



Searchpoint Optima Plus Infrared Point Gas Detector

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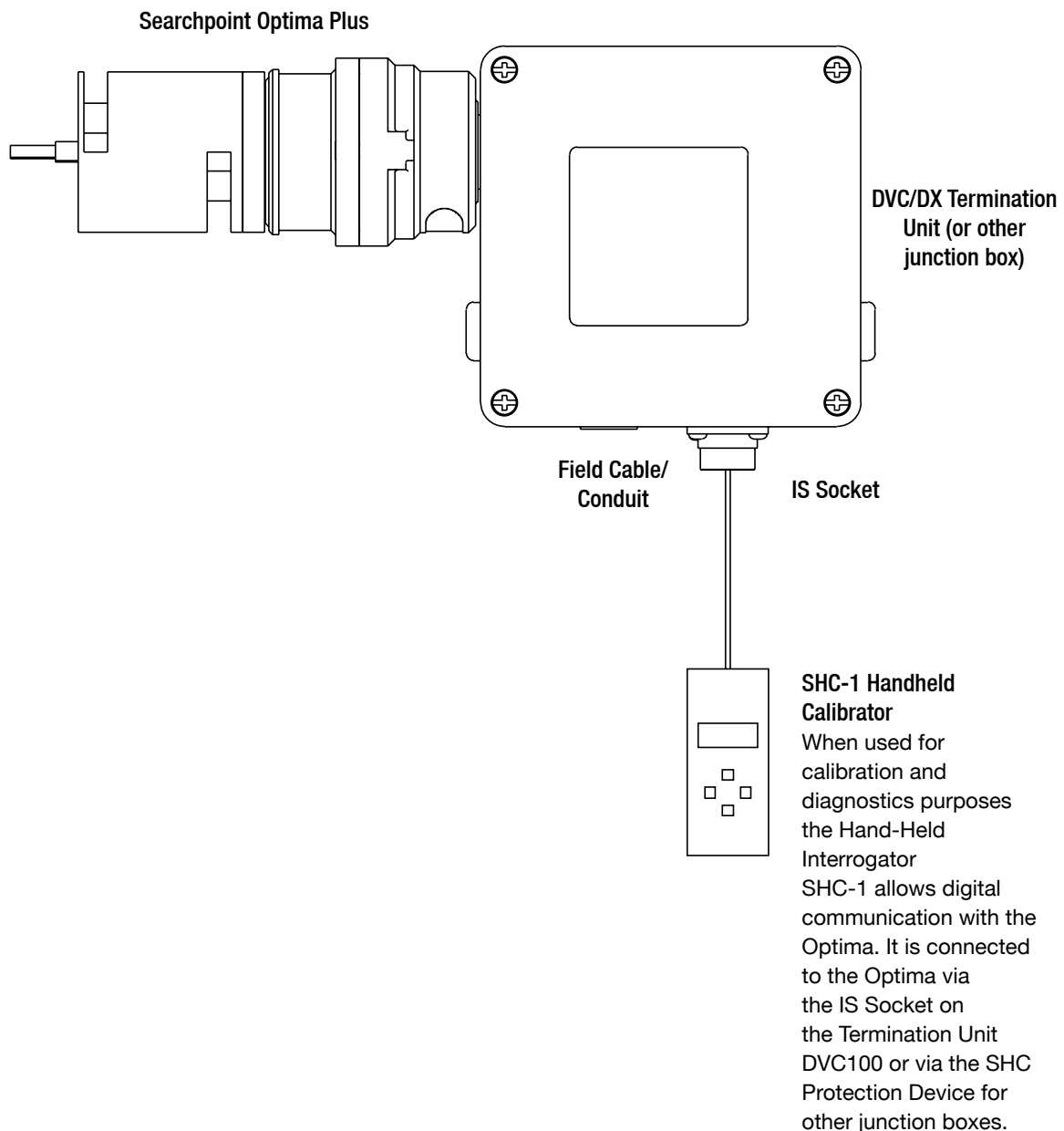
1 Introduction

This guide provides the installation personnel with the basic information necessary to mechanically install the Searchpoint Optima Plus system units and make the necessary electrical connections.

This guide is not intended to replace the associated Searchpoint Optima Plus Operating Instructions (2108M0501) which contains the full safety, installation, commissioning, maintenance and fault finding instructions.

