TX6351 • TX6352
Sentro 1 Universal Gas Detector

User Manual

TROLEX

TX6351 • TX6352 Sentro 1 Universal Gas Detector

Contents

1. Product Overview

TX6351	3/4 wire device with separate output signal and power lines. Can be used with any Sentro eModule
TX6352	2-wire line powered 4 to 20 mA output signal. Can ONLY be used with electrochemical Sentro eModules

1.1 Operating Features

- Fixed sensor for detection of Toxic Gases and Flammable Gases
- Exclusive pre-calibrated plug-in gas sensing modules for many types of gas and climatic conditions
- LCD readout and visual LED alarm indicators
- Choice of supply voltage and output signal format
- Heavy duty housing to IP65, EMC compliant
- STEL and TWA monitoring for selected gases

1.2 Application

Fixed point gas detection for safety monitoring in hazardous areas and general purpose applications.

Underground Mining and Tunnelling Ex ia I Ma TX6351.01 TX6352.01	**Supply Voltage:** 12 V dc from an approved power source **Type of protection:** Intrinsically safe. Ex ia **Category:** I M1
General Purpose TX6351.03 TX6352.03	**Supply Voltage:** 24 V dc

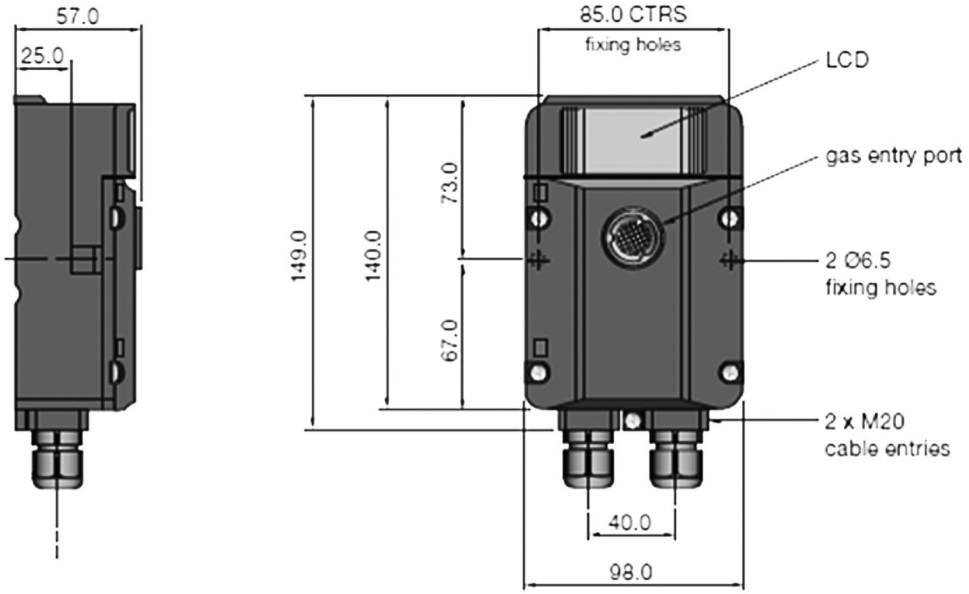
1.3 Product Options

4-wire connection	Mining Ex ia	General Purpose
0.4 to 2 V output	TX6351.01.11	-
4 to 20 mA output	TX6351.01.12	TX6351.03.12
5 to 15 Hz output	TX6351.01.13	-
Contact output	TX6351.01.14	TX6351.03.14
RS485 output	TX6351.01.15	TX6351.03.15

*2-wire line powered	Mining Ex ia	General Purpose
4 to 20 mA output	TX6352.01.12	TX6352.03.12

***For use with Toxic Gas Sentro eModules only**

1.4 Dimensions



1.5 Technical Information

Ambient temperature limits	-20 to +40°C
Storage temperature	-20 to +60°C
Ambient pressure	800 to 1100 mbar
Humidity	90% non-condensing
Protection classification	Dust and waterproof to IP65. Gas Port: IP54.
Housing material	Reinforced polymer
Nett weight	150 g
Cable entries	2 x M20
Electrical connections	4 mm barrier/clamp terminals
Conductors	A maximum of two per terminal
Conductor size	A maximum of 2.5 mm^2
Terminal torque	2.4 Nm maximum
Information display	128 x 64 dot graphic backlit LCD
Vibration limits	Vibration limits (EN 60079-29-1): • 10 to 30 Hz - 1.00 mm total excursion • 31 to 150 Hz - 19.6 m/s^2 acceleration peak
Impact limits	20 joules (housing)
Calibration and setup	Digitally controlled ZERO and SPAN pushbutton setting
Signal fix	The analogue output signal of the sensor is fixed during calibration to prevent false alarms from being initiated
Fault indication	Under range signal transmitted and fault display for: • Loss of communications from the sensing module • Sensing module absent for more than 10 seconds • Sensor over-range protect
Key coding	Coding stops prevent insertion of a non-valid sensing module.

Alarms	Programmable GENERAL alarms and HIGH alarms with an LED indicator. The two adjustable alarm setpoints are preset during manufacture to default values appropriate to the type of sensor, determined by the sensing module being used.
STEL and TWA	Automatic calibration of STEL and TWA limits to EH40 standards. STEL: Exposure over 15-minute successive periods TWA: Exposure over a continuous rolling 8-hour period
Output signals	0.4 to 2 V 4 to 20 mA 5 to 15 Hz Dual contacts RS485 Modbus datacomms

1.6 Electrical Details

General Purpose

TX6351	3/4 wire. Remote powered 4 to 20 mA analogue output		
Supply voltage:	18 to 28 V		
Max. line load:	500 R at 24 V		
Type of sensor:	Toxic	Flammable	Infrared
Supply current:	40 mA	40 mA	60 mA

TX6351	3/4 wire. Remote powered Dual output contacts		
Supply voltage:	20 to 28 V		
Type of sensor:	Toxic	Flammable	Infrared
Supply current:	35 mA	45 mA	60 mA

