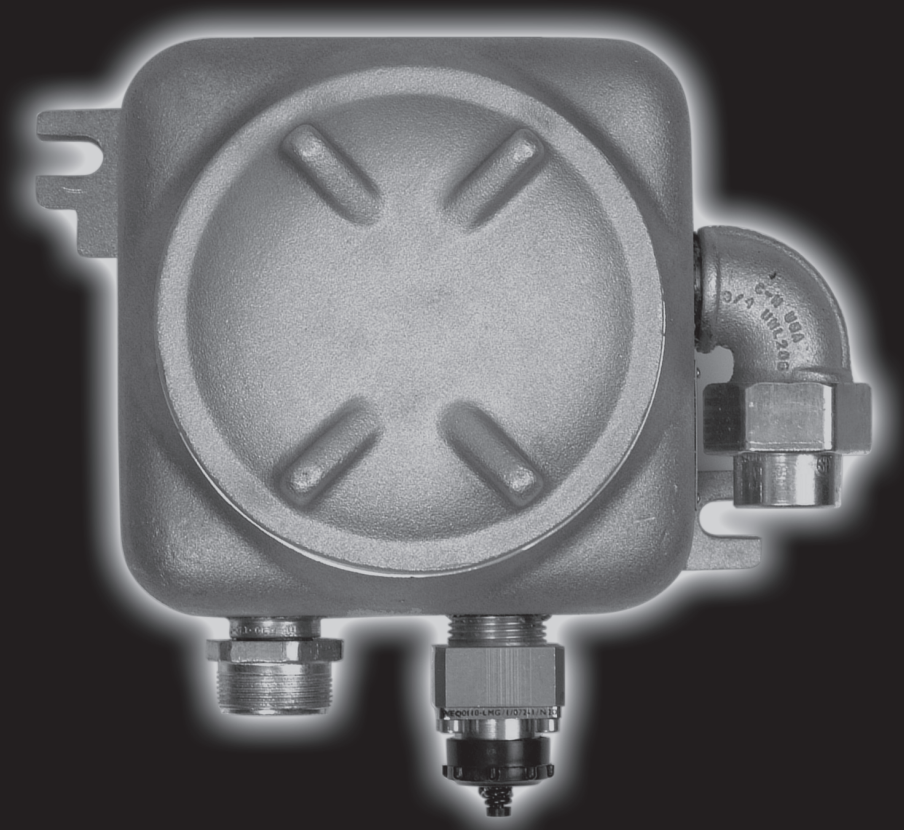
Technical Handbook

Honeywell



Sieger DX100 Series
Termination Units

SAFETY

Ensure that you read and understand this handbook **BEFORE** installing/operating the equipment.

Pay particular attention to the Safety Warnings.

WARNINGS

1. The **DX100 Series Termination Units** are certified for and intended for use in potentially hazardous areas. Install and use the **DX100 Termination Unit** in accordance with the latest regulations. No modifications to the units are permitted without reference to the relevant certifying authority
2. Install UL approved and certified equipment including field wiring in strict accordance with the articles of the National Electrical Code for Division 1 Hazardous Locations (NFPA 70 - 1990) or later issues.
3. Install CSA (APPLIED FOR) approved and certified equipment including field wiring in strict accordance with Canadian Electrical Code, Part 1.
4. For installations elsewhere, the appropriate local or national regulations should be used.
5. The Code of Practice regarding Selection, Installation, Use And Maintenance Of Apparatus For The Detection Of Combustible Gases (Other Than For Mining Applications Or Explosive Processing And Manufacture) must be complied with.
6. Each type of **DX100 Termination Unit** must be properly earthed to protect against electrical shock, minimise electrical interference and comply with IS Safety Requirements.
7. Dismantling or repair of equipment should be carried out in the safe area only.
8. Do not drill holes in the housing as this will invalidate the explosion protection.
9. In order to maintain electrical safety, the unit must not be operated in atmospheres with more than 21% oxygen.
10. Do not open the enclosure in the presence of an explosive atmosphere.

CAUTIONS

1. Only the **Sieger Handheld Interrogator (SHC1)** should be connected to the communication link entry socket of a **Termination Unit**.
2. The **DX100 (I) Termination Unit** can only be used with Searchpoint Optima or Optima Plus gas detectors.

SAFETY

IMPORTANT NOTICES

1. Zellweger Analytics Limited can take no responsibility for installation and/or use of its equipment if this is not done in accordance with the appropriate issue and/or amendment of the handbook.
2. The user of this handbook should ensure that it is appropriate in all details for the exact equipment to be installed and/or operated. If in doubt, the user should contact Zellweger Analytics for advice.

Zellweger Analytics Limited reserve the right to change or revise the information supplied in this document without notice and without obligation to notify any person or organisation of such revision or change. If further details are required that do not appear in this document, contact Zellweger Analytics Limited or one of their agents.

HELP US TO HELP YOU

Every effort has been made to ensure the accuracy in the contents of our documents, however, Zellweger Analytics Limited can assume no responsibility for any errors or omissions in our documents or their consequences.

Zellweger Analytics Limited would greatly appreciate being informed of any errors or omissions that may be found in our documents. To this end we include the following form for you to photocopy, complete and return to us so that we may take the appropriate action.

HELP US TO HELP YOU

To: Marketing Communications Zellweger Analytics Limited Hatch Pond House 4 Stinsford Road Nuffield Estate POOLE. Dorset BH17 0RZ United Kingdom Tel.: +44 (0) 1202 676161 Fax.: +44 (0) 1202 678011 E-mail: sales@zelana.co.uk	From: Address: Tel.: Fax.: E-mail:

I suggest the following corrections/changes be made to Section .....

Marked up copies attached (as appropriate): Yes/No

Please inform me of the outcome of this change: Yes/No

For Marketing Communications, Zellweger Analytics Limited:

Actioned By: Date:

Response: Date:

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1. INTRODUCTION

The **DX100 Series Termination Units** consist of the following two types:

- **DX100 (M)**
- **DX100 (I)**

The **Termination Units** are explosion proof junction boxes intended for use in hazardous environments that provide a connection point between the Zellweger Analytics Searchpoint Optima or Searchline Excel series of gas detectors and associated field wiring.

Caution: The DX100 (I) Termination Unit must only be used with Searchpoint Optima or Optima Plus gas detectors.

The **Termination Units** provides a local IS connection point for the **Sieger Hand Held Interrogator (SHC1)** and both types are available certified to UL or CSA (APPLIED FOR) standards.

The **DX100 (M) Termination Unit** is an active junction box that incorporates a communications module. This module provides a digital interface between the attached gas detector and an external control system via a field RS485 link carrying commands following the Modbus protocol. Using the link the control system can interrogate the gas detector to monitor the gas reading and the detector's status.

Note: Information about configuring the gas detector's digital address for installations using the **DX100 (M) Termination Unit** *is* **only** *provided in this document.*

The **DX100 (I) Termination Unit** acts as a basic junction box for wiring between the gas detector and the field cabling. It does not feature the digital communications module.

Full details about the Searchpoint Optima and Searchline Excel types of gas detectors (including the Excel Cross-Duct version) can be found in their respective technical documents.

Note: Where information refers to both types of Termination Unit in this handbook they are generically referred to as ***DX100 Series Termination Units*** *or* ***DX100****. Where differences occur the specific type name is used, i.e.* ***DX100 (I)*** *or* ***DX100 (M)****.*

This handbook consists of the following chapters and appendices:

- **Chapter 1 Introduction**
- **Chapter 2 Overview**
- **Chapter 3 Installation**
- **Chapter 4 Modbus Data**
- **Appendix A Specifications**
- **Appendix B Certification**
- **Appendix C Glossary**

1. INTRODUCTION

Information notices

The types of information notices used throughout this handbook are as follows:

WARNING

Indicates hazardous or unsafe practice which could result in severe injury or death to personnel.

Caution: ***Indicates hazardous or unsafe practice which could result in minor injury to personnel, or product or property damage.***

Note: *Provides useful/helpful/additional information.*

Trademarks

The following trademarks are used in this handbook:

Modbus® is a registered trademark of Schneider Electric.

If more information outside the scope of this technical handbook is required please contact Zellweger Analytics.

Associated Documents

Searchline Excel Technical Handbook	Part No: 2104M0506
Searchpoint Optima Operating Instructions	Part No: 04200M5001
Searchpoint Optima Operating Instructions (FM/CSA Certified)	Part No: 04200M5004
Searchpoint Optima for Carbon Dioxide (CO_2) Operating Instructions	Part No: 04200M5013
Searchpoint Optima Plus Operating Instructions	Part No: 2108M0501
Modicon Modbus Protocol Reference Guide	PI-MBUS-300 (Rev. J)
For on-line information about the Modbus protocol visit:	www.modbus.org

2. OVERVIEW

This chapter provides an overview of the **DX100 Series Termination Units**. The **DX100 Series Termination Units** consist of two different versions:

- **DX100 (M)**
- **DX100 (I)**

The **Termination Units** provide a wiring interconnection point between Zellweger Analytics gas detectors and field cabling. They can be used with the following types of gas detector.

DX100 (M)	**Searchpoint Optima (3V0)**
	Searchpoint Optima Plus
	Searchline Excel
	Searchline Excel Cross-Duct
DX100 (I)	**Searchpoint Optima**
	Searchpoint Optima Plus

Caution: The DX100 (I) Termination Unit can only be used with Searchpoint Optima or Optima Plus gas detectors.

Both types of **Termination Unit** are explosion proof and intended for use in potentially hazardous environments. They are physically identical in size and shape. UL and CSA (APPLIED FOR) certified versions of each **Termination Unit** are available.

Each type of **Termination Unit** provides:

- terminals for connecting the gas detector and the field cabling
- a local IS connection point for the **Sieger Hand Held Interrogator (SHC1)**
- a local mounting point for the Searchpoint Optima type of gas detector

The **Termination Units** feature:

- three 3/4” NPT cable/conduit entries
- two terminal blocks
- a voltage clamp
- a communications link entry socket

The **DX100 (M)** has extra features that enable it to communicate with an external control system, e.g. a PLC, DCS or SCADA, by means of the Modbus Remote Terminal Unit (RTU) communications protocol over an RS485 link.

One of the three cable/conduit entries (usually the left-hand one) is used to mount a Searchpoint Optima or Optima Plus gas detector directly to the box. All the types of gas detector wired to the **Termination Unit** output a 4-20mA signal that is sent via the **Termination Unit** field wiring back to the controller.

The voltage clamp and the external socket provide an intrinsically safe (IS) connection to the SHC1 Handheld Interrogator.

2. OVERVIEW

The interrogator allows local communication via the **Termination Unit** with any of the attached gas detectors to commission, calibrate and diagnose the system.

Both the Handheld Interrogator and the **Termination Unit** communicate with the gas detector via the detector's RS485 interface. (**Termination Unit** communications with the detector are inhibited when the Handheld Interrogator is communicating with the detector.)

Caution: Only the Sieger Handheld Interrogator (SHC1) must be connected to the Termination Unit's communication link entry socket.

Basic operation of the Sieger Hand Held Interrogator (SHC1) is different when the unit is used with each of the different types of gas detector so is not covered here in this document but in the technical documentation supplied with each detector. However the use of the SHC1 to configure the gas detector's digital address for installations using the **DX100 (M) Termination Unit** is ***only*** described in this document.

The **Termination Units** require no routine maintenance.

For installation information see **Chapter 3**.

2.1 DX100 (M) FEATURES

The **DX100 (M) Termination Unit** provides extra features that allow digital communication between the network controller and individual gas detectors over a multi-drop communications network.

The **DX100 (M)** acts as a Modbus RTU slave device, only transmitting data in response to specific requests from the control system over the RS485 link.

The digital interface in the **DX100 (M)** supports a sub-set of the functions provided by the Modbus protocol. Modbus broadcast and global commands are not implemented.

