

ABB AUTOMATION

The Company

ABB Automation is 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 NAMAS Calibration Laboratory (No. 0255) is just one of ten flow calibration plants operated by the Company, and is indicative of ABB Automation's dedication to quality and accuracy.

BS EN ISO 9001



St Neots, U.K. – Cert. No. Q5907
Stonehouse, U.K. – Cert. No. FM 21106

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.



Caution.

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



Note.

Clarification of an instruction or additional information.



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 Marketing Communications Department, ABB Automation.

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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1 INTRODUCTION

MagMaster™ is a range of high performance electromagnetic flowmeters for the measurement of electrically conductive fluids and slurries, and is normally supplied as a calibrated system, with the transmitter, factory configured, to a supplied full-bore or insertion probe sensor.

A wide range of options is available to suit most applications, including:

- Integral or remote transmitter.
- Glass loaded polypropylene or aluminium transmitter housing.
- Combined Hart™ and Keypad support in the aluminium housing transmitter.
- Flanged or wafer style sensors.
- Insertion Probes.
- Approved Versions, including:
 - Hazardous area operation.
 - Hygienic.
 - HART™ communication protocol.



Warning.

For MagMaster Approved /Hazardous Versions see the full installation manual.

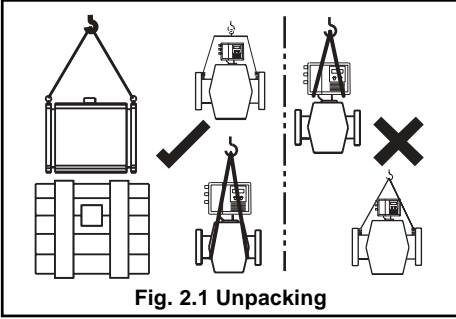


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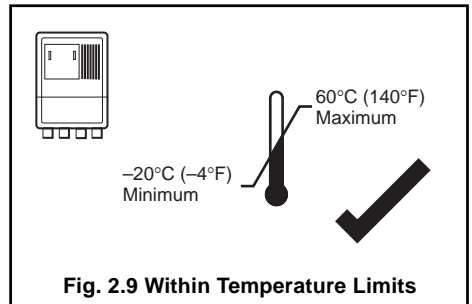
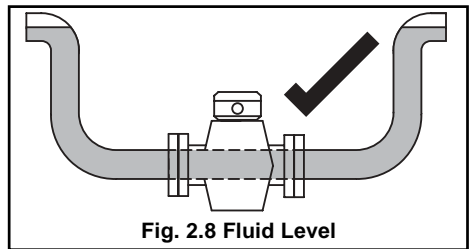
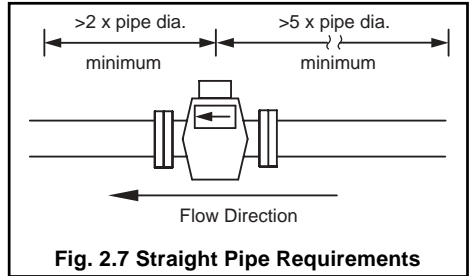
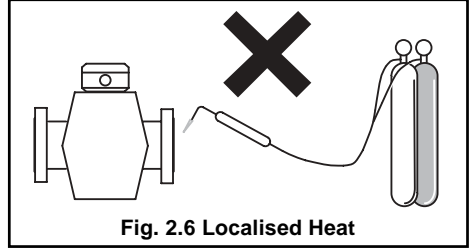
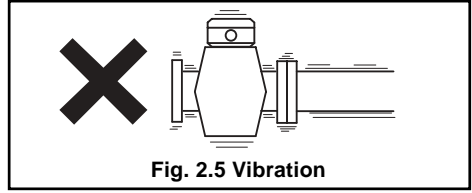
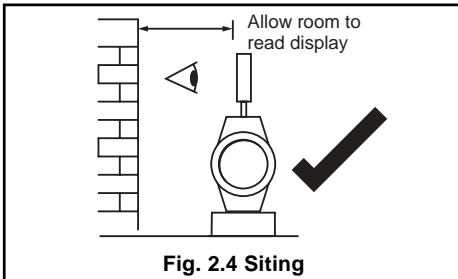
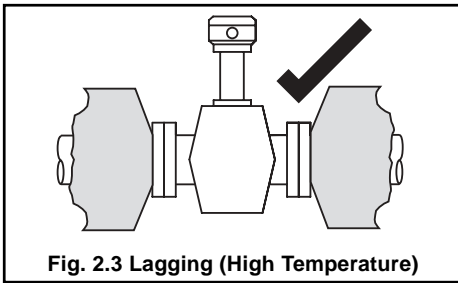
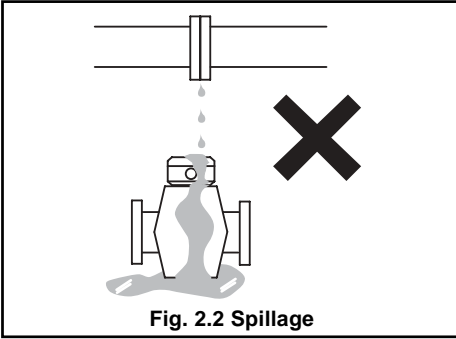
- Installation and maintenance must only be carried out by suitably trained personnel.
- All relevant sections of this manual must be read before selecting a location.
- Safety requirements of this equipment, any associated equipment and the local environment must be taken into consideration.
- The installation and use of this equipment must be in accordance with relevant national and local standards.

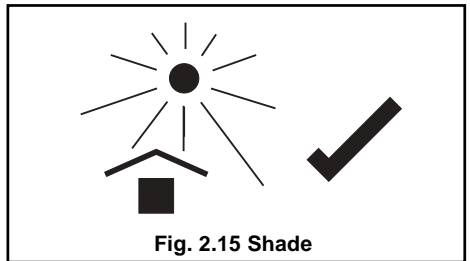
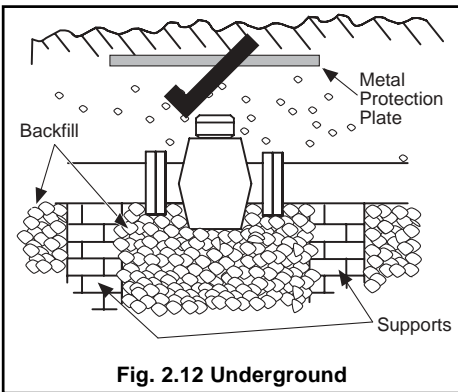
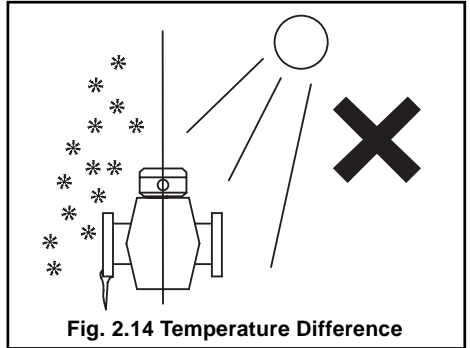
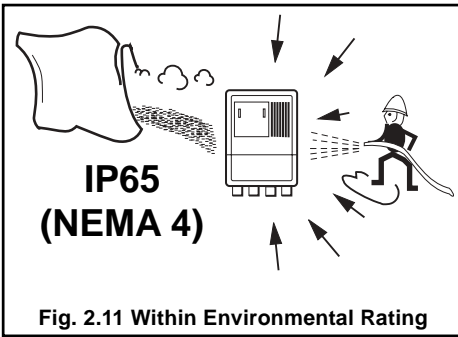
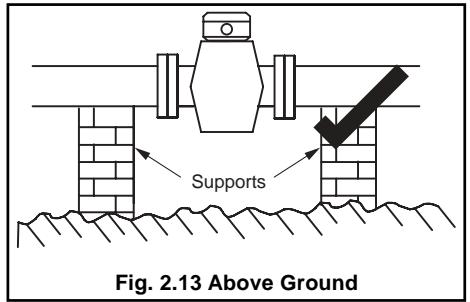
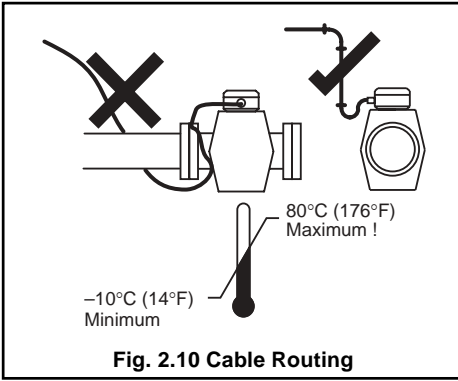
2 MECHANICAL INSTALLATION

