



## 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. Q 05907

EN 29001 (ISO 9001)



Lenno, Italy – Cert. No. 9/90A

Stonehouse, U.K.



## Use of Instructions



### Warning.

An instruction that draws attention to the risk of injury or death.



### Note.

Clarification of an instruction or additional information.



### Caution.

An instruction that draws attention to the risk of damage to the product, process or surroundings.



### Information.

Further reference for more detailed information or technical details.

Although **Warning** hazards are related to personal injury, and **Caution** hazards are associated with equipment or property damage, it must be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process system performance leading to personal injury or death. Therefore, comply fully with all **Warning** and **Caution** notices.

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 Marketing Communications 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.

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**Note.** Not all versions referred to are available as approved. This book covers general aspects for hazardous and general approved products.

## SAFETY MEASURES



### Warning.

- EXPLOSION HAZARD.  
SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.
  
- EXPLOSION HAZARD.  
DO NOT REMOVE FUSE OR DISCONNECT POWER LEADS WHILE CIRCUIT IS LIVE.
  
- THE LOCAL TERMINAL MUST NOT BE USED WHEN THERE IS AN EXPLOSION RISK.



### Warning.

- Installation and maintenance must only be carried out by suitably trained personnel.
  
- HAZARDOUS AREA DESIGNATION ON THE EQUIPMENT LABEL MUST BE SUITABLE FOR THE INTENDED DUTY AND LOCATION.
  
- All relevant sections of this manual must be read before selecting a location.
  
- Safety requirements of this equipment, any associated equipment, and the local environment must be taken into consideration.
  
- The installation and use of this equipment must be in accordance with relevant national and local standards.

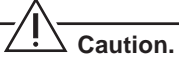
## 1 INTRODUCTION

This book describes the electrical installation of the MagMaster Transmitter with full bore and insertion type electromagnetic flowmeters.

Attention to the installation procedures, safety measures and general precautions will ensure trouble free operation of the system.

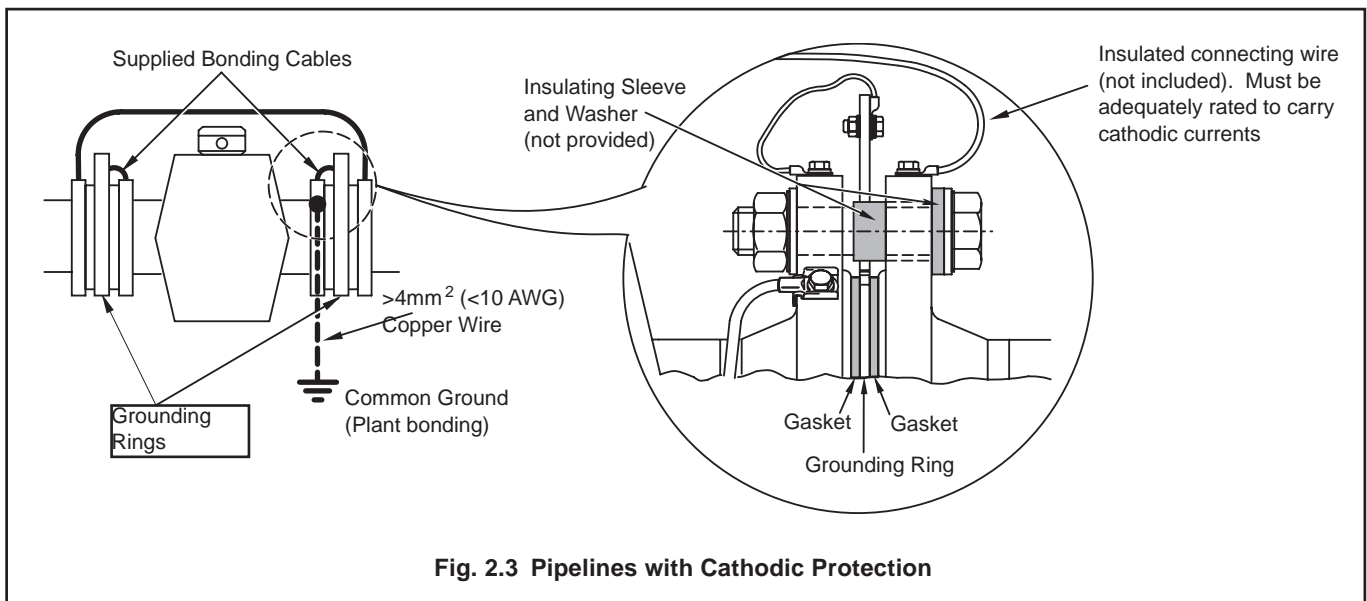
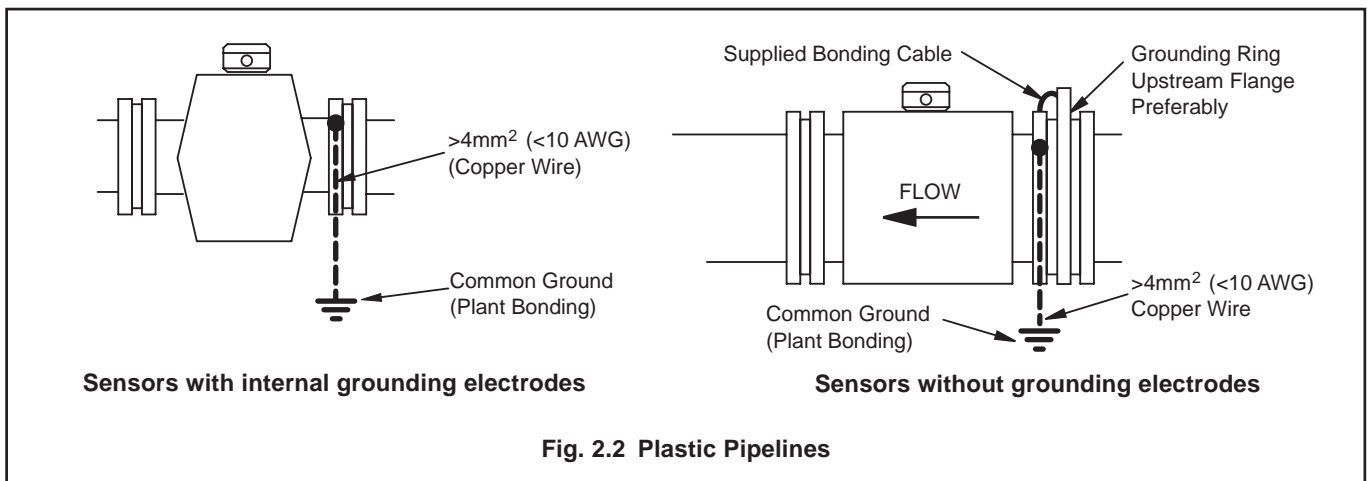
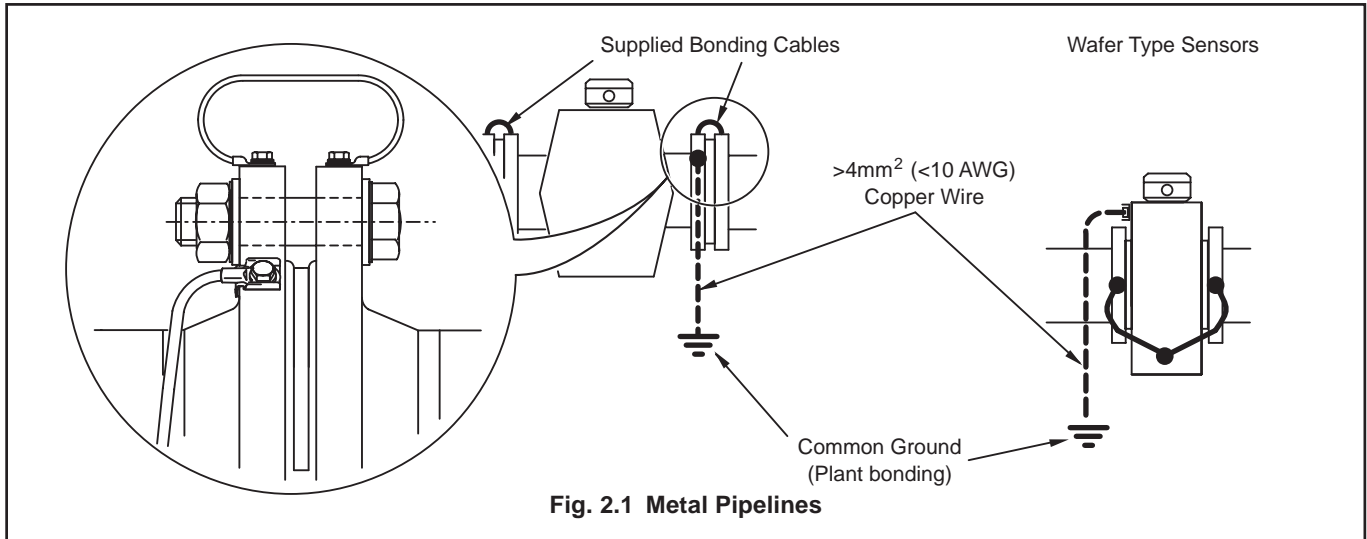
## 2 GROUNDING

### 2.1 Full Bore Sensors

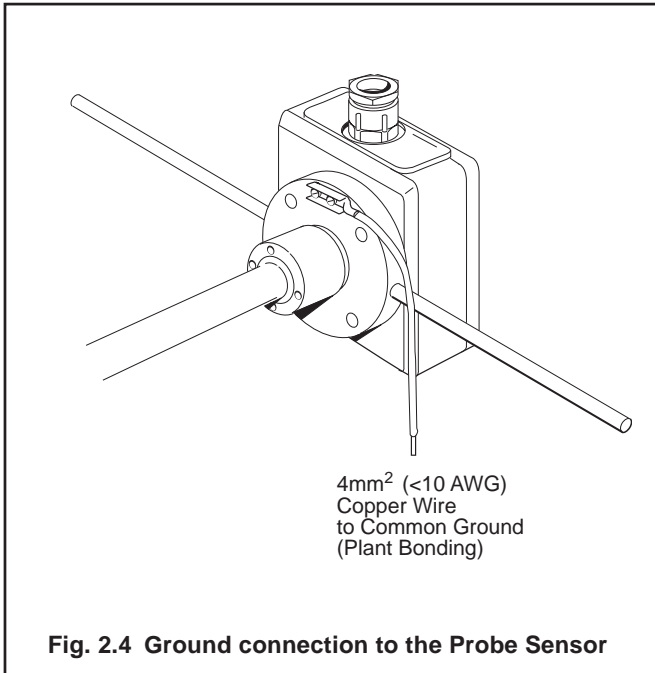


**Caution.**

- Do NOT rely on the flange bolts or studs for electrical connection.
- All earth bonding (grounding) must be in accordance with relevant national and local safety standards.