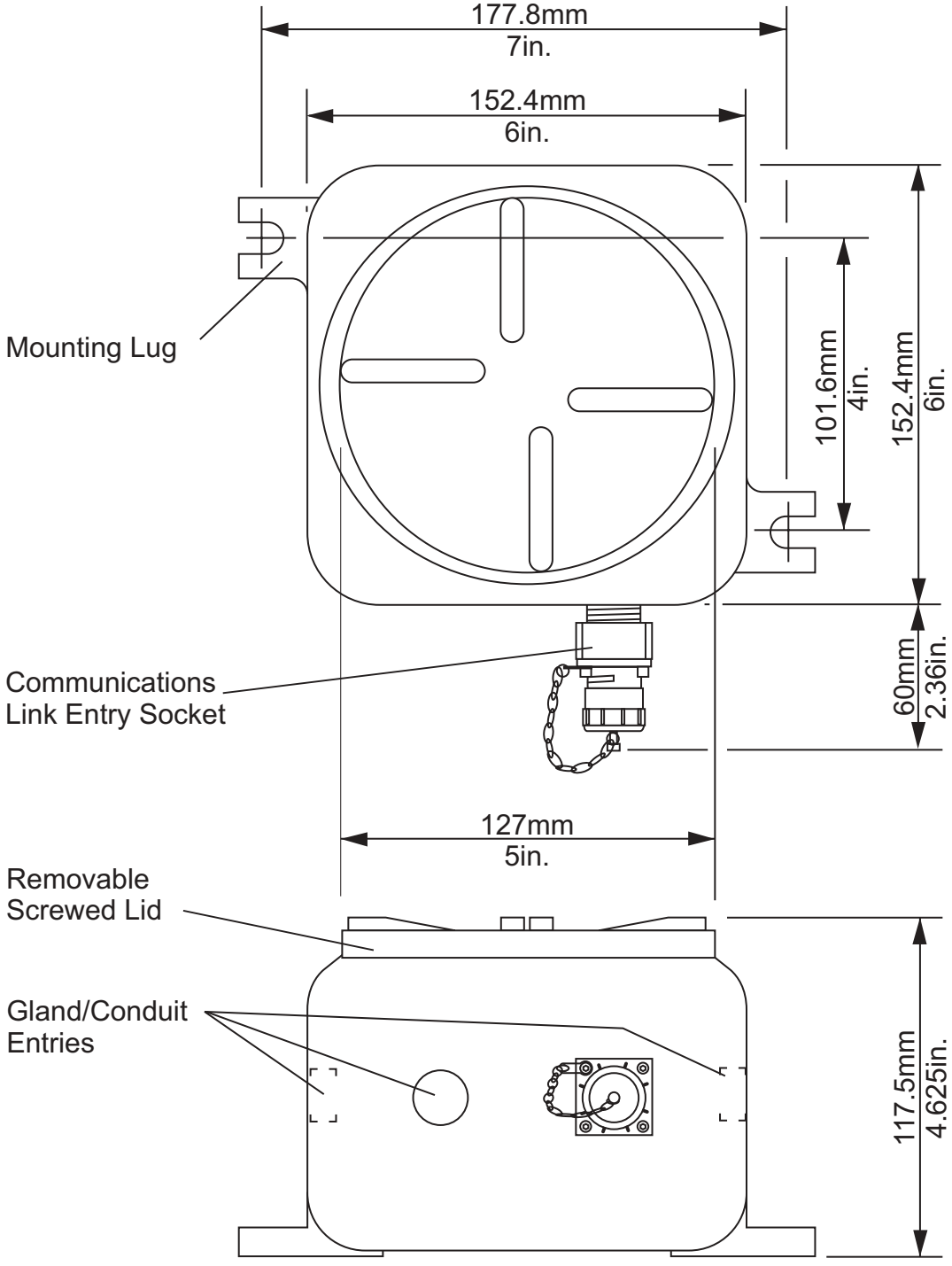
In summary the **DX100 (M)**:

- Operates as a Modbus RTU Slave.
- Supports functions 02, 03, 04 and 06 of the Modbus protocol.
- Provides gas detector reading, status and fault log information.
- Supports inhibit and force mA output commands.
- Supports communications over the RS485 electrical standard.
- Provides multi-drop capability.

Dependent upon the installation, operation is possible over distances of up to 1.2km (3900ft). Up to 32 devices including the controller can be connected to the RS485 network – 31 gas detectors and 1 controller.

Information about the Modbus functions supported by the **DX100 (M)** for network configuration purposes can be found in **Chapter 4**.

2. OVERVIEW


177.8mm
7in.
152.4mm
6in.
Mounting Lug
101.6mm
4in.
152.4mm
6in.
Communications
Link Entry Socket
60mm
2.36in.
127mm
5in.
Removable
Screwed Lid
Gland/Conduit
Entries
117.5mm
4.625in.

3. INSTALLATION

This chapter describes how to plan and then install the **DX100 Series Termination Units** in conjunction with the following types of gas detector:

- **Searchpoint Optima (3V0) or Optima Plus** - **DX100 (I)** and **DX100 (M)**
- **Searchline Excel** - **DX100 (M)** only
- **Searchline Excel Cross-Duct** - **DX100 (M)** only

Caution: The DX100 (I) Termination Unit must only be used with Searchpoint Optima or Optima Plus gas detectors.

The chapter also describes how to configure the digital address of the **DX100 (M)**. For programming information needed so that the network controller can communicate with the gas detectors via the **DX100 (M)** RS485 interface using the Modbus protocol see **Chapter 4**.

3.1 PLANNING THE INSTALLATION

This section provides guidelines to design authorities to help them plan the installation of the **DX100 Series Termination Units**.

Installation involves:

- **Mechanical installation** - by a mechanical/electrical technician - see **3.2**
- **Electrical installation** - by a mechanical/electrical technician - see **3.3**

DX100 (M) only:

- **Unit configuration** - by an electronics technician - see **3.4**
- **Network programming** - by a software technician - see **Chapter 4**

  *This is so that the network controller can communicate with the gas detectors via the **Termination Unit***

Mechanical installation of both the **DX100 (I)** and **DX100 (M)** is identical for each type of gas detector.

Electrical installation is the same except that the **DX100 (M)** has the Modbus communications interface fitted and requires extra connections.

General Installation Guidelines

The following general points should be noted when planning the installation.

1. Read the **Warnings** and **Cautions** at the beginning of this handbook and all the subsequent planning guidelines and installation instructions.
2. Refer to the associated Zellweger Analytics handbooks for details about the individual gas detectors.

Mechanical Installation Guidelines

1. Identify a suitable location where the **Termination Unit** is to be mounted. The unit should be fitted to a flat surface.
2. When deciding the position of a **Termination Unit** consideration should be made regarding the probability of mechanical impacts and interference from other equipment and apparatus.

3. INSTALLATION

Electrical Installation Guidelines

Basic electrical wiring is the same for both types of junction box but each one has a different terminal block layout. The **DX100 (M)** also has extra connections for the Modbus network connections.

The **Termination Units** are designed to enable good EMC/RFI performance to be achieved in typical industrial environments. Since EMC/RFI performance can also be heavily influenced by the design and engineering of an electrical installation, Zellweger Analytics recommend that the electrical installation design authority takes account of the following:

a. The cabling connected to field equipment should be provided with a suitable screen/shield (>=70% area coverage). The length of any unscreened/unshielded conductors should be kept to a minimum (ideally =<10cm).

b. Wherever possible, the screen/shield should be connected to a low noise (clean) earth/ground.

c. Screens/shields should not be connected in a manner that creates earth loops. (This will ordinarily require a screen/shield to only be connected to earth/ground at one end.)

d. Cable screens/shields should be connected in a manner that minimises the potential for earth/ground seeking currents flowing from heavy plant or equipment into the screens/shields.

e. Where a connection between low noise (clean) instrument earth/ground and protective earth/ground is required, this should be made at a single point and in a manner that minimises the noise introduced onto the low noise instrument earth/ground.

f. The case of the Termination Unit should be locally bonded to earth/ground. This earth/ground bonding should ensure that the maximum voltage between the case earth/ground and any conductor in the field cable is less than 350V. (Voltages in excess of 350V may result in permanent damage to connected equipment.)

g. For installations or environments where earth/ground bonding might not be sufficient to prevent voltages in excess of 350V developing between the case and conductors in the field cabling, consideration should be given to the fitting of suitable high energy, transient suppression/absorption devices.

h. Where a single cable will connect a number of **Termination Units**/detectors to the control room, the resistance of the +24V and 0V conductors should be sufficiently low to ensure that all **Termination Units**/detectors connected to this cable receive a supply voltage of at least 18V at their maximum rated power.

i. RS485 data connections should be made using a screened, twisted pair.

j. In order to comply with the general requirements for flammable gas detectors (EN50054 or equivalent), any interference induced onto the 4-20mA conductors by the electrical installation/operating environment should be kept below +/- 0.25mA.

k. In most industrial installations, the protective earth / ground frequently carries a high level of electrical noise and transients. In order to avoid such noise and transients being introduced onto the 4-20mA signal received by a control card it is recommended that there be no direct connection between the conductors and circuitry of the 4-20mA loop and protective earth/ground.

3. INSTALLATION

l. All electrical equipment connected to the system should comply with the relevant national EMC/RFI standards (EN50081, EN50082 and EN50270 or equivalents.).

m. Equipment should not be installed in close proximity to high powered radio, radar and satellite communication equipment. If such installations cannot be avoided, consideration should be giving to the use of additional EMC/RFI protection (double-screened/shielded cable, ferrite sleeves/collars, line filters etc.).

System planners should also consider the following points:

1. Identify cable requirements and the necessary cable entry ports to be used on the **Termination Unit**. Refer to any documentation for the associated network control system for details about external network connection information, field wiring, interconnections, etc.
2. Approved and certified cable glands are required for fitting to the **Termination Unit** cable entries where used for field wiring. Sealing washers may be required to maintain the ingress protection rating.
3. The supplied approved and certified blanking plug must be fitted to the unused **Termination Unit** cable entry.
4. The **Termination Unit** mounting plate must be bonded to a protective earth.
5. The field terminals of the **Termination Unit** accept single or multi- stranded wire up to 2.5mm^2 (14 AWG).
6. Cable routes must be planned carefully to avoid physical and environmental hazards such as mechanical stress and high temperatures.
7. To achieve fast reliable data connections to the **DX100 (M)** over the RS485 line, good quality screened twisted pair cable should be used. The maximum achievable data rate is limited by the cable capacitance and therefore the cable length should be kept as short as possible (also see the following guidelines).

Planning the RS485 line connections - DX100 (M) only

The following specific points regarding the RS485 line should be noted.

General

The **DX100 (M)** supports up to 32 nodes connected to a single RS485 transmission line.

If a spur is necessary, the spur length should be kept to a minimum [typically less than 1m (3ft)]. The data ground return connection (DGND) of all devices must also be connected together.

The voltage between the data grounds of the various devices must not cause the common mode voltage rating of any device on the bus to be exceeded.

The data ground of each **DX100 (M)** interface is isolated from the **DX100 (M)** ground to reduce earth loop current flow problems. The cable screen should not be used as a data ground return and in systems spread over a wide area the cable screen is best connected to system ground at a single point only.

3. INSTALLATION

Terminal connections are:

Modbus RS485 (A)	-	Transceiver Channel A (or +)
Modbus RS485 (B)	-	Transceiver Channel B (or -)
Modbus RS485 (Drain)	-	Isolated Data Ground

Cabling

The field terminals of the **DX100 (M)** accept single or multi-stranded wire up to 2.5mm^2 (14 AWG). Carefully route cables to avoid physical and environmental hazards such as mechanical stress and high temperatures.

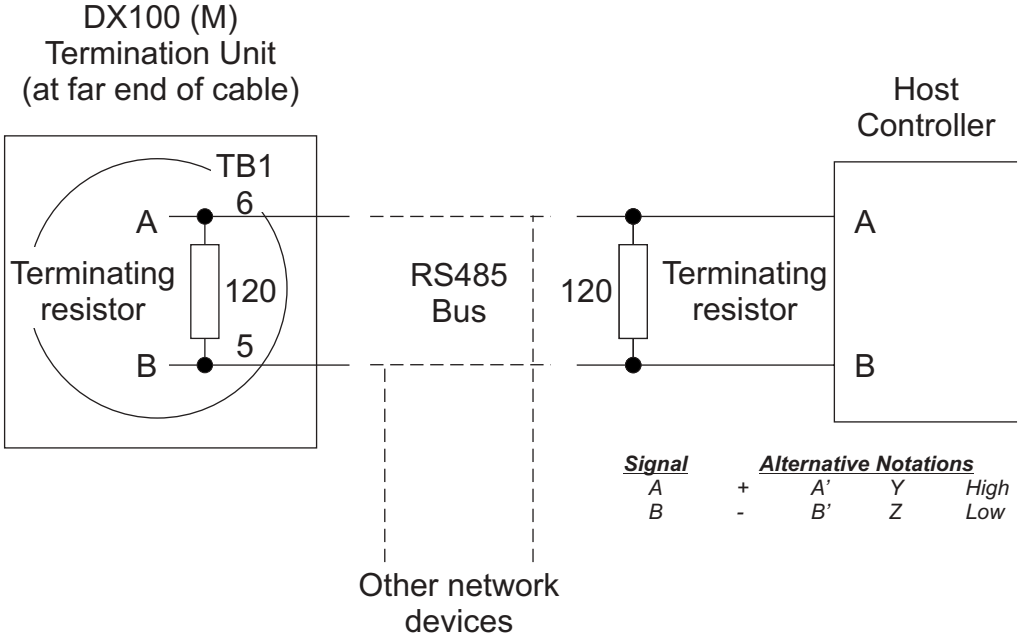
To achieve fast reliable data connections use good quality screened twisted pair cable. The maximum achievable data rate is limited by the cable capacitance and therefore keep the cable length as short as possible.

In order to ensure the correct operation and to meet relevant standards for RFI and EMC, it is recommended that all field cables should be of the screened type with the cable screen connected at one end only.

Transmission Line Termination

RS485 transmission lines must be properly terminated. The simplest form of termination is typically with a 120ohm resistor connected across the differential input.

RS485 line systems require a terminating resistance at the transceiver device located in the host and also at the transceiver device located in the **DX100 (M)** node at the far end of the cable.



Note: In general RS485 transmitter circuits are specified as being capable of driving a minimum load resistance of 60ohms, so no more than two terminating resistors should be connected in parallel onto a single bus.

