SAFETY

Ensure that you read and understand these instructions **BEFORE** operating the equipment. Please pay particular attention to the Safety Warnings.

WARNINGS

1. The Searchline Excel gas detector is certified for and intended for use in potentially hazardous areas. Install and use the Searchline Excel gas detector in accordance with the latest regulations.
2. 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 BS EN 60079-14:2008 & IEC 60079-14:2007. Refer to BS EN 60079-29-2:2007 & IEC 60079-29-2:2007 in the UK or the appropriate local or national regulations.
3. For installations in North America, the national Electrical Code (NFPA 70 - 1990) or later issues should be strictly observed.
4. Elsewhere, the appropriate local or national regulations should be used.
5. The Searchline Excel gas detector must be properly earthed to protect against electrical shock and minimise electrical interference. For electrical installation design considerations refer to Section 3.
6. Operators must be fully aware of the action to be taken if the gas concentration exceeds an alarm level.
7. Dismantling or repair of equipment should be carried out in the safe area only.
8. Test gases may be toxic and/or combustible. Refer to Material Safety Sheets for appropriate warnings.
9. Do not drill holes in any housing as this will invalidate the explosion protection.
10. In order to maintain electrical safety, the unit must not be operated in atmospheres with more than 21% oxygen.
11. Ensure that the bolts which secure flameproof enclosures are fully tightened. The securing bolts used are made from a special certified grade of steel. Only bolts supplied by Honeywell Analytics should be fitted for this purpose.
12. Do not open the enclosure in the presence of an explosive atmosphere.
13. The transmitter unit contains high voltages when operational. These are discharged when the unit is removed from its enclosure.
14. The conduit and cable glands fitted to Searchline Excel should not be modified. If, however, it becomes necessary to make modifications they must comply with the relevant national Codes of Practice.
15. The energy emitted by the Searchline Excel is less than 20mW/mm^2.

SAFETY

CAUTIONS

1. Use only approved parts and accessories with the Searchline Excel gas detector.
2. To maintain safety standards, commissioning and regular maintenance of the Searchline Excel gas detector should only be performed by qualified personnel.

IMPORTANT NOTICES

1. Honeywell 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 manual.
2. The user of this manual should ensure that it is appropriate in all details to the exact equipment to be installed and/or operated. If in doubt, the user should contact Honeywell Analytics Limited for advice.
3. Effect of explosive atmosphere on materials.

   Searchline Excel is made from materials which exhibit good resistance to corrosive and solvative substances. The Exd enclosures are made from 316 stainless steel and the explosion protected windows are made from toughened soda lime glass. Honeywell Analytics are not aware of any significant effects of explosive atmospheres upon these materials. Contact Honeywell Analytics or one of their agents for specific queries.

