Series 3000 MkII and MkIII

2-wire loop powered toxic and Oxygen gas detector for use in potentially explosive atmospheres - explosion proof and intrinsically safe versions
The Series 3000 range of transmitters provide comprehensive monitoring of toxic and Oxygen gas hazards in potentially explosive atmospheres. Suitable for mounting both indoors and out, they are available in two versions and offer excellent versatility. The MkII is contained in a flameproof housing, has an intrinsically safe sensor connection and is for use in predominantly Zone 1 applications. However with the use of the optional remote mounting kit the sensor of the MkII can be mounted in a Zone 0 environment. The MkIII is for use with a separate suitable IS barrier allowing the complete transmitter to be used in Zone 0 applications.

These low powered gas detectors all feature a loop powered 4-20 mA connection, making them ideal for both new and retrofit installations. Users can configure the detector through the use of the easy to read LCD and intuitive interface while fault diagnostic software and a programmable calibration period greatly simplify maintenance procedures.
Installation

Mechanical Installation Options

Series 3000 MkII and MkIII are designed for use in potentially explosive atmospheres. As such, installation should follow national guidelines using suitable mechanically protected cable and glands (M20 or ¾” NPT) or conduit (¾” NPT). Use 0.5mm² (20AWG) to 2.0mm² (~14AWG) cross sectional area cable as needed to ensure minimum operating voltage at the detector, depending on installed cable length. Various accessories are available for different applications.

Wiring Schematics Series 3000 MkII

Detector supply \( V_d \)
- 17Vdc (min) to 32Vdc (max)

Maximum detector signal \( I_m \)
- 22mA (over range)

Cable resistance \( R_c \)
- Subject to cable type

Load resistor of control panel \( R_L \)
- Assumed 33Ω (min) or 250Ω (max)
  - Subject to controller manufacturer

Controller supply voltage \( V_c \)
- Subject to controller manufacturer
  - Assumed nominal of 24Vdc

Typical Maximum Installed Cable Lengths Series 3000 MkII

The maximum cable length between a controller and detector is dependent upon:

- The minimum guaranteed supply voltage to the detector at the controller \( V_d \).
- The minimum operating voltage of the detector \( V_d \).
- The maximum current draw of the detector \( I_m \).
- The input impedance of the controller \( R_L \).
- The resistance of the cable \( R_c \).

Using the example values, the table opposite shows typical cable lengths.

For a specific application, the cable manufacturer’s resistance data for a specific cable type must be used.

A cable length calculation formula can be found in the product technical manual.

<table>
<thead>
<tr>
<th>Cable Size</th>
<th>Cable Resistance ( R_c ) (Ω/km)</th>
<th>Cable distance km (m) where the input impedance ( R_L = 33Ω )</th>
<th>Cable distance km (m) where the input impedance ( R_L = 250Ω )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5mm² (20AWG*)</td>
<td>36.8 (99.2)</td>
<td>3.9 (2.4)</td>
<td>0.9 (0.6)</td>
</tr>
<tr>
<td>1.0mm² (17AWG*)</td>
<td>19.5 (51.4)</td>
<td>7.3 (4.5)</td>
<td>1.7 (1.1)</td>
</tr>
<tr>
<td>1.5mm² (16AWG*)</td>
<td>12.7 (32.4)</td>
<td>11.2 (7.0)</td>
<td>2.7 (1.7)</td>
</tr>
<tr>
<td>2.0mm² (14AWG*)</td>
<td>10.1 (26.3)</td>
<td>14.1 (8.8)</td>
<td>3.4 (2.1)</td>
</tr>
</tbody>
</table>

*Nearest equivalent
Wiring Schematics Series 3000 MkIII

**Single Barrier Schematic**

**Dual Barrier Schematic**

### Series 3000 MkIII Cable Length

The limiting factors in calculating maximum cable lengths when using barriers and isolators are the total capacitance and inductance. Barriers and isolators have a fixed amount of capacitance and inductance that can be connected to their outputs. The cable between the field device and barrier/isolator will have a value for capacitance and inductance per metre or kilometre that will be available from the manufacturer or supplier.

To calculate the maximum cable lengths, calculate the total capacitance and inductance for the length of cable, add any capacitance or inductance due to the field device (in the case of Series 3000 MkIII capacitance and inductance = 0). The resulting totals should not be greater than the value shown for the barrier or isolator.

### Suggested barriers and isolators Series 3000 MkIII

Listed below are some suggested barriers and isolators for use with Series 3000 MkIII.