3. INSTALLATION

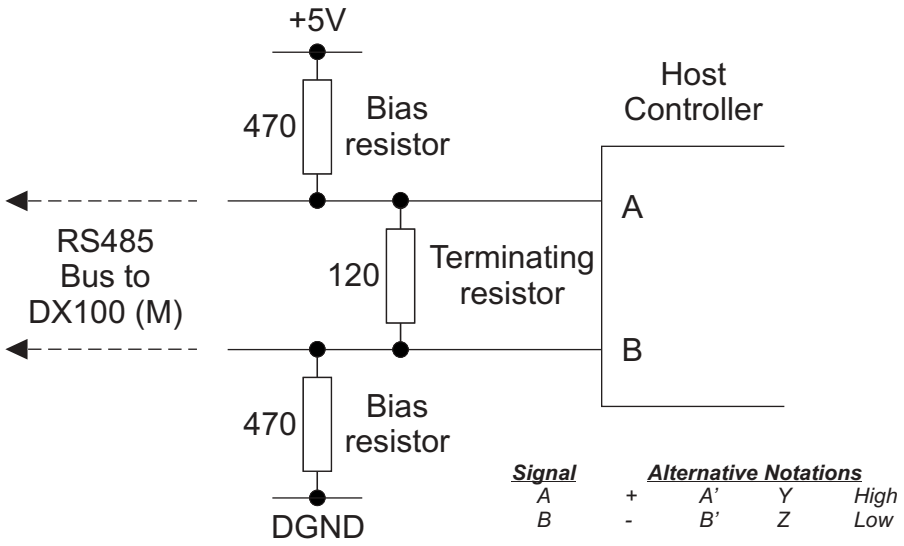
Network Biasing Resistors

Note: In most systems network biasing resistors are not required. These resistors should ***only*** *be added as part of a troubleshooting procedure.*

In a multi-drop RS485 system there are brief periods when no transmitter is enabled and the network is allowed to float. During these periods noise or erroneous data may be detected at the receiver, preventing communication or causing communications errors.

The **DX100 (M)** may be susceptible in this state and as a preventative measure, two Network Biasing Resistors can be added externally to the transceiver at the host end of the bus so that the network is biased by a few volts when all transmitters are disabled.

The normal network termination resistors must still be kept in circuit. The following diagram illustrates a typical biasing network:



Signalling Sense (or Signal Polarity)

The description of the polarity of the signalling lines in the EIA standard for RS485 states:

"The signalling sense of the voltages appearing across the interconnection cable are defined as follows:

- The **A** terminal of the generator shall be negative with respect to the **B** terminal for a binary **1** (**MARK** or **OFF**) state.
- The **A** terminal of the generator shall be positive with respect to the **B** terminal for a binary **0** (**SPACE** or **ON**) state."

Signal	Alternative Notations			
A	A'	Y	High	+
B	B'	Z	Low	-

3. INSTALLATION

3.2 MECHANICAL INSTALLATION

Caution: Read the Warnings and Cautions at the beginning of this handbook and all the relevant instructions before starting any of the installation procedures.

This section describes how to mechanically install the **Termination Units** with the different types of gas detector.

These procedures are intended for use by a mechanical/electrical technician.

Ensure the **Termination Unit** is fitted to a flat surface.

3.2.1 With Searchpoint Optima

For this procedure the **Termination Unit** is first fitted to the mounting location and then the Optima gas detector is fitted to the **Termination Unit**. Refer also to the Searchpoint Optima handbook.

Caution: The DX100 (I) Termination Unit must only be used with Searchpoint Optima or Optima Plus gas detectors.

(1) Securely fit the **DX100 Series Termination Unit** at the required monitoring point.

*Use the two **Termination Unit** mounting lugs.*

Ensure the communications link entry socket connector is located at the bottom. This is to fulfil the requirement to position the Optima sensor horizontally so that the risk of fouling the gas detector's optical surfaces is reduced.

(2) Remove the **Termination Unit** lid.

Use the lugs on the lid to unscrew it anticlockwise from the Termination Unit base.

(3) Fit the Optima detector to the left-hand entry.

First remove the 3/4 NPT approved blanking plug.

(4) Fit approved certified 3/4 NPT cable glands or conduit fittings to the **Termination Unit** cable/conduit entries as required.

Use sealing washers where necessary to maintain the ingress protection rating. Fit any locking rings **before** *terminating cables in the **Termination Unit** (see section* **3.2***).*

(5) Fit the external field wiring through the cable/conduit fittings and secure.

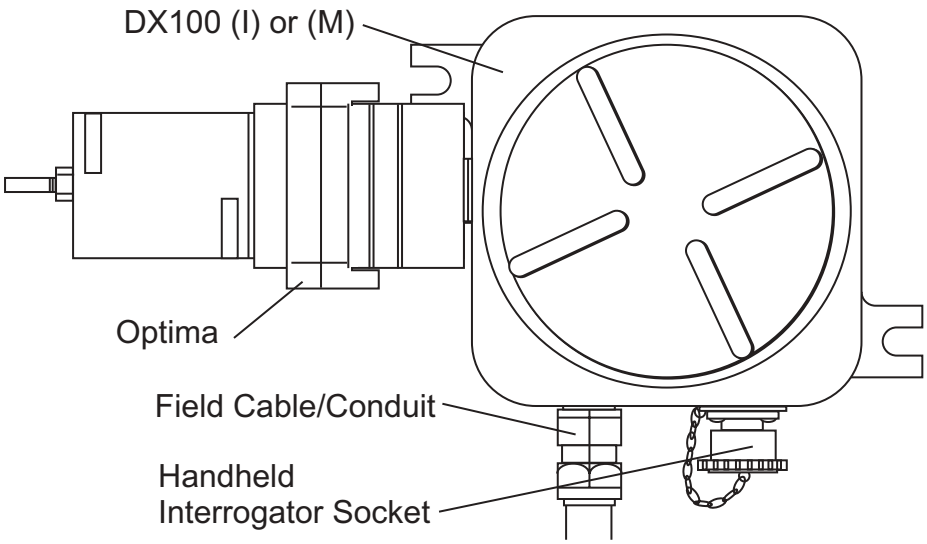
Fit the supplied approved certified blanking plug to the unused cable/conduit entry.

(6) Terminate the Optima and field wiring.

Refer to section **3.2**.

The following diagram shows a typical Searchpoint Optima and **DX100 Series Termination Unit** installation.

3. INSTALLATION



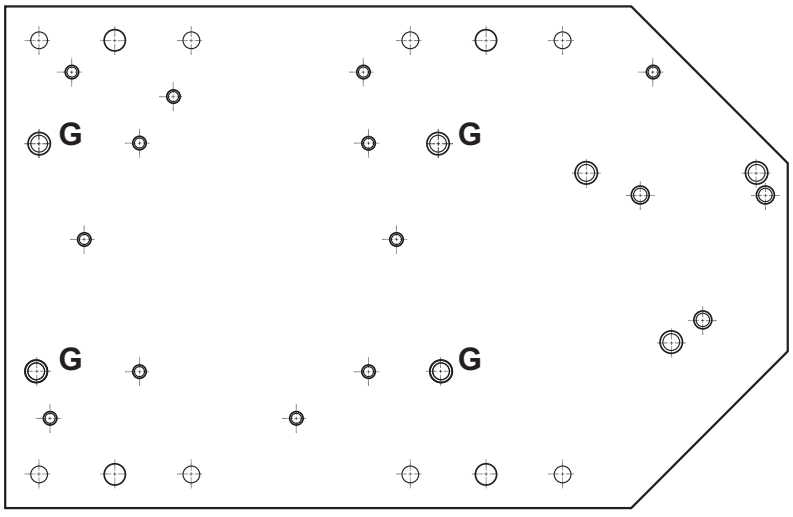
3.2.2 With Searchline Excel

The **DX100 (M)** is mechanically fixed to the Searchline Excel receiver's mounting plate. Refer also to the Searchline Excel handbook.

Caution: The DX100 (I) Termination Unit must not be used with Searchline Excel type of gas detector.

(1) Securely fit the **Termination Unit** to the mounting plate so that the communications link entry socket connector is located at the bottom.

*Use the **Termination Unit** mounting holes marked **G** on the diagram. The box uses two of the four holes depending on the plate's horizontal orientation.*



*Note: Mounting plate fixing holes are unthreaded. **Termination Unit** and Searchline Excel system component mounting holes are threaded. For the identity of other mounting holes refer to the Searchline Excel Technical Handbook.*

(2) Remove the **Termination Unit** lid.

*Use the lugs on the lid to unscrew it anticlockwise from the **Termination Unit** base.*

3. INSTALLATION

(3) Attach the Searchline Excel gas detector's cable to the **Termination Unit**.

Fit to the bottom left entry after removing the 3/4 NPT blanking plug.

(4) Fit approved certified 3/4 NPT cable glands or conduit fittings to the **Termination Unit** cable/conduit entries as necessary.

Use sealing washers where necessary to maintain the ingress protection rating. Fit any locking rings **before** *terminating cables in the* ***Termination Unit*** *(see section* **3.2***).*

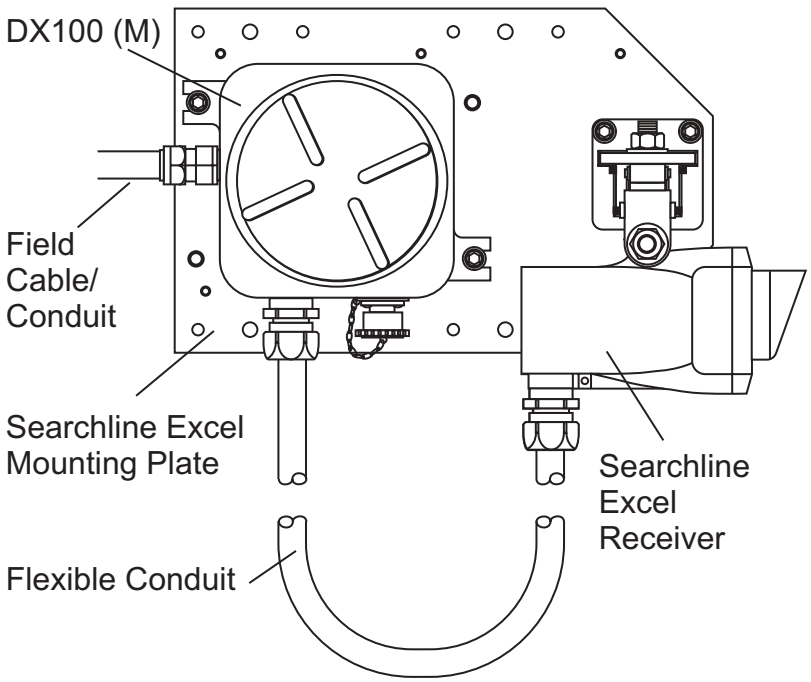
(5) Fit the external field wiring through the cable/conduit fittings and secure.

Fit the supplied approved certified blanking plug to the unused cable/conduit entry.

(6) Terminate the wiring.

Refer to section **3.2**.

The diagram shows a typical Searchline Excel Receiver and **DX100 (M)** installation.



3.2.3 With Searchline Excel Cross-Duct

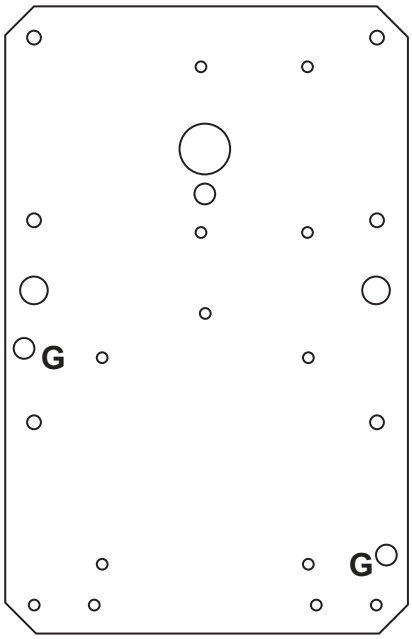
The **DX100 (M) Termination Unit** is mechanically fixed to the Searchline Excel Cross-Duct transmitter/detector's mounting plate. Refer also to the Searchline Excel handbook.

Caution: The DX100 (I) Termination Unit must not be used with the Searchline Excel Cross-Duct type of gas detector.

(1) Securely fit the **Termination Unit** to the mounting plate so that the communications link entry socket connector is located at the bottom.

Use the mounting holes marked **G** *on the following diagram.*

3. INSTALLATION



Note: Mounting plate fixing holes are unthreaded. ***Termination Unit*** *and Searchline Excel Cross-Duct system component mounting holes are threaded. For the identity of other mounting holes refer to the Searchline Excel Technical Handbook.*

(2) Remove the **Termination Unit** lid.

Use the lugs on the lid to unscrew it anticlockwise from the ***Termination Unit*** *base.*

(3) Attach the two cables from the Searchline Excel Cross-Duct gas detector to the **Termination Unit**.

Fit the transmitter's cable to the bottom left entry after removing the 3/4 NPT blanking plug. Fit the receiver's cable to the right-hand entry after removing the 3/4 NPT blanking plug (see the subsequent diagram). Use suitably approved certified glands/adaptors.

Fit any locking rings **before** *terminating cables in the* ***Termination Unit*** *(see section* **3.2***).*

(4) Fit an approved certified 3/4 NPT cable gland or conduit fitting to the **Termination Unit** cable/conduit entry as necessary.