2.2 Insertion Probe Sensors



## 3 INSTALLATION

### 3.1 Connection Requirements

#### 3.1.1 Sensors



#### Caution.

- Each connection **MUST** be insulated from all others; in particular, **NO** connections must be made to screens or drain wires except as shown.
- All cable entries must be properly sealed.
- Glands must be appropriate for sealing on the cable size in use.
- Unused cable entries must be plugged.
- Electrical installation and earthing must be in accordance with relevant national and local standards.
- The transmitter and sensor are supplied as a matched system. Check serial numbers to ensure matched pair.

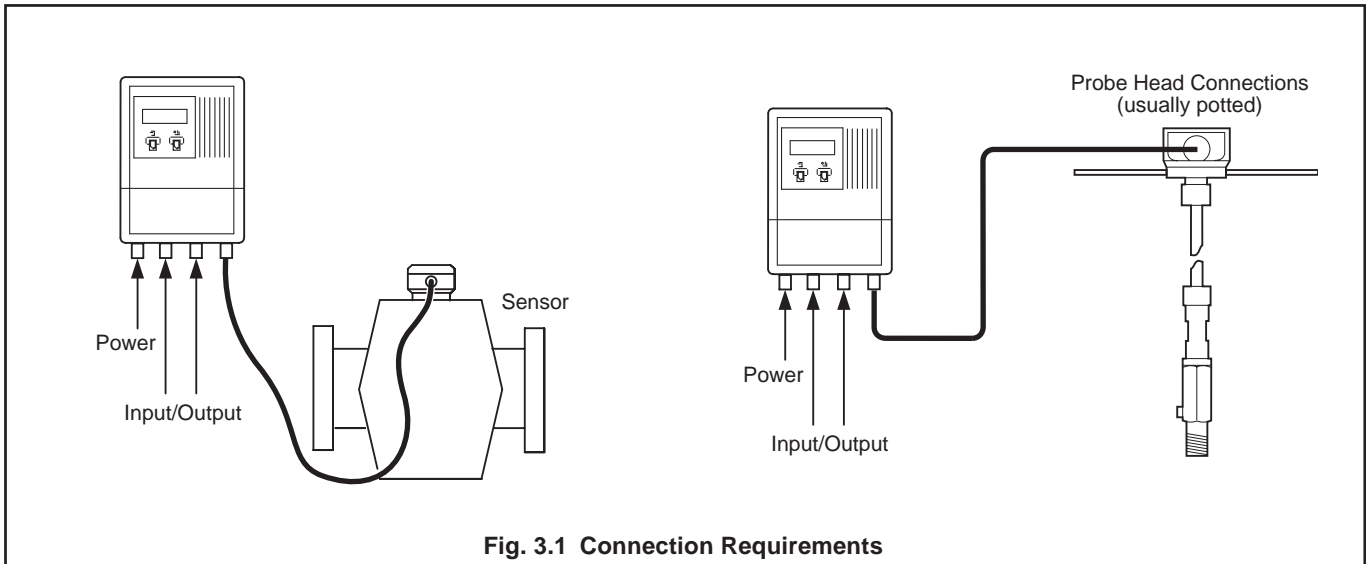


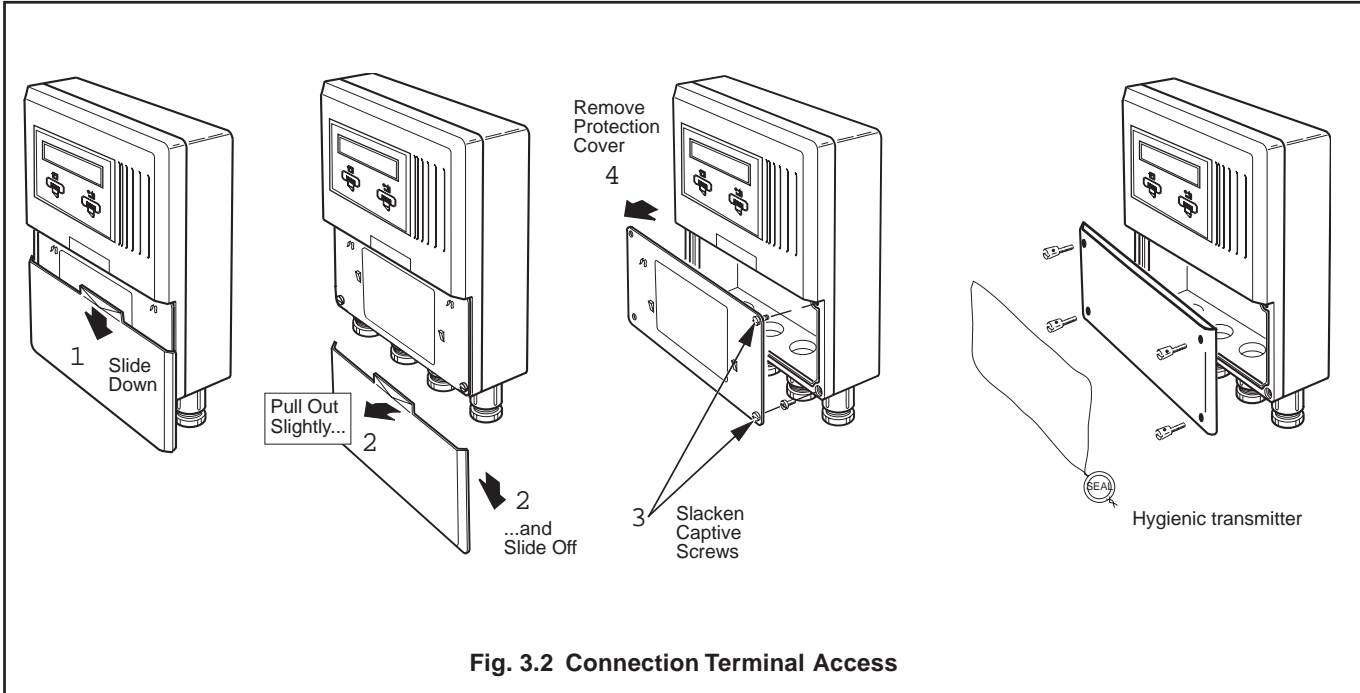
Fig. 3.1 Connection Requirements

#### Sensor Connections

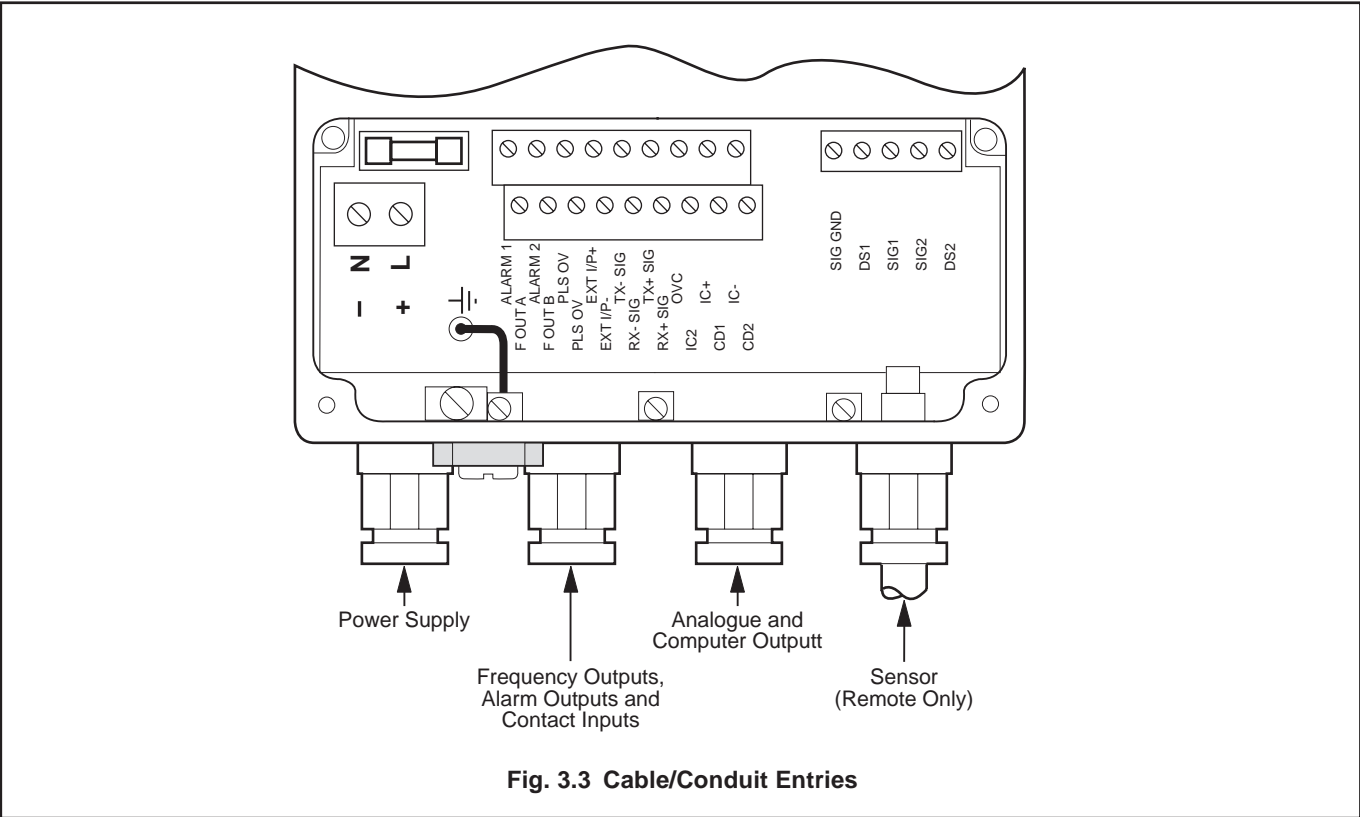
Sensors are usually supplied with an integral cable and potted head connections. The transmitter end of the cable, the power supply and any output cables must be prepared and connected as detailed in the relevant parts of this book. If the sensor has been supplied unpotted, connections must also be made to the full-bore sensor terminal box or probe head (Fig. 3.1) and then potted on completion – see ENVIRONMENTAL PROTECTION.