These procedures assume that consideration of the location and mounting of the system units has already been taken into account in accordance with the guidelines in the Operating Instructions.

The following diagram shows a typical system configuration and identifies the main parts.



2 Safety

Ensure that you read and understand these instructions BEFORE installing or operating any part of the Searchpoint Optima Plus.

Please pay particular attention to the Safety Warnings.



WARNINGS

1. For installations in the UK, the Code of Practice SELECTION, INSTALLATION AND MAINTENANCE OF ELECTRICAL APPARATUS FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES should be strictly observed. General recommendations are given in BS5345: Part 1: 1989. Specific requirements for flameproof (Type 'd'), intrinsically safe (Type 'i') and increased safety (Type 'e') protection are given in BS 5345: Part 3: 1979, BS5345: Part 4: 1977 and BS5345: Part 6: 1978 respectively.

For installations in North America, the National Electrical Code (NFPA 70 - 1990) or later issues should be strictly observed.

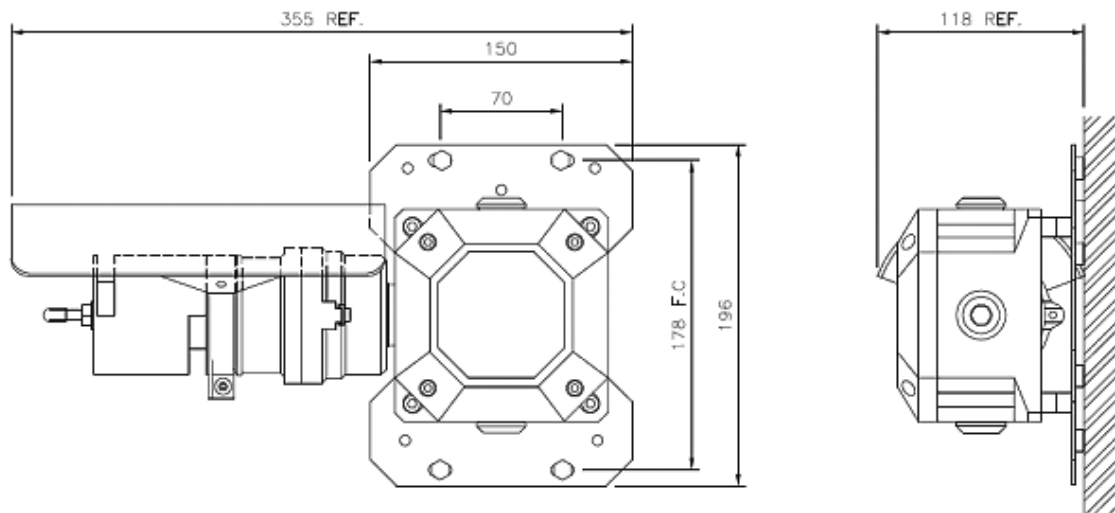
Elsewhere the appropriate local or national regulations should be used.

2. The Code of Practice regarding SELECTION, INSTALLATION, USE AND MAINTENANCE OF APPARATUS FOR THE DETECTION AND MEASUREMENT OF COMBUSTIBLE GASES (OTHER THAN FOR MINING APPLICATIONS OR EXPLOSIVES PROCESSING AND MANUFACTURE) must be complied with. Refer to BS6959:1988 in the UK or the appropriate local or national regulations.

3 Mechanical Assembly

This section details the basic mechanical assembly information and important dimensions necessary for installation.