Use sealing washers where necessary to maintain the ingress protection rating.

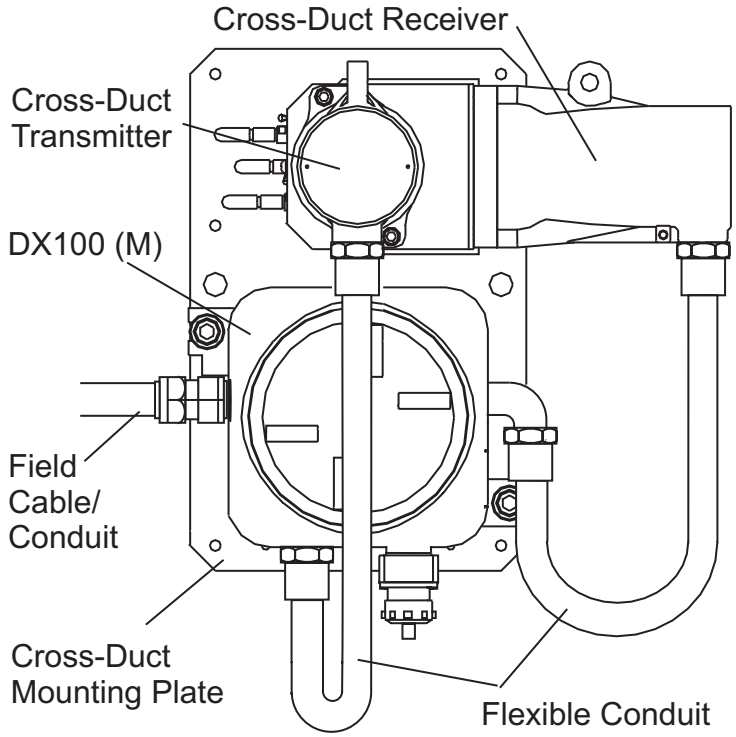
(5) Fit the external field wiring through the cable/conduit fitting and secure.

(6) Terminate the wiring.

Refer to section **3.2**.

3. INSTALLATION

The diagram shows a typical Searchline Excel Cross-Duct and **DX100 (M)** installation.



3.3 ELECTRICAL INSTALLATION

Caution: Read the Warnings and Cautions at the beginning of this handbook and all the relevant instructions before starting any of the installation procedures.

Electrical installation consists of connecting the wiring from the associated gas detector and field cables to the terminal blocks inside the **DX100 Series Termination Unit**.

The basic wiring is the same to each box but each type of box has a different terminal block layout. The **DX100 (M)** has extra connections for the network Modbus signal connections. The information covers the connections to the different types of gas detector.

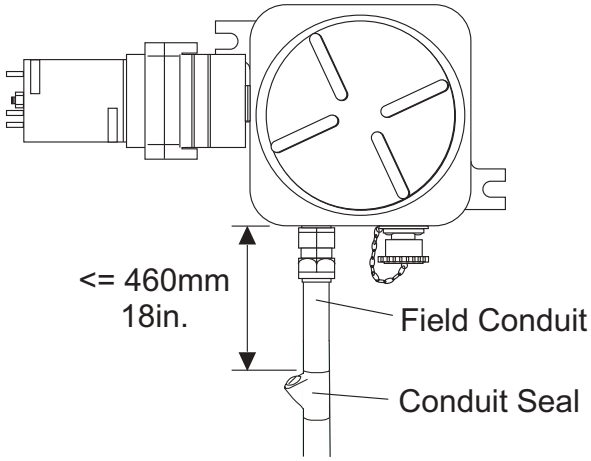
These procedures are intended for use by a mechanical/electrical technician.

Electrical Installation Guidelines

1. Isolate all associated power supplies and ensure that they remain ***OFF*** during the procedures.
2. Refer to wiring diagrams for the associated network control system for details about external connection information, field wiring, interconnections, etc.
3. Ensure that approved and certified cable glands are fitted to the **Termination Unit** cable entries where used for field wiring, with sealing washers where necessary to maintain the ingress protection rating.
4. Ensure that any cable gland/conduit locking rings are fitted before terminating the cables.

3. INSTALLATION

5. Make sure that a conduit sealing fitting is installed within 460mm (18in.) of the Termination Unit on all conduit runs. The following diagram shows a vertical conduit seal fixed in the conduit run close to a Termination Unit fitted with an Optima unit. Excel and Excel Cross-Duct installations should be similar.



6. The supplied approved and certified blanking plug must be fitted to the unused **Termination Unit** cable entry.
7. Ensure that the **Termination Unit** mounting plate is bonded to a protective earth.
8. Suitable crimps and/or ferrules must be used when connecting more than one wire to a **Termination Unit** terminal.
9. The field terminals of the **Termination Unit** accept single or multi-stranded wire up to 2.5mm^2 (14 AWG).

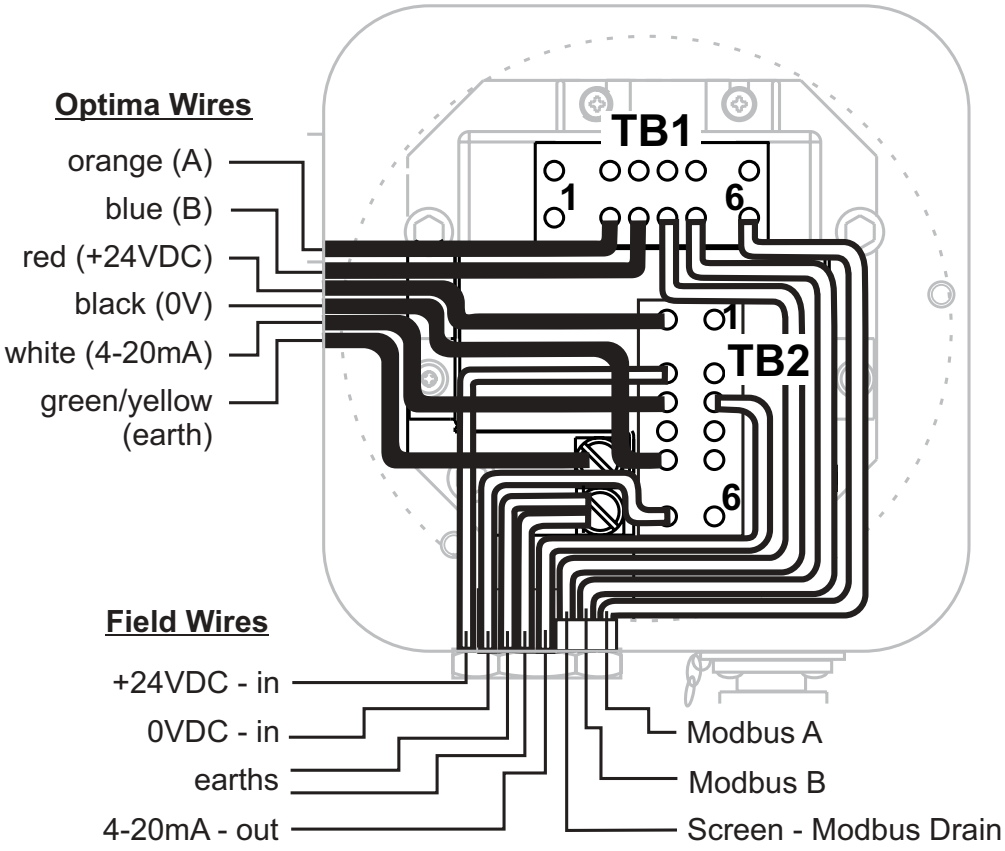
3.3.1 DX100 (M)

The information on the following pages covers the gas detector and field wiring to the **DX100 (M)** for each of the different types of gas detector.

Connect the gas detector and field wiring to the terminal blocks in the **Termination Unit** according to the wiring diagrams and associated tables.

3. INSTALLATION

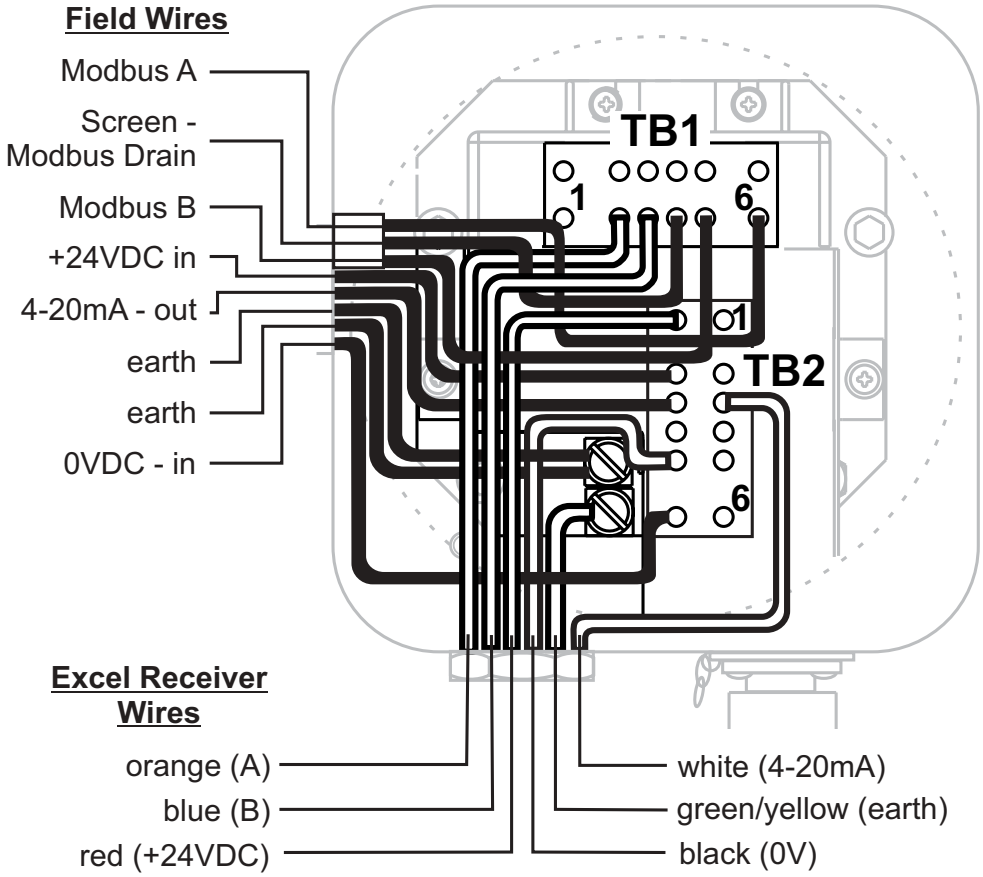
Searchpoint Optima - DX100 (M)



Terminal/ Number		Gas Detector Wiring		Field Wiring
		Function	Colour	
TB1	1	-	-	-
	2	A	Orange	-
	3	B	Blue	-
	4	-	-	Drain
	5	-	-	Modbus B
	6	-		Modbus A
TB2	1	+24VDC	Red	-
	2	-	-	+24VDC - Supply
	3	4-20mA	White	4-20mA - Output
	4	-	-	-
	5	0V	Black	-
	6	-	-	0V - Supply
Earth Posts	-	Earth	Green/Yellow	Earth Barrier Earth

3. INSTALLATION

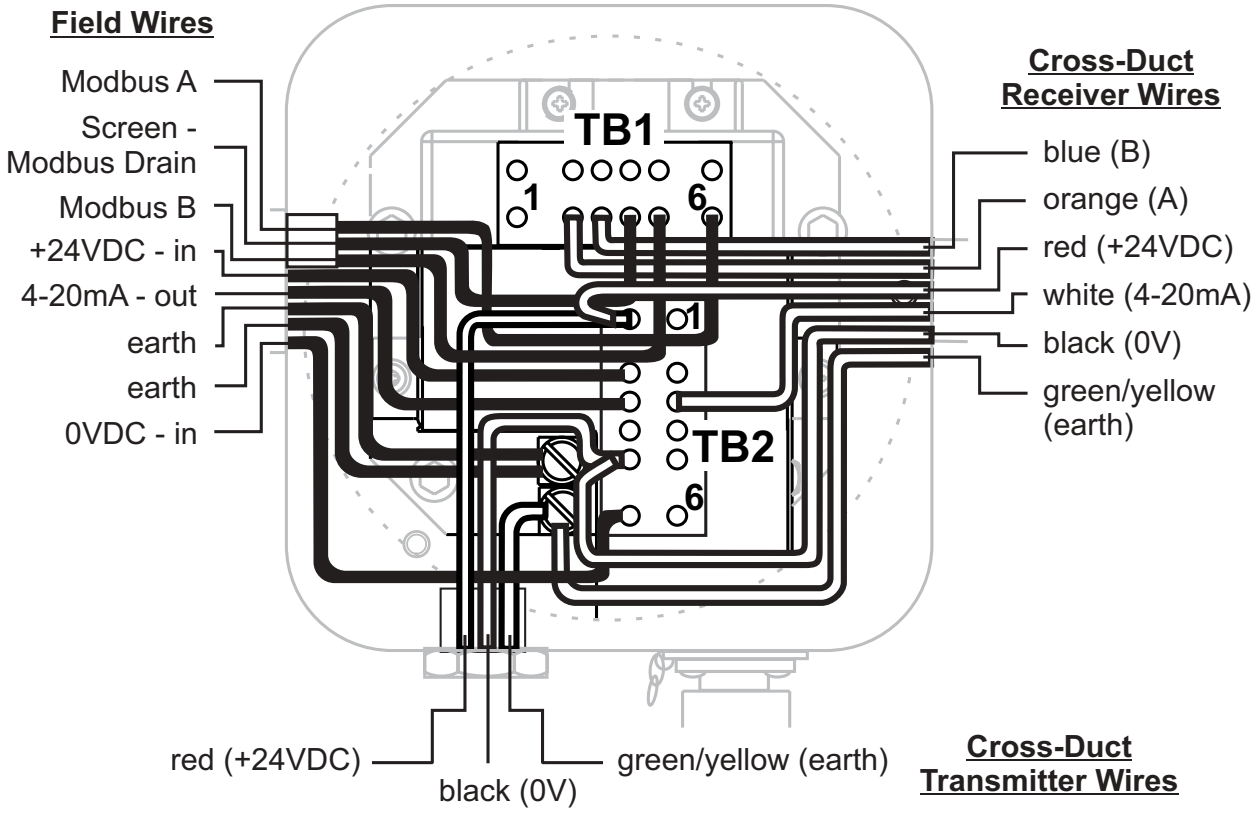
Searchline Excel - DX100 (M)