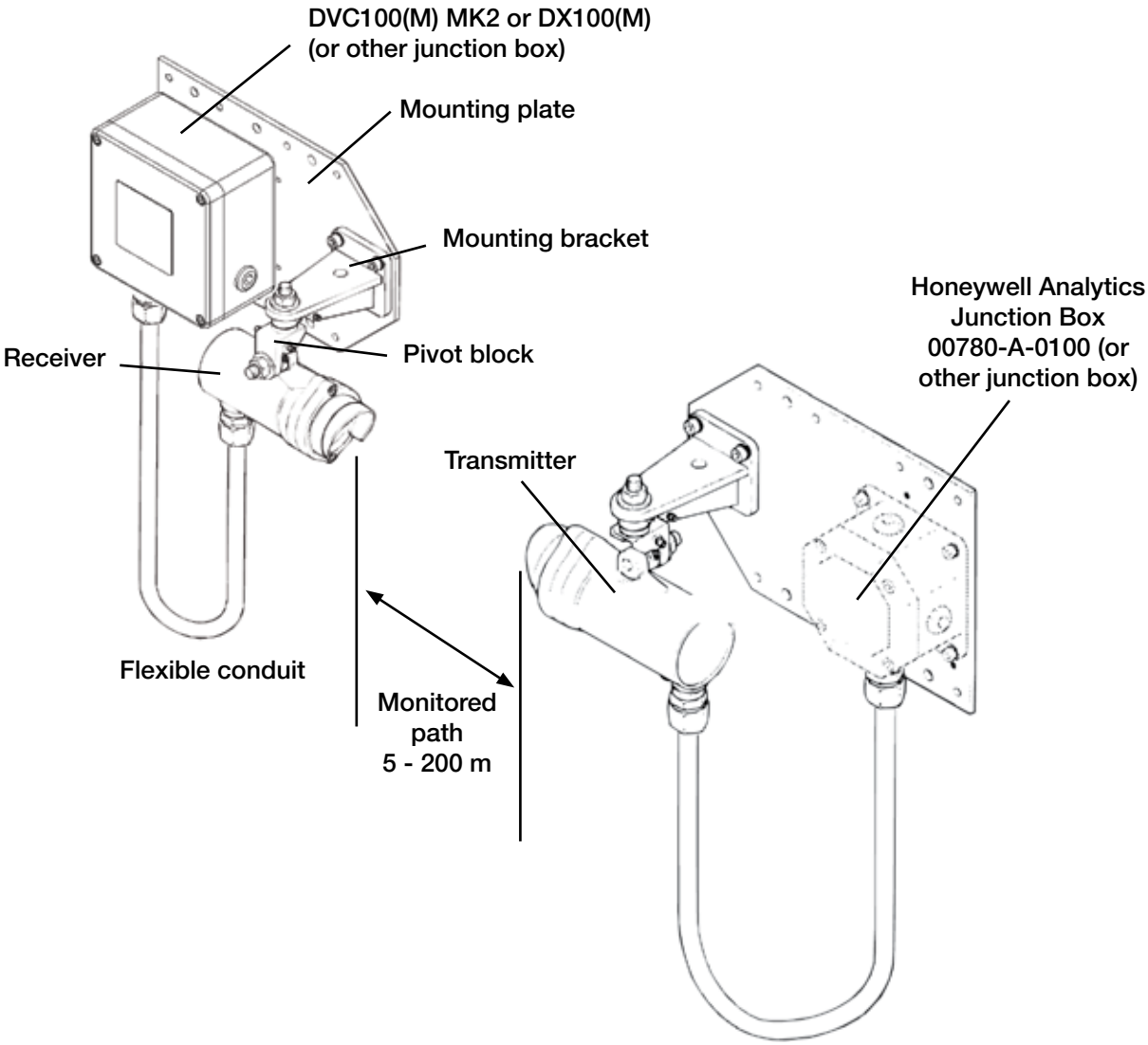
Honeywell Analytics Limited reserve the right to change or revise the information supplied in this document without notice and without obligation to notify any person or organisation of such revision or change.

If further details are required that do not appear in this manual, contact Honeywell Analytics Limited or one of their agents.