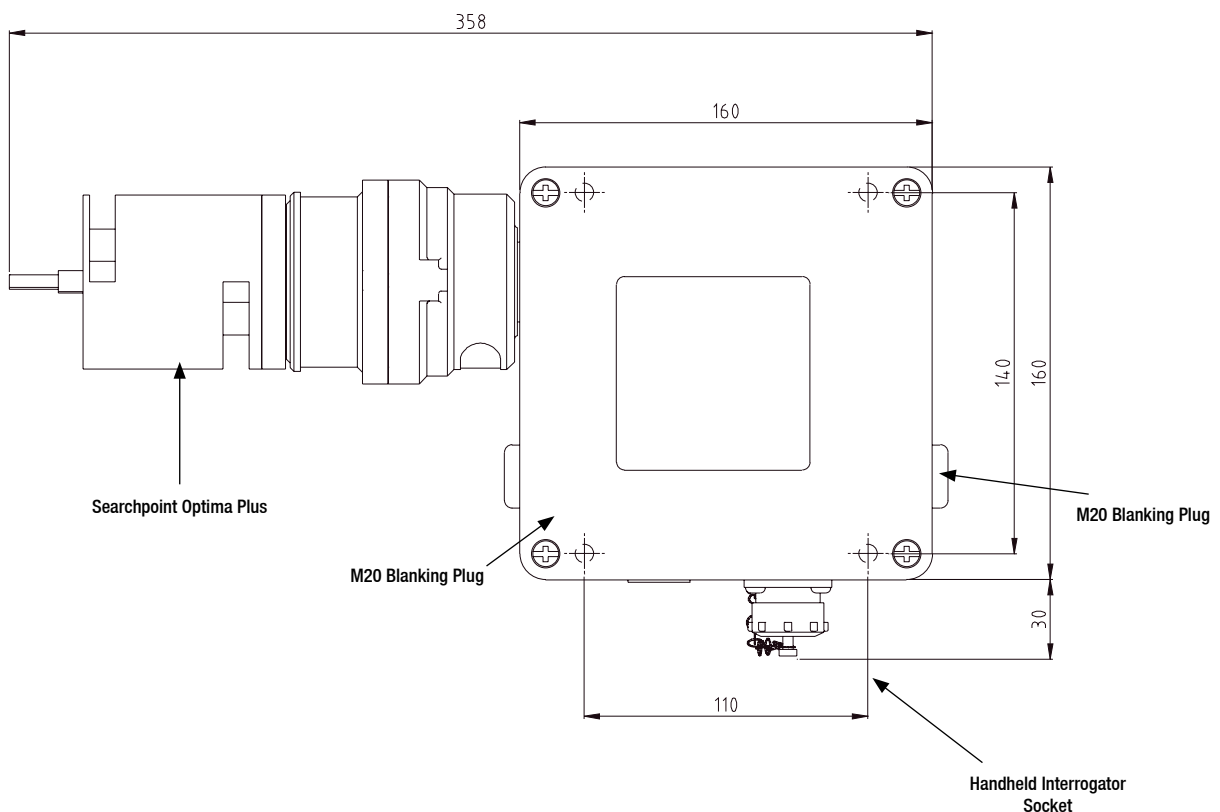
3.1 Using a Standard Junction Box



Note: The mounting plate is supplied separately.

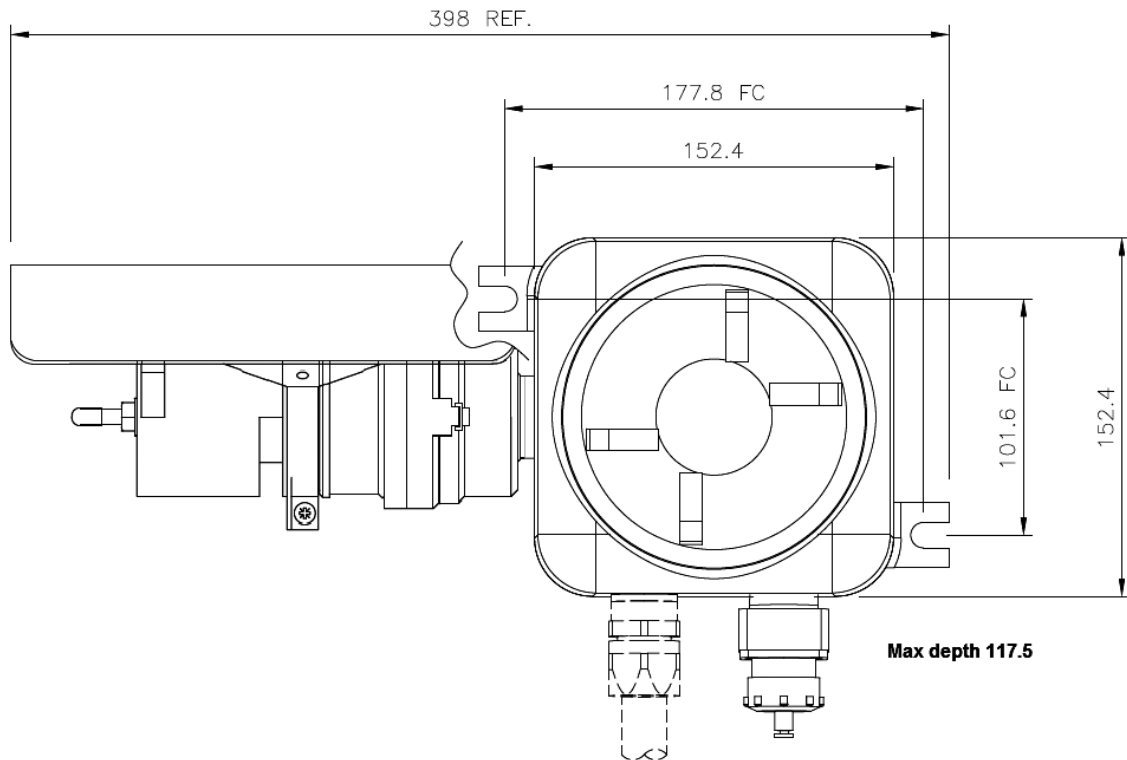
3.2 Using a DVC100 Series Termination Unit