Terminal/ Number		Gas Detector Wiring		Field Wiring
		Function	Colour	
TB1	1	-	-	-
	2	A	Orange	-
	3	B	Blue	-
	4	-	-	Drain
	5	-	-	Modbus B
	6	-		Modbus A
TB2	1	+24VDC	Red	-
	2	-	-	+24VDC - Supply
	3	4-20mA	White	4-20mA - Output
	4	-	-	-
	5	0V	Black	-
	6	-	-	0V - Supply
Earth Posts	-	Earth	Green/Yellow	Earth Barrier Earth

3. INSTALLATION

Searchline Excel Cross-Duct - DX100 (M)



Terminal/ Number		Gas Detector Wiring			Field Wiring
		Function	Colour	Receiver/Transmitter	
TB1	1	-	-	-	-
	2	A	Orange	-	-
	3	B	Blue	-	-
	4	-	-	-	Drain
	5	-	-	-	Modbus B
	6	-		-	Modbus A
TB2	1	+24VDC	Red	Receiver/Transmitter	-
	2	-	-	-	+24VDC - Supply
	3	4-20mA	White	Receiver	4-20mA - Output
	4	-	-	-	-
	5	0V	Black	Receiver/Transmitter	-
	6	-	-	-	0V - Supply
Earth Posts	-	Earth	Green/Yellow	Receiver/Transmitter	Earth Barrier Earth

3. INSTALLATION

3.3.2 DX100 (I)

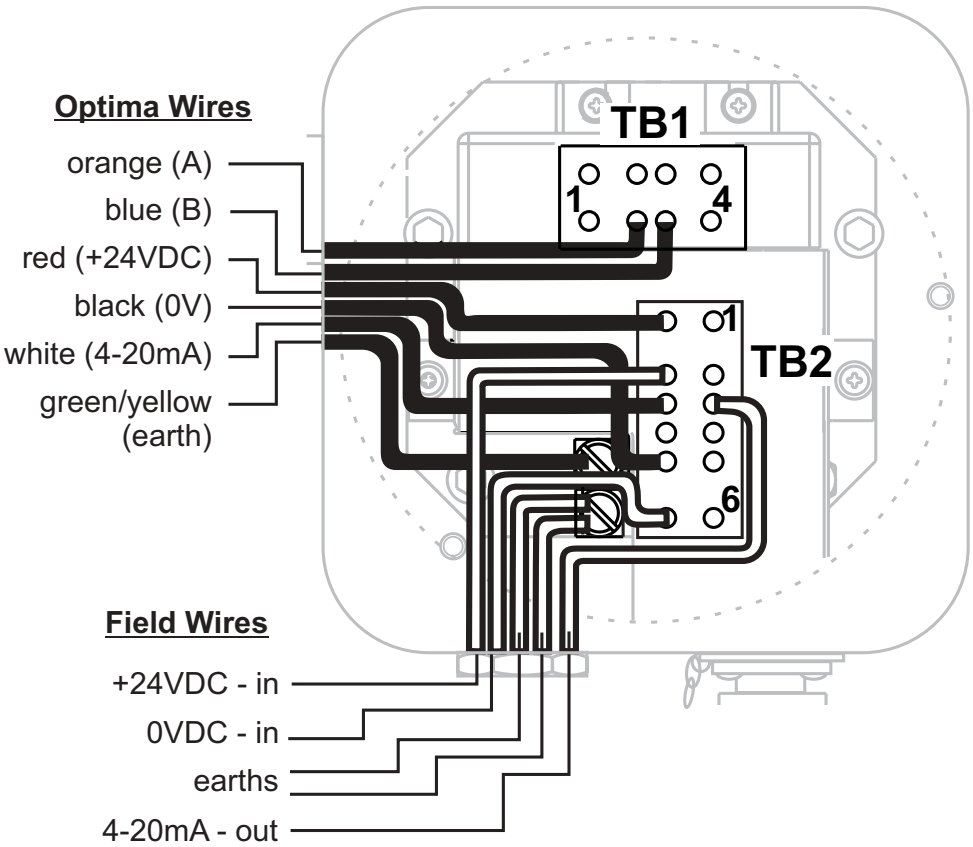
The information on the following pages covers the gas detector and field wiring to the **DX100 (I)** for the Searchpoint Optima gas detector.

Caution: The DX100 (I) Termination Unit must only be used with Searchpoint Optima or Optima Plus gas detectors.

Connect the gas detector and field wiring to the terminal blocks in the **Termination Unit** according to the wiring diagrams and associated tables.

3. INSTALLATION

Searchpoint Optima - DX100 (I)



Terminal/ Number		Gas Detector Wiring		Field Wiring
		Function	Colour	
TB1	1	-	-	-
	2	A	Orange	-
	3	B	Blue	-
	4	-	-	-
TB2	1	+24VDC	Red	-
	2	-	-	+24VDC - Supply
	3	4-20mA	White	4-20mA - Output
	4	-	-	-
	5	0V	Black	
	6	-	-	0V - Supply
Earth Posts	-	Earth	Green/Yellow	Earth Barrier Earth

3. INSTALLATION

3.4 DX100 (M) CONFIGURATION

This procedure is intended for use by an electronics technician. It only applies to the **DX100 (M) Termination Unit**. It tells how to configure the **DX100 (M)** with a digital address so that the **Termination Unit** can communicate data between the gas detector and the Modbus network controller over the RS485 link.

The DX100 (M) inherits its Modbus address from the *gas detector* that it is connected to.

Until the gas detector has its digital address configured, it defaults to an address of **00** which gives the **DX100 (M)** a Modbus address of **99**. With this default address of **99** the **Termination Unit** ignores all attempts to communicate with it.

Thus when initially installed and powered-up the **DX100 (M)** assumes this default Modbus address of **99** and ignores all attempts at communication.

The gas detector's digital address *must* be changed from the default to enable Modbus communications via the DX100 (M).

The address is configured using the SHC1 Handheld Interrogator. To set the address requires access to a hidden version of the interrogator's software menu system, called the *Field Engineer Version*.

The process to switch on the SHC1 and access this alternative set of menus is different to that described in the gas detector's technical documentation for normal power-up and use.

Apart from this switch on procedure, and initial menu access procedures, general operation of the interrogator menus and keys is the same as that described in the gas detector's technical documents.

(1) Connect the SHC1 Handheld Interrogator to the **DX100 (M) Termination Unit**.

(2) Switch on the SHC1.

Press the [ESC] *and the* [↵] *keys simultaneously for 2 seconds.*

The name of the last gas detector the interrogator was used with is displayed. If it is necessary to change the type of gas detector connected to the ***Termination Unit*** *press the* [ESC] *key repeatedly until the connected detector type name is displayed. Release the* [ESC] *key.*

(3) With the name of the gas detector **still showing**, press the [▲] and [▼] keys at the same time.

The message **Field Engineer Version Enabled** *is displayed for a short time followed by the* **Main Menu** *screen.*

(4) Scroll through the options until the ***Configure*** item is displayed.

Use the [▲] *and* [▼] *keys.*

(5) Press [↵].

The **Configure** *screen is displayed.*

3. INSTALLATION

(6) Scroll through the options until the ***Mod Config*** item is displayed.

(7) Press ↵.
The current digital address for the connected gas detector is displayed.

(8) Press ↵.
This enables the user to modify the displayed value for the digital address.

(9) Change the reading to the new address.
Use the ▲ and ▼ keys to change the displayed value.

(10) Press ↵.
This confirms the new value. The following message is displayed:
Config Updated

(11) Return to the ***Main Menu***.
*Switch off the SHC1 and disconnect it from the **Termination Unit**.*

Note: The configured digital address is stored in the gas detector. If a gas detection head is replaced it will be necessary to configure the replacement detector with a suitable address by following the above procedure.

For information about the Modbus functions supported see **Chapter 4**.

4. MODBUS DATA

This chapter of the handbook provides information about the communications module fitted to the **DX100 (M)** and about the Modbus protocol used by the interface.

The controlling network needs to be able to communicate with the gas detector via the **Termination Unit** to monitor the gas reading and the state of the detector.

This is done by creating and sending commands over the network that conform to the Modbus protocol. The commands used to communicate with the **DX100 (M)** and the gas detector form a sub-set of those provided by the Modbus protocol. The ones required are defined in this chapter.

4.1 INTERFACE DEFINITION

The Modbus data module fitted inside the **DX100 (M)** provides an RS485 communications interface to the Excel and Optima types of gas detectors. It provides isolated, multi-drop RS485 communications using the Modbus protocol.

The interface module also provides an IS field connection to the Sieger Handheld Interrogator (SHC1) via the Communications Link Entry Socket mounted in the base of the **DX100 (M)**.

Operation of the SHC1, Excel and Optima Plus commands/functions are unaffected when routed via the IS connection. (See the Excel and Optima technical documentation for details of how the SHC1 is used with the gas detectors.)

The interface module allows output data from the gas detectors to be monitored by the digital network controller and provides a digital interface for commands from the controller to the system components.

4.2 COMMUNICATIONS SPECIFICATION

Communications Protocol	Modbus
Programmable Modbus Addresses	1-99 (DX100M Modbus address is derived from the gas detector using the following transfer function: 01 to 98 = 01 to 98 00 = Default = 99)
Data Rate	9,600 Baud
Parity	Odd
Data Bits	8
Stop Bit	1
Time to Commence Responding to Request	<= 0.1 mS
Compatible Detectors	Searchline Excel Searchline Excel Cross-Duct Searchpoint Optima and Optima Plus

4. MODBUS DATA

4.3 ACCESSIBLE DATA & COMMANDS

This section provides information about the data that can be read from the **DX100 (M)** and the gas detector and the Modbus commands that are used.

4.3.1 Gas Detector Readings

Gas Reading Format	Reading: 16 bit, unsigned Scale Factor: 16 bit, unsigned
Optima Plus and Excel (Cross-Duct)	0-100%LEL or 0-100%UEG 0 = 0.0 % 1000 = 100.0 % Scale Factor = 100
Optima (ppm)	0-XX000 ppm 0 = 0 ppm 5000 = 5000 ppm Scale Factor = 1000
Optima (%V/V)	0-X%V/V 0 = 0 %V/V 200 = 2.00 %V/V Scale Factor = 10
Excel (Standard)	0-5 LEL.m or 0-5 UEG.m 0 = 0.0 LEL.m 500 = 5.00 LEL.m Scale Factor = 10
Scale Factor Conversion	Gas Reading = Reading x Scale Factor / 1000
Gas Reading Update Rate	0.5 seconds (Max)
Gas Name/Units	*gas_selector* *gas_name* *gas_units_selector* *gas_units* (extracted from gas detector on power-up and following SHC1 communications time-out.)

4.3.2 Gas Detector Status

Optima	Fault, Alarm, Inhibit (includes Initializing), Warning, Over-Range
Excel	Fault, Beam-Block, Low Signal, Alarm, Over-Range, Inhibit, Warning
Status Update Rate	0.5 seconds (Max)

*Note: The Modbus protocol does **not** include exception codes that can be used to signal that the gas detector is in* **FAULT**, **INHIBIT** *or* **BEAM-BLOCK** *modes, or is* **Off-Line** *when the controller requests a gas reading. It is essential that the Modbus controller continuously monitors the* **Detector Status** *bits to determine whether or not a gas reading is valid and current.*

4. MODBUS DATA

4.3.3 Gas Detector Diagnostics

Optima	Active Faults/Warnings. (Inc count-back time.)
Excel	Active Faults/Warnings. (Inc date-stamp.)
Diagnostics Update	Diagnostics only updated in response to commands/requests received over Modbus link. Selection of **FAULT/WARNING** table and position is controlled via content of Modbus commands/requests.

4.3.4 Forced Commands

Optima	0 to 22mA (Force and Release.) Inhibit (Force and Release.)
Excel	0 to 22mA (Force and Release.) Inhibit (Force and Release.)