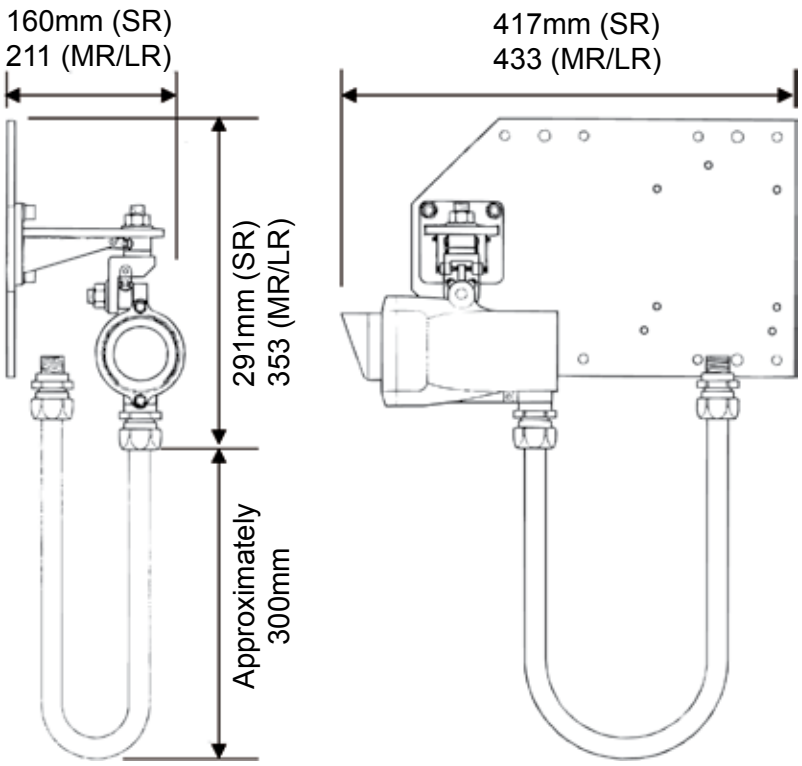
2. OVERVIEW

2.1 INTRODUCTION

Each type of Searchline Excel gas detector consists of two units, a Transmitter and a Receiver. This separate Transmitter/Receiver configuration provides the most reliable basis for open path gas detection.



2. OVERVIEW



The Transmitter window is heated to minimise condensation, frosting and the build up of snow. During particularly cold operating conditions, the heating of the Transmitter window is increased to turbo levels. The turbo mode can be disabled if not required.

Electrical connections to the Transmitter are made via wires which run through the protective, flexible conduit. There are three Transmitter wires, red (+24V), black (0V) and green/yellow (GND).

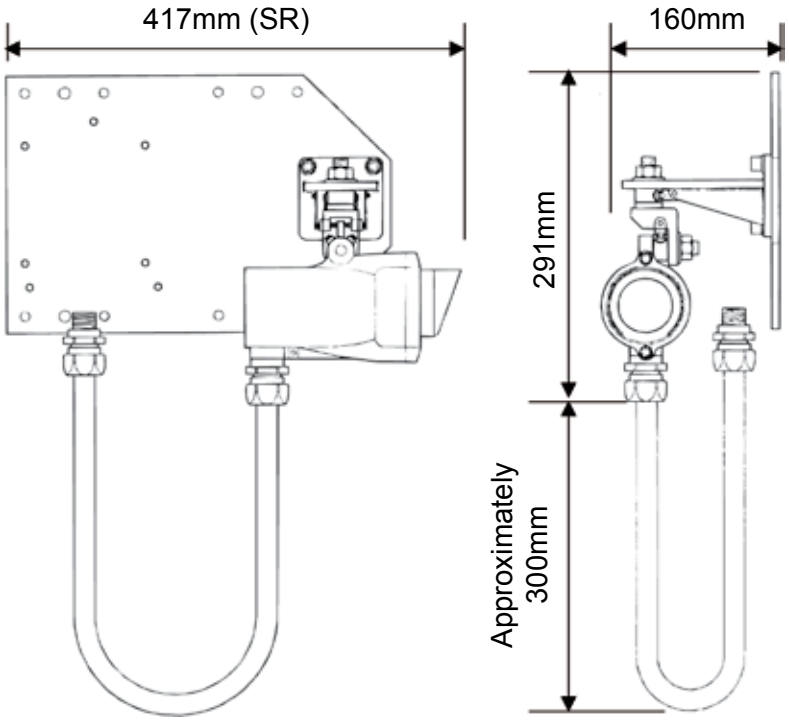
2.3 RECEIVER

The Searchline Excel Receiver collects infrared radiation from the Transmitter and performs measurements to enable hydrocarbon gases in the beam path to be detected.

Infrared radiation is collected by a single, silicon lens, which is common to both the sample and reference measurement channels. This radiation is divided by a beamsplitter and fed to two filtered detectors, sample and reference.

The sample detector input is filtered at wavelengths where strong infrared absorption is exhibited by the target gas. The reference detector input is filtered at nearby wavelengths, where strong infrared absorption is ***not*** exhibited by the target gas. By calculating the ratio of the sample to reference signal it is possible to measure the quantity of gas in the beam, whilst compensating for the effects of rain, fog, dirt etc.

2. OVERVIEW



The solid state, photovoltaic detectors used in Searchline Excel provide an exceptional dynamic range and superb temperature and long term stability. These features contribute strongly to the solar immunity and stability of Searchline Excel.