Refer to Quick Start Guide 2104M0408 DVC100 (I) MK2 or 2104M0409 DVC100 (M) MK2, or DX100 Series Technical Handbook 2104M0701 for more detailed information.



3.3 Using a DX100 Series Termination Unit

Refer to Quick Start Guide 2104M0702 (DX100 I) or 2104M0703 (DX100 M), or DX100 Series Technical Handbook 2104M0701 for more detailed information.



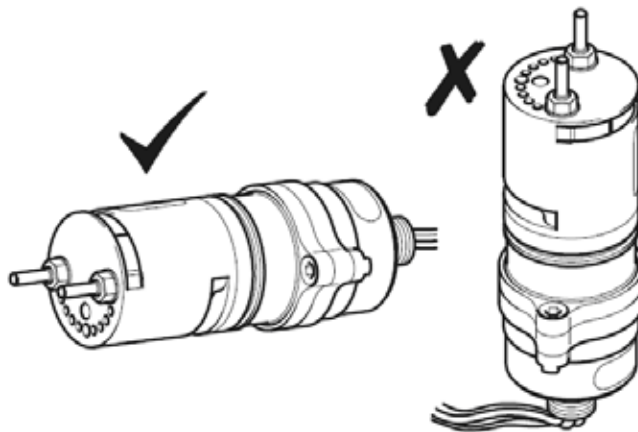
4 Installation

Searchpoint Optima Plus is designed to allow installation to be performed by a single operator. The installation procedure is split into mechanical installation and electrical installation.

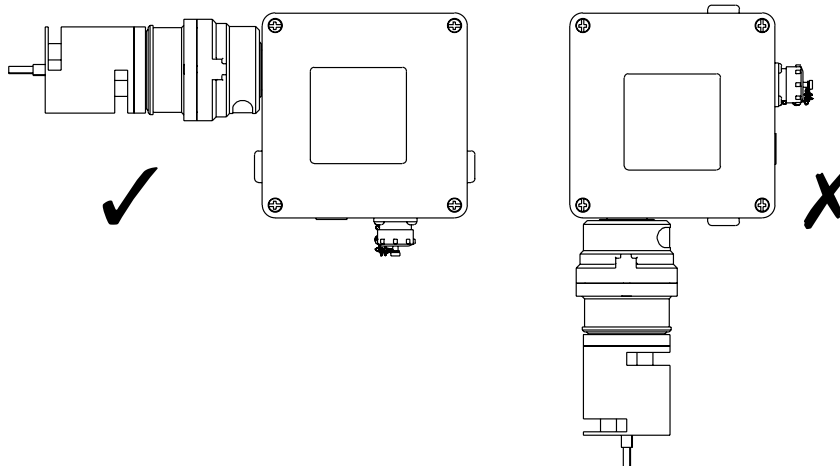
4.1 Mechanical Installation

Note: Installation of Searchpoint Optima Plus does not require the unit to be opened. There are no user serviceable parts inside the unit. Do not attempt to open or dismantle the unit.