3.1.2 Transmitter

**Caution.** Unused cable entries must be blanked with the permanent blanking plugs supplied.

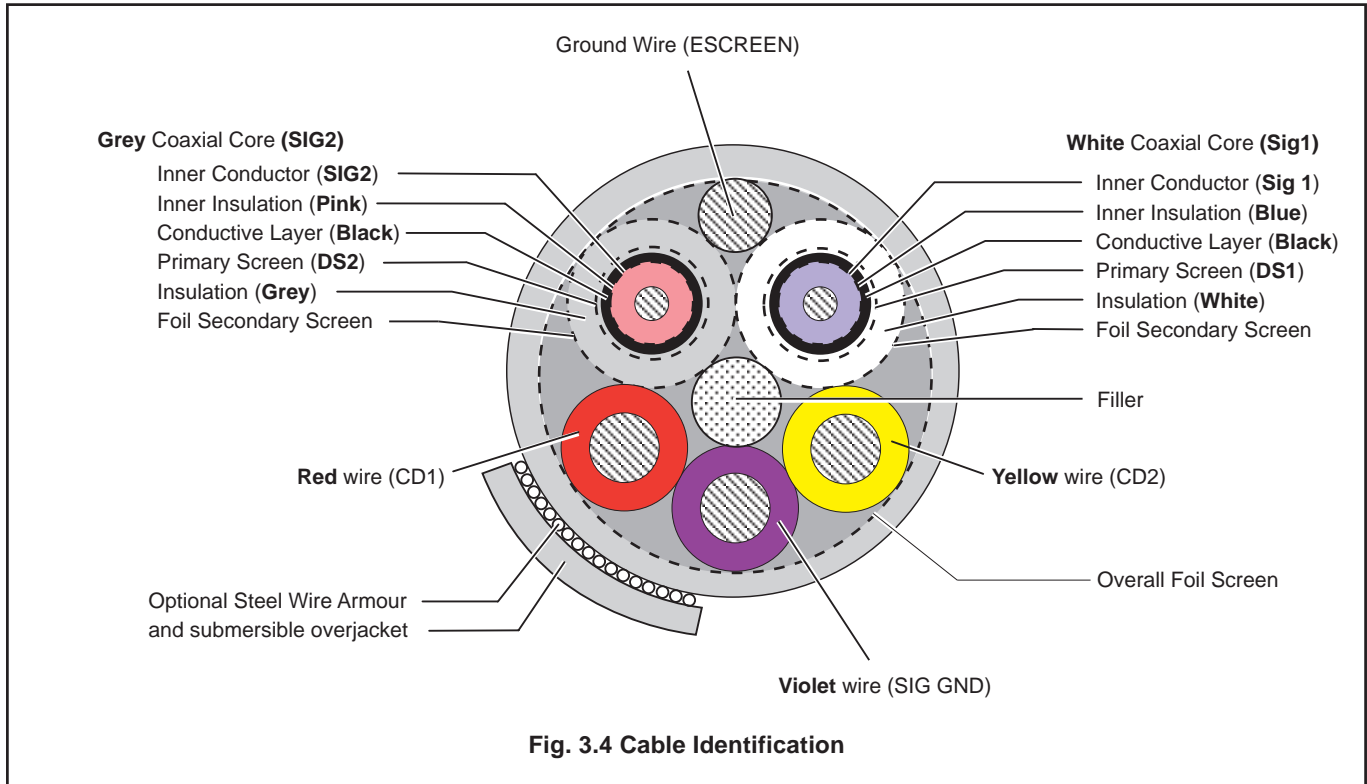


Transmitter Connections

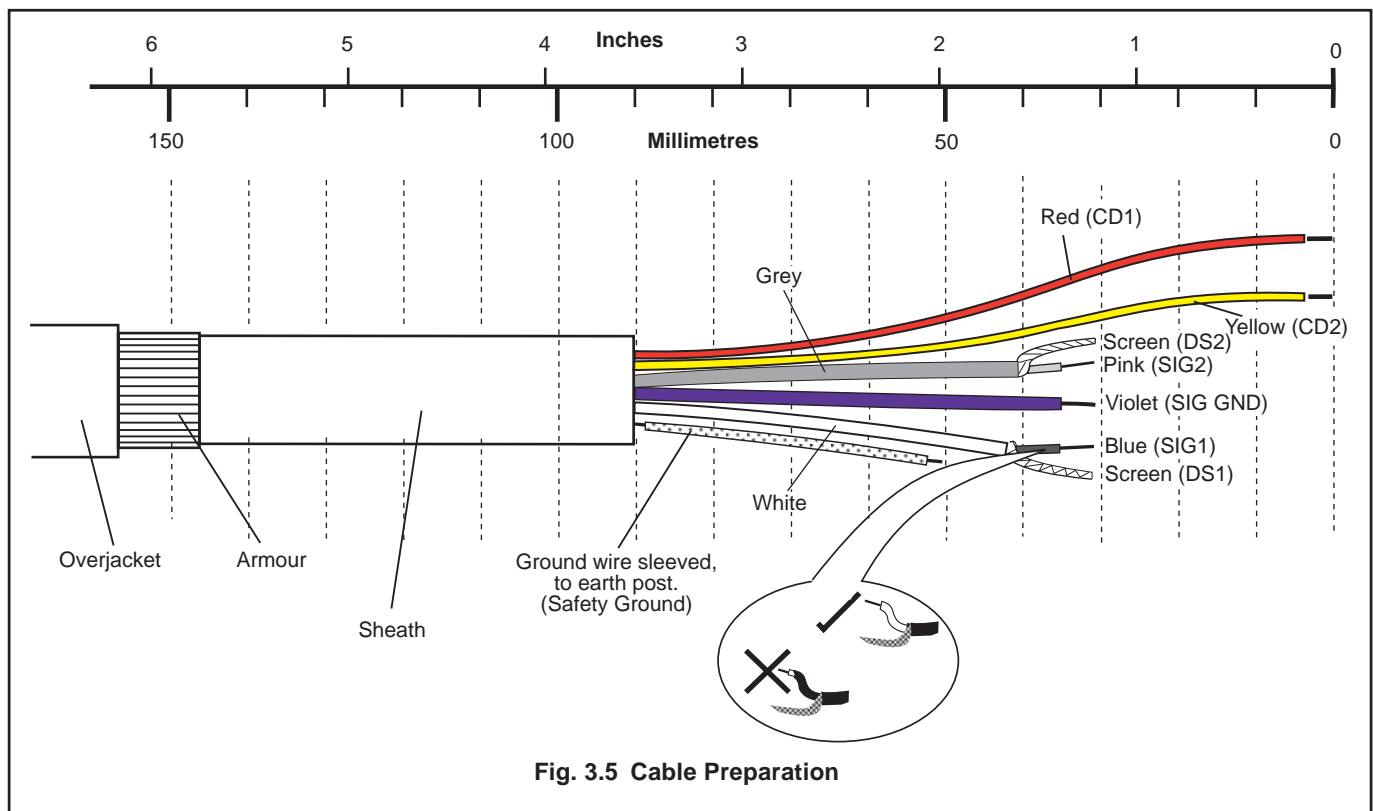


### ...3 INSTALLATION

#### 3.2 Cable Identification (Fig. 3.4)



#### 3.3 Cable Preparation (Fig. 3.5)



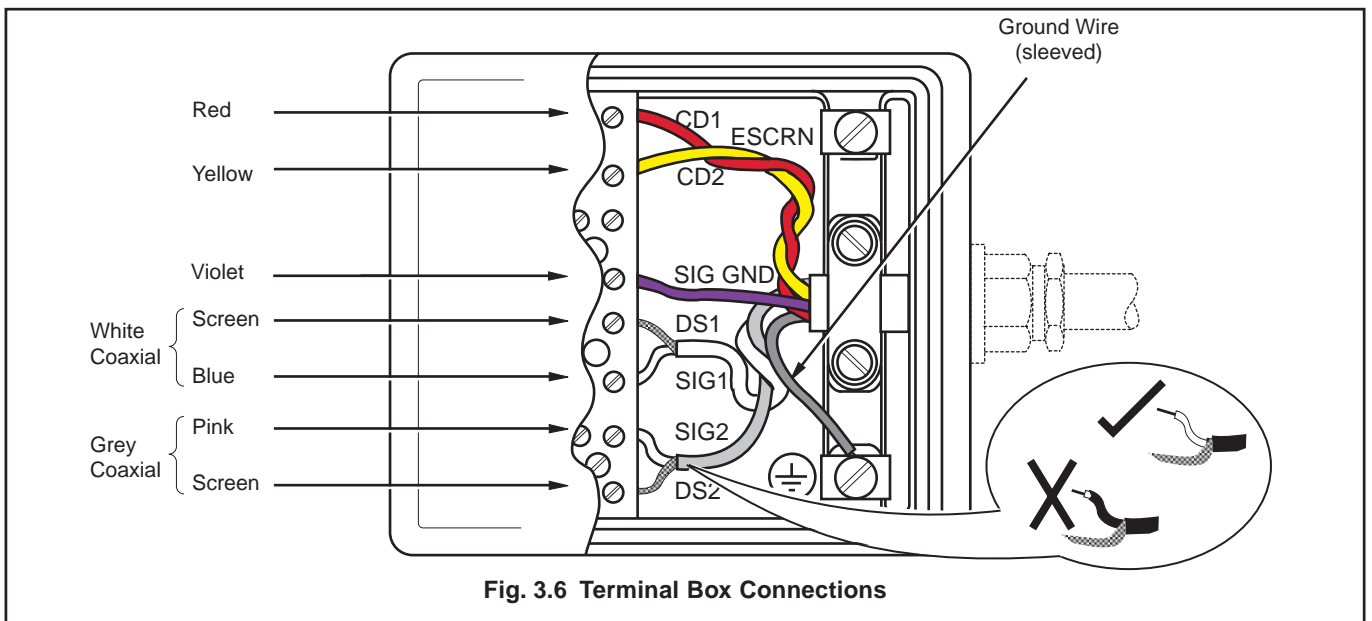
## 3.4 Sensor Terminal Box Connections (Remote System) – Fig. 3.6

**Caution.**

- **Remove any exposed black conductive layer from under coaxial screens.**
- Make connections only as shown.
- Sleeve all bare wiring.
- Twist RED and YELLOW cores lightly together.
- Twist WHITE and GREY coaxial cables lightly together.
- Maintain Environmental Protection at all times.
- Conduit connections must provide cable entry sealing.

**Information.**

- Refer to ENVIRONMENTAL PROTECTION (APPENDIX A).
- Internal appearance of Terminal Box may vary from that shown.
- Hazardous area approved flowmeters – see BOOK 1.



## ...3 INSTALLATION

### 3.5 Transmitter Sensor Cable Connections (Remote Transmitter) Fig. 3.7



#### Caution.

- Remove any exposed black conductive layer from the inner insulation of both coaxial cables.
- Substitute sensor cable of any kind is not acceptable.
- Do not make connections except as shown.
- Twist cable pairs together as shown.
- Sleeve ALL bare wires.
- Sensor cable may only be joined using company supplied junction box - available separately.