2.1 Unpacking



2.2 Installation Conditions

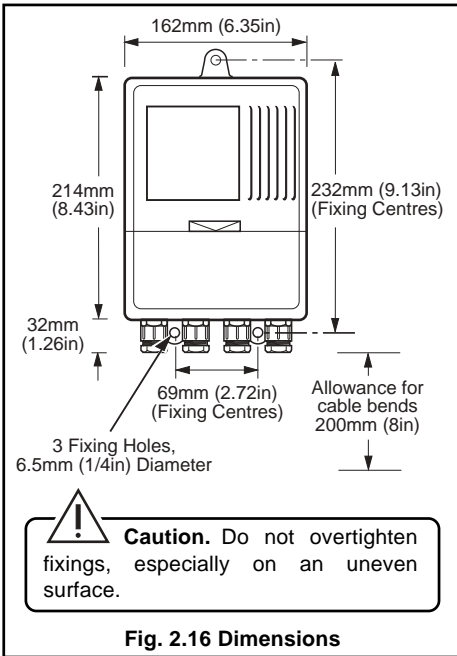




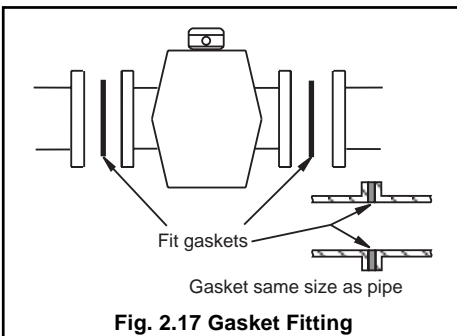
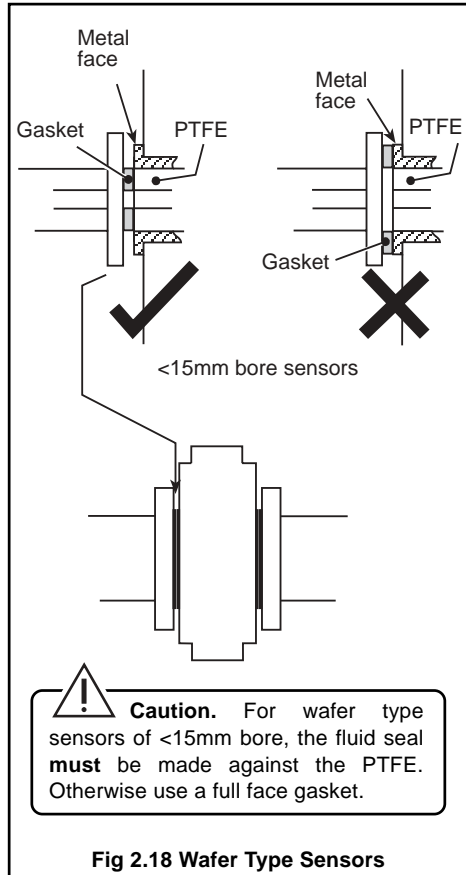
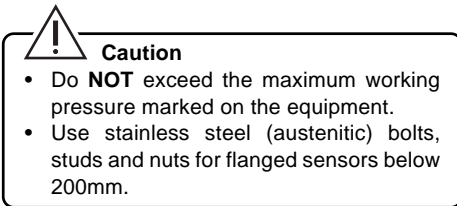
...2 MECHANICAL INSTALLATION

2.3 Mechanical Installation

2.3.1 Transmitters

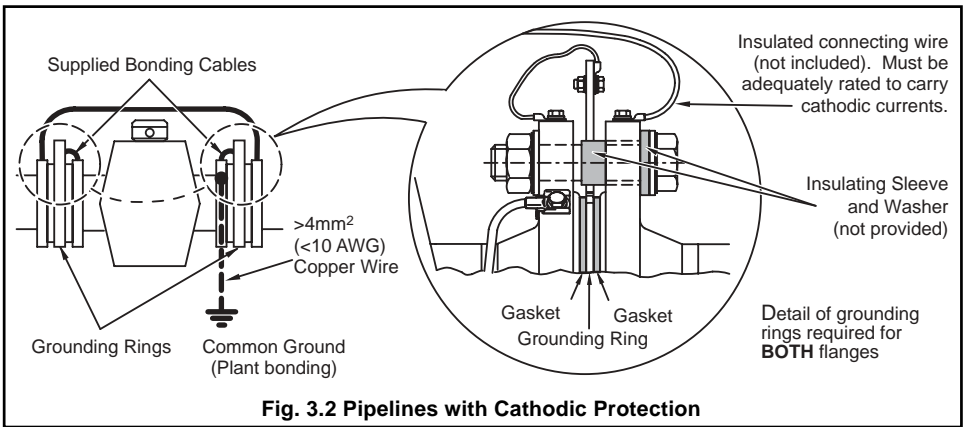
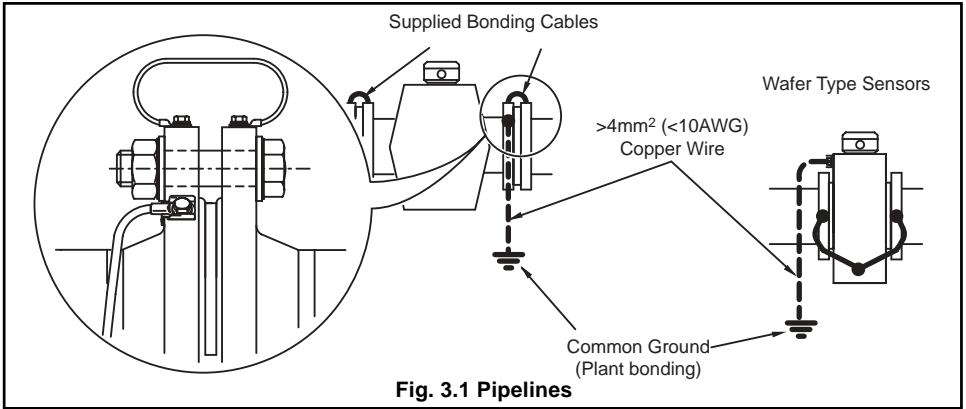