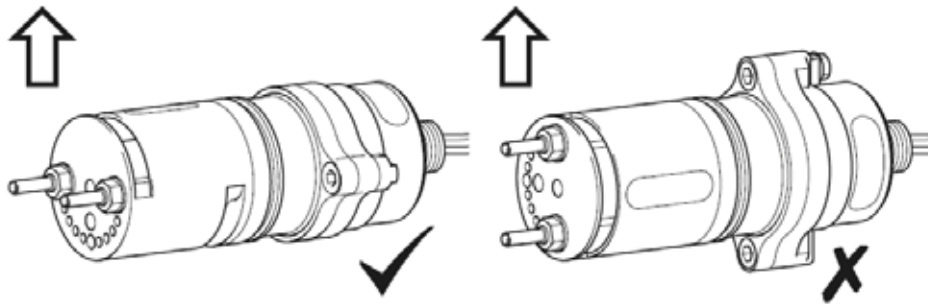
- 1) Ensure that the correct attachments and accessories for the application have been fitted (refer to operating manual (2108M0501 for further details).
- 2) Searchpoint Optima Plus must be mounted horizontally, as this greatly reduces the risk of obscuration due to build up of dirt and moisture on the optical surfaces. Ensure the area immediately surrounding the sensor is free from objects that could hinder the free flow of air around it.



- 3) Secure the junction box onto the mounting surface, using the Junction Box Adaptor Plate if required. Searchpoint Optima Plus must be installed with its long axis horizontal in order for the standard weather protection to operate correctly and to prevent water from settling on the optical surfaces (see below). The Optima unit should therefore only be screwed into a threaded entry that is in a vertical wall of the junction box. The deluge/heat shade (supplied as standard) should also be fitted.



- 4) Feed the unit's wires carefully through the chosen junction box entry and offer up it's threaded boss to the entry. Screw the unit into the junction box until it is secure and the semi-circular pattern of holes on the front of the weather protection are on the bottom (see below). For M25 entries, the boss should go right through the wall; whilst for 3/4 NPT entries, the boss should lock off on the taper. If getting the holes in the right orientation requires more rotation than is readily achievable, remove the weather protection and rotate it through 180 degrees.



- 5) Using a multimeter, check that the voltages on the +24V, and 4-20mA connections with respect to 0V are less than +32V DC.
- 6) Using a multimeter, check and that there is no 110V or 230VAC on the connections.
- 7) Wire up the unit's electrical connections in accordance with Section 4.2, taking note of the general recommendations upon electrical installation. For electrical installation schematics see Section 4.3.
- 8) Ensure that all cable entries are either used or plugged in strict accordance with the relevant certification requirements and local codes of practice.
- 9) Verify the correct installation and operation of the unit using the SHC-1 handheld interrogator. If a DVC100 or DX100 junction box has been used, testing can be performed without the need for a hot work permit. Alternatively, if a basic junction box has been used, electrical connections can be made to the terminals inside the box using the SHC protection device. This will ordinarily require a hot work permit.

4.2 Electrical Installation

Searchpoint Optima Plus complies with the European EMC requirements set out in standards EN50270. In order to maintain compliance with these standards it is essential that the electrical installation of Searchpoint Optima Plus is engineered appropriately.

Electrical installation standards and practices vary for different countries, companies and hazardous area approvals. It is the responsibility of the electrical installation design authority to determine the applicable standards / practices and ensure compliance with them. When designing electrical installations for Searchpoint Optima Plus it is recommended that the design authority considers the following:-