#### Information.

- Environmental protection – See APPENDIX
- Hazardous area approved flowmeters– See Book 1

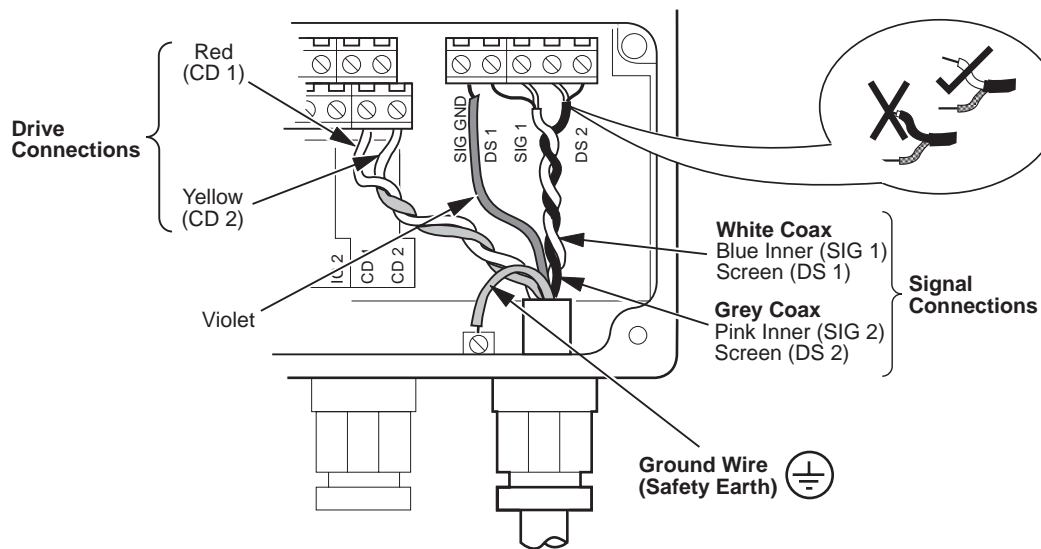
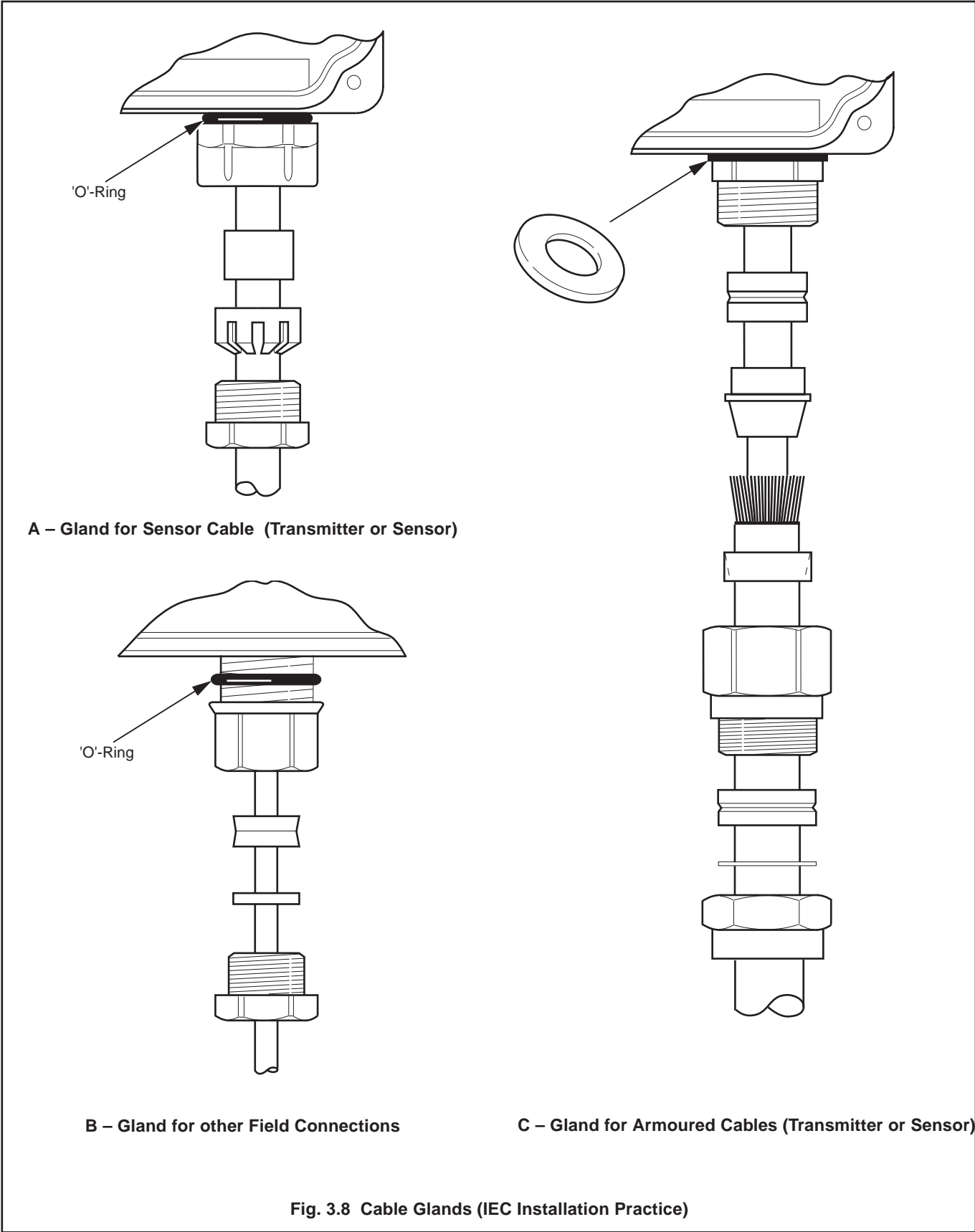


Fig. 3.7 Sensor Cable Connections

3.6 Cable Glands and Conduit Fixings

3.6.1 Cable Glands (IEC – 20mm)



### ...3 INSTALLATION

#### 3.6.2 Conduit Adaptors (N. American – 0.5") – Fig. 3.9



**Warning.**

- Rigid conduit must NOT be fitted to the transmitter.
- Transmitter adaptors must incorporate a face seal.
- Sensor adaptors must incorporate cable/conduit sealing.
- Cable/conduit sealing is advisable on transmitter adaptors.
- Torque settings for the hubs and outer nuts on the specified adaptors is 20ft. lbs minimum, 25ft. lbs. maximum.



**Information.**

- Suitable adaptors for transmitter (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.
- When fitting conduit adaptor hubs to the transmitter, start with an outer adaptor and also temporarily fit an adaptor hub at the opposite end, to aid location of the transmitter gland plate. Fit and tighten hubs consecutively from initial hub.

#### 3.6.3 Cable Glands (N. American – 0.5") – Fig. 3.10



**Warning.**

- Transmitter 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 transmitter, 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.

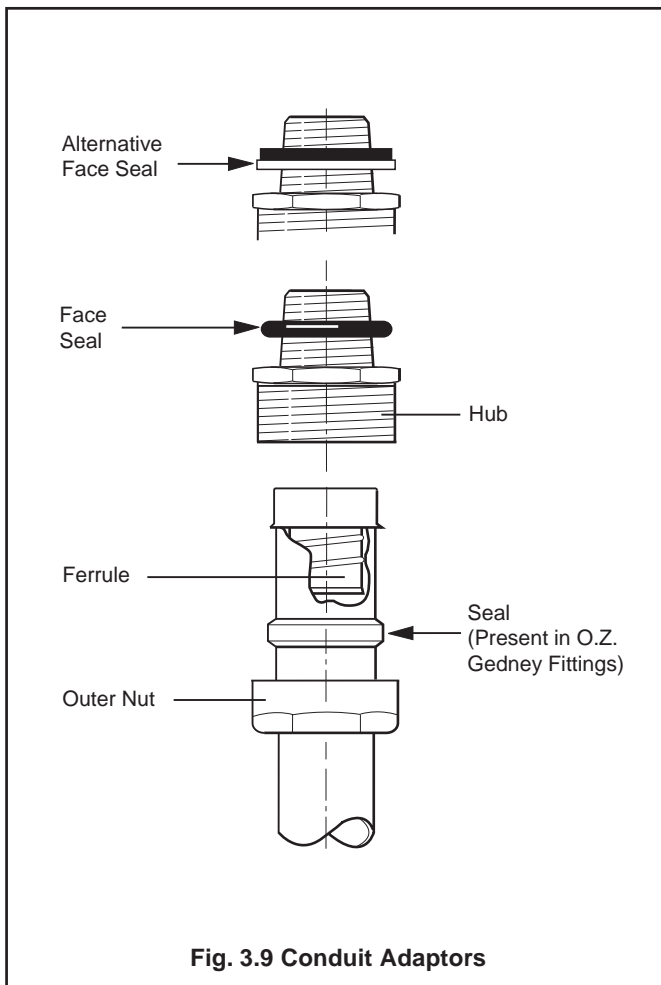


Fig. 3.9 Conduit Adaptors

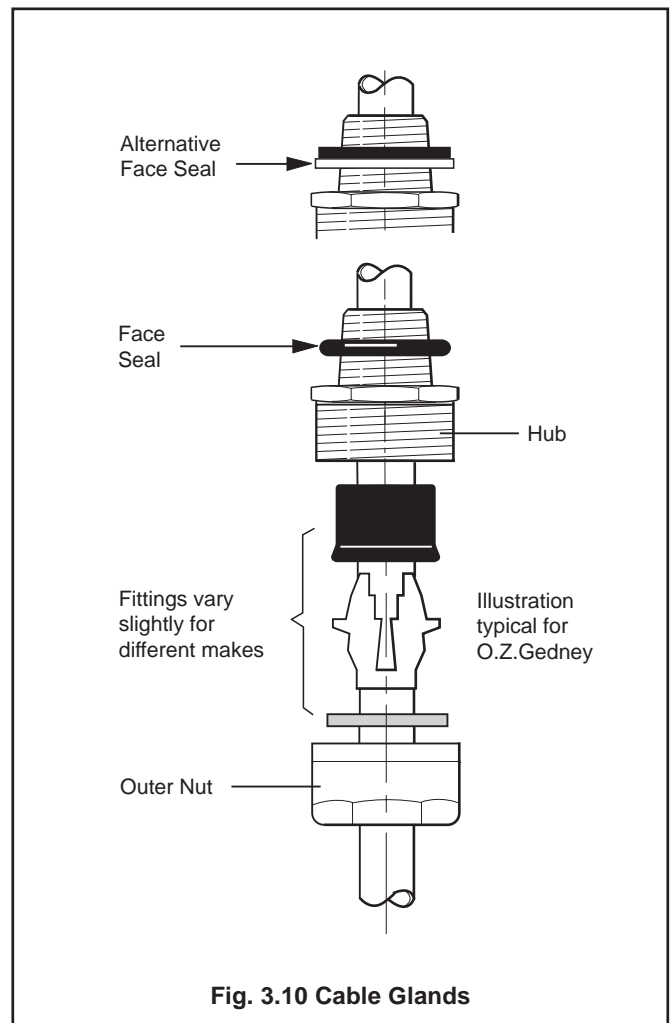


Fig. 3.10 Cable Glands

3.7 Input/Output Connections



**Caution.**

- Refer to SPECIFICATION SHEET for Input/Output ratings.
- Inductive loads must be suppressed or clamped to limit voltage swings
- Capacitive loads must be inrush current limited.
- Hazardous area requirements are not considered in the following pages.

