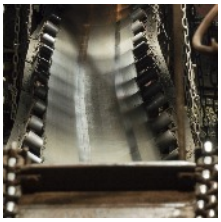
TROLEX

TX6363
INFRARED GAS SENSOR/TRANSMITTER

ATEX
M1
GROUP I & II
INTRINSICALLY
SAFE



PETROCHEMICAL
PROCESSING

MINING &
TUNNELLING

contents...

ISSUE T 11/14

1 PRINCIPAL OPERATING FEATURES

Fixed gas sensors for the detection of methane and carbon dioxide.

Poison resistant INFRARED sensors.

Pre-calibrated plug-in gas sensing module with a standardised output signal for convenient replacement and servicing.

Methane or carbon dioxide gas sensing modules options.

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LCD readout of gas concentration.

Output signal versions:- 4 to 20 mA, 0.4 to 2 V o r 5 to 15 Hz.

Reinforced Polymer - proof against electrostatic charge.

Intrinsically safe for use in Group I and Group II hazardous areas.

Special versions with weatherproof plug and socket connections in place of cable glands.

2 APPLICATION

Fixed gas monitoring for point-source hazards and perimeter protection in arduous duty and exposed locations.
Safety protection for methane and carbon dioxide gas risk occurring in hazardous areas and general industrial applications.

- Brewing industry.
- Petrochemical processing.
- Mining and tunnelling.
- Offshore platforms.
- Manufacturing and process plants.
- Storage areas and warehousing.
- Water management and sewage treatment.
- Power generation.
- Gas storage and distribution.
- Marine and shipping applications.
- Marine and cargo handling.
- Telecommunications.

A choice of output signals for direct interfacing with most standard industrial monitoring systems.

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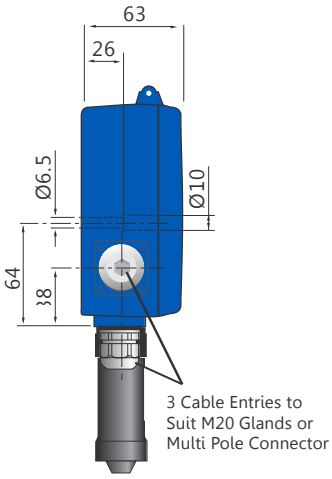
A range of primary instrumentation and monitoring modules is available from Trolex to which the sensors can be directly connected to provide a flexible choice of display and control functions.

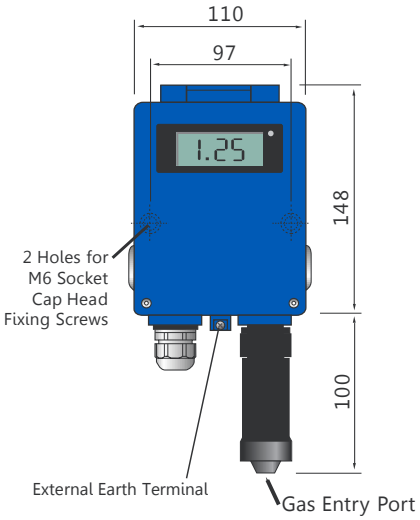
TRIP AMPLIFIER
for use with
analogue output sensors.

CONFIGURABLE SENSOR CONTROLLER
for monitoring up to
8 analogue output sensors.

COMMANDER DISTRIBUTED I/O SYSTEM
for large scale general plant monitoring systems
and the mining and tunnelling industries.

3 DIMENSIONS





ALL DIMENSIONS IN MM

4 TECHNICAL DETAILS

4.1 Specification

Ambient Temperature Limits:	–10 to +44°C.	
Storage Temperature Limits:	–20 to +60°C.	
Ambient Pressure Limits:	1 bar ± 100 mbar absolute.	
Humidity:	95% RH non-condensing.	
Protection Classification:	Dust and waterproof to IP66. Gas inlet port to IP52.	
Housing Material:	Reinforced Polymer - proof against electrostatic charge.	
Nett Weight:	450 g.	
Cable Entries:	M20 x 1.5.	
Electrical Connections:	4 mm Barrier/clamp terminals.	
Information Display:	$3^1/_2$ Digit LCD.	
Vibration Limits:	10 to 100 Hz, 0.25 mm pk.	
(BS2011)	100 to 600 Hz, 2 g pk.	
Impact Limits:	20 joules (Housing).	
Measuring Range:	Methane:	0 to 4.4% v/v (0 to 100% LEL).
	Methane:	0 to 100% v/v.
	Carbon Dioxide:	0 to 5% v/v.
Linearity:	±2.5% FSD.	0 to 5% v/v.
Maximum Drift:	Methane:	±0.05%
	Carbon Dioxide:	±100 ppm/month
Repeatability:	Methane:	
	Carbon Dioxide:	±0.05%.
Response Time(T90):	20 secs.	
Sensing Element Life:	>2 years.	
Warm Up Time:	<20 secs.	

