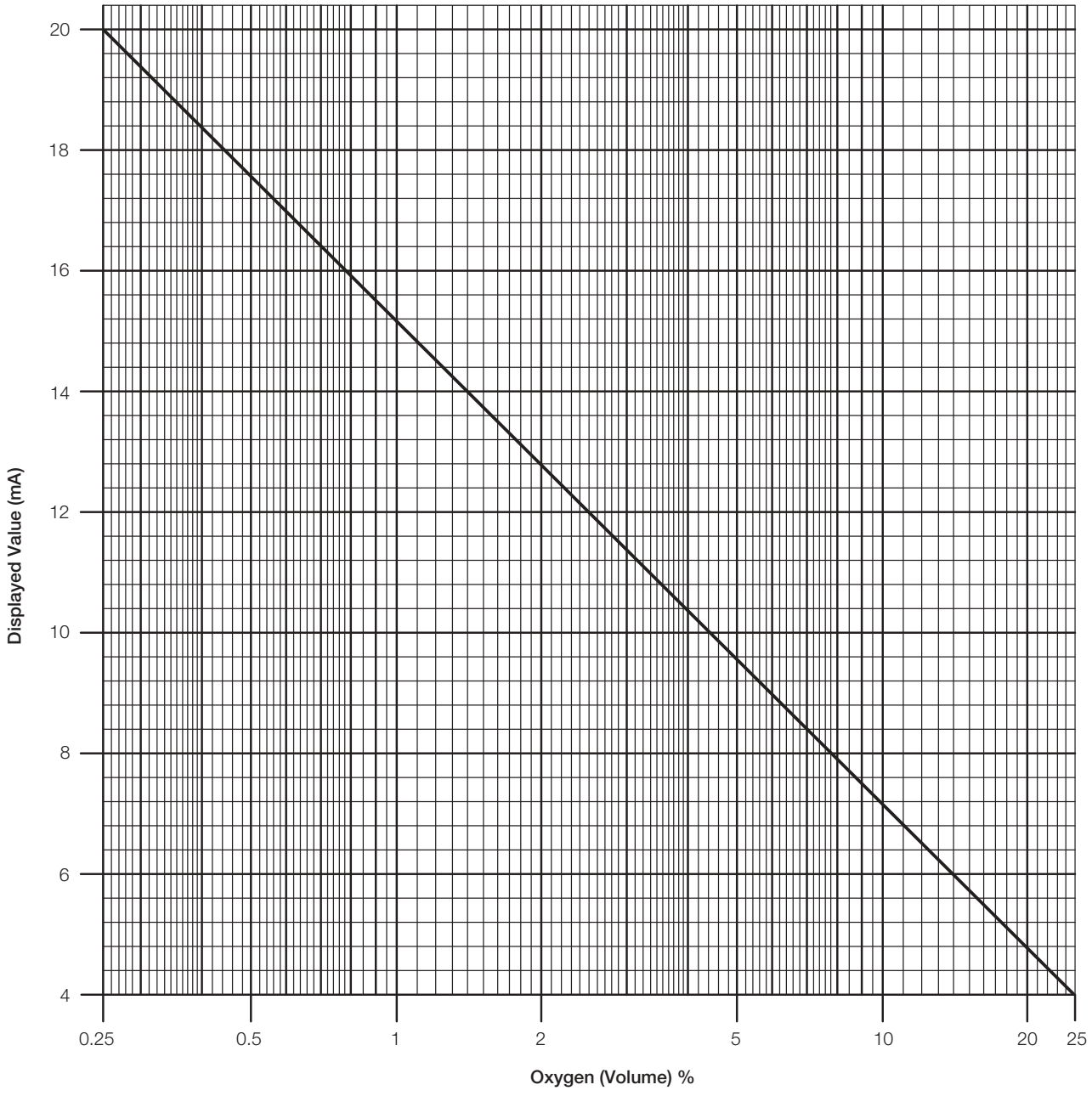
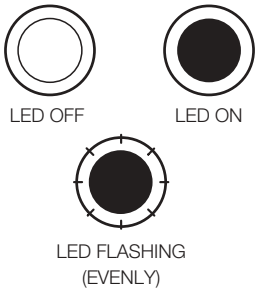