- 1) Ideally, the cases of units should not be connected to electrically noisy (dirty) metalwork or conductors. Preferably, the case (internally connected to the unit's green / yellow GND wire) should be connected to a low noise instrument (clean) earth.
- 2) Preferably, the field cable screen should be connected to the unit's green / yellow GND wire, providing a single, continuous earth screen connected to a low noise instrument (clean) earth. This connection must not be allowed to complete an earth loop or connect instrument earth to safety earth.
- 3) If armoured cable is being used it is necessary to prevent safety (dirty) earth from becoming connected to instrument (clean) earth via the continuity plate in the field junction box. This is most easily achieved by the use of insulating cable glands for the field cable entry.
- 4) For UL / CSA certified installations it is not practical to isolate the unit's case from safety (dirty) earth. The unit and its junction box should be earthed in a manner that complies with the certification requirements.
- 5) Any earth / ground bonding arrangement employed should ensure that the maximum peak voltage between the unit's case earth and any field cable conductor is less than 350V. This includes conditions where transient surge voltages are generated by lightning or the switching of heavy electrical plant. Surge voltages in excess of 350V can cause permanent damage to the unit's RFI filters and such damage is not covered by warranty.
- 6) Earthing / grounding arrangements that employ multiple protective earths or earth grids significantly increase the likelihood of large transient surge voltages being generated between a unit's case earth and the field cable conductors.
- 7) If it is suspected that the earth / ground bonding arrangement employed will not prevent voltages between the unit's case earth and any field cable conductor from exceeding 350V it is strongly recommended that surge suppression devices be installed close to the unit. Suitable, certified surge suppression devices include MTL's TP-48-I-NDI and Pepperl & Fuchs. FN-LB-1. Two of these devices are sufficient to provide protection of the +24V, 0V, 4-20mA and RS485 (A) connections to a unit.
- 8) In general, correctly engineered star earthing arrangements minimise earth current crosstalk and noise, improving the reliability and performance of instrumentation.
- 9) Low noise instrument (clean) earth should only be connected to safety earth (usually dirty) at a single point on a site / installation. This connection should be made in such a manner that it does not introduce noise onto the instrument earth.

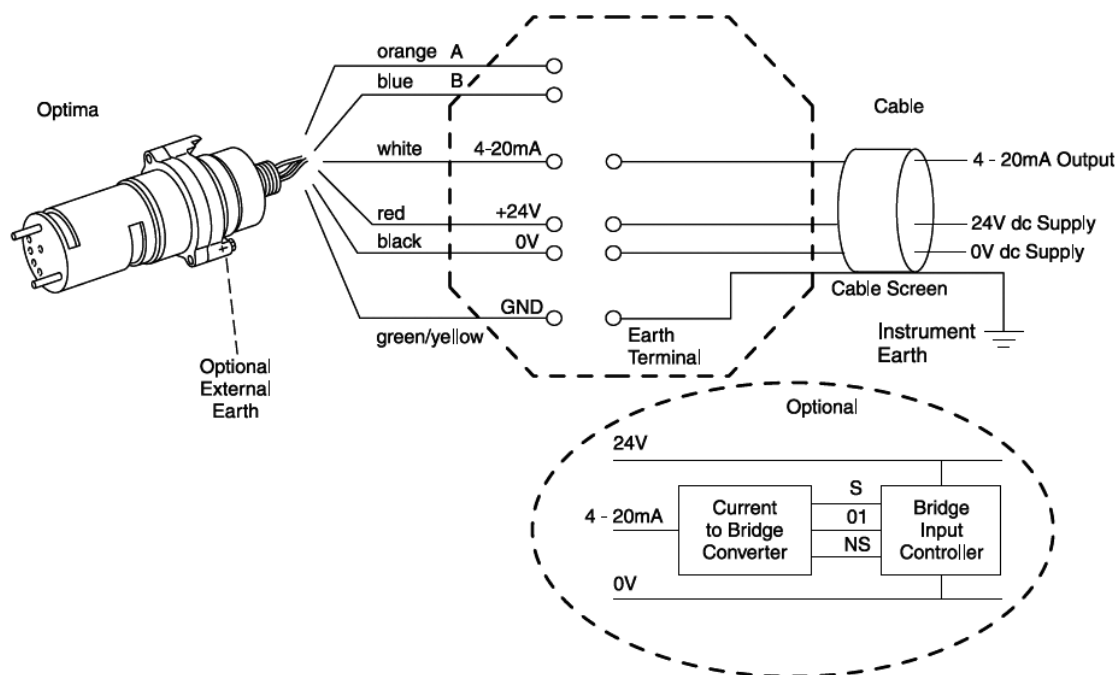
- 10) The entire length of the field cabling connected to a unit should be screened / shielded. This screen / shield should be connected to a low noise instrument (clean) earth at a single end. (The screen / shield can be connected to the unit's earth in the junction box, provided that this is isolated from all other earths / grounds.)