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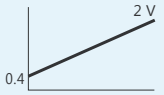
4 TECHNICAL DETAILS continued

4.2 Electrical Details

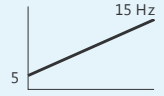
TX6363.01 GROUP I APPLICATIONS (12 V dc)

Output:	0.4 to 2 V
Min Load	1 K ohms
Supply	9 to 16.5 V dc
Max Supply Current	100 mA*

Output:	4 to 20 mA
Max Load	160 ohms @ 12 V, ((50 x (V supply – 9.5)) + 40) ohms at other voltages
Supply	9 to 16.5 V dc
Max Supply Current	120 mA*



Output:	5 to 15 Hz
Max Load	Opto isolated. 2 mA max @ 15.4 V max
Supply	9 to 16.5 V dc
Max Supply Current	100 mA*



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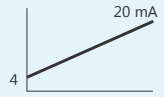
TX6363.02 GROUP II APPLICATIONS (12 V dc)

When used in conjunction with safety barriers. (Section 6)

Refer to Section 6

Output:	4 to 20 mA
Max Load	160 ohms @ 12 V
Supply	10.5 to 13.5 V
Max Supply Current	120 mA*



TX6363.03 GENERAL PURPOSE APPLICATIONS (24 V dc)

NOT FOR USE IN CLASSIFIED HAZARDOUS AREAS.

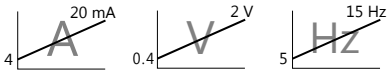
Output:	4 to 20 mA
Max Load	160 ohms @ 12 V ((50 x (V supply – 20)) + 700) ohms at other voltages
Supply	20 to 30 V dc
Nominal Supply Current	100 mA*

NOTE

* *The supply current pulses between 40 mA and 100 mA at 4 Hz.*
This should be taken into account during system design.

5 INSTALLATION

5.1 Conformity Check



(Refer to Test Certificate provided with the sensor).
Does the output signal of the sensor concur with the input requirement of the monitoring equipment being used.

12 V dc 24 V dc

Is the correct supply voltage available for the sensor?

Is the type of gas, its LEL, v/v and its anticipated maximum level of concentration, within the operating parameters of the sensor?

Is the temperature variation range, at the installation, within the stated temperature range of the sensor?

Is the hazardous area classification correct?

If the hazard is Group II – are the correct safety barriers fitted?

STANDARD OPTIONS AVAILABLE

TX6363.01	**INFRARED GAS SENSOR/ TRANSMITTER**	**GROUP I**
TX6363.02	**INFRARED GAS SENSOR/ TRANSMITTER**	**GROUP II**
TX6363.03	**INFRARED GAS SENSOR/ TRANSMITTER**	**GENERAL PURPOSE (CO2 ONLY)**

OUTPUT SIGNAL	0.4 to 2 V		(11)
	4 to 20 mA		(12)
	5 to 15 Hz		(13)
MEASURING RANGE	CH_4	0 to 100%v/v	(242)
	CH_4	0 to 5%v/v	(243)
	CH_4	0 to 100% LEL	(245)
	CO_2	0 to 2%v/v	(253)
	CO_2	0 to 5%v/v	(278)

5 INSTALLATION continued

5.2 Location

Each installation needs to be considered in its own right, with reference to safety authorities and in compliance with mandatory local safety regulations.
The sensor must be operated in accordance with the Installation and Operating Data to maintain safety, reliability and to preserve Intrinsic Safety Integrity where applicable.

It is important that sensors are located in positions determined in consultation with those who have specialised knowledge of the plant or installation and of the principles of gas dispersion. Reference should also be made to those responsible for the engineering layout and topology of the plant as they will be most familiar with the nature of the potential dangers and the most likely sources of gas release.

It is also important to recognise that the characteristics of the gas source can be influenced by many factors; including the relative density or buoyancy of the gas, the pressure at the point of release, the ambient temperature and the ventilation of the site.