3.7.1 Frequency Outputs – Fig. 3.11

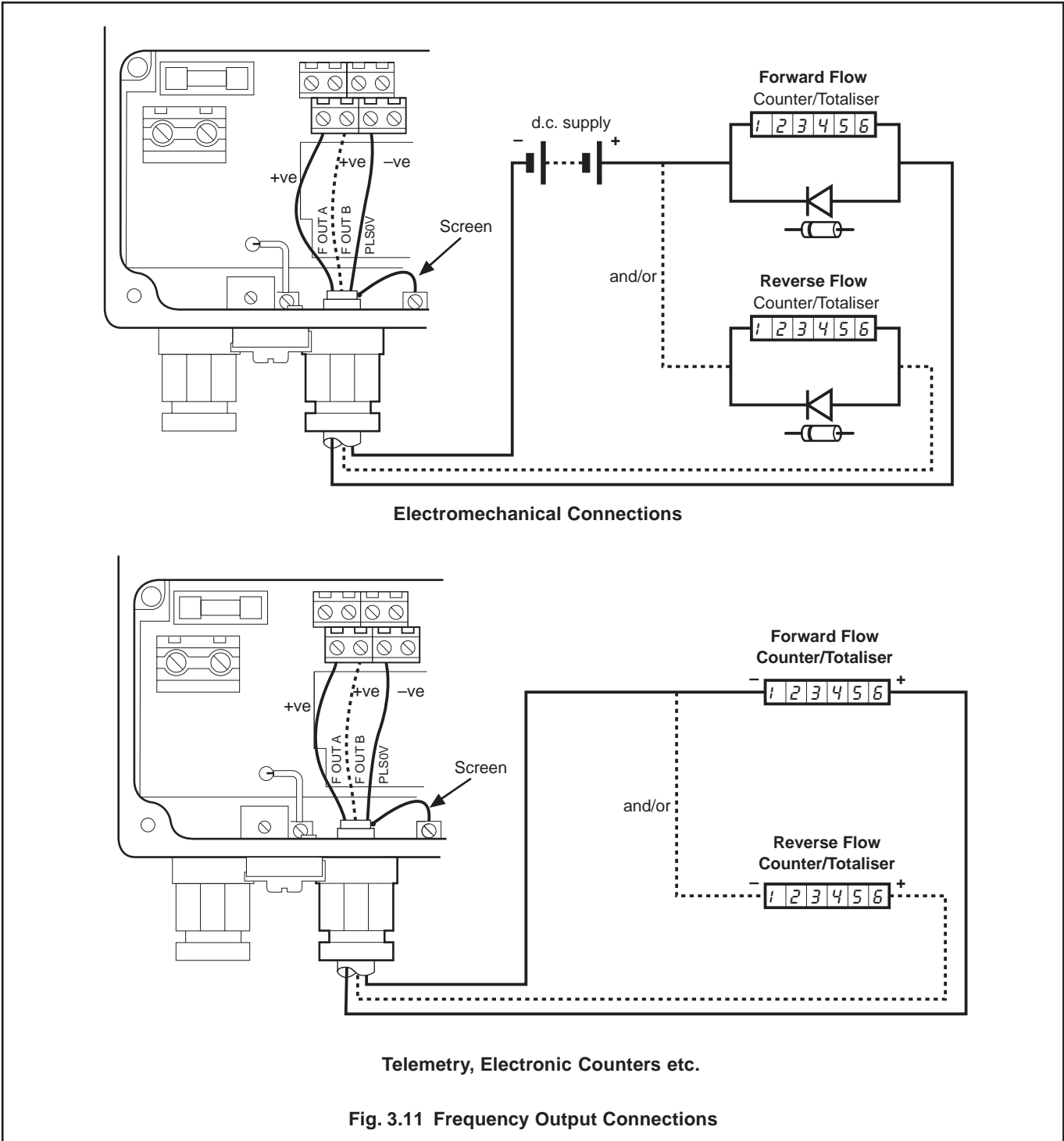
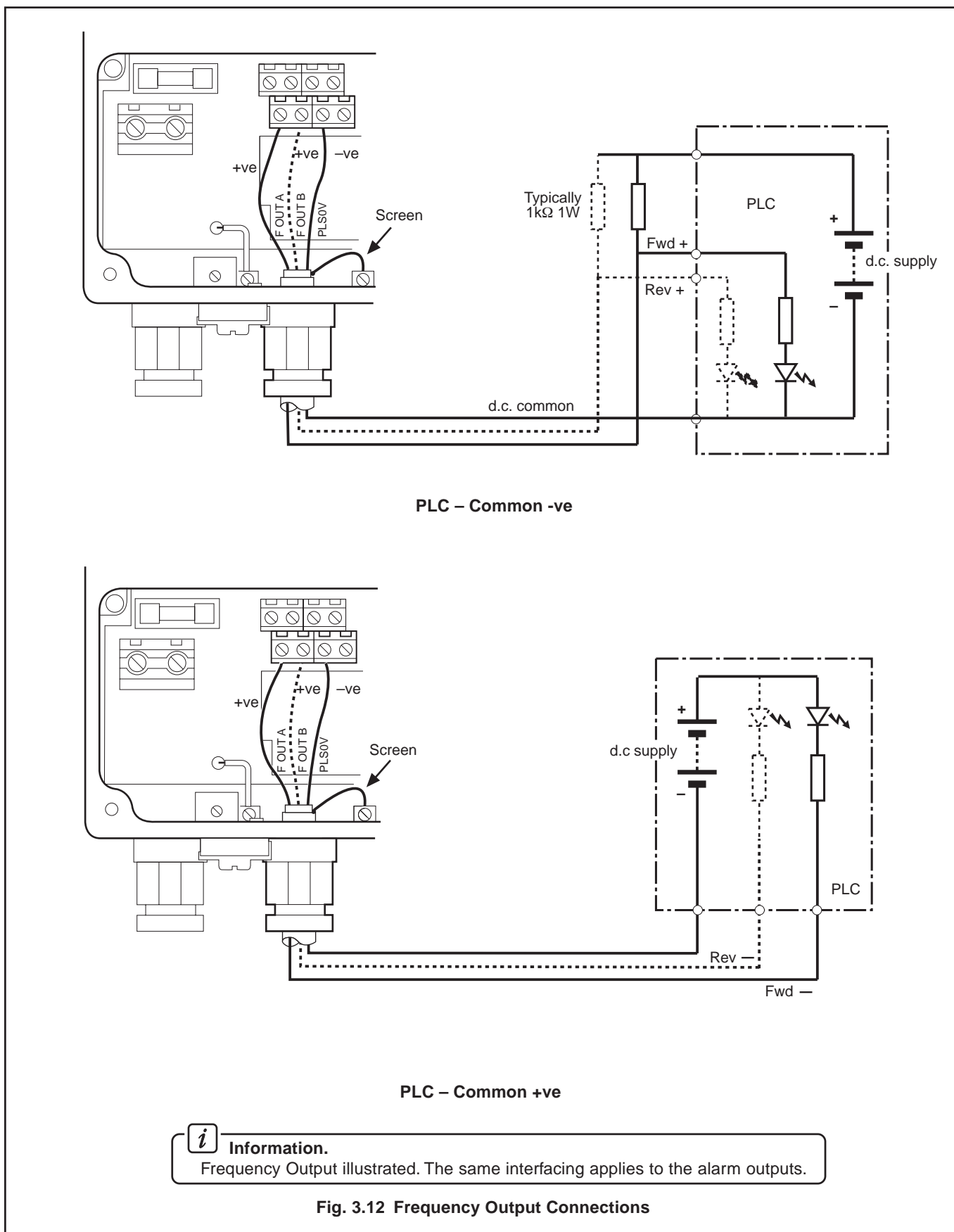


Fig. 3.11 Frequency Output Connections

### ...3 INSTALLATION

#### 3.7.2 PLC Interface – Fig. 3.12



3.7.3 Alarm Outputs – Fig. 3.13

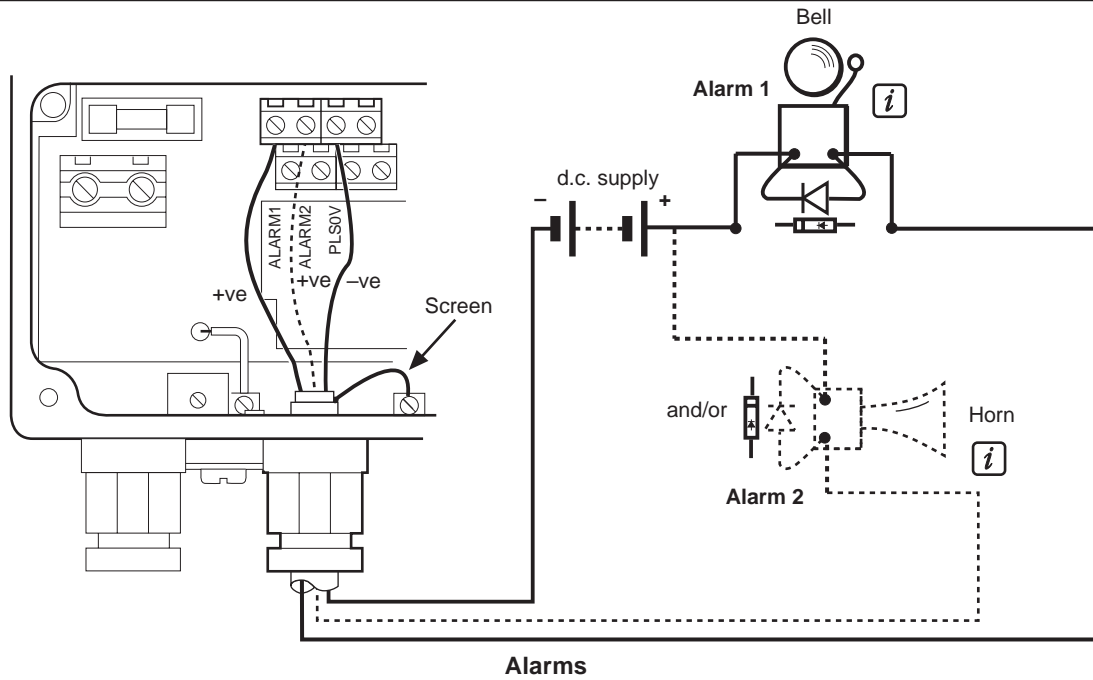


**Information.**

- Inductive loads may be suppressed by diodes (D) – 1N4004 or similar.
- Inrush currents are limited to 1 Amp by resistor R – e.g. 27Ω 1W for 24V systems.
- Operation of outputs is programmable – see Configuration Manual for details.
- Frequency and Alarm outputs share a common return with contact input.
- External isolators not normally required, as the pulse, alarm and contact circuits are electrically separated from all other Magmaster connections.