- 11) For installations where the field cable conductors run through conduit or armour connected to safety (dirty) earth, the conduit or armour should not be considered as a sufficient screen / shield. A separate cable screen / shield, connected to a low noise instrument earth should be employed.
- 12) The screens / shields of field cabling should not be connected in a manner that creates earth loops or that will result in the screens / shields carrying large currents from heavy plant or equipment.
- 13) The use of a single, screened / shielded cable for each field device ensures good screening / shielding and reduces crosstalk. Cabling arrangements that use a single cable to connect a number of field devices compromise screening and increase the potential for crosstalk. Such arrangements should only be employed if the electrical installation design authority is confident that this will not adversely affect the reliability or performance of the system.
- 14) Any electrical interference induced onto the conductors of a 4-20mA loop by the installation must be kept below the levels necessary to comply with the general requirements of EN50054 or other applicable gas detector performance requirements / standards. In practice, this means that peak noise currents induced on the current loop should be no greater than $\pm 0.25\text{mA}$. If peak noise currents larger than this are induced on the current loop it is possible that spurious gas readings, alarms and faults will be reported by the control system monitoring the current loop.
- 15) The 0V rail of a control card / control system is often connected directly to one side of the 4-20mA input's current sensing resistor. In such instances, any electrical noise on the 0V rail can be considered to be directly connected to the 4-20mA input. In order to reduce the likelihood of such noise adversely affecting the performance of a gas detection system it is desirable to keep noise on the 0V rail to a minimum. Safety earth / ground frequently carries a high level of electrical noise and it is therefore advisable not to connect the 0V rail to safety earth / ground. If the 0V rail cannot be isolated from earth it is advisable to either connect it to a low noise instrument (clean) earth or through a path that presents a high impedance to noise on the earth.
- 16) For installations in Europe, all electrical equipment connected to the system should comply with EN50081 and EN50082 or EN50270. For non-European installations, electrical equipment connected to the system should comply with applicable national or international EMC standards.
- 17) Searchpoint Optima Plus is designed to operate correctly with supply voltages down to 18V. When supplied with 18V, the maximum current drawn by a single Searchpoint Optima Plus unit will be 250mA. The field cabling conductors should have sufficient cross sectional area to ensure that when a unit is drawing 250mA the voltage reaching it does not fall below 18V. For a control room voltage of 24V, the maximum round loop cable resistance must therefore be 24 Ohms. Round loop cable resistances greater than those necessary to ensure that units always receive at least 18V may result in unreliable operation.