Sensor coverage cannot be simply expressed in terms of 'number per unit area'. Sensors need to be sited where they are capable of monitoring those parts of a plant where gas may accumulate or when a source of gas release is expected to occur. This way the earliest possible warning of a gas release can be given to initiate shutdown functions, alarm functions or safe evacuation of the premises.

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5.3 System Integrity

If a gas monitoring system should fail for any reason, it is important that the system is capable of immediately alerting operational staff to this fact.
The sensor will indicate a system failure or mechanical defect and this information can be utilised to initiate a warning alarm. It is good practice to provide emergency facilities to protect against the loss of the mains power supply.
Standby batteries can be incorporated with automatic changeover facilities, so guaranteeing continued operation of the pressure sensing system even in the event of a plant breakdown as a result of a power supply failure.
Certainly, in critical plants, duplication or triplication of sensors is recommended.

The Trolex TX9042 or TX9044 Programmable Sensor Controller can be programmed to operate with sensors in the multiple voting mode.

5.4 Sensor Management

A very important part of an efficient gas monitoring system is the training of plant personnel in operation and maintenance of the sensors and the complete monitoring system. Training facilities can be provided by qualified Trolex application engineers.

Once a sensor installation is complete, the sensor locations and types should be formally recorded and a planned test and maintenance procedure instituted.

5 INSTALLATION continued

5.5 Relative Density

The relative density or buoyancy of the gas or vapour with respect to air is a very important consideration. This determines its propensity to rise or fall when released into the atmosphere.

Gases or vapours with a buoyancy less than air will tend to rise from the source of release.

Conversely, gases or vapours heavier than air will tend to fall and accumulate in concentrations for long periods of time.

This is a particular problem in pits, trenches, machine rooms, etc. Normal air movements in and around such gas concentrations will have the inevitable effect of producing zones of dangerous gas mixtures.

This knowledge of the characteristics of the gas assists when positioning the gas sensor.

The behaviour of the gas accumulation will also be affected by the velocity and location of the gas release and by ambient air movement caused by ventilation systems or draughts.

Pockets of gas can be trapped in trenches or ceiling cavities, all of which adds to the unpredictability of critical gas concentrations.

Methane	LIGHTER THAN AIR
Carbon Dioxide	HEAVIER

ATEX M1 GROUP I & II INTRINSICALLY SAFE

5.6 Hazardous Areas

Do not disassemble the sensor whilst in the hazardous area or use a sensor that has a damaged housing in the hazardous area.

5.7 Evacuation

If a dangerous level of gas concentration is detected by the instrument, leave the area immediately.

5.8 Discrimination

The infrared hydrocarbon sensor will detect most hydrocarbon gases and vapours, but cannot discriminate between them.

There is no response to flammable gases which are not hydrocarbon based such as ammonia and hydrogen. There is a very slight response to CO_2.

The infrared CO_2 sensor has no significant cross sensitivities.

5.9 Toxicity

Be aware that most flammable gases and vapours are also toxic at low concentrations of LEL.

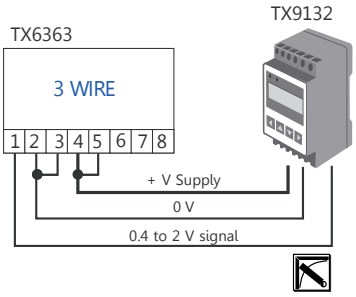
6 CONNECTIONS

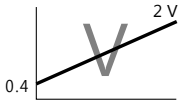
OUTPUT SIGNAL OPTIONS

TX6363.01	INFRARED GAS SENSOR/ TRANSMITTER	GROUP I
TX6363.02	INFRARED GAS SENSOR/ TRANSMITTER	GROUP II
TX6363.03	INFRARED GAS SENSOR/ TRANSMITTER	GENERAL PURPOSE (CO2 ONLY)

ATEX M1
GROUP I & II INTRINSICALLY SAFE

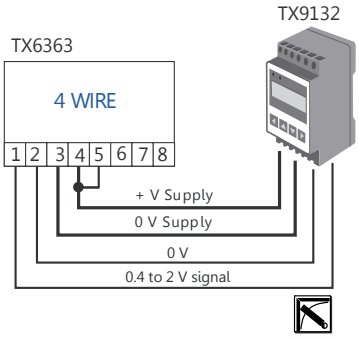
6.1 0.4 to 2 V Output Signal





A low impedance two-wire voltage output signal requiring a separate power supply to the sensor. This can be derived from a Trip Amplifier or Programmable Sensor Controller, when one of those is used as the monitoring instrument.