- MTL7728+ (single channel zener barrier)
- MTL7787+ (2-channel zener barrier)
- MTL5042 (Galvanic Isolator)
- Pepperl+Fuchs KFD2-STC4-EX1 (Galvanic Isolator)

**Note:** It is up to the user to ensure that the barrier or isolator used is suitable for their application.

### Electrical Connections

- **Terminal Number**  | **Detector Terminal** | **Controller Connection**
- 1  | +  | +VE
- 2  | -  | Signal
Series 3000 MkII and MkIII Detector

**Use**
Rugged and reliable gas detector for the protection of personnel from toxic and Oxygen gas hazards. MkII version suitable for use in Zone 1, 2, 21 or 22 hazardous areas and North American Class I and II Division 1 or 2 areas. MkIII version suitable for use in Zone 0, 1, 20, 21 or 22 applications.

**Detectable Gases**

<table>
<thead>
<tr>
<th>Gas</th>
<th>Formula</th>
<th>Selectable Full Scale Range</th>
<th>Default Range</th>
<th>Operating Temperature**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min</td>
<td>Max</td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td>O₂</td>
<td>25.0% Vol only</td>
<td>25.0% Vol</td>
<td>-30°C / -22°F</td>
</tr>
<tr>
<td>Hydrogen Sulphide</td>
<td>H₂S</td>
<td>10.0 to 50.0 ppm</td>
<td>15.0 ppm</td>
<td>-40°C / -40°F</td>
</tr>
<tr>
<td>Hydrogen Sulphide</td>
<td>H₂S</td>
<td>50 to 500 ppm</td>
<td>100 ppm</td>
<td>-40°C / -40°F</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>100 to 500 ppm</td>
<td>300 ppm</td>
<td>-40°C / -40°F</td>
</tr>
<tr>
<td>Sulphur Dioxide</td>
<td>SO₂</td>
<td>5.0 to 20.0 ppm</td>
<td>15.0 ppm</td>
<td>-40°C / -40°F</td>
</tr>
<tr>
<td>Ammonia*</td>
<td>NH₃</td>
<td>50 to 200 ppm</td>
<td>200 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Ammonia*</td>
<td>NH₃</td>
<td>200 to 1,000 ppm</td>
<td>1,000 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Chlorine</td>
<td>O₂</td>
<td>5.0 to 20 ppm</td>
<td>5.0 ppm</td>
<td>-10°C / 14°F</td>
</tr>
<tr>
<td>Chlorine Dioxide</td>
<td>Cl₂O₇</td>
<td>1.000 ppm only</td>
<td>1.000 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Nitric Oxide</td>
<td>NO</td>
<td>100 ppm only</td>
<td>100 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Nitrogen Dioxide</td>
<td>NO₂</td>
<td>5.0 to 50.0 ppm</td>
<td>10 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>H₂</td>
<td>1,000 ppm only</td>
<td>1,000 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>H₂</td>
<td>9,999 ppm only</td>
<td>9,999 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Hydrogen Chloride</td>
<td>HCl</td>
<td>10.0 to 20.0 ppm</td>
<td>10 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Hydrogen Cyanide</td>
<td>HCN</td>
<td>30.0 ppm only</td>
<td>30.0 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Hydrogen Fluoride</td>
<td>HF</td>
<td>12.0 ppm only</td>
<td>12.0 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Phosphine</td>
<td>PH₃</td>
<td>1.2 ppm only</td>
<td>1.2 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Fluorine</td>
<td>F₂</td>
<td>4.0 ppm only</td>
<td>4.0 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Ozone</td>
<td>O₃</td>
<td>0.400 ppm only</td>
<td>0.400 ppm</td>
<td>-20°C / -4°F</td>
</tr>
<tr>
<td>Ethylene Oxide</td>
<td>ETO</td>
<td>20.0 to 50.0 ppm</td>
<td>25.0 ppm</td>
<td>-20°C / -4°F</td>
</tr>
</tbody>
</table>

**Electrical**

**Connections and Power**

<table>
<thead>
<tr>
<th>MkII</th>
<th>MkIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire loop powered</td>
<td>2-wire loop powered</td>
</tr>
<tr>
<td>17Vdc (+10%) to 32Vdc (max)</td>
<td>10Vdc (+10%) to 30Vdc (max)</td>
</tr>
<tr>
<td>22mA max. over range</td>
<td>22mA max. over-range</td>
</tr>
</tbody>
</table>