4.3.5 Detector Communications Status

Optima and Excel	**Detector Off-Line** or **Detector On-line** A Detector Communications Status bit shows whether communications between the Modbus module and the detector are live. If detector to Modbus module communications are live the status bit reports **Detector On-Line**. If the SHC1 comms are active (not timed-out) or the module cannot establish communications with the detector, the status bit reports **Detector Off-Line**.

4.4 INITIALISATION/POWER-UP

At power-up, the **DX100 (M)** module handling Modbus communications performs the following actions:

1. System and code-space checks.
2. Waits for a Modbus address to be loaded into the on-board memory by the gas detector's communications module.
3. Verifies that the Modbus address is not the default (gas detector - **00**, **DX100 (M)** - **99**).

Note: If the Modbus gas detector address is the default then the DX100M module does not respond to Modbus communications.

4. Begins responding to Modbus commands and requests as appropriate to the detector’s status and gas reading, see section **4.5,** no. **2**.

4. MODBUS DATA

4.5 OPERATION/MONITORING

After successful completion of the initialisation/power-up sequence, the **DX100 (M)** communications module starts normal operations.

These comprise:

1. Monitoring the RS485 link for commands or requests with its own Modbus address.
2. Providing Modbus responses to requests for gas reading and status information using the latest information stored in the on-board memory.
3. Loading commands or requests that need to be actioned by the gas detector into the on-board memory.
4. Providing Modbus responses to commands or requests that have been actioned and completed by the gas detector.

Note: These responses are only available after action and completion by the gas detector, the timing of which depends upon the nature of the command or request. If the response is not available when requested over the interface, an appropriate Modbus exception is returned.

5. Increment the ***watchdog*** count in the on-board memory.
6. Repeat the operations from the beginning.

4.6 MODBUS SUPPORTED FUNCTIONS

Full details of the Modbus protocol can be found in the Modicon Modbus Protocol Reference Guide PI-MBUS-300 (Rev. J) available at *www.modbus.org.*

The **DX100 (M)** supports the following Modbus functions:

Function 02 – Read Input Status
Function 03 – Read Holding Registers
Function 04 – Read Input Register
Function 06 – Preset Single Holding Register

Note: Modbus **broadcast** *commands cannot be used.*

The addressing conventions and register values used in this chapter follow those set by Modicon and which are described in the following sub-sections.

The first digit of the on-board memory address refers to the data type stored in the register and therefore defines the Modbus function command that should be used when polling it. This first digit is ignored when calculating the register address transmitted in the Modbus request.

1xxxx These register addresses record the gas detector status (in two specific blocks) and also the units of gas measurement.
They are read back using Modbus **Function 02**

3xxxx These register addresses record gas detector gas reading and scale factor as analogue values.
They are read using **Function 04**

4. MODBUS DATA

4xxxx These register addresses have two purposes.

One range of addresses stores commands sent to the gas detector by the controller.
They can be written singly using **Function 06**.

The other address range stores the result of those commands sent to the gas detector, as analogue values
They are read using **Function 03**.

4.6.1 Function 02 – Read Input Status Bits

Unit of measure

Six individual bits are used to indicate the units of measure for the gas reading. These should be periodically tested to ensure that no field modifications have been made.

Address	Description
10001	Unit of Measure = %LEL
10002	Unit of Measure = %UEG
10003	Unit of Measure = %v/v
10004	Unit of Measure = ppm
10005	Unit of Measure = LEL.m
10006	Unit of Measure = UEG.m

Detector Status

There are two ***blocks*** of gas detector status bits. These are called the **Critical Block** and **Non-Critical Block**.

The **Critical Block** stores 5 types of detector status information and if any of the **Critical Block** bits are set this information ***must*** be taken into account when determining whether or not a gas reading is valid.

The **Non-Critical Block** stores 3 types of different gas detector status information. Gas readings remain valid if any of the **Non-Critical Block** bits are set.

Critical Block

It is recommended that before any executive action is taken in response to a gas reading the contents of the **Critical Block** are checked.

If any of the bits in the **Critical Block** are set then the gas reading might not be valid and the controller should be programmed to respond accordingly.

Address	Description
10008	Gas Detector Status = **Fault** Detector is not operational. Gas reading output after a detector indicates a fault should be treated as not valid.

4. MODBUS DATA

10009	Gas Detector Status = **Inhibit** The detector is initialising or has been put into **Inhibit**. Gas readings output from an inhibited gas detector are likely to be due to test/maintenance activities being performed on the detector and should be treated accordingly (usually ignored).
10010	Gas Detector Status = **Beam-Block** The gas detector's beam-path is blocked. Gas readings output after a detector indicates **Beam-Block** should be ignored.
10011	Gas Detector Status = **Detector Off-Line** The detector is communicating with the SHC1 Handheld Interrogator or is not responding to DX100 (M) communications. The gas reading is the last value obtained before the detector went **Off-Line**.
10015	Gas Detector Status = **Over Range** The detector's gas reading has exceeded its full-scale range. The gas reading should be treated as a valid, full-scale reading for alarm purposes. The indicated value of gas reading might not be accurate.

Non-critical Block

Address	Description
10013	Detector Status = **Alarm** The detector's gas reading has exceeded its alarm threshold.
10014	Detector Status = **Warning** The gas detector is operational but it is recommended that a technician checks the detector to identify and clear the **Warning**.
10016	Detector Status = **Low Signal** The detector is operational but the signal reaching the receiver is low. It is recommended that a technician checks the gas detector.

4.6.2 Function 04 - Read Input Register

This function is used to read back analogue values as 16-bit words. There are two values that should be read in conjunction for each gas reading:

- **gas reading**
- **scale factor**

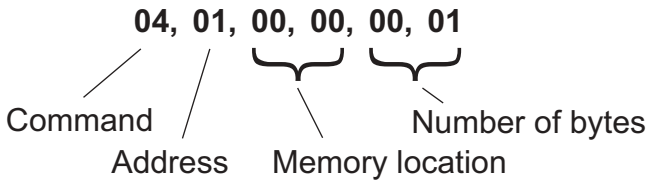
The actual gas value can be calculated by using the following formula:

Gas value = (Gas reading x Scale factor)/1000

Address	Description
30001	Gas reading
30002	Scale factor

4. MODBUS DATA

Example: To get the detector gas reading with address 01



4.6.3 Function 06 - Preset Single Holding Register

This function is used to send commands to the detector, and to request fault and warning tables from the detector.

The following three registers are used for transferring command data to the detector.

Address	Description
40001	Enumerated value **0** - Ready **1** - Active Fault Request **2** - Force 4-20mA Request **3** - Inhibit Unit **4** - Request Gas Name
40002	Command Data
40003	Command Data

The first of these registers contains an enumerated value that defines the data held in the other two registers.

Value held in 40001	1	2	3	4
Data held in 40002	**0** - Fault **1** - Warning	**0** - Force **1** - Release	**0** -Inhibit **1** -Release	**0** – Request Gas Name
Data held in 40003	**0** - First **1** - Previous **2** - Next	mA level		

In order to send a command request to the detector the following sequence must be followed.

1. Write data to register **40002**
2. Write data to register **40003**
3. Write data to register **40001**

This ensures that the correct data is sent to the detector since command requests are carried out when the data value in **40001** changes.

At the completion of a command the value in **40001** will return to **0**.

Results from commands are read using **Function 03**.

4. MODBUS DATA

4.6.4 Function 03 - Read Holding Registers

Function 03 is used to read the results from commands sent to the detector. The data in these registers is dependent upon the command type that has been sent. Data will not be updated until the current command has completed.

Address	Description
40016	Enumerated value **0** - Ready **1** – Command Acknowledged **2** – Processing **3** – Data Ready **4** – Command failed

Address	Value in 40001			
	1	2	3	4
	Active Fault Request	**Force 4-20mA Request**	**Inhibit Unit**	**Request Gas Name**
40017	Code	mA value - actual	Status	Character 1
40018	Character 1	-	-	Character 2
40019	Character 2	-	-	Character 3
40020	Character 3	-	-	Character 4
40021	Character 4	-	-	Character 5
40022	Character 5	-	-	Character 6
40023	Character 6	-	-	Character 7
40024	Character 7	-	-	Character 8
40025	Character 8	-	-	Character 9
40026	Character 9	-	-	Character 10
40027	Character 10	-	-	Character 11
40028	Character 11	-	-	Character 12
40029	Character 12	-	-	Character 13
40030	Character 13	-	-	Character 14
40031	Character 14	-	-	Character 15
40032	Character 15	-	-	Character 16
40033	Character 16	-	-	-
40034	Time Stamp – Minutes	-	-	
40035	Time Stamp – Hours	-	-	
40036	Date Stamp – Day	-	-	
40037	Date Stamp – Month	-	-	
40038	Date Stamp - Year	-	-	

In order to check that the data in these registers is current it is necessary to test the valid data register (**40016**), as previous results are not cleared automatically.

4. MODBUS DATA

4.7 TROUBLESHOOTING

Problem: **No response from the gas detector when interrogated by the network controller over the RS485 link.**

Possible Cause: *Ensure that the digital address of the gas detector has been set using the SHC1 Handheld Interrogator (see **3.4**). Failure to do this means that the **DX100 (M)** assumes an address of **99** because the default address of the gas detector is **00**. An address of **99** means no communications over the RS485 link between the gas detector/DX100M and the controller.*

Problem: **The 4-20mA output gas reading value is inhibited but a variable gas reading from the gas detector is seen at the network controller over the RS485 link.**

Possible Cause: *When the gas detector is inhibited it still outputs a variable gas reading over the RS485 link despite the fact that the 4-20mA reading is inactive. It is important that users **always** check the status of the gas detector over the RS485 link before acting on the digital gas reading value (see* **4.6.1,** read **Critical Block**).

Problem: **The detector is in *Fault* or *Beam-Block* but the gas reading sent over the Modbus RS485 link is not zero.**

Possible Cause: ***Always** check the status of the gas detector over the RS485 link before acting on the digital gas reading value (see* **4.6.1**, read **Critical Block**).

Problem: **Following power-up gas detectors do not respond to digital communications for a number of seconds.**

Possible Cause: *Until the **DX100 (M)** has extracted a non-default Modbus address from the detector, it will not respond to Modbus communications (see* **4.4**). *The time taken for a gas detector to power-up and supply the **DX100 (M)** with an address can be up to 40 seconds.*

APPENDIX A - SPECIFICATIONS

This section of the handbook provides specification information about the **DX100 Series Termination Units**.

A.1 CONNECTIONS

Inputs	Searchpoint Optima (3V0)/Optima Plus	-	**DX100 (I)** or **DX100 (M)**
	Searchline Excel	-	**DX100 (M)** only
	Searchline Excel Cross-Duct	-	**DX100 (M)** only
	Field wiring.		
Outputs	IS protected Sieger SHC1 Handheld Interrogator communications (RS485) 4-20mA (Non-isolated).		
Power Supply	18-32VDC.		

A.2 ENVIRONMENTAL

Operating temperature	UL	-40°C to 40°C (-40°F to 104°F).
	CSA (APPLIED FOR)	-55°C to 40°C (-67°F to 104°F).

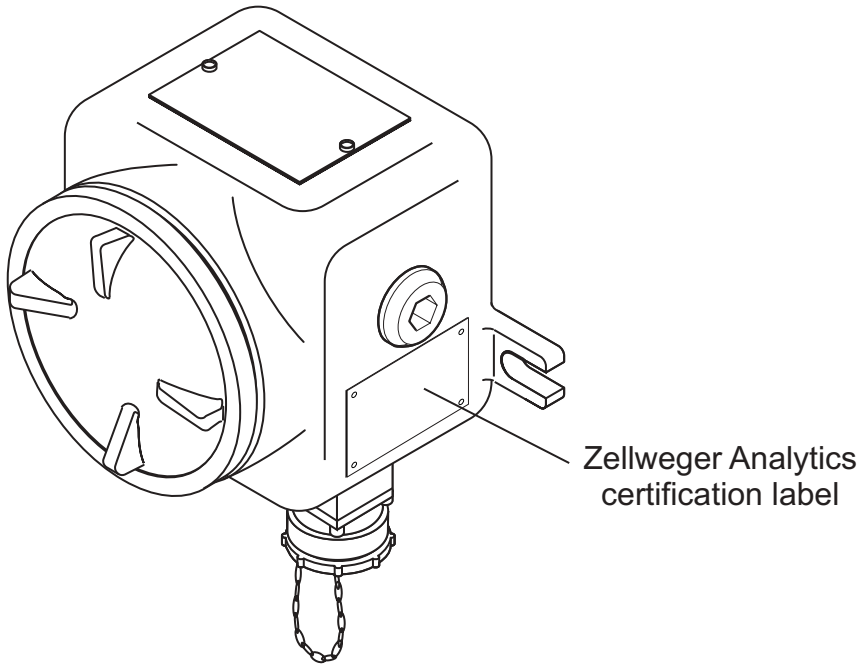
A.3 ENCLOSURE

Entry Socket	One IS protected Communications Link Entry Socket for connecting the SHC1Sieger Handheld interrogator.
Cable/Conduit Entries	Three 3/4 NPT entries (one each side and one in the bottom) to accept gas detector and field cabling or 3/4” conduit.
Size	212mm (8.35in.) wide x 152.4mm (6in.) high x 117.5mm (4.625in.) deep. *Note: The Communications Link Entry Socket adds approximately 60mm (2.36in.) to the height of the unit.*
Weight	2.5kg.
Material	Aluminium.
Ingress Protection	IP66 to BS EN 60529:1992, Degrees of protection provided by enclosures (IP code).
Certification	UL Class 1, Div 1, Groups B, C, D CSA (APPLIED FOR) Class 1, Div 1, Groups B, C, D (see **Appendix B** for details)
***Digital Interface* - DX100 (M) only**	Uses the Modbus RTU communications protocol (see **Chapter 4** for details).