The Receiver contains all of the electronics necessary to amplify, condition and process the signals received by the infrared detectors. The advanced signal processing of Searchline Excel employs two microprocessors.

One microprocessor, the Digital Signal Processor (DSP), is used to perform the necessary intensive signal processing calculations.

The other microprocessor, the microcontroller, controls the overall function of the unit and performs the final calculations to determine the correct gas reading and output state.

The primary output of the Receiver is a signal in the range 4 - 20mA and is available as either source or sink options. For most applications, the output is calibrated for a range of 0 to 5 LEL. m. (See **Appendix B** for the explanation of LEL.m and other terms)

The Receiver also features an RS485 output which is used to communicate with the associated SHC1 Handheld Interrogator. The SHC1 is used to perform final alignment, commissioning, functional testing and diagnostic procedures.

The Receiver window is heated to minimise condensation, frosting and the buildup of snow. The level of heating applied is controlled by the microcontroller and is adjusted from zero to maximum depending on the window temperature.

Electrical connections to the Receiver are made via wires which run through the protective flexible conduit. There are six Receiver wires, red (+24V), black (0V), white (4 - 20mA), orange (RS485 A), blue (RS485 B) and green / yellow (GND).

3. INSTALLATION AND OPERATION

3.4 POWER SUPPLY

3.4.1 General

The Searchline Excel gas detector is designed to be operated from a nominal 24V DC supply. The supply voltage at the terminals must be within the range 18 to 32V.

The unit maximum power consumption and cable lengths are as follows:

Unit Type	Maximum Power Consumption (W)	Maximum Cable Length (m) with 1.5mm^2 Conductors (12 ohms/km)	Maximum Cable Length (m) with 2.5mm^2 Conductors (7.6 ohms/km)
Receiver (All ranges)	8	550	900
SR Transmitter, (Turbo heating enabled)	5	900	1,400
SR Transmitter, (Turbo heating disabled)	3.5	1,300	2,000
MR/LR Transmitter, (Turbo heating enabled)	13	600	950
MR/LR Transmitter, (Turbo heating disabled)	10	820	1,300

Notes:

1. *Control room supply voltage assumed to be +24V.*
2. *Standard configuration of the Transmitter is with turbo heating enabled.*

Terminal sizes:
DVC100(M) MK2 0.5mm^2 - 4mm^2 (20AWG - 12AWG)
DX100(M) 0.5mm^2 - 4mm^2 (20AWG - 12AWG)
Honeywell Analytics Junction Box 00780-A-0100 0.5mm^2 - 6mm^2 (20AWG - 10AWG)

3.4.2 Power Supply Connections - Turbo heating Disabled

When connected as shown in section **3.3.4 Transmitter Connections** all ranges of Transmitter have turbo heating mode enabled.

This means that during conditions of low ambient temperature, additional heating power is applied to the unit's window to minimise condensation, frosting and snow buildup.

If the application/installation does not require turbo heating, reduced power consumption can be achieved by disabling this mode.

The turbo heating is disabled by reversing the power supply connections to the Transmitter as shown in the following diagram. All other connections remain the same.

3. INSTALLATION AND OPERATION

3.7 ALIGNMENT AND COMMISSIONING

WARNING
Do not attempt to view the Sun through the optical telescope.

3.7.1 General

In order to avoid unnecessary problems, alignment and commissioning of Searchline Excel gas detectors should only be performed by personnel trained by Honeywell Analytics.