This connection configuration works well up to about 100 metres distance between the sensor and the monitoring equipment.



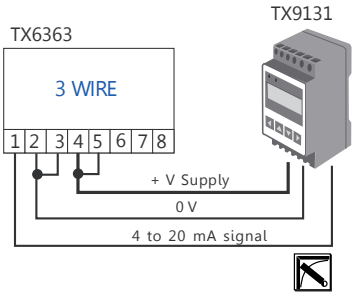
Both the signal and the power supply to the sensor are being carried in the common 0 V conductor so at some point – influenced by the length of the cable and the resistance of the cable cores – the current flowing in the 0 V conductor will impose an unacceptable voltage error onto the signal.

This effect can be reduced on long distance connections by increasing the size of the cable cores, or even better, running a separate 0 V conductor to power the sensor.

APPLICATION GROUP I HAZARDOUS AREAS

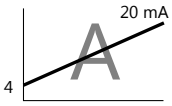
6 CONNECTIONS continued

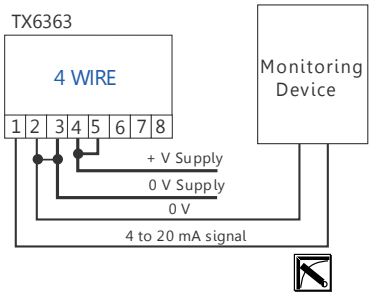
6.2 4 to 20 mA Output Signal



The sensor may be connected the 3 or 4 wire connection mode.

The power supply for the sensor may be sourced from the monitoring equipment (eg. TX9131 Trip Amplifier or a TX9042 Programmable Sensor Controller) or from a separate power supply.





APPLICATION **GROUP I HAZARDOUS AREAS**
GROUP II HAZARDOUS AREAS
GENERAL AREAS

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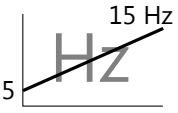
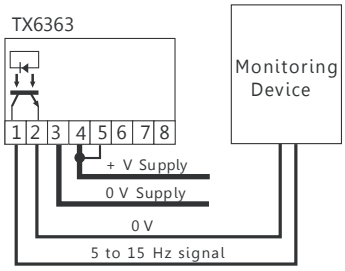
6.3 5 to 15 Hz Output Signal

A square wave, frequency variable output that is proportional to the measured value. The output device is an open NPN transistor.





Output:	5 to 15 Hz. (Zero = 5 Hz). (span = 15 Hz).
Maximum Voltage:	15.4 V.
Maximum Current:	2 mA.
Minimum Pulse Rise Time:	5 V/ms.

APPLICATION **GROUP I HAZARDOUS AREAS**

6 CONNECTIONS continued

6.4 Using Gas Sensors in Hazardous Areas

6.4.1

GROUP I HAZARDOUS AREAS (MINING)

TX6363.01 INFRARED GAS SENSOR/ TRANSMITTER

All options of the TX6363.01 sensor (0.4 to 2 V, 4 to 20 mA and 5 to 15 Hz) are certified Intrinsically Safe for use in Group I hazardous areas (Mining) when used with approved equipment eg. TX 9131 Trip Amplifier or a TX9042 Programmable Sensor Controller.

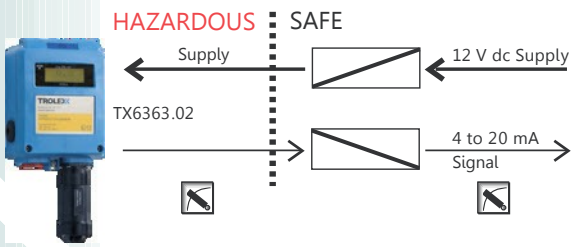
THE COMPLETE SYSTEM, BOTH SENSOR AND MONITORING DEVICE, CAN BE MOUNTED IN THE HAZARDOUS AREA.

The interconnecting cable between the sensor and the monitoring device must have steel wire armoured protection or a braided earth screen. The cross sectional area of the conductors must be a minimum of 1 mm^2.