APPENDIX B - CERTIFICATION

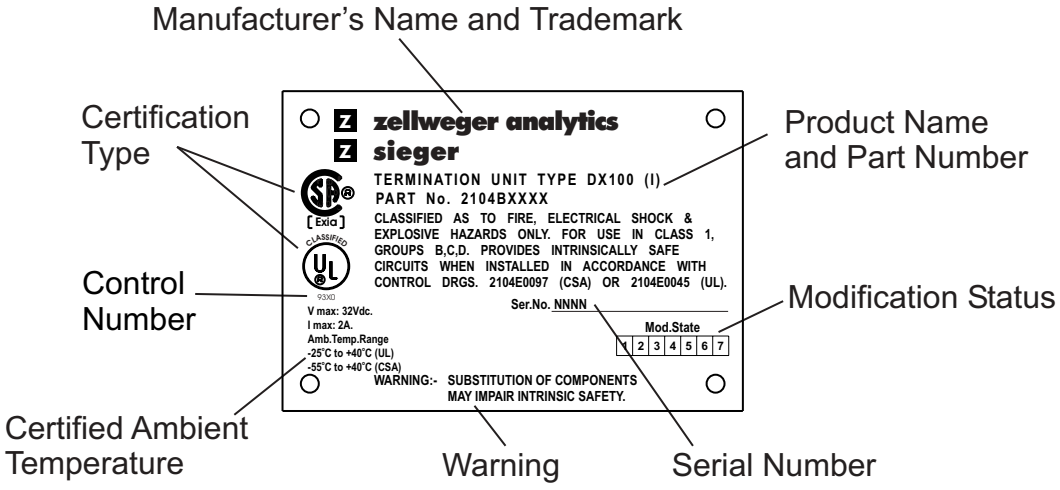
This appendix specifies UL and CSA (APPLIED FOR) certification information for the **DX100 Series Termination Units**. It includes relevant Control Drawings.

A Zellweger Analytics certification label is located on the right-hand side of the **DX100 Series Termination Unit**.



The label contains all the relevant information regarding the product's identification and certification state.

The following diagram shows an example of a Zellweger Analytics CSA (APPLIED FOR) Certification Label and explains the content. The Zellweger Analytics UL label is similar.



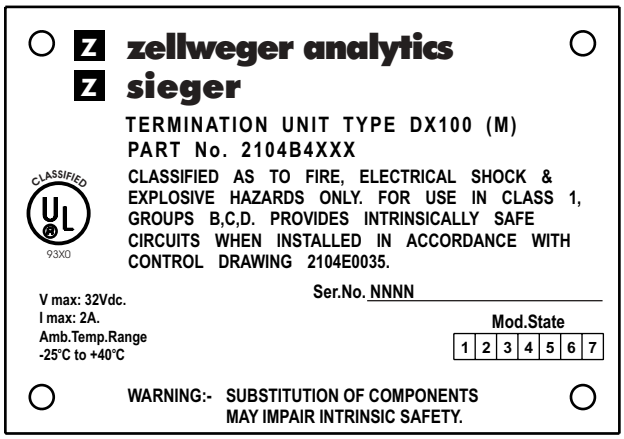
APPENDIX B - CERTIFICATION

B.1 DX100 (M) TERMINATION UNIT

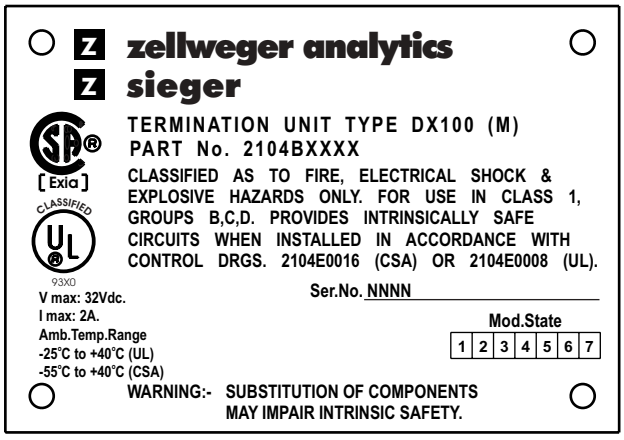
The part number for the **DX100 (M) Termination Unit** is 2104B2382.

B.1.1 Certification Labels

DX100 (M) UL



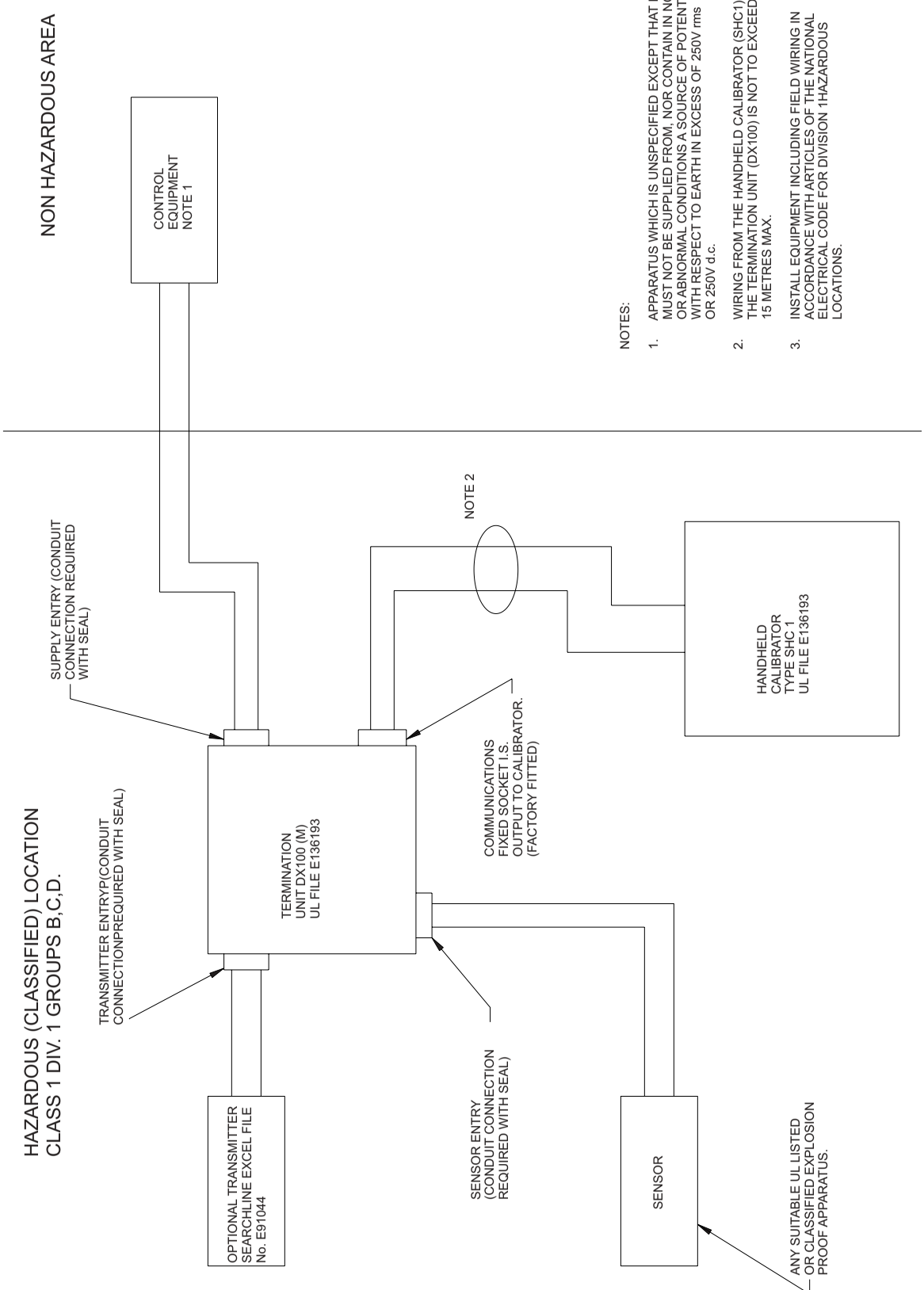
DX100 (M) CSA (APPLIED FOR)



APPENDIX B - CERTIFICATION

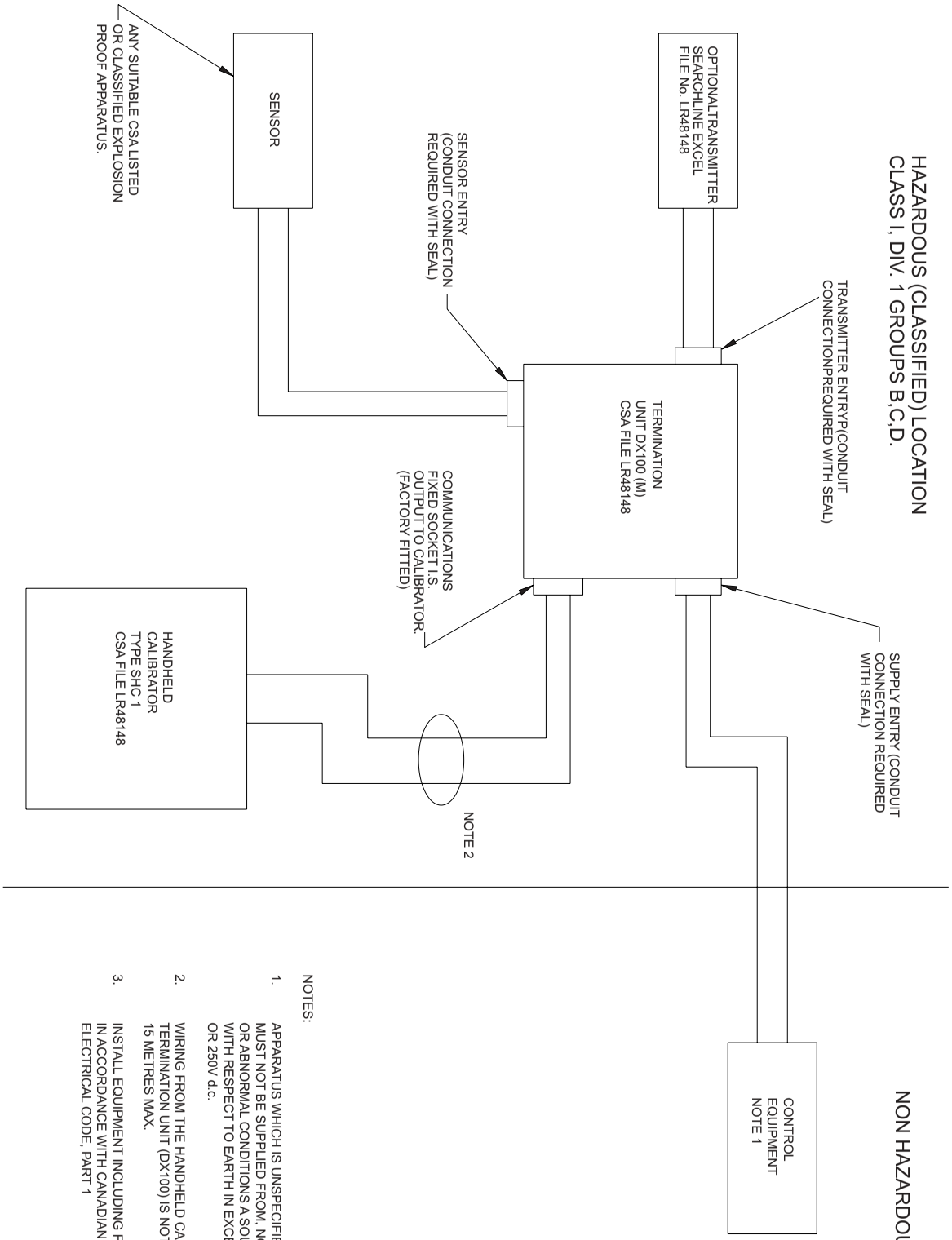
B.1.2 Control Drawings

DX100 (M) UL



APPENDIX B - CERTIFICATION

DX100 (M) CSA (APPLIED FOR)



NOTES:

1. APPARATUS WHICH IS UNSPECIFIED EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN IN NORMAL OR ABNORMAL CONDITIONS A SOURCE OF POTENTIAL WITH RESPECT TO EARTH IN EXCESS OF 250V rms OR 250V d.c.
2. WIRING FROM THE HANDHELD CALIBRATOR (SHC1) TO THE TERMINATION UNIT (DX100) IS NOT TO EXCEED 15 METRES MAX.
3. INSTALL EQUIPMENT INCLUDING FIELD WIRING IN ACCORDANCE WITH CANADIAN ELECTRICAL CODE, PART 1