2.3.2 Sensors



3 ELECTRICAL INSTALLATION

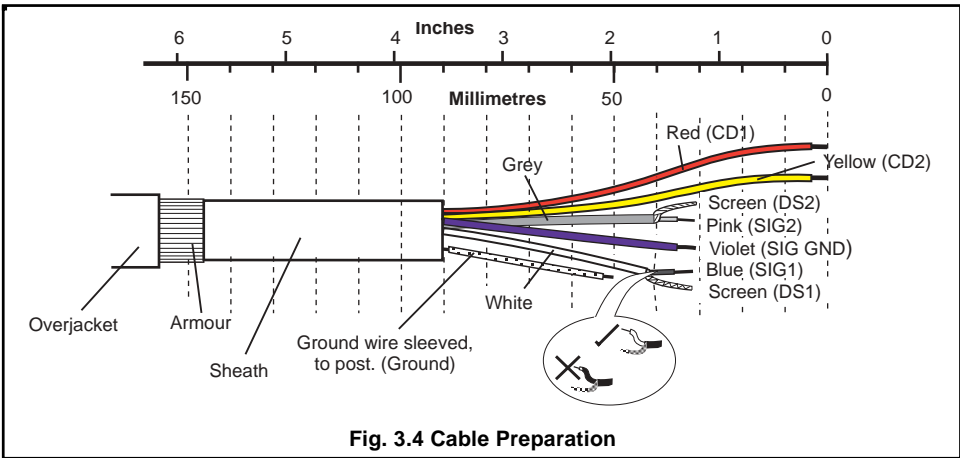
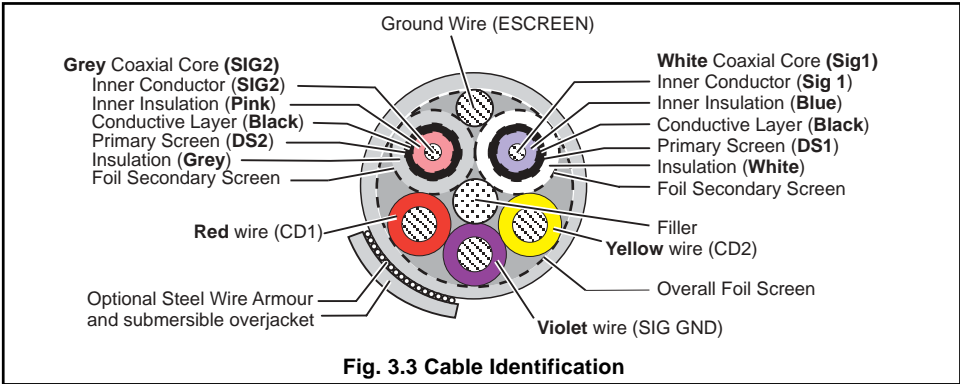
3.1 Grounding (Fig. 3.1, 3.2)



...3 ELECTRICAL INSTALLATION

3.2 Cables

3.2.1 Cable (Remote Versions only)



3.2.2 Cable (Alternative Type – North American Wiring Practice)

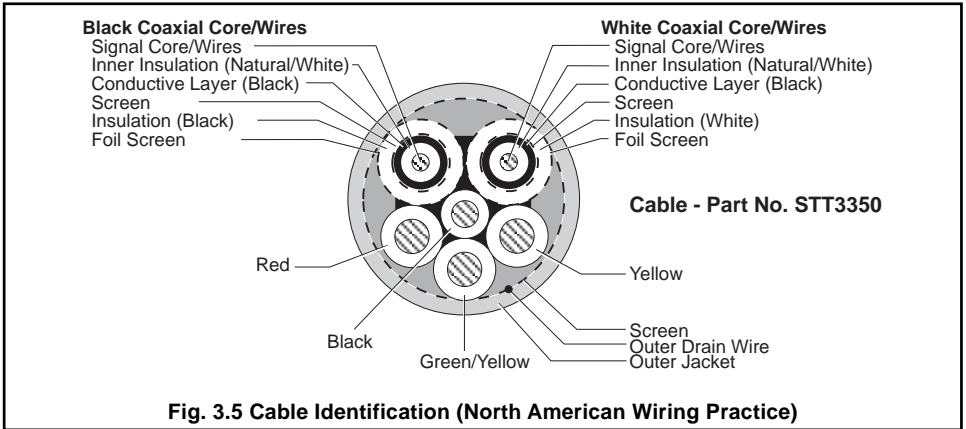


Fig. 3.5 Cable Identification (North American Wiring Practice)

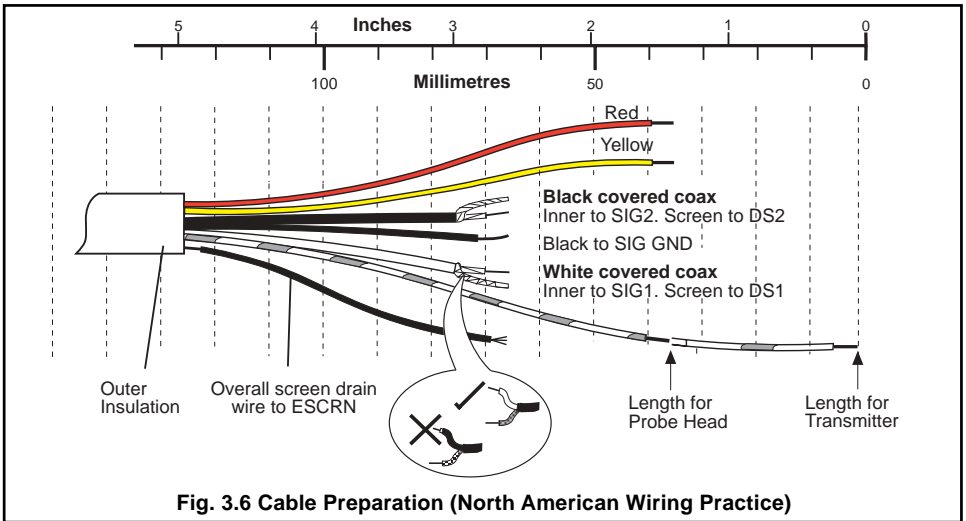
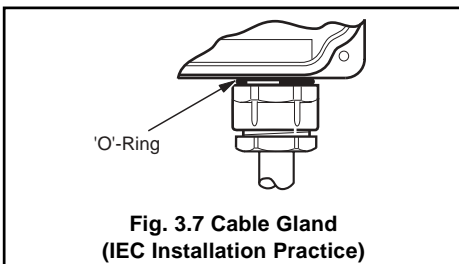


Fig. 3.6 Cable Preparation (North American Wiring Practice)

3.2.3 Cable Glands (IEC Installation Practice)



Warning.

- Rigid conduit must not be fitted to the transmitter.
- Transmitter conduit adaptors must incorporate a face seal.