6.4.2

GROUP II HAZARDOUS AREAS (12 V dc)

TX6363.02 INFRARED GAS SENSOR/ TRANSMITTER



This version of the sensor (4 to 20 mA) is certified Intrinsically Safe for use in Group II hazardous areas, when used in conjunction with safety barriers.

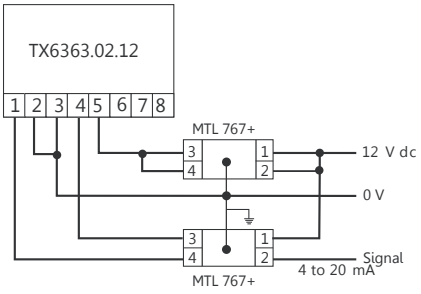
THE SAFETY BARRIERS ARE MOUNTED IN THE SAFE AREA, ONLY THE SENSOR IS MOUNTED IN THE HAZARDOUS AREA.

The system may be used with either zener safety barriers or isolation safety barriers.

6.4.2

GROUP II HAZARDOUS AREAS

TX6363.02 INFRARED GAS SENSOR/ TRANSMITTER



Group II sensor connections using zener safety barriers.

This version of the sensor is certified Intrinsically Safe for use in Group II hazardous areas, zones 1 and 2, when used in conjunction with zener safety barriers or isolation safety barriers.

THE BARRIERS ARE MOUNTED IN THE SAFE AREA AND ONLY THE SENSOR IS MOUNTED IN THE HAZARDOUS AREA.

	SUPPLY	SIGNAL
Suggested Zener Safety Barrier	MTL767+	MTL767+

Max. Cable Length: 1 km using 1.5 mm^2 cable conductors.

If you require any help with the use and connection of hazardous area equipment please contact the Trolex Technical Department.

7 CONTROLS AND INDICATORS

TX 6363 INFRARED GAS SENSOR/ TRANSMITTER

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GROUP I & II INTRINSICALLY SAFE

8 CALIBRATION

Natural 'ageing' of the gas sensing module will gradually change its response characteristics, by a small amount, during normal use.

The module may be recalibrated when required, using a Trolex TX6520 Gas Test Kit equipped with both Air and Gas canisters.

8.2 Prepare to Calibrate

The sensor should be powered for a minimum of 10 minutes prior to commencing calibration.

Connect the application tube of the gas test kit to the inlet aperture of the gas sensing module.

8.3 Calibrate Zero

Apply the purge air, at a flow rate of 0.3 to 1.0 l/min.

Allow the reading to stabilise.

If necessary, adjust the Offset potentiometer until the display reads 0.00.

Remove the purge air.

8.4 Calibration Span

Apply the test gas at a flow rate of 0.3 to 1.0 l/min.

Allow the reading to stabilise.

Adjust the Span potentiometer until the display reads the same value as the test gas being used.

Remove the span gas.

CHECK POINT

The test gas used must be a minimum concentration of 50% of the full scale measuring value of the sensor.

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GROUP I & II
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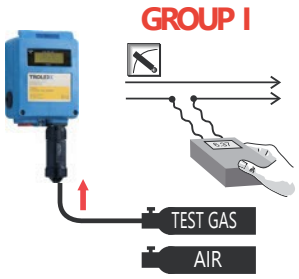
8 CALIBRATION continued

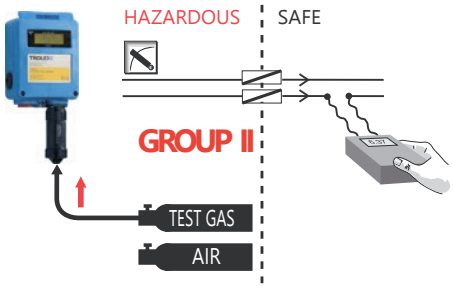
It is good safety practice to carry out regular preventative maintenance to confirm correct operation.

8.4 Output Signal



Check the response of the sensor at pre-determined intervals by injecting a test gas using a Trolex TX6520.32 Gas Test Kit.

Compare the value of the display with the value marked on the test gas canister.



Insert an approved test meter into the signal line and compare the value of the display with the measured value.

Change the gas sensing module if necessary.

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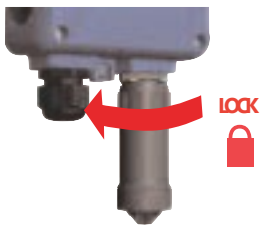
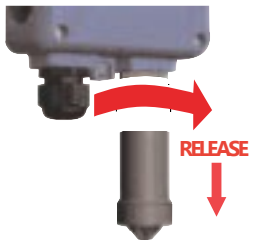
9 MAINTENANCE



9.1 Gas Sensing Modules

The average life of an infrared sensor is between 2 and 5 years.