- 18) Ideally, the 24V supply reaching units should be free from large transients, fluctuations or high frequency noise. Transients or fluctuations which take the supply voltage outside of the 18-32V range may result in units switching off and re-booting.
- 19) In order to reduce the likelihood of radio frequency interference affecting the operation of units it is recommended that neither units nor their cabling are installed in close proximity to the antennae of high powered radio, radar or satellite communication equipment.

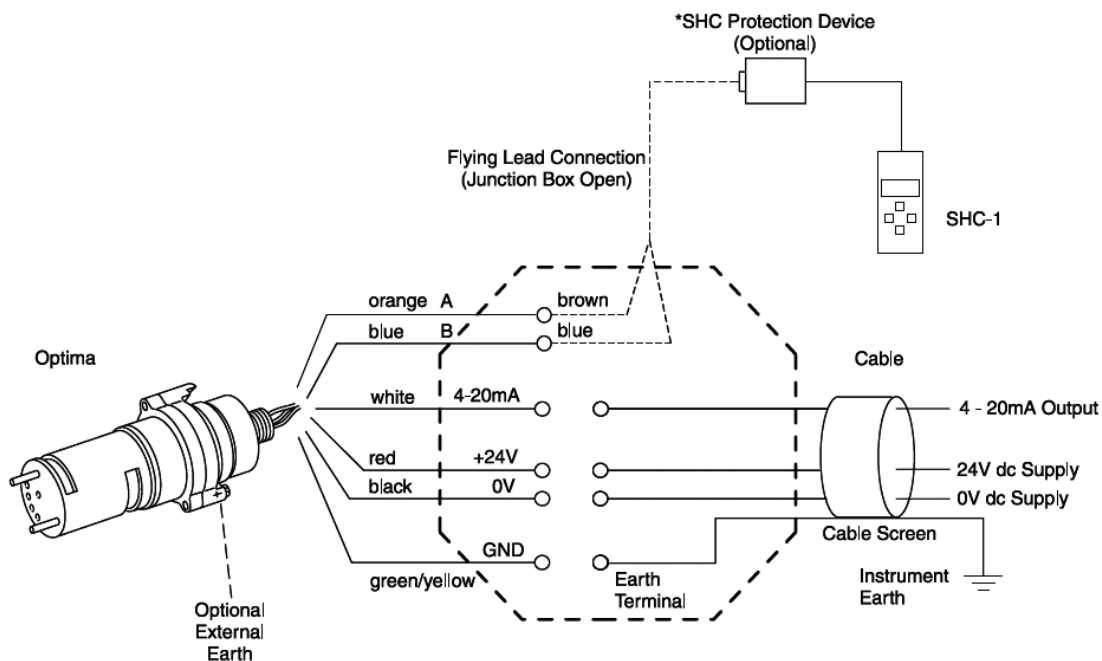
4.3 Electrical Installation Schematics

This section details the basic electrical installation information. Refer to the Searchpoint Optima Plus Operating Instructions (2108M0501) for more detailed information.

4.3.1 Junction Box Connection

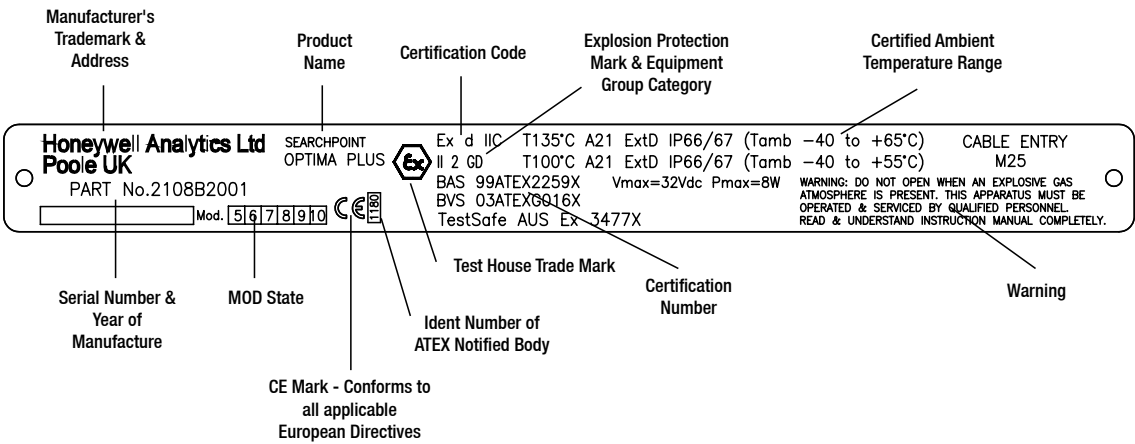


4.3.2 Junction Box and SHC-1 Protection Device Connection



4.3.3 Certification label details

An explanation of the information shown on the equipment certification label is shown below:



5 Outline Specification

Measurement Range:	0-100% LEL
Operational and Certified Temperature Range:	-40°C to +65°C
Power Supply:	18 to 32Vdc (24Vdc nominal)
Power Consumption:	<4.5W max
Current Demand:	<235mA at 18V <190mA at 24V <155mA at 32V
Outputs:	
Analogue:	4-20mA, non-isolated, current source or sink. (Default configuration is current source).
Maximum 4-20mA Loop Resistance	600 Ohms
Output Signals	
Measuring Range (0-100% FSD):	4-20mA
Inhibit:	1 to 3mA (Default 2mA)
Warning:	0 to 6mA (Default 3mA*)
Fault:	0mA
Over-range:	20 to 21.5mA (Default 21mA)
Certification Approvals	
ATEX:	BAS99ATEX2259X II 2GD EEx d IIC T100°C (Tamb -40°C to +55°C) T135°C (Tamb -40°C to +65°C)
UL:	Class I, Div 1, Groups B,C & D. -40°C to +65°C
Performance approvals:	EN61779 BVS 03 ATEX G 016 X. See DETECTABLE GASES (section 11.1) for table of approved gases. Approval only valid for 4-20mA output
EMC Compliance:	EN50270:1999
Environmental Protection:	IP66/67
Vibration:	10 Hz to 30 Hz, 1.0mm total excursion; 31 Hz to 150 Hz, 2 g acceleration peak. EN 61779-1:2000 section 4.4.13.2.2.
Dimensions:	Length: 165mm Diameter: 73mm
Weight:	1.6kg
Material:	316 stainless steel.

**Note for ATEX compliance the warning value should not be set between 3 and 5mA*