**Information.** Bell and Horn shown for example only. Use any suitable alarm device, e.g. lamp, siren, buzzer etc.



**Information.** Relay and Timer Switch shown for example only. Connect as required.

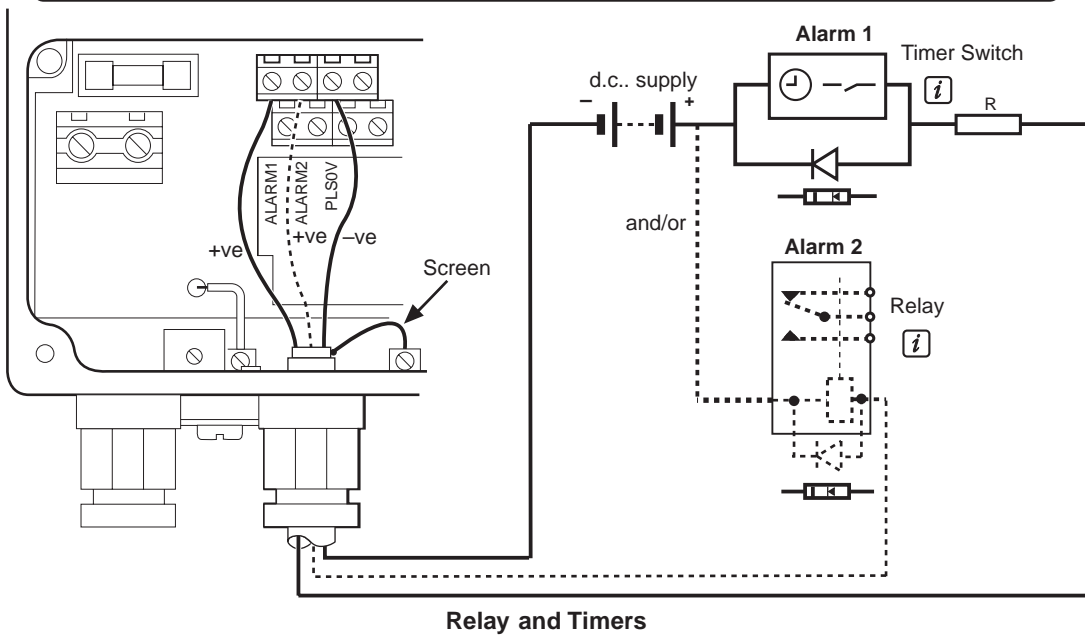


Fig. 3.13 Alarm Output Connections

### ...3 INSTALLATION

#### 3.7.4 Contact Input – Fig. 3.14

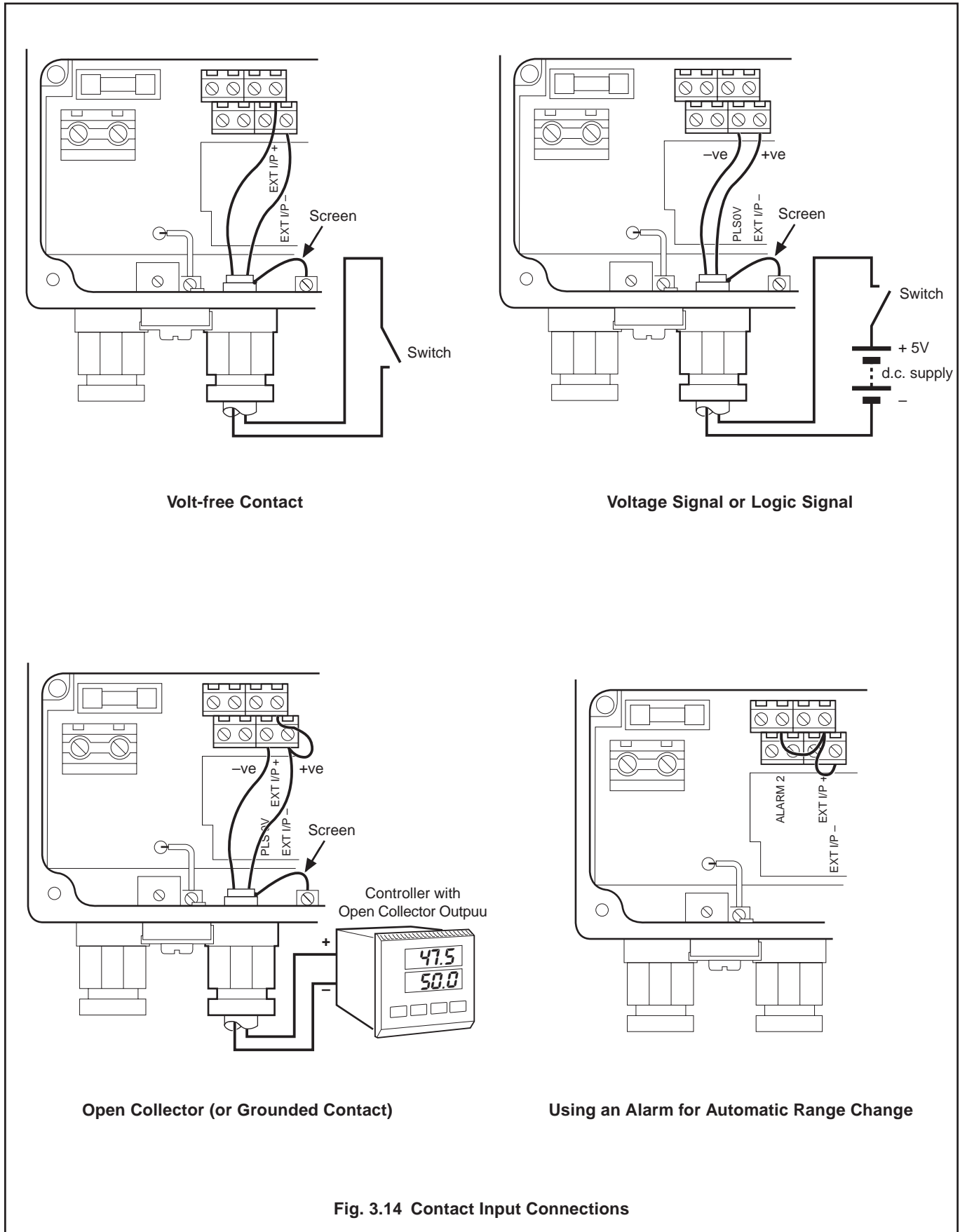


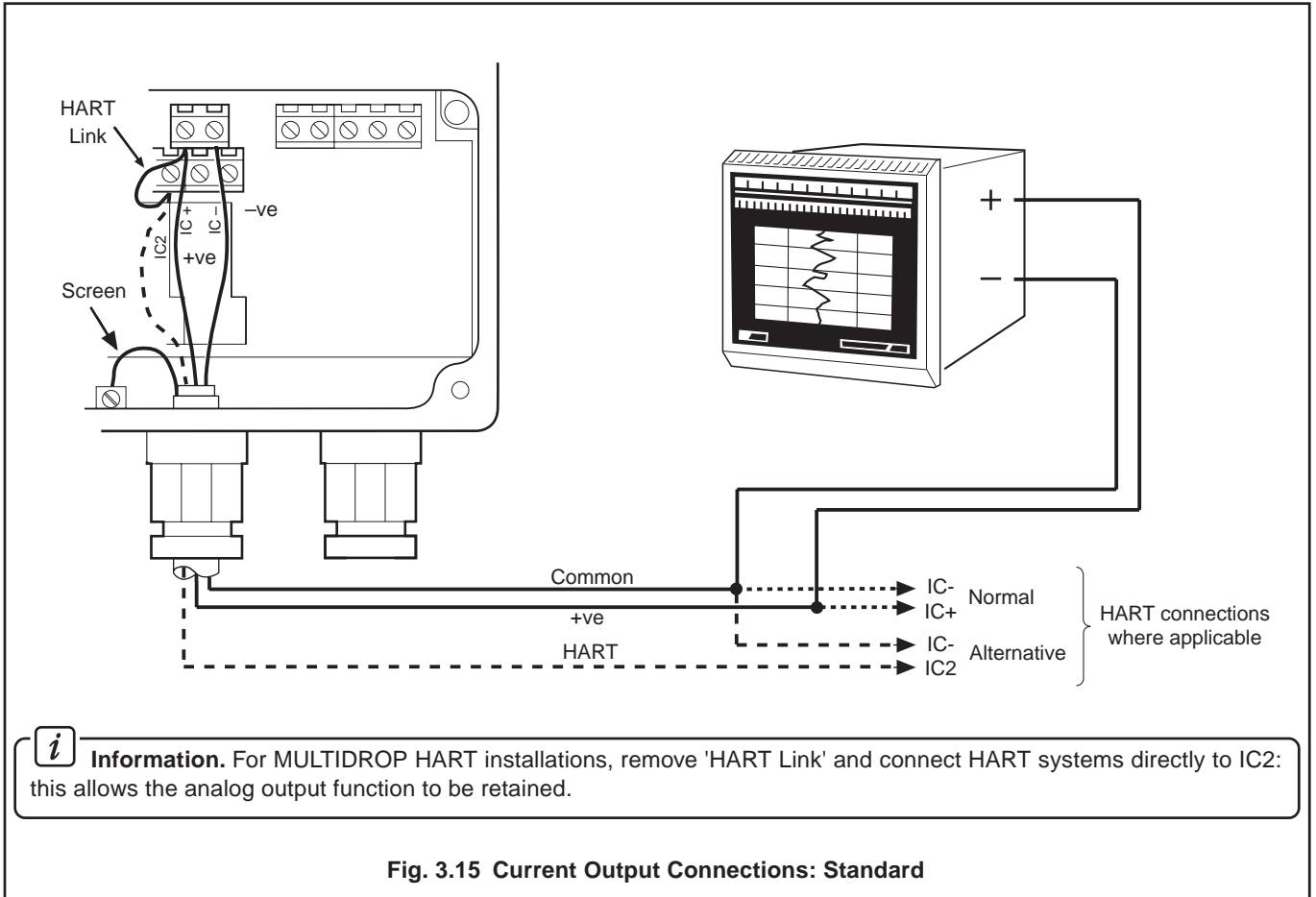
Fig. 3.14 Contact Input Connections

3.7.5 Current Output – Fig. 3.15 and 3.16



**Information.**

- Output is fully programmable – see Configuration Manual.
- Output is electrically separated from all other MagMaster connections.
- External isolators are not normally required and may significantly limit accuracy if used.



**Information.** For MULTIDROP HART installations, remove 'HART Link' and connect HART systems directly to IC2: this allows the analog output function to be retained.