**Recommended Cable**
2-wire with screen (90% coverage) or conduit
0.5mm² (20AWG) to 2.0mm² (14AWG)

**Signal**
0-100% FS 4-20mA
Fault = 3mA
Calibration due selectable off or 3mA
Max. over range 22mA
Inhibit (Oxygen sensor) = Selectable 3mA or 4mA
Inhibit (Oxygen sensor) = Selectable 3mA or 17.4mA

**Construction**

**Material**
Transmitter: Epoxy painted aluminium alloy LM25 or 316 Stainless Steel, Sensor: 316 Stainless Steel with PTFE filter

**Maximum Dimensions**
164mm x 201mm x 99mm (6.4" x 7.9" x 3.9")

**Weight**
Aluminium alloy LM25: 1.7kg (3.75lbs.) Stainless Steel 316: 3.7kg (8.16lbs.)

**Environmental**

**IP Rating**
IP66 (EN 60529), NEMA 4X

**Certified Temperature**
ATEX/IECEx: -20°C to +55°C (-4°F to +131°F) (MkII -40°C to +55°C [-40°F to +131°F])
UL/c-UL: -40°C to +55°C (-40°F to +131°F)

**Operating Humidity**
Continuous 20-90% RH (non-condensing) Intermittent 0-98% RH (non-condensing)

**Operating Pressure**
90-1100Pa

**Storage Conditions**
15°C to 30°C (59°F to 86°F), 30-70% RH (non-condensing)

*Suitable for applications without NH₃ ambient background concentrations only.
**When operating in Hazardous Area applications the detector must not be operated outside the certified temperature range. See Certification details for UL, c-UL and ATEX/IECEx certified temperature ranges.

1 +55°C / 131°F intermittent.
Technical Summary and Ordering Information

Certification

MkII

Transmitter:
UL/c-UL: Class I, Div. 1 & 2, Groups B, C & D; Class II, Div. 1 Groups E, F & G, Class II, Div. 2, Groups F & G, Class I Zone 1, Group IIB + H2 Hazardous Locations
ATEX: II 2 (1) GD Ex d [ia IIC Ga] IB + H2 T4 Gb Ex t [ia IIC Da] IIB T135°C Db
IECEx: Ex d [ia IIC Ga] IB + H2 T4 Gb Ex t [ia IIC Da] IIB T135°C Db

Remote Sensor Accessory:
UL/c-UL: Class I, Division 1, Groups A, B, C and D; Class II, Divisions 1 and 2, Groups E, F and G
Class 1, Zone 0, Group IIC; Class II, Zone 20
ATEX: II 1G D Ex ia IIC T4 Ga Ex ia IIC T135°C Da
IECEx: Ex ia IIC T4 Ga Ex ia IIC T135°C Da

MkIII

Transmitter:
UL/c-UL: Class I, Divisions 1 & 2, Groups A, B, C & D; Class II, Divisions 1 & 2, Groups E, F & G
ATEX: II 1 (1) GD Ex ia IIC T4 Ga Ex ia IIC T135°C Da
IECEx: Ex ia IIC T4 Ga Ex ia IIC T135°C Da

Remote Sensor Accessory:
UL/c-UL: Class I, Div. 1, Groups A, B, C & D; Class II, Divisions 1 & 2, Groups E, F & G, Class I Zone 0, Group IC, Class II, Zone 20
ATEX: II 1G D Ex ia IIC T4 Ga Ex ia IIC T135°C Da
IECEx: Ex ia IIC T4 Ga Ex ia IIC T135°C Da

Approvals

Ordering Information

A complete assembly consists of two parts, a transmitter and sensor which must be ordered separately.

- Transmitter PN#: Two certified versions are available:
  - ATEX/IECEx approved version (Aluminium version part number S3KAL2, S3KAL3 Stainless Steel version part number S3KAS2, S3KAS3)
  - UL/CSA approved version (Aluminium version part number S3KUL2, S3KUL3, Stainless Steel version part number S3KUS2, S3KUS3)
  - Inmetro approved version (Aluminium version part number S3KNL2, S3KNL3, Stainless Steel version part number S3KNS2, S3KNS3)
- Sensor PN#: All certified ATEX, IECEx, UL, CSA (c-UL) with two digits to specify gas type and range:
  - e.g. S3KXXC1SS (C1 denotes Carbon Monoxide, with a default range of 0-300ppm and user configurable for ranges from 0-100ppm to 0-500ppm (in 100ppm steps))