TX6351	3/4 wire. Remote powered RS485 datacomms output		
Supply voltage:	14 to 28 V		
Line:	Modbus protocol		
Type of sensor:	Toxic	Flammable	Infrared
Supply current:	40 mA	40 mA	60 mA

TX6352	2 wire. Line powered 4 to 20 mA analogue output		
Supply voltage:	18 to 28 V		
Max. Line Load:	300 R		
Type of Sensor:	Toxic only		

Mining and Tunnelling

TX6351	3/4 wire. Remote powered 4 to 20 mA		
Supply voltage:	10 to 14 V		
Max. line load:	220 R maximum @ 12 V dc		
Type of sensor:	Toxic	Flammable	Infrared
Supply current @ 12 V:	48 mA	70 mA	91 mA

TX6351	3/4 wire. Remote powered Dual output contacts		
Supply voltage:	10 to 14 V		
Type of sensor:	Toxic	Flammable	Infrared
Supply current @ 12 V:	60 mA	85 mA	105 mA

TX6351	3/4 wire. Remote powered RS485 datacomms output		
Supply voltage:	10 to 14 V		
Line:	Modbus protocol		
Type of sensor:	Toxic	Flammable	Infrared
Supply current @ 12 V:	25 mA	60 mA	80 mA

TX6351	3/4 wire. Remote powered 0.4 to 2 V analogue output		
Supply voltage:	10 to 14 V		
Min. line load:	10 KR		
Type of sensor:	Toxic	Flammable	Infrared
Supply current @ 12 V:	20 mA	60 mA	80 mA

TX6351	3/4 wire. Remote powered 5 to 15 Hz analogue output		
Supply voltage:	10 to 14 V		
Max. line load:	Opto isolated to 2 mA maximum		
Type of sensor:	Toxic	Flammable	Infrared
Supply current @ 12 V:	20 mA	60 mA	80 mA

TX6352	2 wire. Remote powered 4 to 20 mA analogue output
Supply voltage:	10 to 14 V
Max. line load:	90 R
Type of sensor:	Toxic only

1.7 Sentro eModules

Plug-in pre-calibrated modules with standardised output data.

- Each module stores all the necessary data about its type identification, sensing range and specific calibration. This data is automatically recognised by Sentro when the module is loaded into the module bay.
- The modules are pre-calibrated so can be substituted at any time by a replacement module – usually of the same type, but an alternative may be inserted if required.
- Insert coding stops to prevent invalid module combinations.
- The sensing module will identify itself when plugged into the sensor housing and auto configuration will take place.
- All Sentro Modules have two output alarm signals for GENERAL alarm and HIGH alarm. Default values are entered during manufacture and these can be changed to preferred values.
- The alarm signals can be set to illuminate built-in flashing LED indicators.
- The signals can operate the two GENERAL alarm and HIGH alarm relays on the CONTACT OUTPUT version of Sentro 1.

Gas Sensor

Flammable gases • Poison resistant catalytic sensor

The sensor can be configured to respond to many flammable gases and vapours. It is usual to calibrate to methane in terms of %LEL or %volume.

Section 4.4.5 ❯❯

TX6350	.240	.246	.244
	Methane CH_4	Methane CH_4	Methane CH_4
Sensing element	Poison resistant pellistor with active temperature/humidity compensation		
Sensing range	0 to 100% LEL	0 to 4% v/v	0 to 5% v/v
Linearity	Linear up to 3% v/v	3% to 5% ±0.25%	
Max. Drift @ 25°C	±0.25% CH4 v/v per month		
Response time (T63)	<15 secs		
Response time (T90)	<20 secs		
Sensing element life	>5 years in clean atmosphere		
Warm up time	<5 mins in air or 1% v/v CH4 (to 95% of stated accuracy)		
GENERAL alarm	10% LEL (.240)	1.25% (.246)	1.25% (.244)
HIGH alarm	20% LEL (.240)	2.00% (.246)	2.00% (.244)

Checkpoint
Not suitable for use with the TX6352 4 to 20 mA two wire, line powered version of Sentro.

Checkpoint
The pellistor is automatically protected against exposure to excessively high concentrations of gas.

Toxic gases • Electrochemical cells

Selected toxic gas modules are equipped with automatic STEL/TWA calculation in accordance with EH40.

Section 4.4.5

TX6350	.250.50 Carbon Monoxide CO	.250.250 Carbon Monoxide CO	.250.300 Carbon Monoxide CO	.250.500 Carbon Monoxide CO	.251 Hydrogen Sulphide H_2S	.252 Sulphur Dioxide SO_2
Sensing element	Electrochemical cell					
Sensing range	0 to 50 ppm	0 to 250 ppm	0 to 300 ppm	0 to 500 ppm	0 to 50 ppm	0 to 20 ppm
Linearity	±2% FS					
Drift	2% per month					
Repeatability	±2%					
Response time T63%	<20 secs				<30 secs	<20 secs
Operating life	2 years					
Relative humidity	15 to 90% non-condensing					
Operating temperature	-10 to +40°C					
GENERAL alarm	15 ppm	30 ppm	30 ppm	30 ppm	5 ppm	5 ppm
HIGH alarm	30 ppm	100 ppm	100 ppm	200 ppm	10 ppm	10 ppm
STEL & TWA	200 ppm 30 ppm	200 ppm 30 ppm	200 ppm 30 ppm	200 ppm 30 ppm	10 ppm 5 ppm	5 ppm 2 ppm

Toxic gases • Electrochemical cells - continued

Selected toxic gas modules are equipped with automatic STEL/TWA calculation in accordance with EH40.