3.2.4 Conduit Adapters and Cable Glands (North American – 0.5in)

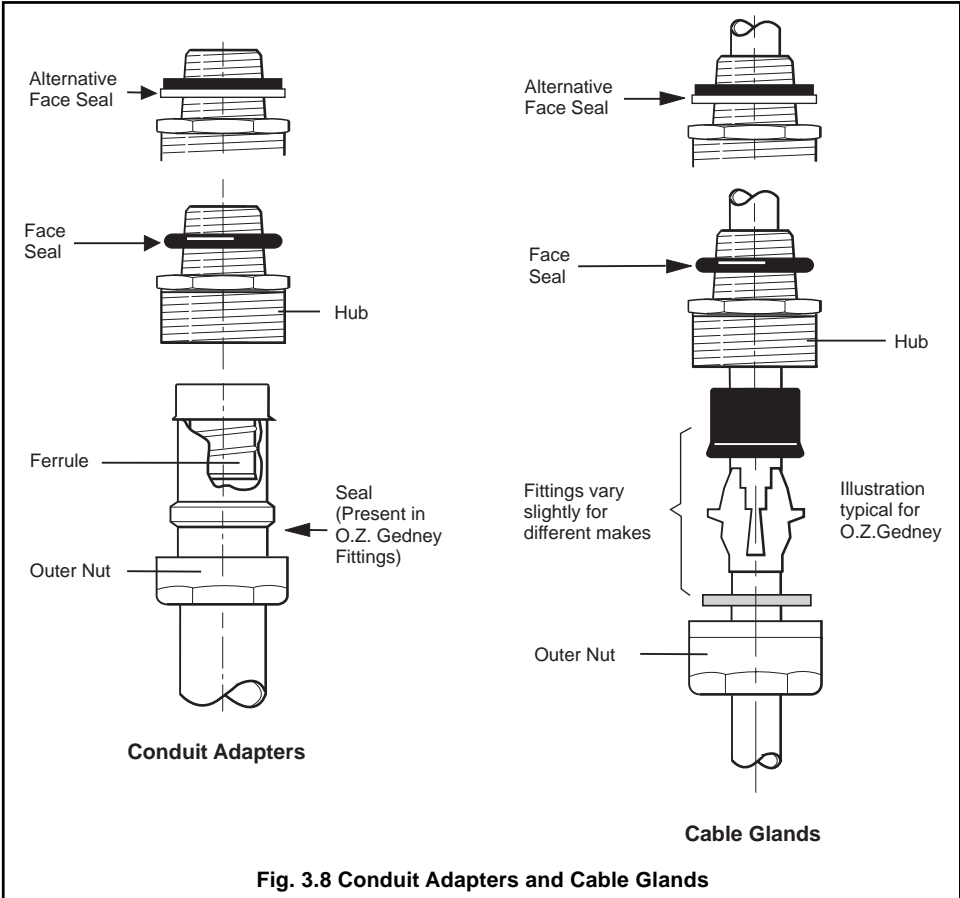


Fig. 3.8 Conduit Adapters and Cable Glands

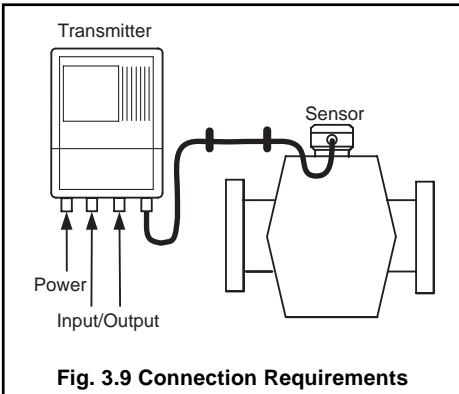


Fig. 3.9 Connection Requirements

3.3 Connection Requirements

The transmitter and sensor are supplied as a matched system. Check serial numbers to ensure they are matched.

3.3.1 Sensors

Remote sensors are usually supplied with an integral cable and potted connections. If the sensor has been supplied unpotted, connections must also be made to the sensor terminal box and then potted on completion with the supplied potting material – See Appendix A.



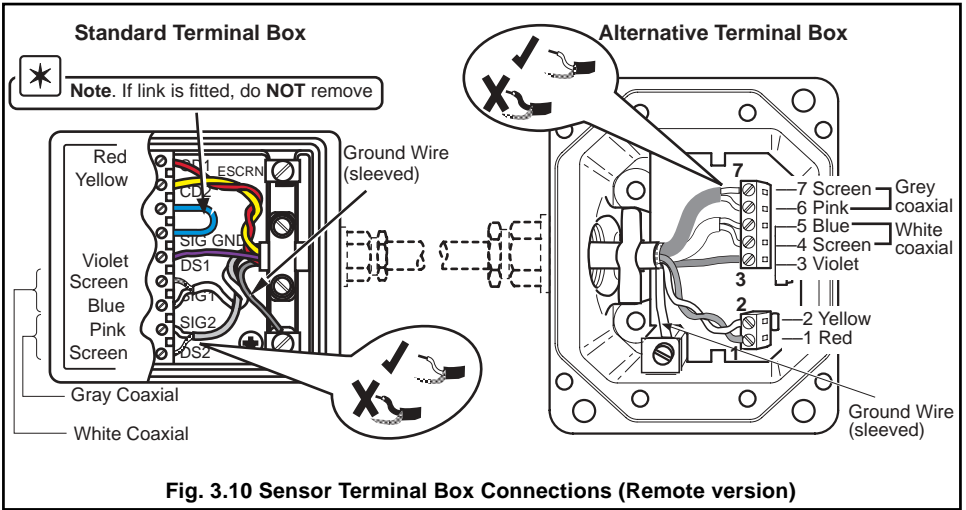
Caution. (Remote versions)

- 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.

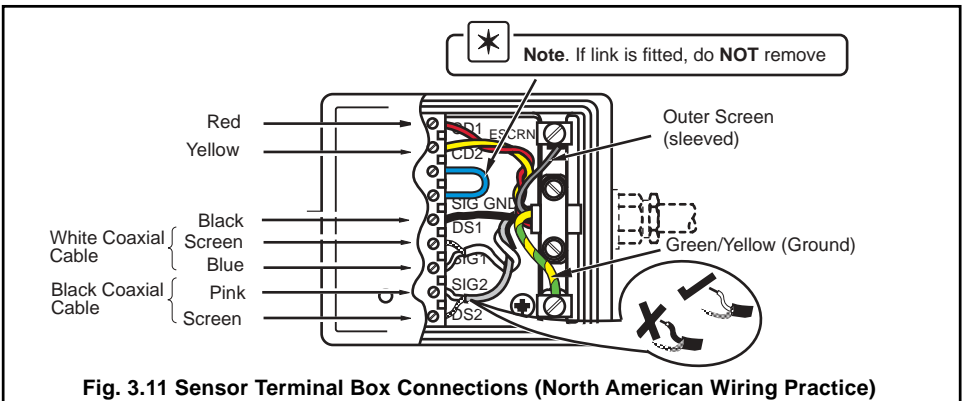


Information. (Remote versions)