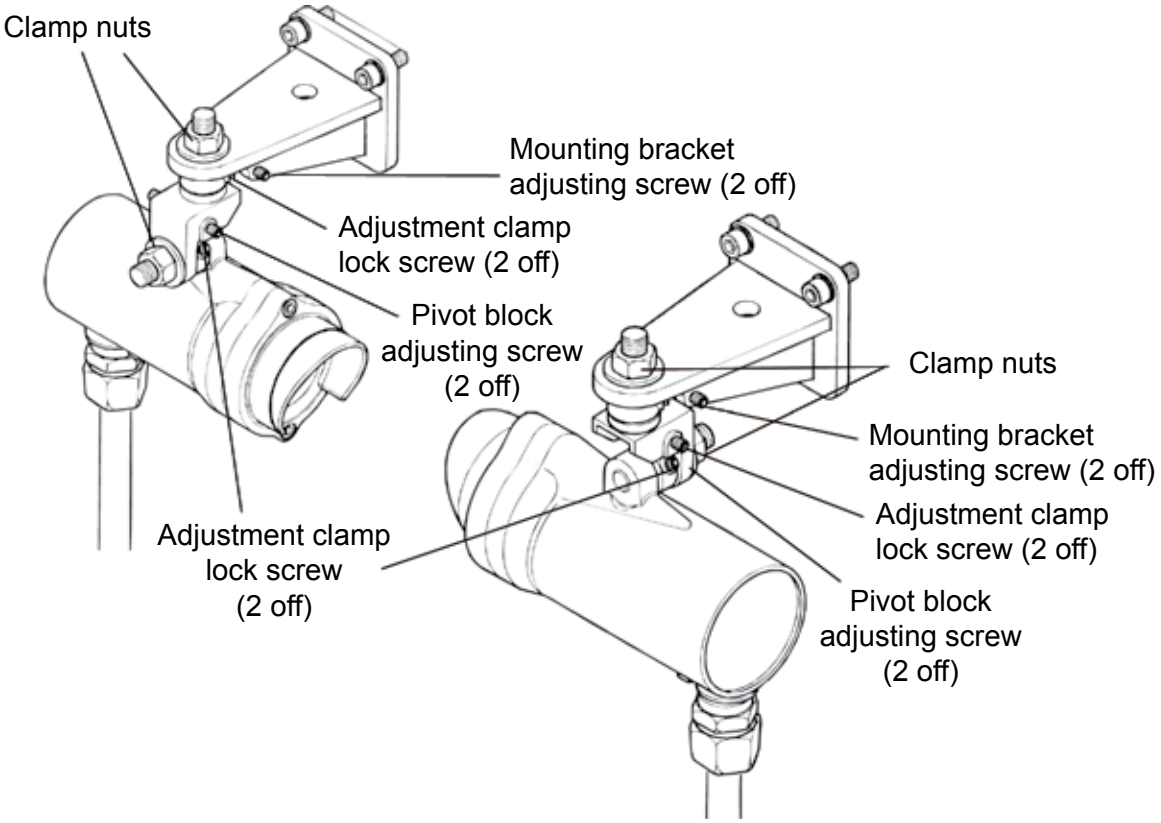
To ensure optimum performance the gas detector Transmitter and Receiver units must be accurately aligned with a clear line of sight between them.

The Transmitter unit is first aligned with the Receiver using a telescope attached to the body of the unit. A telescope is then fitted to the Receiver and the alignment procedure repeated.

The Handheld Interrogator is then attached to the Receiver to finally commission the equipment and, depending on the type of Receiver, may need to be used to assist in fine-tuning the alignment.

The procedure can be performed by a single technician.

Each gas detector unit features a mounting assembly that allow both coarse and fine mechanical adjustment in the horizontal and vertical directions as shown in the subsequent diagram.



Initial coarse mechanical adjustment is first carried out by means of large clamping nuts and with the help of an alignment telescope.

6. SPECIFICATIONS

6.1 SYSTEM

	OPEN-PATH					
Available Gases	Methane*, Ethane*, Propane*, Butane*, Pentane, Ethylene, Propylene, Butadiene * FM Performance Approved					
Range	0 - 5 LELm					
Recommended Alarm Setting	Low 1 LELm High 3 LELm					
Minimum Alarm Setting	0.5LELm					
Path Length	Short Range: 5 - 40m (15 - 130ft)		Medium Range: 40 - 120m (130 - 390ft)		Long Range: 120 - 200m (390 - 650ft)	
Speed of Response	T90 less than 3 seconds					
Output Signal	4 – 20 mA Normal operation (linearised 0 – 5 LELm)	0 mA Fault	2 mA Inhibit	2.5 mA Beam block*	3 mA Low signal	21 mA Overrange

*Searchline Excel will indicate Beam Block after 30 s without signal. After a further 120 s it will indicate Fault. These values are programmable; please refer to Appendix A for details. To comply with FM performance approval, the maximum value for Time to Block is 200 s.