Section 4.4.5 »

TX6350	.254 Nitrogen Dioxide NO_2	.254.10 Nitrogen Dioxide NO_2	.257 Oxygen O_2	.259 Nitric Oxide NO	.261 Hydrogen H_2
Sensing element	Electrochemical Cell				
Sensing range	0 to 20 ppm	0 to 10 ppm	0 to 25%	0 to 50 ppm	0 to 1000 ppm
Linearity	±2% FS		±5% FS		±2% FS
Drift	2% per month		10% per year	2% per month	
Repeatability	±2%				
Response time T63%	<20 secs		N/A	<20 secs	<70 secs
Operating life	2 years		1 year	2 years	
Relative humidity	15 to 90% non-condensing				
Operating temperature	-10 to +40°C				
GENERAL alarm	5 ppm	2.5 ppm	19% (under)	5 ppm	250 ppm
HIGH alarm	10 ppm	5 ppm	23% (over)	20 ppm	500 ppm
STEL & TWA	5 ppm 3 ppm	5 ppm 3 ppm	N/A N/A	10 ppm 3 ppm	N/A N/A

Checkpoint

Toxic gas Sentro eModules have a very low power consumption, enabling 4 to 20 mA two wire TX6352 line-powered version of Sentro to be used.

Checkpoint

All values listed are nominal and slight variations may occur depending upon operating conditions.

- The natural level of oxygen available in the atmosphere is influenced by relative humidity and temperature. The oxygen sensor will react to these changes.
- Sudden changes in atmospheric pressure will also cause temporary instability in electrochemical sensors which may exceed 60 seconds.
- Long periods of use in extremely high or low humidity may affect the response of the sensor and shorten the life of electrochemical sensors.
- Nitric oxide sensors must be continuously powered to maintain calibration stability. If power has been absent for more than 10 minutes, it may take 24-48 hours for the sensor to restore stability. Do not calibrate until the output signal is steady.
- The presence of high levels of carbon dioxide (over 5%) may have a minor effect on the accuracy of the oxygen sensor.

Checkpoint

Periodic calibration of the gas sensor should be carried out whilst it is in service. For oxygen and carbon monoxide gas sensors Trolex recommends that this is carried out every 3 weeks. For other gas sensors Trolex recommends that this is carried out in accordance with best practice for the industry where the gas sensor is being used, and should take into consideration local operating conditions.

Carbon Dioxide/Methane Gases • Infrared sensor

The sensor is highly specific to the selected gas and exhibits consistent sensing accuracy with superior long-term stability.

The linear response means that it can be calibrated for low gas concentrations and high concentrations up to 100% by volume.

TX6350	.243 Methane CH_4	.245 Methane CH_4	.242 Methane CH_4	.253 Carbon Dioxide CO_2	.278 Carbon Dioxide CO_2	.279 Carbon Dioxide CO_2
Sensing element	Infrared					
Sensing range	0 to 5% v/v	0 to 100% LEL	0 to 100% v/v	0 to 2% v/v	0 to 5% v/v	0 to 100% v/v
Zero drift	±0.05% v/v per month	±1% LEL per month	±0.5% v/v per month	±0.05% v/v per month		±1% v/v per month
Repeatability	±0.1% v/v	±2% LEL	±2% v/v	±0.05% v/v		±2% v/v
Response time T63%	<15 secs					
Response time T90%	<30 secs					
Operating life	<5 years					
Relative humidity	15 to 90% non-condensing					
Operating temperature	-10 to +40°C					
GENERAL alarm	1.25% v/v	10% LEL	25% v/v	0.5% v/v	1.25% v/v	25% v/v
HIGH alarm	2.5% v/v	20% LEL	50% v/v	1 % v/v	2.5% v/v	50% v/v

Checkpoint - Carbon Dioxide Sensors

Normal atmosphere contains carbon dioxide which will affect the sensor signal so nitrogen gas must be used to accurately calibrate the zero value. Power should be applied to the sensor and the nitrogen applied for at least 5 minutes to ensure that the sensor has stabilised.

Checkpoint

Not suitable for use with the TX6352 4 to 20 mA two wire, line powered version of Sentro 1.

2. Certification

	Ex certified for use in M1 applications: Europe: TX6351.01i.xx/TX6352.01i.xx Ex Certificate Number: SIRA09ATEX2352X I M1 Ex ia I Ma (20°C ≤ Ta ≤ +40°C) **Important** – Prior to installation, it is essential that the user refers to the relevant 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 www.trolex.com.
	ATEX directive 94/9/EC EMC directive 2004/108/EC

Special Conditions for Safe Use

The minimum ingress protection stated in the Ex-certificates for the Sentro eModules are satisfied when mounted in the Sentro Gas Detector, as are the conditions for impact protection and external fuse protection in the case of the infrared eModule.

The Ex-certificates associated with the Sentro Modules are listed below:

eModule Flammable Group I	SIRA 10ATEX2046U
eModule Toxic Group I	SIRA 08ATEX2097U
eModule Infrared Group I	SIRA 10ATEX2356U

	Ex certified for use in Ma applications: International (IECEx): TX6351.01i.xx/TX6352.01i.xx Ex Certificate Number: IECExSIR09.0147X Ex ia I Ma (20°C ≤ Ta ≤ +40°C) **Important** – Prior to installation, it is essential that the user refers to the relevant 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 www.trolex.com.

Special Conditions for Safe Use

The minimum ingress protection stated in the Ex-certificates for the Sentro eModules are satisfied when mounted in the Sentro Gas Detector, as are the conditions for impact protection and external fuse protection in the case of the infrared eModule.

The Ex-certificates associated with the Sentro Modules are listed below:

eModule Flammable Group I	IECEx SIR 10.0018U
eModule Toxic Group I	IECEx SIR 08.0036U
eModule Infrared Group I	IECEx SIR 10.0185U

Approvals

EN 60079-29-1 Performance requirements of detectors for flammable gases - TX6350.01.240 Methane 0 to 100% LEL and TX6350.01.246 Methane 0 to 4% v/v, when mounted in the suitable Sentro Gas Detector.

3. Installation

3.1 Safety Precautions

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.

Evacuation

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

Operating Life of Gas Sensors

Electrochemical cells contain an electrolyte that is gradually consumed during use. The average life is about two years, dependant upon the duty cycle. The response should be checked at regular intervals.