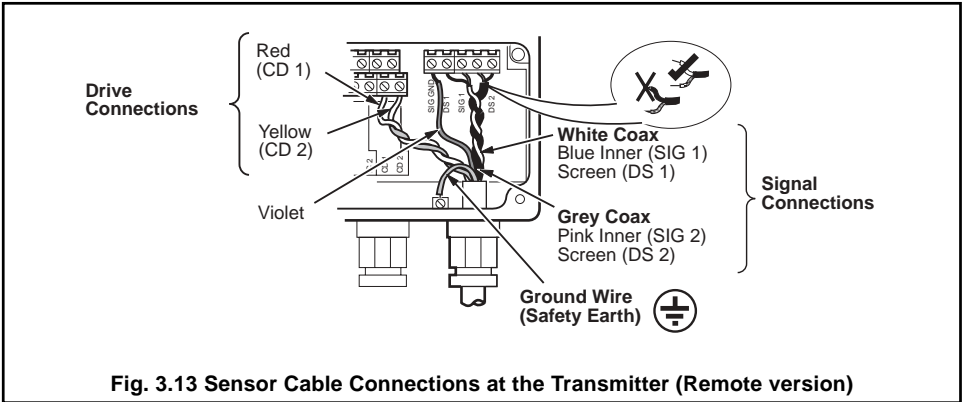
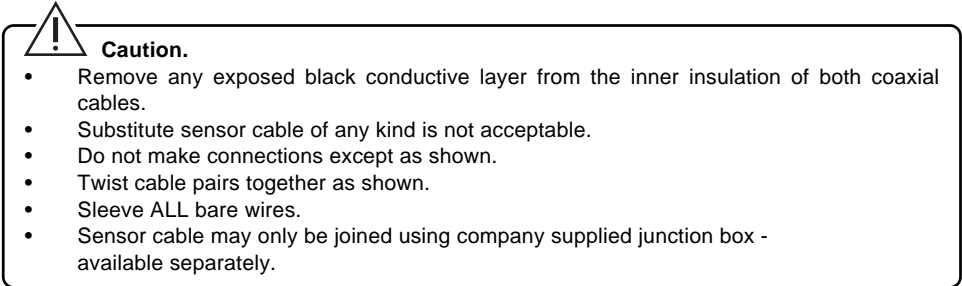
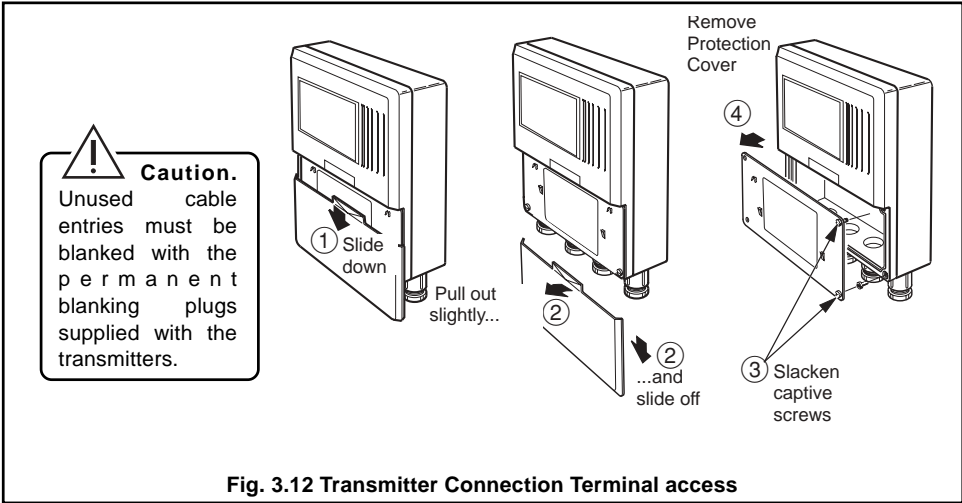
- Refer to ENVIRONMENTAL PROTECTION (Appendix A).
- Internal appearance of Terminal Box may vary from that shown.



North American Wiring Practice



3.3.2 Transmitters (All versions)



North American Wiring Practice

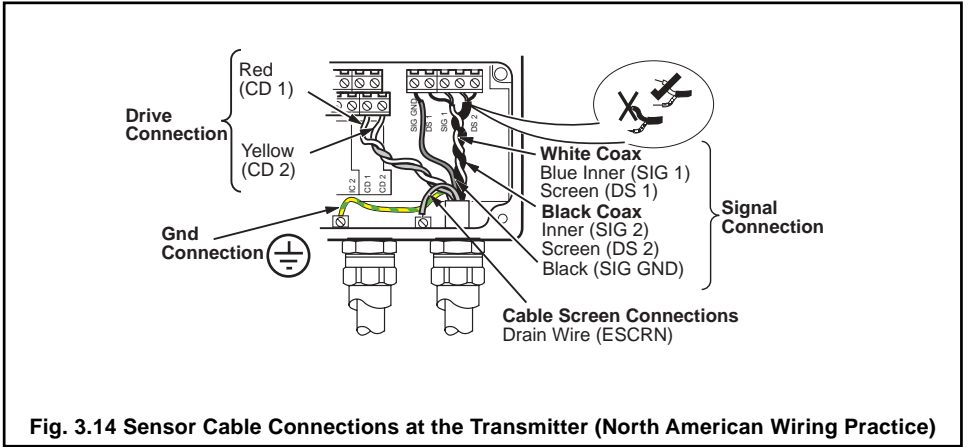


Fig. 3.14 Sensor Cable Connections at the Transmitter (North American Wiring Practice)

3.3.3 MagMaster-CalMaster Adapter

When a MagMaster Transmitter is fitted with an adaptor board for use with a CalMaster Verification Unit, wiring from the sensor to this adaptor board is shown in the following diagram.

To wire the adaptor plug, carefully pull off the plug from the adaptor board, connect the wires, using only a screwdriver with a 2.5mm blade to tighten the terminal screws, and replace the plug.

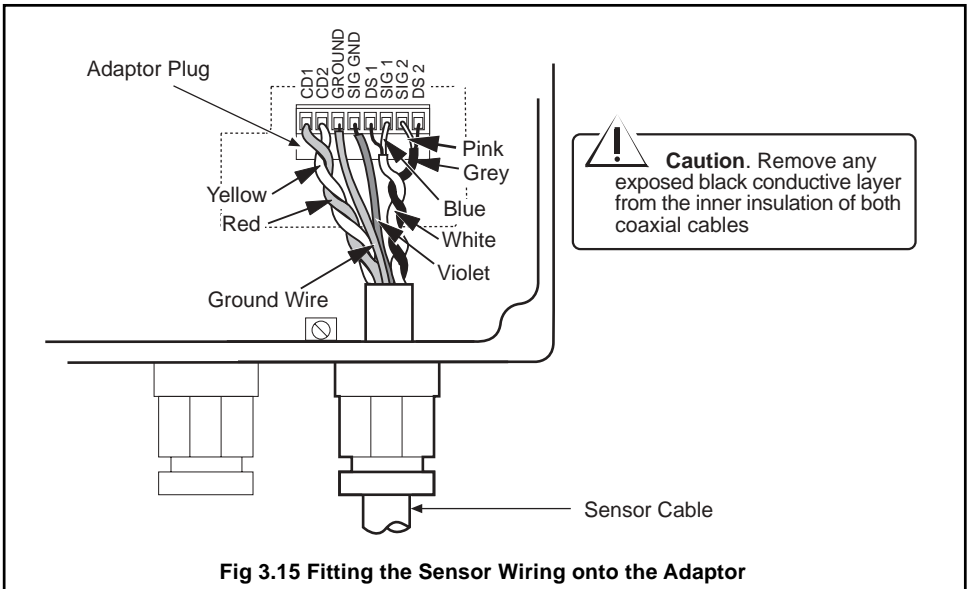


Fig 3.15 Fitting the Sensor Wiring onto the Adaptor

3.4 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.



Note. The connection terminal markings in the metal housed transmitter are identical to those in the standard transmitter as shown in this section. However, the supply connection in the former is made using a non-reversible plug (provided).