Note: For safety reasons, if Searchline Excel loses signal while measuring a gas reading above its internal Alarm threshold (default 1 LELm) it will not indicate beam block. Instead it will hold the previous gas reading until it is again able to measure the current gas concentration. Operator intervention may be required to remove a blockage from the beam.

Operating and Storage Temperature	40°C to +65°C (-40°F to +150°F)	
Humidity	0 – 99%RH Non-condensing	
Pressure	91.5kPa – 105.5kPa (915 – 1055mBar, non-compensated)	
Repeatability	±0.4LELm	
Temperature Drift (-40°C to+65°C)	±0.2LEL.m @ zero ±0.5LEL.m @3LEL.m	
Warm-up Time	Less than 5 minutes (operational), Less than 1 hour (fully stabilised)	
Power Supply	18 to 32Vdc	
Power Consumption	*** Turbo heating activated (below 0°C)**	
Transmitter **Receiver**	Short Range: 3.5/5* W max 8W maximum	Medium / Long Range: 10/13* W max.
Inrush Current		
Transmitter	Short Range: < 0.3 A	Medium/Long Range: < 0.9 A
Receiver	< 0.6 A	
Enclosure Material	316 Stainless Steel	
Weight		
Transmitter	Short Range: 3.5kg	Medium / Long Range: 7.0kg
Receiver	3.5kg	
Vibration	2 – 60Hz, maximum peak to peak amplitude 1mm FM 10 - 30 Hz, 1 mm; 31 - 150 Hz, 2g.	
Divergence/ Misalignment Tolerance	Short Range: ±0.5° (~±35cm at 40m)	Medium Range: ±0.5° (~±105cm at 120m)	Long Range: ±0.5° (~±175cm at 200m)
IP rating	IP66/67	
EMC / EMI	EN 50270 / Immune to FM Modulated Portable Radio Transmitters (5 W at 1 m, 150-179 MHz and 450-470 MHz)	

APPENDIX C - ACCESSORIES & SPARE PARTS

2104B2091	Long Range Transmitter Incl Conduit ATEX
2104B2111	Receiver Std Version Short Range ATEX
2104B2112	Short Range Receiver Sink ATEX
2104B2131	Medium Range Receiver Source ATEX
2104B2132	Medium Range Receiver Sink ATEX
2104B2151	Receiver Standard Version Long Range ATEX
2104B2152	Long Range Receiver Sink ATEX
2104B3001	Short Range Transmitter Incl Approved Adaptor UL
2104B3011	Medium Range Transmitter UL
2104B3021	Long Range Transmitter UL
2104B3101	Receiver Standard Version Short Range UL
2104B3102	Short Range Receiver Sink UL
2104B3111	Medium Range Receiver Source UL
2104B3112	Medium Range Receiver Sink UL
2104B3121	Long Range Receiver Source UL
2104B3122	Long Range Receiver Sink UL
2104B3201	Short Range Transmitter CSA/FM
2104B3211	Medium Range Transmitter CSA/FM
2104B3221	Long Range Transmitter CSA/FM
2104B3301	Short Range Receiver Source CSA/FM
2104B3302	Short Range Receiver Sink CSA/FM
2104B3311	Medium Range Receiver Source CSA/FM
2104B3312	Medium Range Receiver Sink CSA/FM
2104B3321	Long Range Receiver Source CSA/FM
2104B3322	Long Range Receiver Sink CSA/FM
Manuals (Hard Copy)	
Note: Electronic copies of the manuals are supplied on CD with each instrument	
2104M0506	Searchline Excel and Cross Duct Technical Handbook (English)
2104M0510	Searchline Excel Installation Guide (English)
2104M0409	DVC100(M) MK2 Termination Unit Quick Start Guide Guide (English)
2104M0701	DX100 Series Termination Units Technical Handbook (English)
2104M0523	Searchline Excel Test Filter Leaflet (English)