Fig. 3.15 Current Output Connections: Standard

### ...3 INSTALLATION

#### ...3.7.5 Current Output

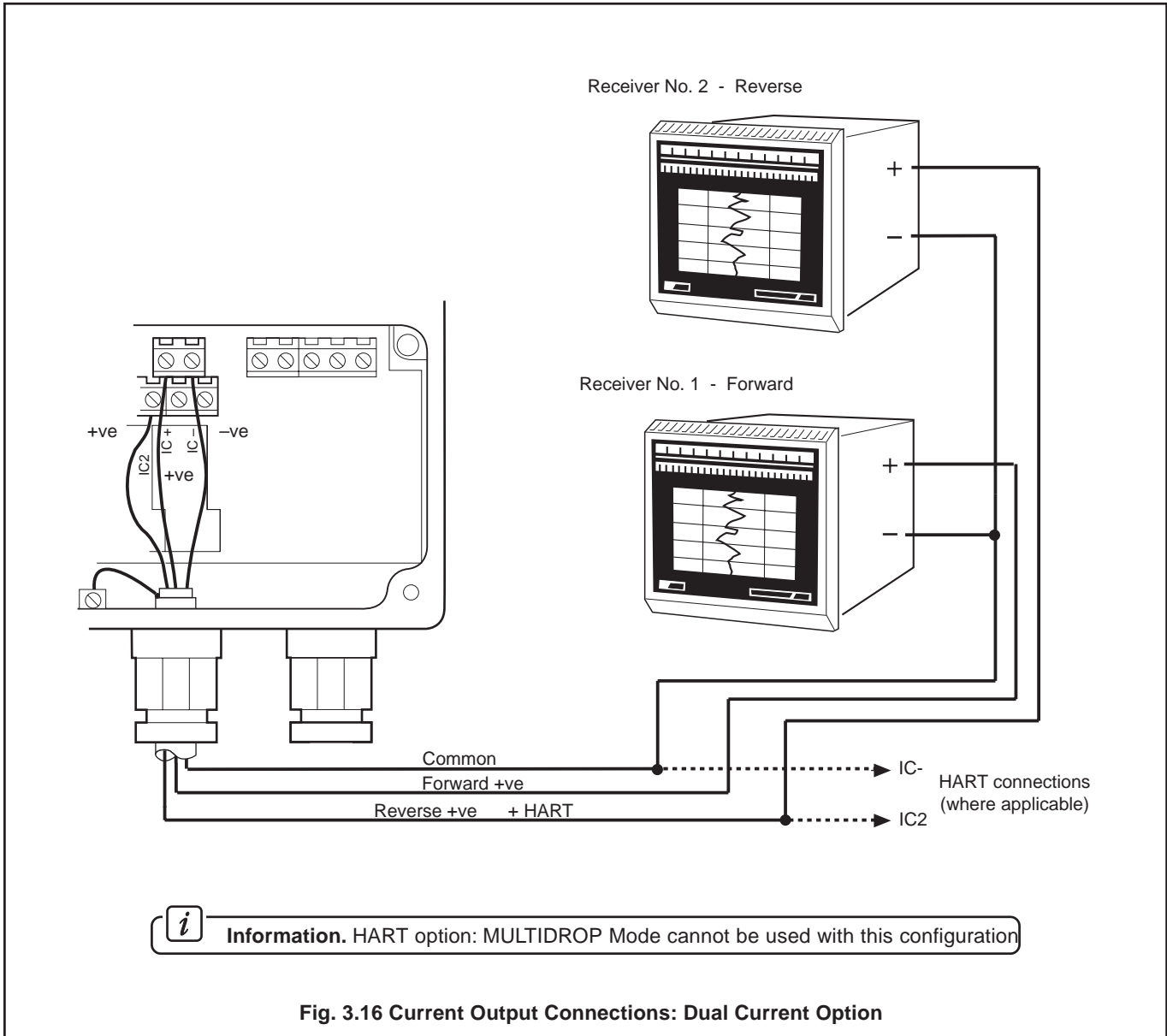


Fig. 3.16 Current Output Connections: Dual Current Option

3.7.6 Computer Connection – Fig. 3.17 and 3.18



**Information.**

- RS422/423 option is electrically isolated from all other MagMaster connections.

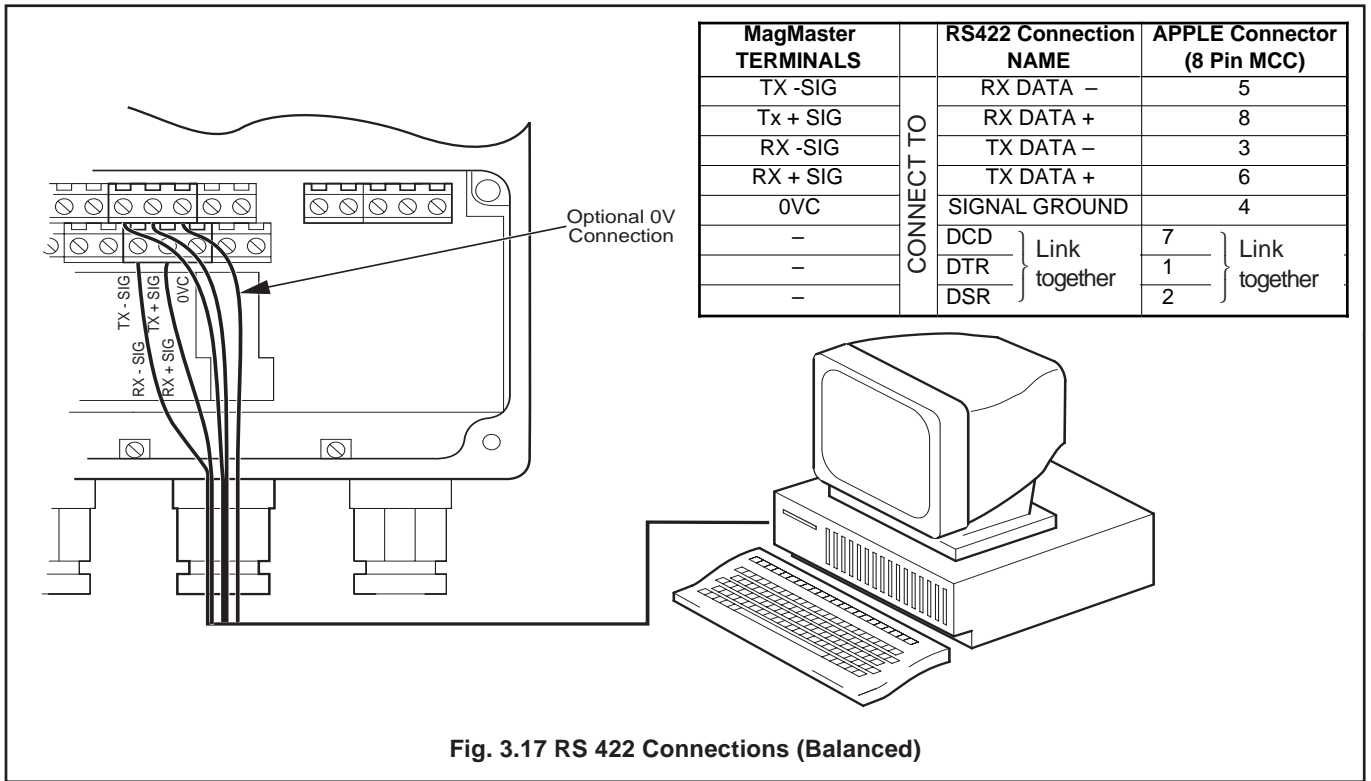


Fig. 3.17 RS 422 Connections (Balanced)