Sensitivity

Electrochemical cells for toxic gases can be affected by other interfering gases which may displace the subject gas being monitored. Steam laden atmospheres and condensation can also reduce the sensitivity.

Flammable

Be aware that some toxic gases are also 'flammable' at high percentage concentrations.

Operating Limits of Catalytic Combustion Sensors

Catalytic combustion sensors positively detect the presence of flammable gas. They rely upon the presence of oxygen in the atmosphere and should only be used for gas concentration up to the Lower Explosive Limit (LEL).

After this point, the output becomes non-linear and may erroneously indicate that the gas concentration is below the LEL. They should not be used in oxygen enriched or deficient atmospheres.

Discrimination

Catalytic combustion sensors can detect a wide range of flammable gases but they cannot discriminate between individual gases. They will respond to most, or all, of the flammable components present in the atmosphere without distinguishing between them.

Infrared sensors are highly specific to the defined gas type and may not respond to other similar gases.

Contamination

The response of catalytic combustion gas sensors can be affected by air borne contaminants which will reduce the sensitivity. Substances such as silicones, tetraethyl lead, sulphur compounds and phosphate esters can cause permanent degradation (poisoning). Halogenated hydrocarbons may also cause temporary inhibition.

Interference

If the atmosphere to be monitored contains a gas that dilutes or displaces the air, this may reduce the response of catalytic sensors. Similarly, steam laden atmospheres and condensation can reduce the stability.

High Concentrations of Flammable Gas

Exposure of low concentration catalytic combustion sensors to concentrations of flammable gas greater than the LEL can affect the sensitivity and zero stability of catalytic elements and the calibration should be checked after such an exposure.

Toxicity

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

3.2. Tools and Test Equipment Required

No special tools are needed.

3.3. Siting Recommendations

Location of Gas Detectors

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 User Manual to maintain safety, reliability and to preserve 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 where 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.

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 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.

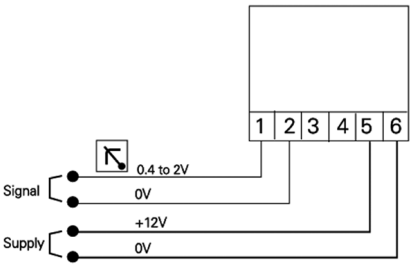
STEL and TWA

Selected gas sensors are equipped to automatically calculate STEL and TWA limits in accordance with EH40 standards.

If the facility is selected for use, ensure that all accumulated data is reset to zero before the commencement of a working period.

3.4 Connections

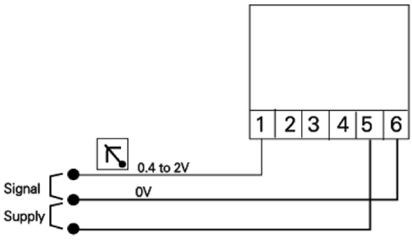
3.4.1 0.4 to 2 V Analogue Output Signal



A low impedance two-wire voltage output signal requiring a separate power supply to the sensor.

12 V dc power can usually be derived from the monitoring instrument being used.

The connection configuration works well up to 5-100 m distance between the sensor and the monitoring equipment, dependent on cabling and sensor current consumption.



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.

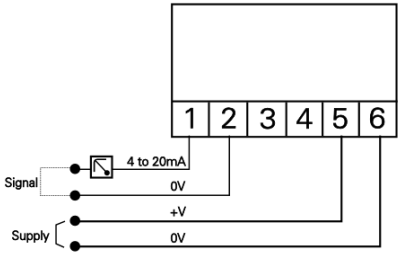
This effect can be reduced on long distance connections by increasing the size of the cable cores, or even better, by running a separate 0 V conductor to power the sensor enabling operating distances up to 1,000 m.

Alternatively, the sensor may be powered by a suitable power source close by.

3.4.2 4 to 20 mA Analogue Output Signal

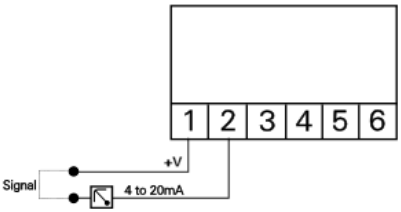
TX6351

The output signal from terminals 1 and 2 is a conventional 4 to 20 mA two wire current regulated signal loop.



TX6352 (Toxic Sentro eModules only)

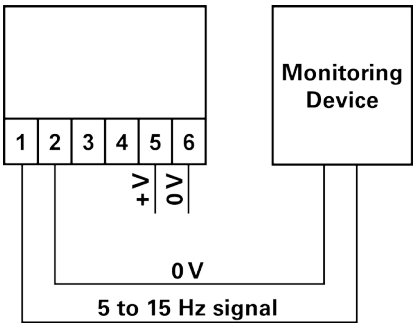
The output signal from terminals 1 and 2 is a conventional 4 to 20 mA two wire current regulated signal loop.



Electrochemical cells have very low power consumption so the same loop can be used to also power the sensor. No separate power supply is needed.

Checkpoint

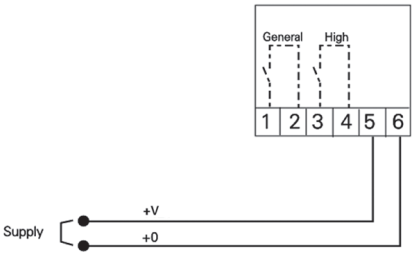
The TX6352 version of Sentro is **NOT** suitable for flammable gas and infrared Sentro eModules.



3.4.3 5 to 15 Hz Output Signal

A square wave, frequency variable output that is proportional to the measured value.

A pull up resistor may be required at the monitoring device.