3.4.1 Frequency Outputs – Fig. 3.16

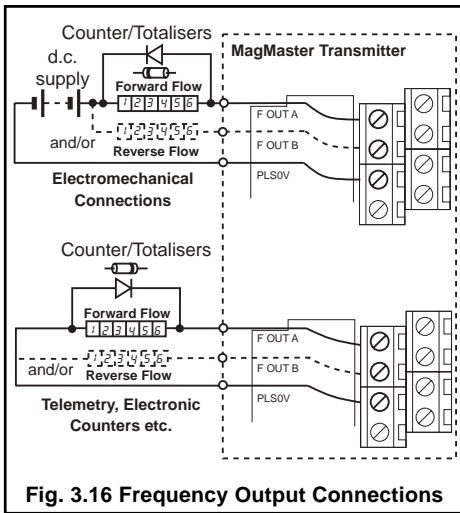


Fig. 3.16 Frequency Output Connections

3.4.2 PLC Interface – Fig. 3.17

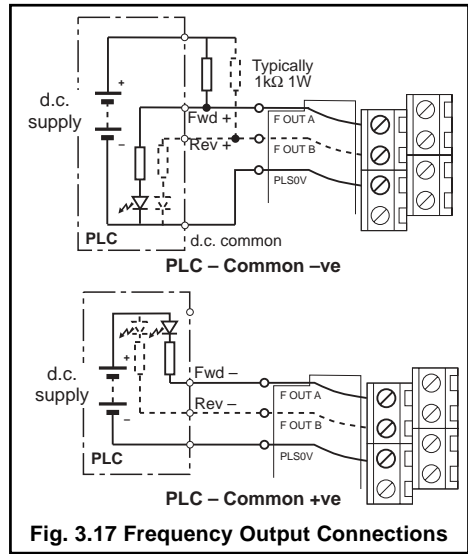
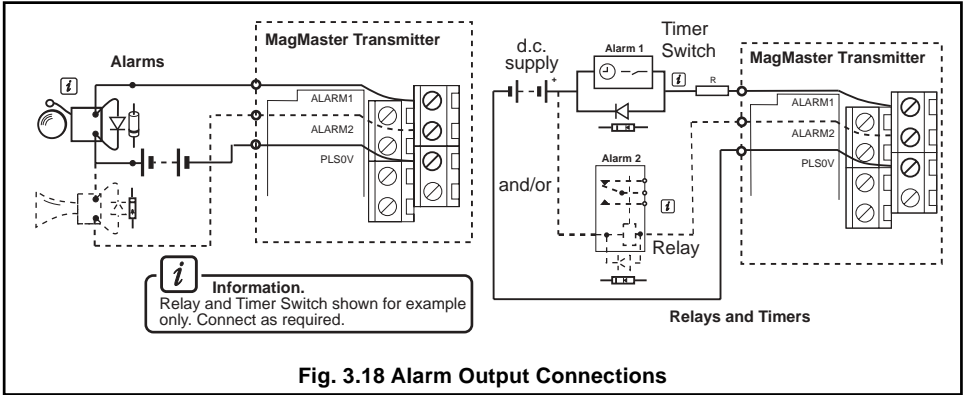


Fig. 3.17 Frequency Output Connections

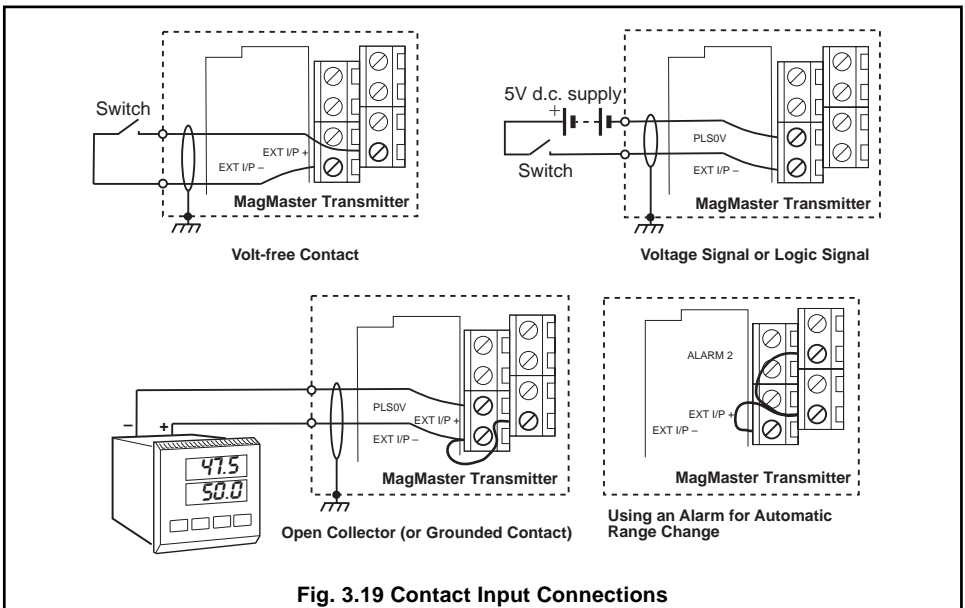
3.4.3 Alarm Outputs – Fig. 3.18

i 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.



3.4.4 Contact Input – Fig 3.19

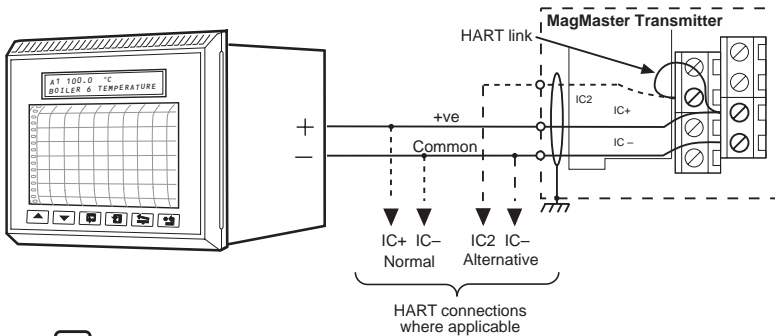


3.4.5 Current Output – Fig. 3.20 and 3.21



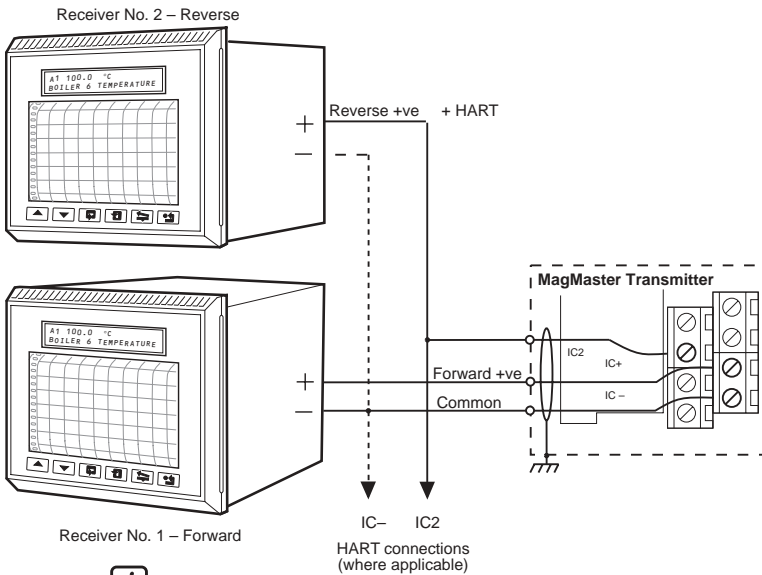
Information.