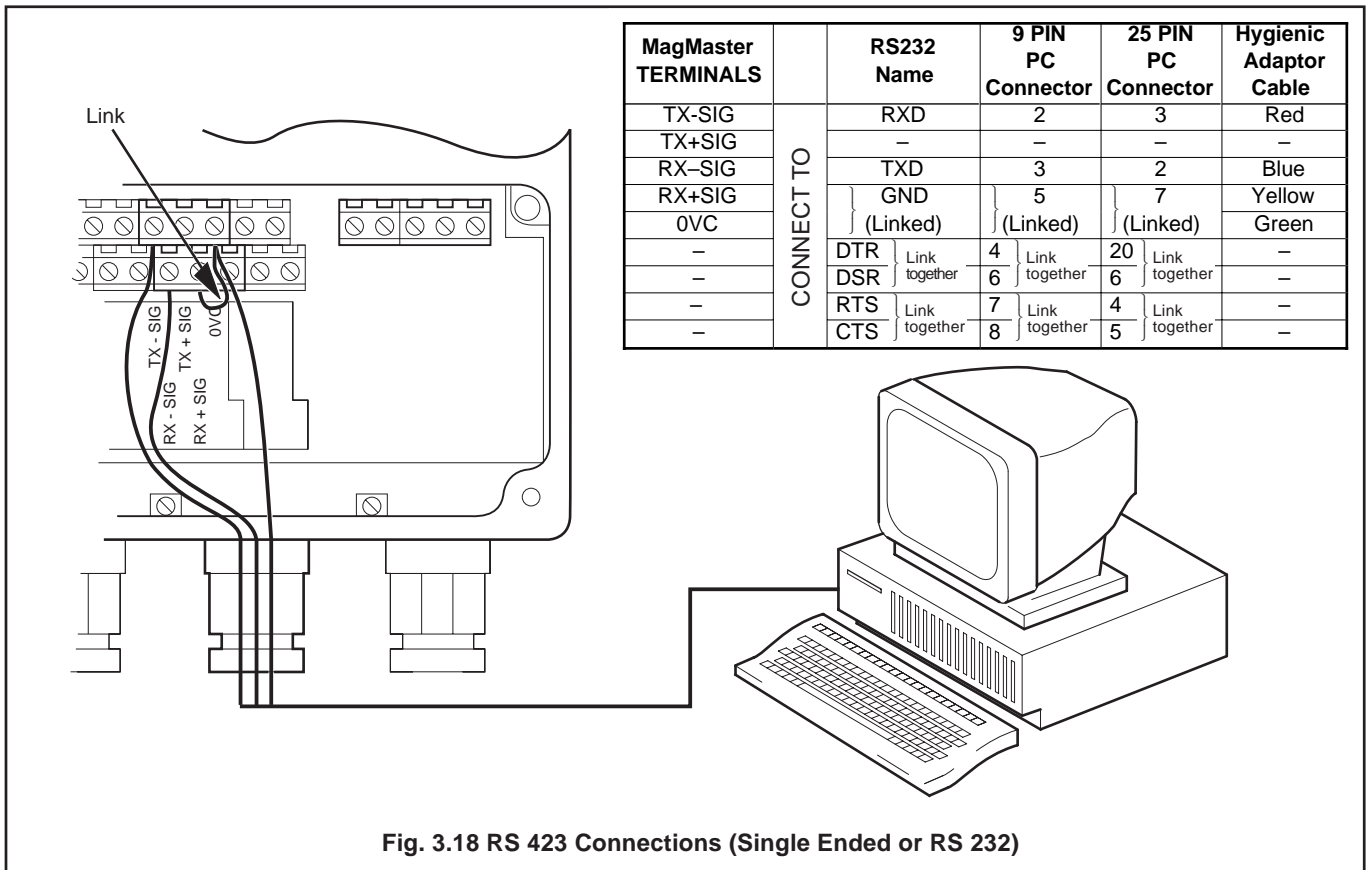


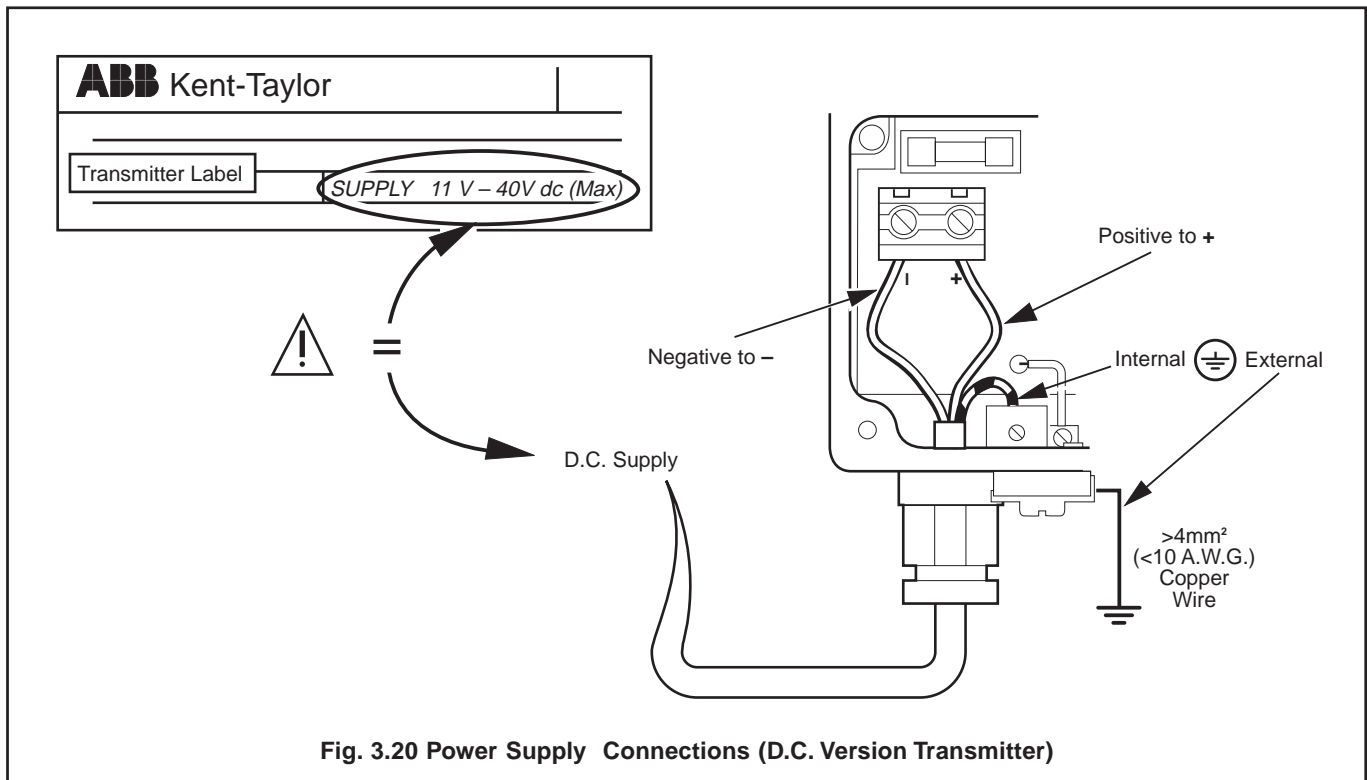
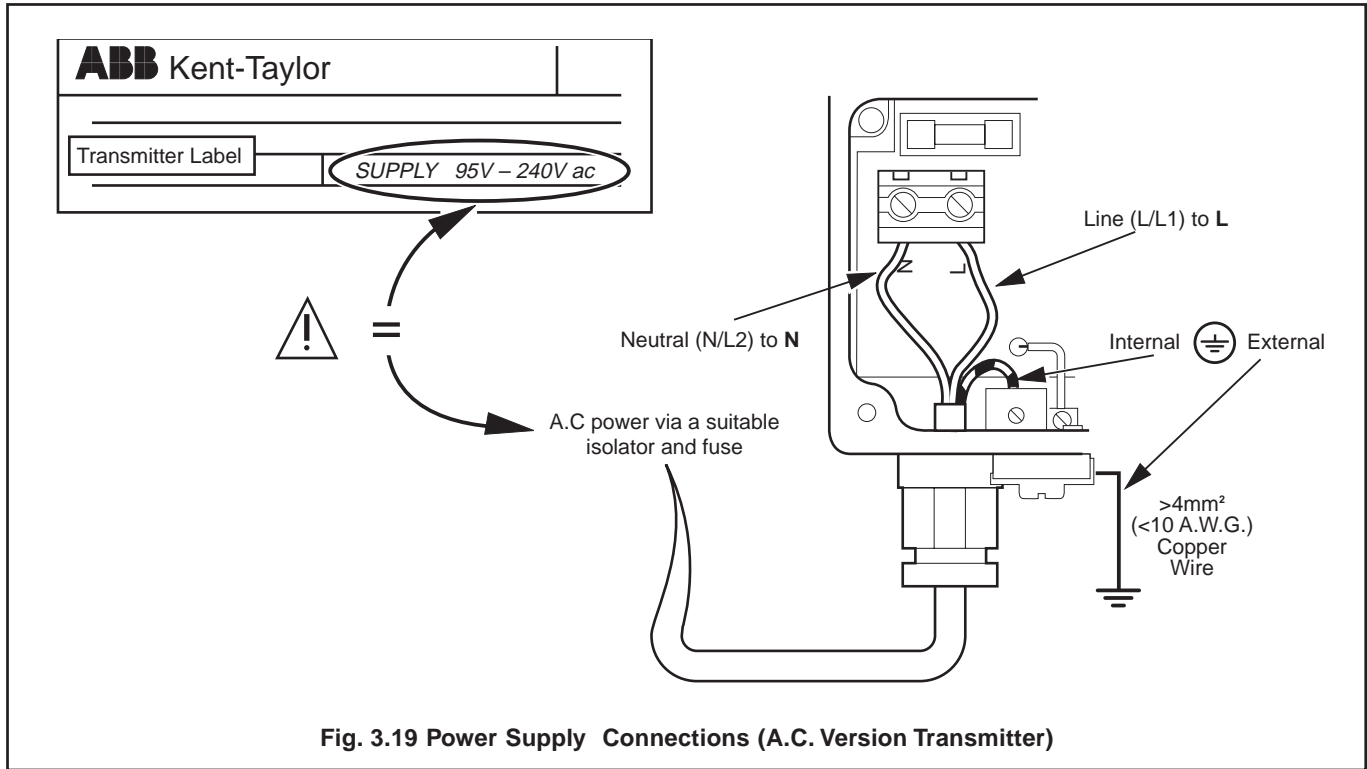
Fig. 3.18 RS 423 Connections (Single Ended or RS 232)

### ...3 INSTALLATION

#### 3.7.7 Power Supply Connections – Figs. 3.19 and 3.20

**Warning.**

- DISCONNECT THE SUPPLY FROM ANY CABLES BEING TERMINATED ON THE TRANSMITTER.
- Electrical installation and earthing must be in accordance with relevant national and local standards.



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## APPENDIX A – ENVIRONMENTAL PROTECTION

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**Warning.**

- Potting materials are toxic – use suitable safety precautions.
- Read the manufacturers instructions carefully before preparing the potting material.
- The remote sensor terminal box connections must be potted immediately on completion to prevent the ingress of moisture. For hazardous area versions – see HAZARDOUS AREA APPROVALS.
- Check all connections before potting – see ELECTRICAL INSTALLATION.
- Do not overfill the terminal box or allow the potting material to come into contact with the 'O' ring or groove.
- Do not let potting material enter conduit, if used.

# APPENDIX B – MAGMASTER BLOCK DIAGRAM

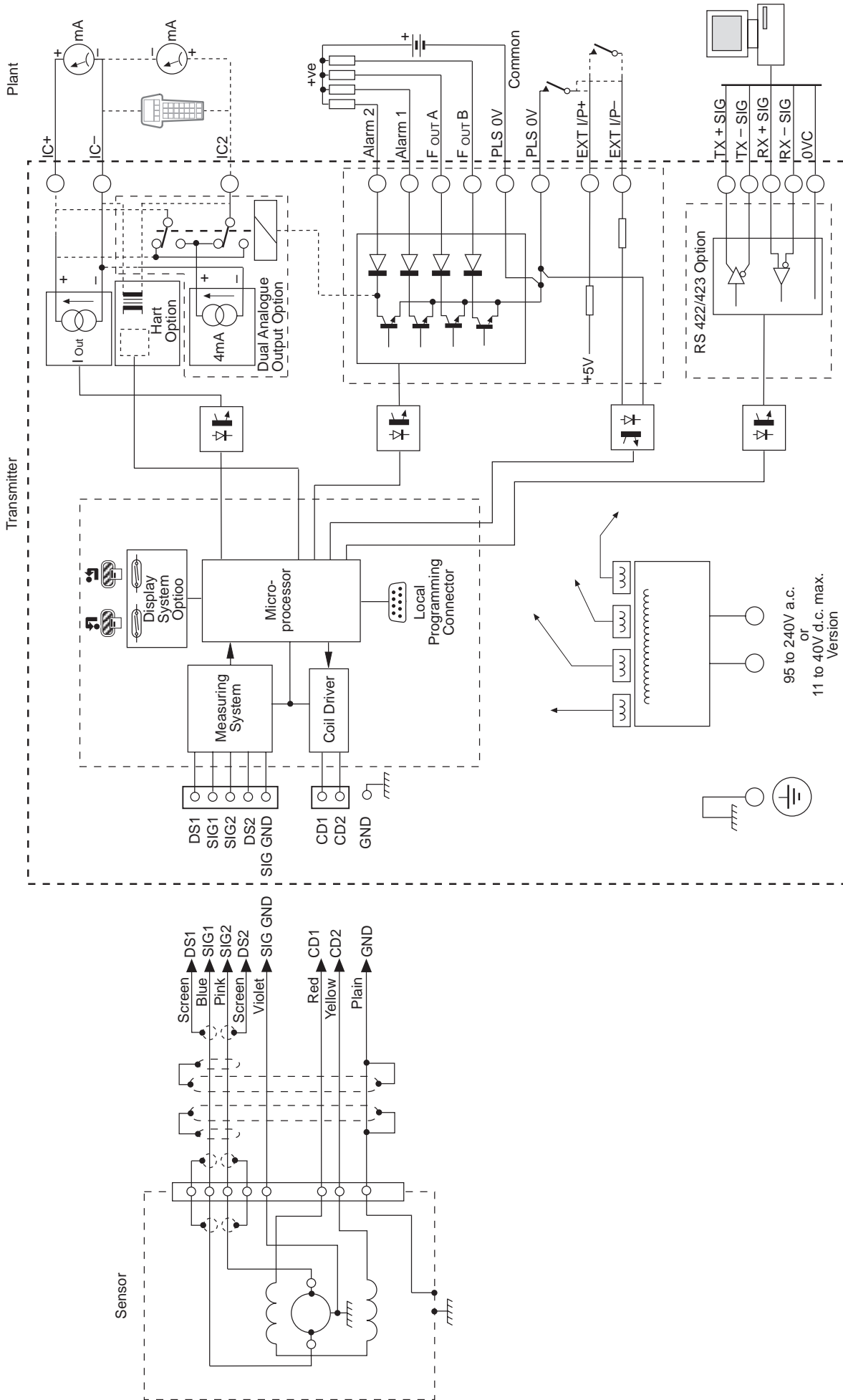


Fig. B1 MagMaster Block Diagram

# 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, Strip Chart and Paperless 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) 755 883 4366  
Fax: +1 (0) 755 883 4373

#### 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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