3.4.4 Contact Output Signal

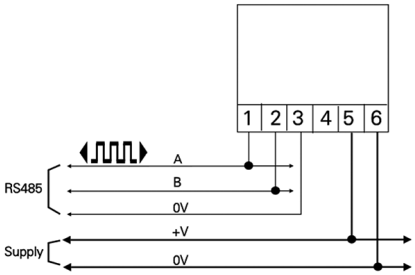
Dual independent output contacts for remote signalling and control. Setpoint values for GENERAL alarm and HIGH alarm are setup during manufacture to prescribed levels appropriate to the type of gas intended to be monitored; determined by the gas sensing module.

The setpoints may be adjusted to preference.

Section 4.4.3 »

Checkpoint
The relay contacts are clearance compatible for use with other intrinsically safe circuits emanating from different IS power sources.

3.4.5 RS485 Data Output Signal



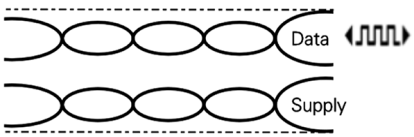
RS485 serial data output with analogue signal intelligence.
Use in conjunction with a PC for data display and setpoint alarm warnings.
Up to 32 sensors acting as slaves can communicate with the master unit on a single data cable.
The address code of the sensor is marked on the duty label of the sensor.

Physical layer:	RS485
Protocol:	Trolex proprietary
Connection mode:	Modbus
Number of points:	32
Maximum distance:	1,000 m

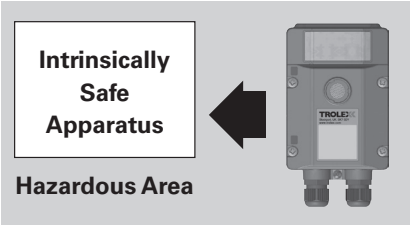
Recommended cable (specified in BS5308 Part 1) for locally powered sensors:

- 1 twisted pair
- 0.5 mm^2
- Overall screen

Recommended cable for sensors that are powered through the data cable:



- 2 twisted pair
- 0.5 mm^2
- Individual/overall screen



3.5 Connecting in Hazardous Areas

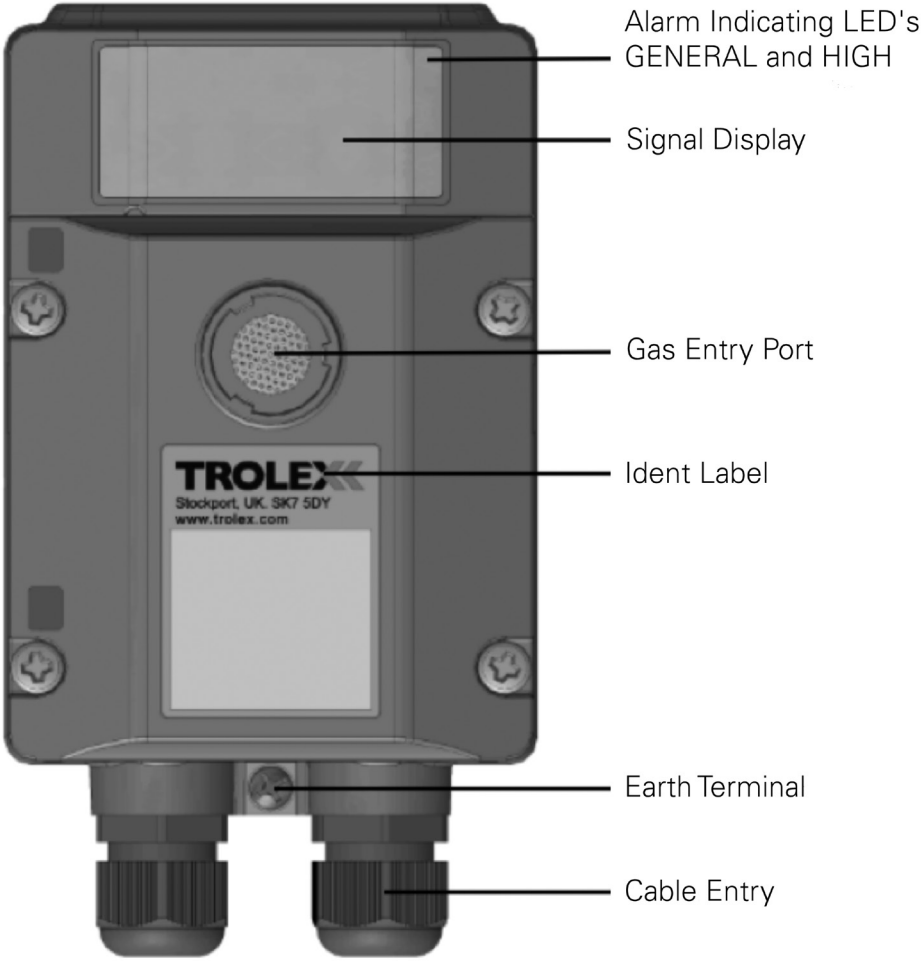
Certified Intrinsically Safe for use in mining hazardous areas, category M1, when used with approved monitoring apparatus.