- Output is fully programmable – see Programming Guide.
- 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. 3.20 Current Output Connections: Standard



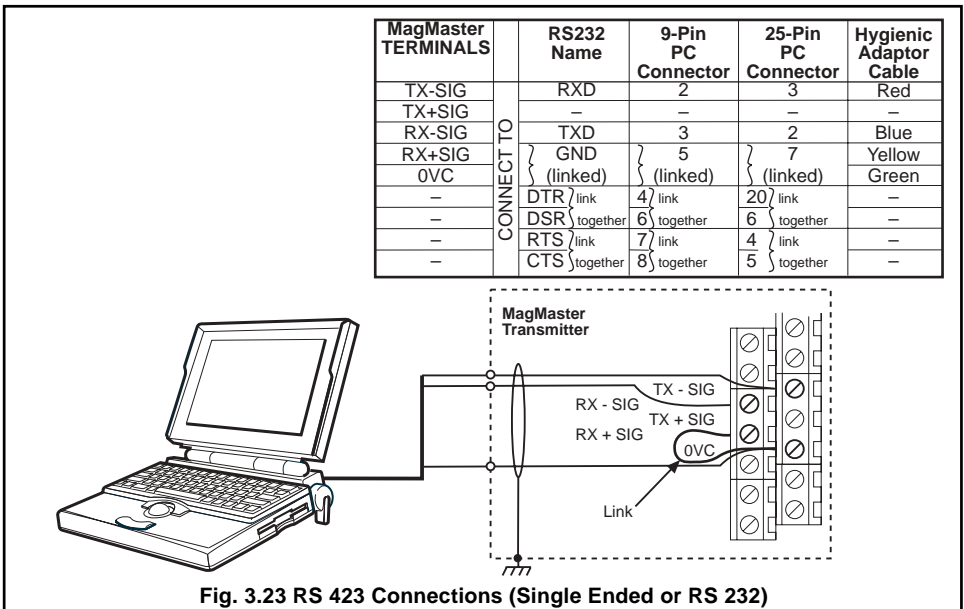
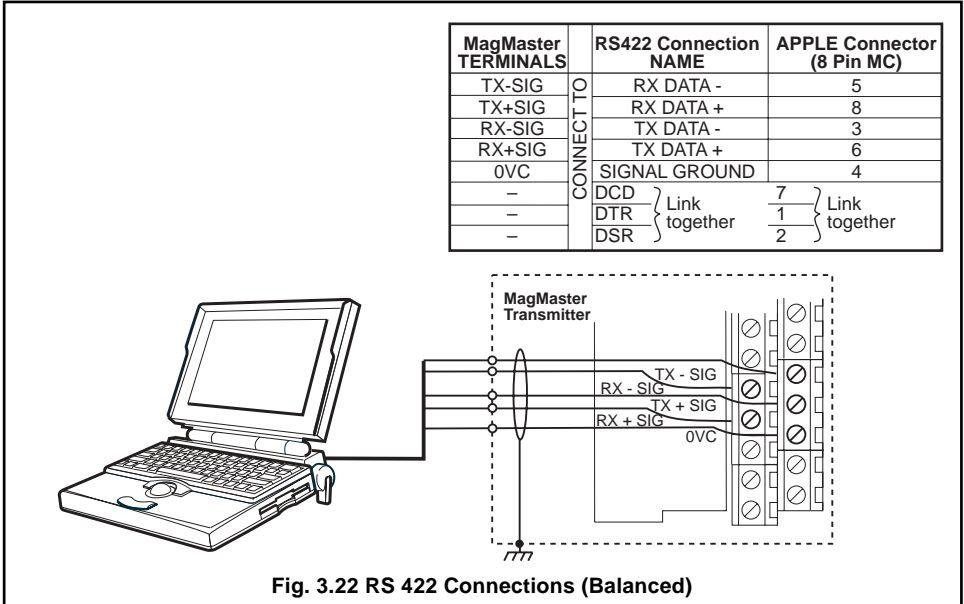
Information. Multidrop HART mode cannot be used with this configuration.

Fig. 3.21 Current Output Connections: Dual Current Option

3.4.6 Computer Connection – Fig. 3.22 and 3.23



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



...3 ELECTRICAL INSTALLATION

3.4.7 Power Supply Connections – Fig. 3.24 and 3.25



Warning.

- DISCONNECT THE SUPPLY FROM ANY CABLES BEING TERMINATED ON THE TRANSMITTER.
- Electrical installation and earthing (grounding) must be in accordance with relevant national and local standards.
- Ensure that the cover of the metal housed transmitter is never cross threaded. The threads are greased (as supplied).
- Ensure that the grease is in good condition when fitting the cover, and replenish as required with a grease suitable for aluminium threads.

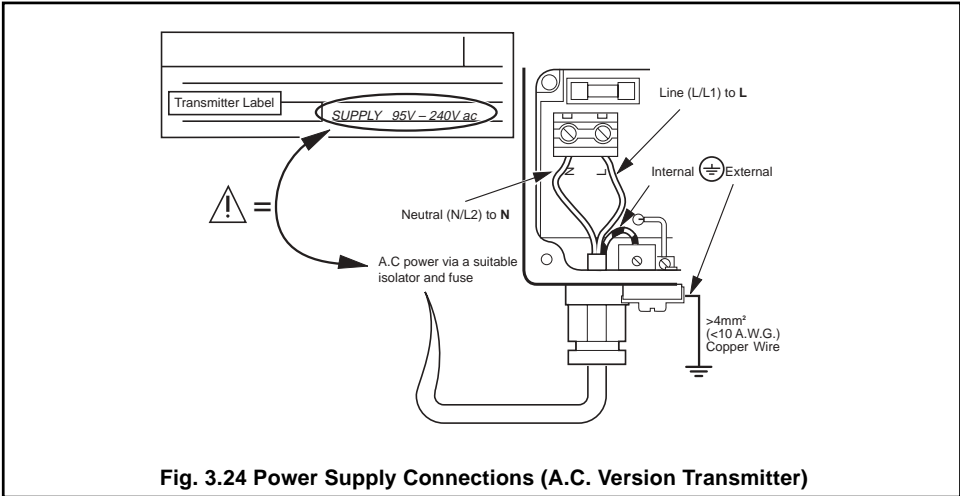


Fig. 3.24 Power Supply Connections (A.C. Version Transmitter)

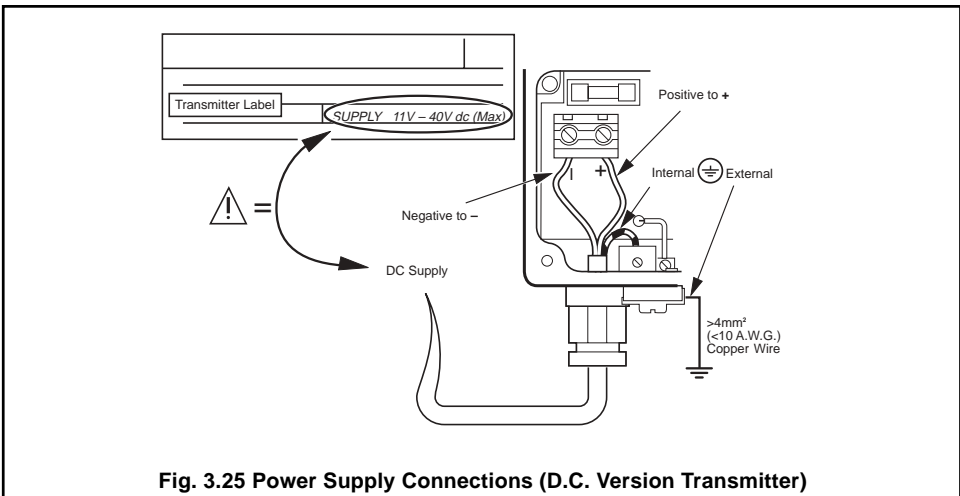


Fig. 3.25 Power Supply Connections (D.C. Version Transmitter)

4 STARTUP AND OPERATION




Warning.

- Ensure Plant Safety while configuring, at all times.
- The 9-way D-Type Serial Link is not isolated. Ensure that it is **NOT** connected to power earth (ground), with cathodically protected systems.


4.1 Startup

Switch on the power supply to the flowmeter, and if a transmitter with display has been ordered, the flow rate will be shown on the display as shown in Fig. 4.1 or 4.2.