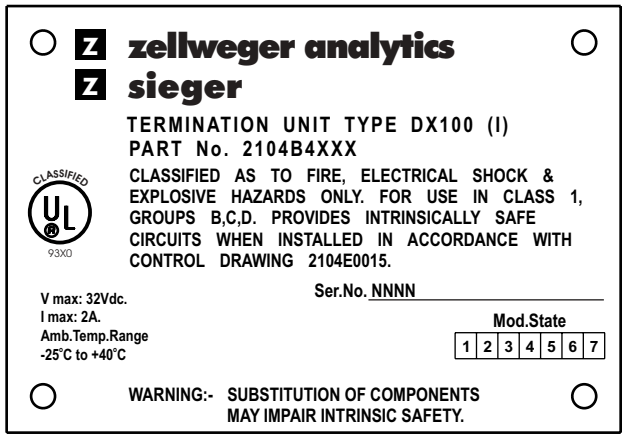
APPENDIX B - CERTIFICATION

B.2 DX100 (I) TERMINATION UNIT

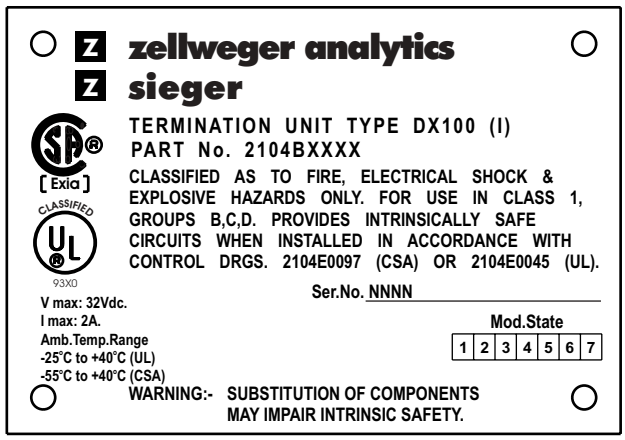
The part number for the **DX100 (I) Termination Unit** is 2104B2381.

B.2.1 Certification Labels

DX100 (I) UL



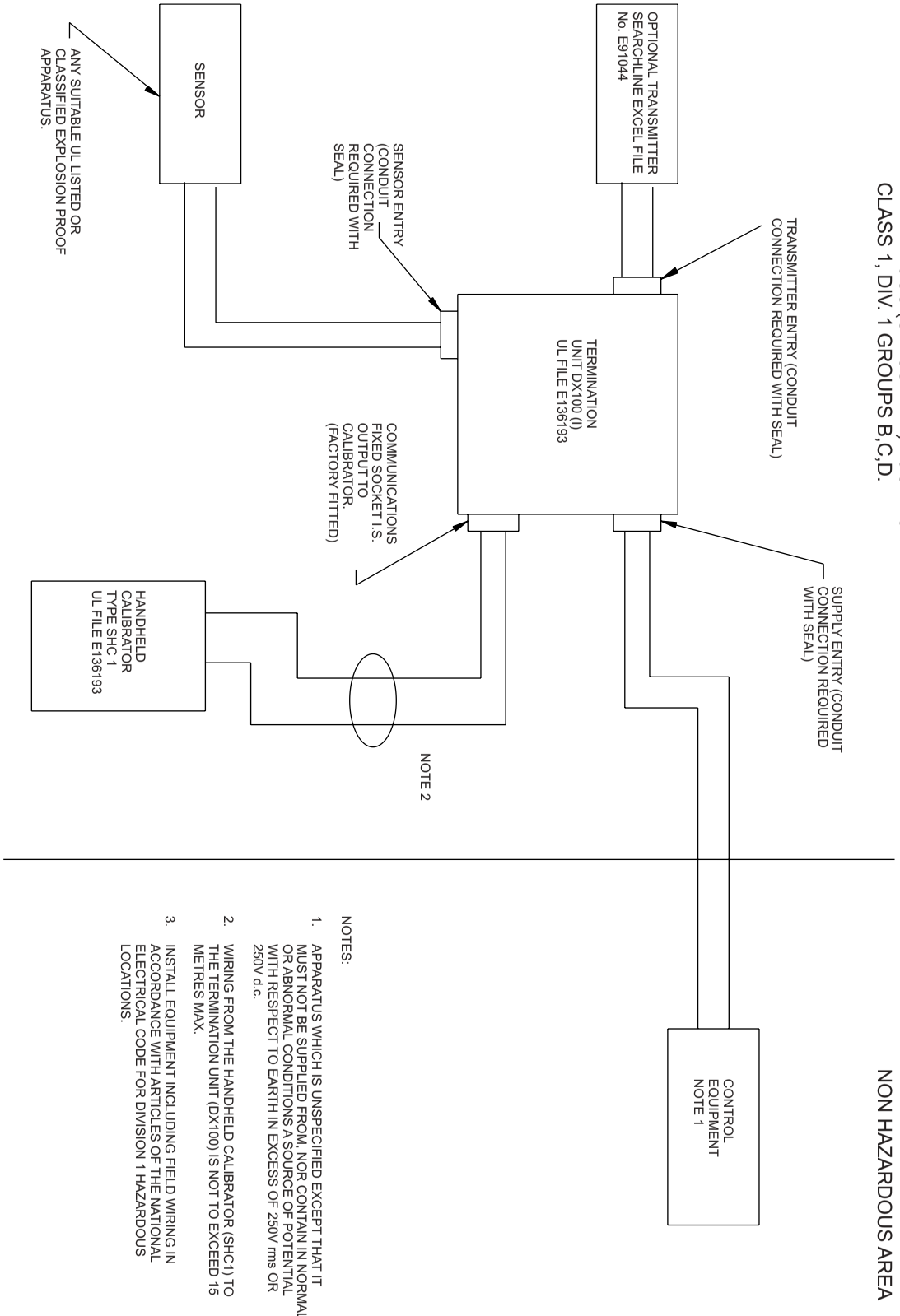
DX100 (I) CSA (APPLIED FOR)



APPENDIX B - CERTIFICATION

B.2.2 Control Drawings

DX100 (I) UL

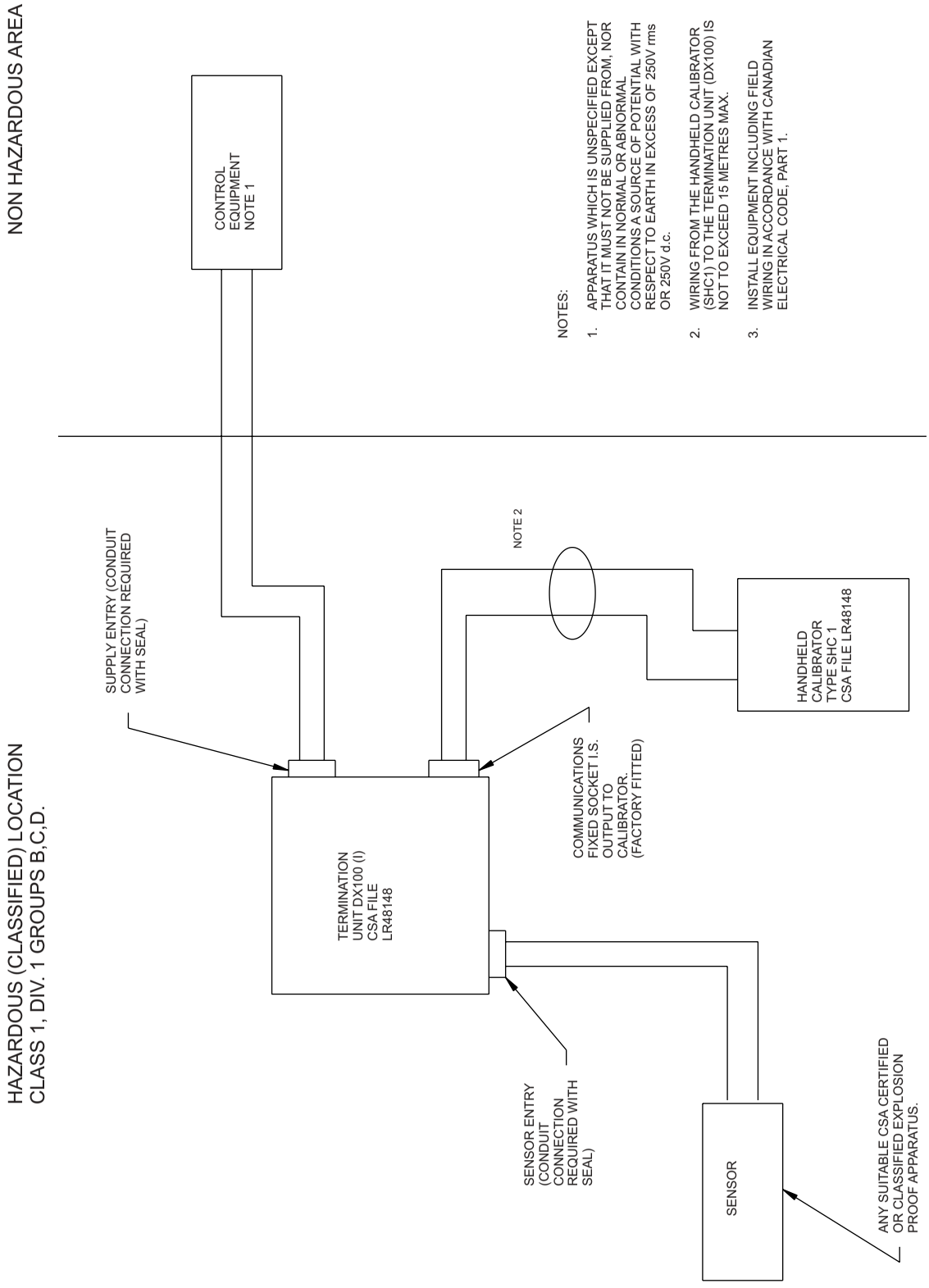


NOTES:

1. APPARATUS WHICH IS UNSPECIFIED EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN IN NORMAL OR ABNORMAL CONDITIONS A SOURCE OF POTENTIAL WITH RESPECT TO EARTH IN EXCESS OF 250V rms OR 250V d.c.
2. WIRING FROM THE HANDHELD CALIBRATOR (SHC1) TO THE TERMINATION UNIT (DX100) IS NOT TO EXCEED 15 METRES MAX.
3. INSTALL EQUIPMENT INCLUDING FIELD WIRING IN ACCORDANCE WITH ARTICLES OF THE NATIONAL ELECTRICAL CODE FOR DIVISION 1 HAZARDOUS LOCATIONS.

APPENDIX B - CERTIFICATION

DX100 (I) CSA (APPLIED FOR)



APPENDIX C - GLOSSARY

This appendix provides a glossary of terms and abbreviations used in this handbook.

%VOL
Concentration of explosive gas, measured in percentage by volume.

%V/V
Another way of representing %VOL

AWG
American Wire Gauge.

CSA
CSA International - Canadian product testing and certification services provider.

DCS
Digital Control System.

DGND
Data Ground.

EIA
Electronics Industries Association.

EMC
Electromagnetic Compatibility.

IS
Intrinsically Safe. A type of design where the currents, voltages and stored energy levels are controlled in such a way as to eliminate the possibility of ignition of a flammable gas mixture. The design requirements are published in the form of standards, e.g. EN50020.

LEL
Lower Explosive Limit. The volume ratio of flammable gas in air below which an explosive gas atmosphere will not be formed. For example, the LEL of hydrogen is 4%V/V. The LEL levels are defined in BS EN 61779-1:2000.

Note: For some gases (e.g. methane) the LEL level has different values in the European and North American standards.

LEL%
Percentage of the Lower Explosive Limit (for example, 10% LEL of methane is approximately 0.5% by volume).

APPENDIX C - GLOSSARY

NEC

National Electrical Code.

NFPA

National Fire Protection Association.

NPT

National Pipe Thread

PCB

Printed circuit board.

PLC

Programmable Logic Controller. A device that contains hardware and software that is used to perform control functions. A PLC consists of two basic sections: the central processing unit (CPU) and the input/output interface system.

PPM

Parts per million.

RFI

Radio Frequency Interference.

RH

Relative humidity.

RTU

Remote Terminal Unit. A stand-alone data acquisition and control unit. Its function is to control process equipment at a remote site, acquire data from the equipment, and transfer the data back to the central control system.

SCADA

Supervisory Control And Data Acquisition. A supervisory software system that is positioned on top of hardware to which it is interfaced, in general via Programmable Logic Controllers (PLCs), or other commercial hardware modules.

UEG

Unterexplosionsgrenze. The German term for LEL. In some cases (notably methane) the UEG value used to be different from the LEL value. Since the publication of BS EN 61779-1:2000, the LEL and UEG values are identical in Europe, so UEG is simply a German translation of LEL.

APPENDIX C - GLOSSARY

UEL

Upper Explosive Limit. The volume ratio of flammable gas in air above which an explosive gas atmosphere will not be formed. The UEL levels are defined in BS EN 61779-1:2000.

Note: For some gases (e.g. methane) the UEL level has different values in the European and North American standards.

UL

Underwriters Laboratories Inc. - US product testing and certification services provider.

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