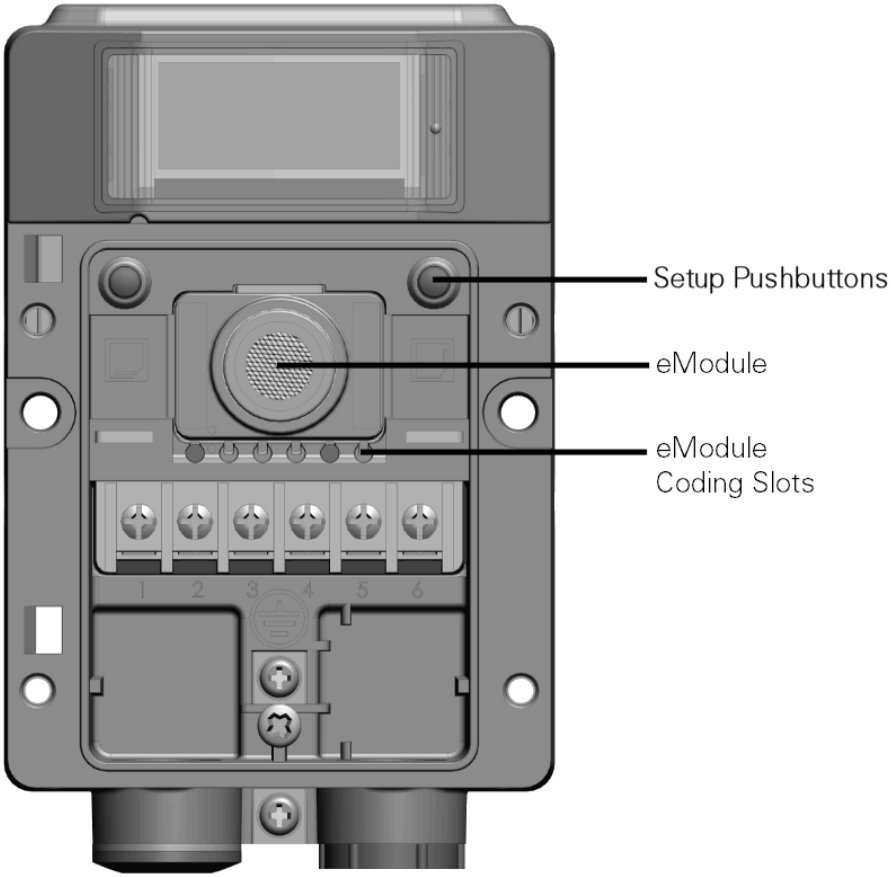
Power for the sensor must be derived from an approved 12 V dc power supply e.g. TX6642 Intrinsically Safe Power Supply or approved apparatus.

The installation must be in accordance with the Sentro certification parameters.

4. Setup and Calibration

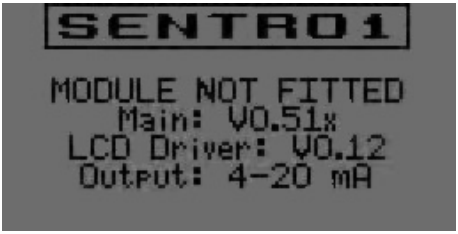
4.1 Controls and Indicators




Setup Pushbuttons
eModule
eModule
Coding Slots
1
2
3
4
5
6

4.2 Main Display

Power On



NEXT/FUNCTION **SELECT/CHANGE**

Checkpoint
Next/Function is the **Left** hand key **(L)** and Select/Change is the **Right** hand key **(R)**.

Main Menu

Press the **R** key to enter the Main Menu

Section 4.3 »

Section 4.4 »

Checkpoint
The front cover of Sentro may be safely removed, for setup in a hazardous area, even with the power applied.

4.3 Security Code Access

A security code may be requested:

Press the **R** key to change the digit

Use the **L** key to increment the digits

Use the **R** key to select Enter and return to the Main Menu

Section 4.4 »

4.4 Main Menu

(L) Prompt Bar **(R)**

Checkpoint
Sentro will automatically return to the Main Display if no commands are given within 1 minute. The time limit is extended to 8 minutes during calibration to allow the gas value to stabilise.

Calibrate — Section 4.4.1 »
- Zero
- Set Test Gas
- Span

Sentro 1 Setup — Section 4.4.2 »
- System Information
- Display Setup
- Alert Setup
- Set Security Code
- Exit

Output Setup — Section 4.4.3 »
- Output Information
- Trim Output Zero
- Trim Output Span
- Reset Output
- *Set Relay 1 Mode*
- *Set Relay 2 Mode*
- Exit

Modbus Setup — Section 4.4.4 »
- Modbus Address
- Baud Rate
- TX On Delay
- TX Off Delay
- Exit

Module Setup — Section 4.4.5 »
- Setpoint 1
- Setpoint 2
- STEL/TWA
- Exit

4.4.1 Calibrate

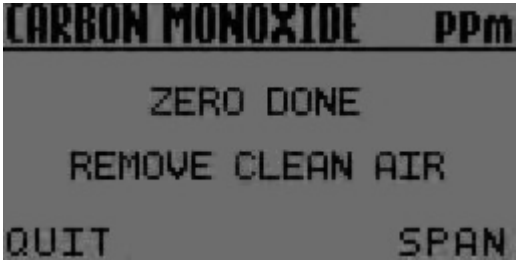
Connect a Gas Test Kit equipped with both 'clean air' and the appropriate test gas canisters.

Section 5.2 »

Calibrate Zero

- Follow the prompt bar and screen instructions

- Go to Span



Calibrate Span using a Test Gas of EXPECTED value

- Follow the prompt bar and screen instructions

- Key Done and return to the Main Display

Press **L** and **R** together to quit and return to the main display.

Calibrate Span using a Test Gas of DIFFERENT value

The display will show the concentration of Span Gas that is EXPECTED to be used.

Set the expected value to agree with the actual Test Gas value:

- Follow the prompt bar and screen instructions

Press **R** to continue with the normal span calibration (previous page)

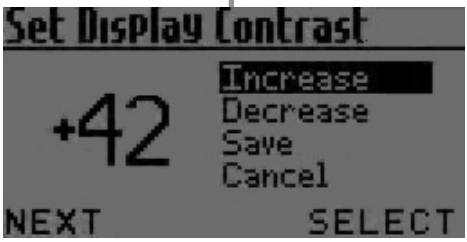
4.4.2 Sentro 1 Setup

The basic functional characteristics of the sensor can be setup, or reviewed, from a choice of parameters.

System Information Display

Display Setup

- The display backlight illumination may be set to on, or off, to reduce power consumption. (TX6351 only)
- The contrast of the display may be set for best visual appearance.



Alert Setup (TX6351 only)

- The integral GENERAL and HIGH visual alarms can be set to ON or OFF.
- The 'confidence' condition flash can be set to ON or OFF.

Set Security Code

- A four digit security code can be entered to prevent unauthorised access to the setup menu.