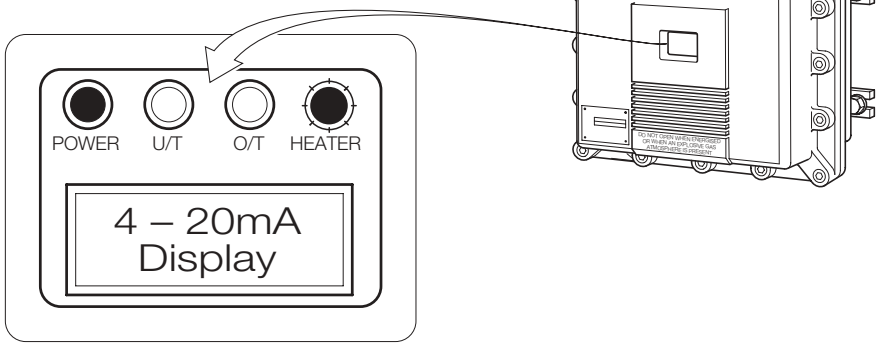
Fig. 5.4 Displayed Value (mA) v. Percentage Oxygen

6 FAULT FINDING

Warning. ***Never*** open the EXFG Interface Electronics Unit in the presence of a flammable atmosphere.

Key to LED Indication





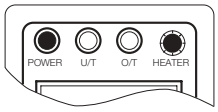
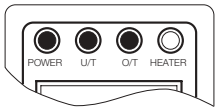
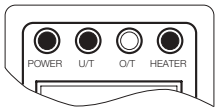
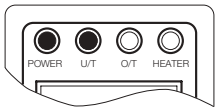
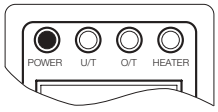
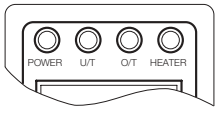
LED INDICATION	CONDITION	ACTION
	a) Normal operation (approximately 15 minutes after power up).	N/A
	a) Over temperature trip has operated.	Check trip thermocouple for open circuit and control thermocouple wiring for short circuit or reversed connections. When fault has been rectified, press and release RESET button – see Fig. 5.1.
	a) Cell under temperature.	If heater l.e.d. is lit continuously (not flashing) 15 minutes after switching on, check for faults c), d) and e).
	b) Probe heater still warming up.	If heater l.e.d. is lit continuously (not flashing) 15 minutes after switching on, check for faults c), d) and e).
	c) Heater open circuit.	Replace heater assembly – see *Section 8.5**.
	d) Thermocouple leads shorted or reversed.	Check thermocouple wiring – see *Section 7.1.1**.
	e) Heater loop resistance too high.	Check the heater extension lead resistance by removing the heater wires at the H H terminals and measuring the resistance across the wires which should be between 22Ω and 28Ω – see *Section 4.3.*
	a) Control thermocouple open circuit if l.e.d fails to flash after 15 minutes of power on.	Check control thermocouple for open circuit – see *Section 7.1.1*.*
	a) No power to heater.	Check probe control thermocouple for open circuit – see *Section 7.1.1*.* Check fuse in heater circuit – see Fig. 4.5. Check wiring (open circuit). Check heater loop resistance – see step e) above.
	a) No power to Interface Electronics Unit.	Check mains power supply.
	b) Failure of internal power supply.	Check operation of Interface Electronics Unit power supply. *Refer to the *EXFG Probe Guide* for section references.

Fig. 6.1 Fault Finding Chart

PRODUCTS & CUSTOMER SUPPORT

Products

Automation Systems

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

Drives and Motors

- *AC and DC Drives, AC and DC Machines, AC Motors to 1kV*
- *Drive Systems*
- *Force Measurement*
- *Servo Drives*

Controllers & Recorders

- *Single and Multi-loop Controllers*
- *Circular Chart and Strip Chart Recorders*
- *Paperless Recorders*
- *Process Indicators*

Flexible Automation

- *Industrial Robots and Robot Systems*

Flow Measurement

- *Electromagnetic Flowmeters*
- *Mass Flow Meters*
- *Turbine Flowmeters*
- *Flow Elements*

Marine Systems & Turbochargers

- *Electrical Systems*
- *Marine Equipment*
- *Offshore Retrofit and Refurbishment*

Process Analytics

- *Process Gas Analysis*
- *Systems Integration*

Transmitters

- *Pressure*
- *Temperature*
- *Level*
- *Interface Modules*

Valves, Actuators and Positioners

- *Control Valves*
- *Actuators*
- *Positioners*

Water, Gas & Industrial Analytics Instrumentation

- *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.

United Kingdom

ABB Limited
Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

United States of America

ABB Inc.
Tel: +1 (0) 775 850 4800
Fax: +1 (0) 775 850 4808

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.

ABB has Sales & Customer Support expertise in over 100 countries worldwide

www.abb.com

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

Printed in UK (07.05)

IM/EXFG–INT Issue 6

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