Sequential application of the provided magnetic wand to the left hand icon in the transmitter display area, or by pressing the  button on the keypad versions or the remote display, steps the display through the following sequence:

%	(Flow Rate % of Range)
>	(Forward flow total value)
<	(Reverse flow total value)
*	(Net flow total value)
Alm	(Active alarms)
Vel	(Flow Velocity in m/s or ft/s)

Any alarms are displayed sequentially if more than one alarm is present.

Application of the wand to the right hand icon, or pressing the keypad  button, resets the totaliser display, if this facility is enabled.



Information.

- For the use of local or remote serial communication, and configuration, see the Quick Reference Programming Guide or the main MagMaster manual.
- For all versions supporting HART™, see the main MagMaster manual.

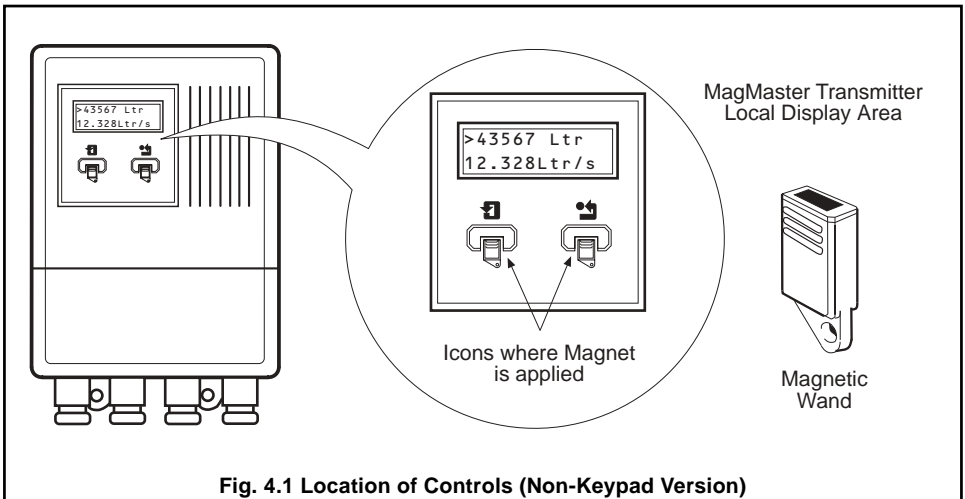


Fig. 4.1 Location of Controls (Non-Keypad Version)

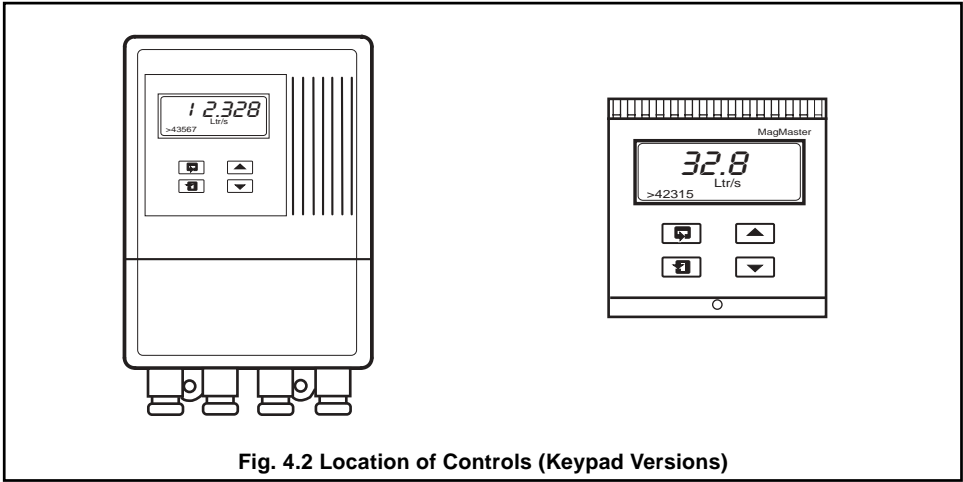


Fig. 4.2 Location of Controls (Keypad Versions)

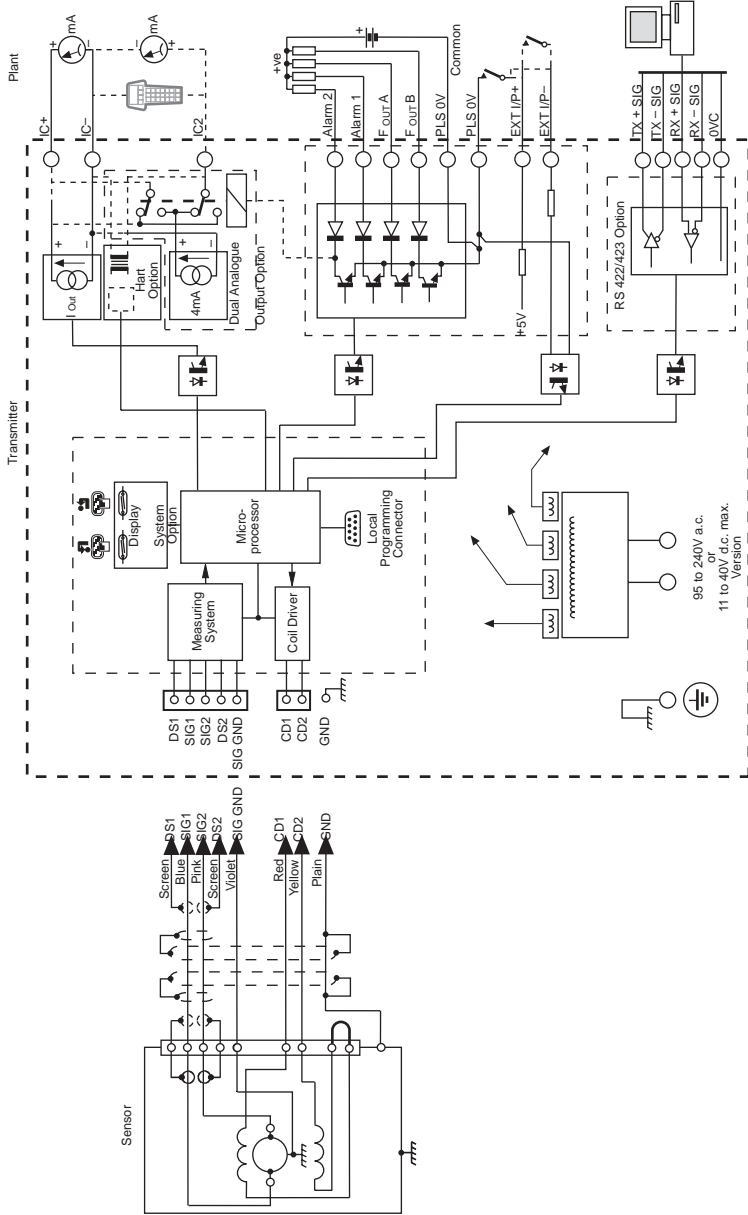
APPENDIX A – ENVIRONMENTAL PROTECTION



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.
- 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



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 Magnetic Flowmeters*
- *Mass Flow Meters*
- *Turbine Flowmeters*
- *Wedge Flow Elements*

Marine Systems & Turbochargers

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

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

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

United Kingdom

ABB Automation Limited
Tel: +44 (0)1453-826-661
Fax: +44 (0)1453-827-856

United States of America

ABB Automation Inc.
Instrumentation Division
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 operating and maintenance records relating to the alleged faulty unit.



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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