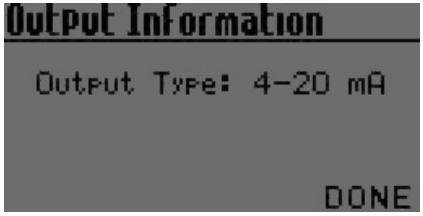
0000: Security protection OFF

4.4.3 Output Setup

The output signal format can be reviewed and setup to preferred values.

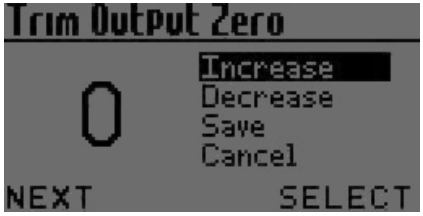
Output Information

- This is the factory setting of the output signal
- Confirm acceptance.



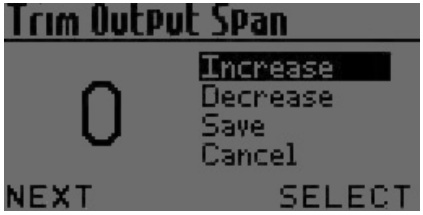
Trim Output Zero

- The level of the transmitted output signal, when the sensor is measuring a Zero gas concentration can be trimmed or offset.



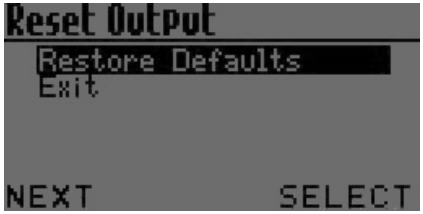
Trim Output Span

- The level of the transmitted output signal when the sensor is measuring a given Span can be trimmed or offset.



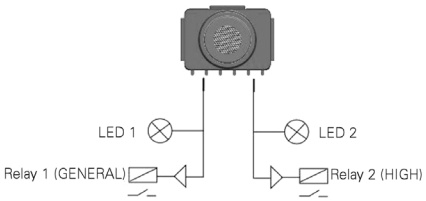
Reset Output

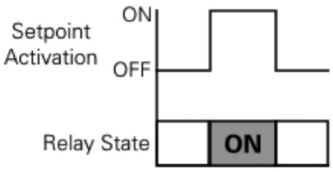
- Reset the Zero and Span output signal levels to the original default settings.



Relay 1 Function Mode
Relay 2 Function Mode

- This item will appear in the menu on the **Contact Output** version only.
- The operating function of each relay can be independently setup.





Checkpoint
The general relay function will be reversed when monitoring oxygen deficiency (i.e. the relay will de-energise when the measured gas concentration recedes from the setpoint value).

To Reset a Latched Relay

Press **L** to view Relay Status

Checkpoint
A Relay will stay LATCHED if the initiating signal has not receded.

4.4.4 Modbus

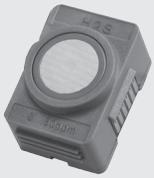
RS485 Output

- The protocol characteristics required for the Modbus datacomms version can be setup. Sentro can then be integrated into a wider communication network or to interface with a PC or SCADA system.

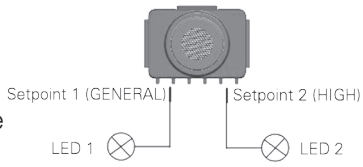
Data Protocol	Modbus
Addresses	1 to 255
Format	Binary
Databits	8
Stopbits	1
Parity	None
Baud Rate	300/600/1200/2400/4800/9600/ 14400/19200/28800/38400/57600/115200
TX On	0 to 99 ms
TX Off	0 to 99 ms
Duplex	Half

4.4.5 Module Setup

The functional characteristics of the Sentro eModule may be setup to preference.

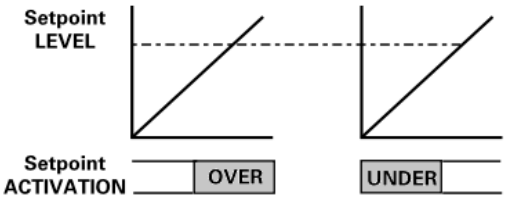


Change Setpoint 1
Change Setpoint 2



- The Sentro Module provides two adjustable setpoint output signals
- If activated, each signal will energise one of the LED alarm indicators in the display window

- The Activation mode and operating level of the setpoints can be setup to preference.

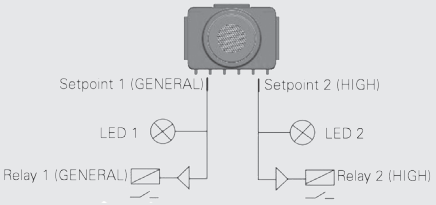


Checkpoint

- The setpoint output signal data will also be available for transmission on the RS485 Modbus version of Sentro.

Checkpoint

- The Contact Output version of Sentro 1 is also equipped with two relays

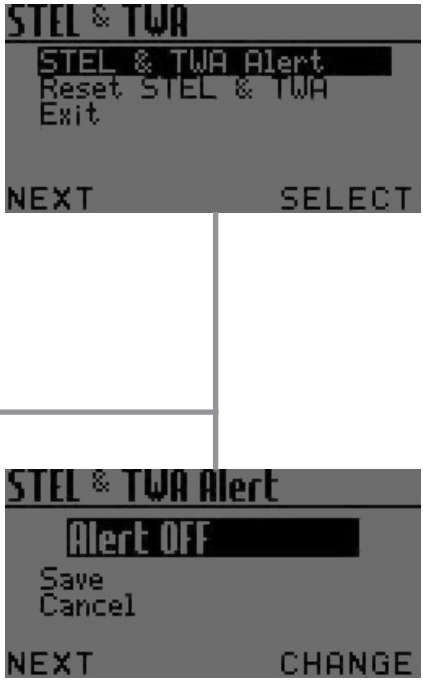


- The Activation will operate in the same way
- The Relay Function mode can also be setup

Section 4.4.3 ❯❯

STEL and TWA

- Toxic gas sensing Sentro eModules are equipped to automatically calculate STEL and TWA limits in accordance with international EH40 recommendations
- The Alert can be set to ON or OFF
- The accumulated STEL and TWA data can be reset to zero ready for the start of a new working period.