Transmitter

Series 3000 Transmitter

S3KAL3

L - LM25 Aluminium
S - 316 Stainless Steel

2 - MkII version
3 - MkIII version

A - ATEX/IECEx approved
U - UL/c-UL approved
N - Inmetro approved

Sensor Part Numbers and Available Gases

S3KX501SS Oxygen (O2) 0-25% Vol
S3KX51SS Carbon Monoxide (CO) 0-300ppm (default) 0-100 to 0-500ppm selectable
S3KX52SS Carbon Monoxide (CO) 0-300ppm (default) 0-100 to 0-999ppm selectable
S3KX5H1SS Hydrogen Sulphide (H2S) 0-15ppm (default) 0-10 to 0-20ppm selectable
S3KX5H2SS Hydrogen Sulphide (H2S) 0-100ppm (default) 0-50 to 0-500ppm selectable
S3KXSL1SS Chlorine (Cl2) 0-5ppm (default) 0-5 to 0-20ppm selectable
S3KXS1SS Sulphur Dioxide (SO2) 0-15ppm (default) 0-5 to 0-20ppm selectable
S3KXS1SS Chlorine Dioxide (ClO2) 0-1ppm only
### Ordering Information Continued

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Gas</th>
<th>Concentration Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3KXSM1SS</td>
<td>Nitrogen Monoxide (NO)</td>
<td>0-100ppm only</td>
</tr>
<tr>
<td>S3KXSN1SS</td>
<td>Nitrogen Dioxide (NO₂)</td>
<td>0-10 ppm (default) 0-5 to 0-50 ppm selectable</td>
</tr>
<tr>
<td>S3KXSG1SS</td>
<td>Hydrogen (H₂)</td>
<td>0-1000ppm only</td>
</tr>
<tr>
<td>S3KXSG2SS</td>
<td>Hydrogen (H₂)</td>
<td>0-10,000 only</td>
</tr>
<tr>
<td>S3KXSRISS</td>
<td>Hydrogen Chloride (HCl)</td>
<td>0-10 ppm (default) 0-10 to 0-20ppm selectable</td>
</tr>
<tr>
<td>S3KXSA1SS</td>
<td>Ammonia (NH₃)</td>
<td>0-200ppm (default) 0-50 to 0-200ppm selectable</td>
</tr>
<tr>
<td>S3KXSA2SS</td>
<td>Ammonia (NH₃)</td>
<td>0-1000ppm (default) 0-200 to 0-1,000ppm selectable</td>
</tr>
<tr>
<td>S3KXSY1SS</td>
<td>Hydrogen Cyanide (HCN)</td>
<td>0-30 ppm only</td>
</tr>
<tr>
<td>S3KXSF1SS</td>
<td>Hydrogen Fluoride (HF)</td>
<td>0-12 ppm only</td>
</tr>
<tr>
<td>S3KXSP1SS</td>
<td>Phosphine (PH₃)</td>
<td>0-1.2 ppm only</td>
</tr>
<tr>
<td>S3KXSU1SS</td>
<td>Fluorine (F₂)</td>
<td>0-4.00ppm only</td>
</tr>
<tr>
<td>S3KXSZ1SS</td>
<td>Ozone (O₃)</td>
<td>0-0.400ppm only</td>
</tr>
<tr>
<td>S3KXSE1SS</td>
<td>Ethylene Oxide (ETO)</td>
<td>0-25.0ppm (default) 0-20.0 to 0-50.0ppm selectable</td>
</tr>
</tbody>
</table>

### Shipping Details

- **Shipping carton dimensions**: 315mm (12.4") (L) x 230mm (9.0") (W) x 115mm (4.5") (D)
- **Approximate weight**: Aluminium alloy LM25 : 1.7kg (3.75lbs.)  Stainless Steel 316 : 3.7kg (8.16lbs.)

### Optional Accessories

- **SPXCDMTBR**: Pipe Mounting Bracket
- **SPXCDSDP**: Sunshade/Deluge Protection
- **S3KCAL**: Calibration gas flow housing
- **S3KCC**: Collecting cone (for use when detecting Hydrogen gas only)
- **S3KDMK**: Duct mounting kit (for use when detecting O₂, CO, H₂S or H₂ gas)
- **S3KRMK**: ATEX/UL/c-UL approved remote sensor mounting kit (includes enclosure with sensor socket, 15m (50 feet) of digital cable and glands, transmitter cable plug, mounting screws)

### Calibration Gases

Contact Honeywell Analytics representative.
Honeywell Analytics is able to provide gas detection solutions to meet the requirements of all applications and industries. Contact us in the following ways:

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Honeywell Analytics
Experts in Gas Detection

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