The length of time is influenced mostly by the level of contaminants in the atmosphere.



Severe conditions may reduce the life span of the sensor so it should be regularly checked to be aware that it is functioning correctly.

9 MAINTENANCE continued

9.2 Pre-calibrated

The gas sensing modules are conveniently replaceable giving a pre-calibrated standardised output signal.

Service replacement modules can be supplied by our Product Support Department on a regular basis.

Simply insert the new module into the instrument and return the original for checking and calibration.

9.3 Main Circuit Module

The main circuit module inside the sensor housing can be removed from the housing for maintenance purposes

Insert a small screwdriver under one of the terminal bridges and lever out gently.

Disconnect the ribbon connector from the rear of the main circuit module.

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9.4 Annual Safety Check

The main transmitter itself will not normally require maintenance or calibration but it is advisable to return it to the Trolex Product Support Department for an annual safety check.

9.5 Damaged Sensors

A Sensor that has been dropped or damaged in any way should be taken out of service immediately for inspection, repair and re-calibration.

9.6 Record Keeping

Institute a regular calibration and maintenance procedure and keep a record.

Incorrect use of the Sensor or inadequate maintenance may not necessarily be self evident in the Sensor and consequently it must be regularly checked and maintained.

9 MAINTENANCE continued

9.7 Maintenance and Calibration Log

ORDER REF **TX6363**	DATE SUPPLIED
SERIAL No.	USER
GAS TYPE	LOCATION

DATE	SCHEDULED	FAILURE	RE-CALIBRATE	CHANGE GAS SENSING MODULE	RETURN TO MANUFACTURER	COMMENTS

ATEX M1 GROUP I & II INTRINSICALLY SAFE

10 APPROVALS AND CERTIFICATION

10.1 ATEX Certification

TX6363.01 INFRARED GAS SENSOR/ TRANSMITTER

GROUP I: I M1
Ex ia I Ma: Sira02ATEX2167X
(Ta = -20 to +60°C)

TX6363.02 INFRARED GAS SENSOR/ TRANSMITTER

GROUP II: II2G
Ex ia d IIB T4 Gb: Sira00ATEX2061
(Ta = -20 to +44°C)

Special Conditions for Safe Use

Group I

The user should note that the internal components may exceed 150°C under fault conditions and care should be taken to prevent the ingress of coal dust when opening the enclosure.

Group II

The equipment shall be mounted such that the sensor housing is vertical and underneath the main enclosure. Alternatively, the enclosure may be mounted in any orientation provided additional protection is given such the the risk of impact is low.

General Conditions for Safe Use

Prior to installation, it is essential that the user refers to the above certificate to ensure that the termination and cable parameters are fully complied with and are compatible with the application. Copies of certificates are available from Trolex.

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ATEX Directive (94/9/EC)
EMC Directive (2004/108/EC)

10.2 ANZEx Certification

TX6363.01 INFRARED GAS SENSOR/ TRANSMITTER

GROUP I:
Ex ia I: ANZEx 12.3015X
(Ta = -20 to +60°C)

TX6363.02 INFRARED GAS SENSOR/ TRANSMITTER

GROUP II:
Ex ia d IIB T4: ANZEx 12.3015X
(Ta = -20 to +44°C)

Conditions for Safe Use

Prior to installation, it is essential that the user refers to the above certificate to ensure that the termination and cable parameters are fully complied with and are compatible with the application. Copies of certificates are available from Trolex.

10.3 Russia (GOST-R) Certification

Contact Trolex for further information.

10.4 South Africa Certification

TX6363.01 INFRARED GAS SENSOR/ TRANSMITTER

GROUP I:
Ex ia I Ma: MASC M/11-376X
(Ta = -20 to +60°C)

Special Conditions for Safe Use

The user should note that the internal components may exceed 150°C under fault conditions and care should be taken to prevent the ingress of coal dust when opening the enclosure.

General Conditions for Safe Use

Prior to installation, it is essential that the user refers to the above certificate to ensure that the termination and cable parameters are fully complied with and are compatible with the application. Copies of certificates are available from Trolex.

ATEX
M1
GROUP I & II
INTRINSICALLY
SAFE

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