Checkpoint

- STEL OVER or TWA OVER will be displayed when limits are exceeded.
- If the visual alarm has been enabled then this will also activate at level 1 when a STEL or TWA limit is exceeded.

- For a contact output version, the STEL and TWA alert will also initiate the Activate command for Relay 1.

4.4.6 Support

If you need technical support to operate this product, or would like details of our after sales technical support packages, contact **service@trolex.com**.

5. Diagnostics and Maintenance

5.1 Diagnostic Messages

Sensor over-range

Loss of signal from the sensor

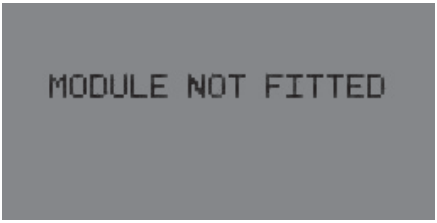
Pellistor Over

- The gas sensing concentration exceeds 100% LEL which is the safe working limit of the sensing element.

- The transmitted output signal from the sensor will be clamped at full scale to prevent ambiguous output data from being transmitted and will latch in this condition
- The pellistor in the gas sensing module will be switched into a PROTECT state to prevent oxidisation damage and will latch in this state.
- Check that the gas concentration has receded, then reset the module by removing it for 2 seconds.

Module Not Fitted

- The eModule has been removed and is out for more than 10 seconds



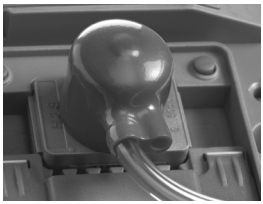
Checkpoint

- Under-range output signal will be transmitted by the sensor.

5.2 Maintenance

Output Signal

- Check the accuracy of the sensor at pre-determined intervals by injecting a test gas



Gas Sensing Modules

- The Sentro eModules should be changed at regular intervals to ensure the accuracy of response

- Service history is logged within the module and this data is used to periodically assess its condition whenever it is returned for servicing. Simply insert the new module into the instrument and return the original for checking and calibration.

Gas Inlet Port

- Check the condition and clean with a small brush to remove dust and debris

Annual Safety Check

The main sensor unit 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.

Calibration

The Sentro 1 performs an important safety function and periodic calibration is an essential part of maintaining safety integrity.

Gas sensors have a known ZERO and SPAN movement related to time, level of exposure to gas, and the nature of the environment, so Trolex recommend that the sensors should be bump tested with a suitable test gas at regular intervals. This should be carried out in accordance with best practice for the industry where the gas sensor is being used.

Periodic calibration of the gas sensor should be carried out whilst it is in service. For oxygen and carbon monoxide gas sensors Trolex recommends that this is carried out every 3 weeks. For other gas sensors Trolex recommends that this is carried out in accordance with best practice for the industry where the gas sensor is being used, and should take into consideration local operating conditions.

Recommended Test Gas Concentration

Gas Sensor Type		ZERO GAS	SPAN GAS	
CH_4:	100% LEL	Zero Air	2.2% v/v	CH_4
CO:	500 ppm	Zero Air	500 ppm	CO
H_2S:	50 ppm	Zero Air	50 ppm	H_2S
NO:	50 ppm	Zero Air	50 ppm	NO
NO_2:	20 ppm	Zero Air	20 ppm	NO_2
SO_2:	20 ppm	Zero Air	20 ppm	SO_2
CO_2:	2% v/v	Nitrogen 100%	2%	CO_2
O_2:	25%	Nitrogen 100%	25%	O_2

Standard test gas canisters are available from our Product Support department and can be supplied in a range of capacities from 34 litres up to 110 litres.

Please call our sales engineers for advice regarding recommended test gas procedures and product support plans.

Checkpoint

- The calibration gas shown is the recommended level of concentration. Any concentration gas down to 50% of full scale can be utilised for accurate calibration.
- CH_4 test gas must be combined with balance air if being used to calibrate pellistor based devices.
- 25% O_2 cannot be shipped by air transport, so a concentration below 23% would be supplied.

5.3 Maintenance and Calibration Log

Order Reference: TX	
Serial Number:	Date Purchased:
Gas Type:	Location:

Date	Scheduled Check	Fault	Recalibrate	Change Modules	Return to Trolex	Comments

5.4 Disposal

Part of the ethos of Trolex is sustainable design. **Sentro 1** contains materials that can be recovered, recycled and reused. At the end of its useful life ensure that the **Sentro 1** is recycled in accordance with local laws and bylaws for the geographic area where it is located. The end of its useful life is to be determined by the owner/operator of the equipment and not Trolex. Ensure that the **Sentro 1** is recycled by licenced waste contractors with the appropriate licences for handling electronic waste in the geographic area where the **Sentro 1** is located.

Checkpoint

Consult your local Trolex service agent or the Trolex Product Support Department if you require assistance with disposal: **service@trolex.com**

Disclaimers

The information provided in this document contains general descriptions and technical characteristics of the performance of the product. It is not intended as a substitute for and is not to be used for determining suitability or reliability of this product for specific user applications. It is the duty of any user or installer to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use. Trolex shall not be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments, or find errors in this publication, please notify us at marketing@trolex.com.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only Trolex or its affiliates should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Trademarks

Document History

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Contact Details

Trolex Ltd, Newby Road, Hazel Grove, Stockport, Cheshire, SK7 5DY, UK
+44 (0) 161 483 1435 sales@trolex.com

Trolex Ltd. Newby Road, Hazel Grove, Stockport, Cheshire SK7 5DY, UK
t: +44 (0)161 483 1435 **e:** sales@trolex.com www.trolex.com