

STX3261 FLAMMABLE GAS SENSOR



INSTALLATION & OPERATING DATA

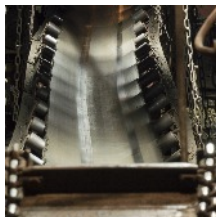
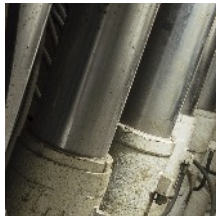


A TEX
M1
GROUP I
INTRINSICALLY
SAFE

MINING

TUNNELLING

MINERAL
EXTRACTION



contents...

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INSTALLATION & OPERATING DATA

1 PRINCIPAL OPERATING FEATURES

Fixed gas sensors for the detection of flammable gases present in the atmosphere.



Poison resistant CATALYTIC COMBUSTION sensors for a wide range of flammable gases.

LCD readout of gas concentration with OVER RANGE indication.

Convenient calibration of ZERO and SPAN via front mounted potentiometers.

Signal CLAMP after gas over-range with manual reset.

Output signal versions: 4 to 20 mA or 0.4 to 2 V.

Reinforced Polymer - EMC protected and proof against electrostatic charge.



Intrinsically safe for use in Group I hazardous areas.

Optional format with remote mounted gas sensing module in



2 APPLICATION

Fixed gas monitoring for point-source hazards and perimeter protection in arduous duty and exposed locations.

Safety protection for toxic gas risk occurring in hazardous areas and general industrial applications.

A range of primary instrumentation and monitoring modules is available from Trolex 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.

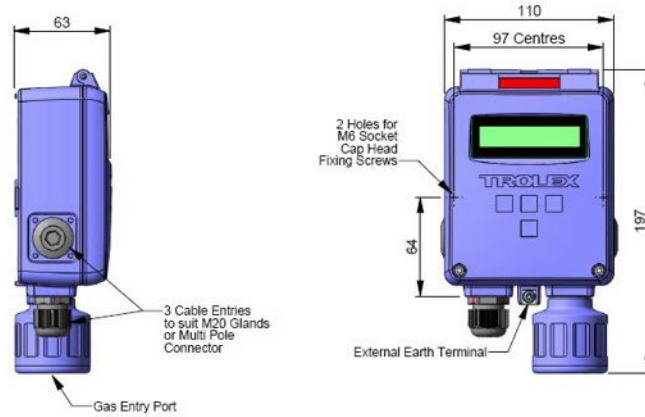


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INSTALLATION & OPERATING DATA

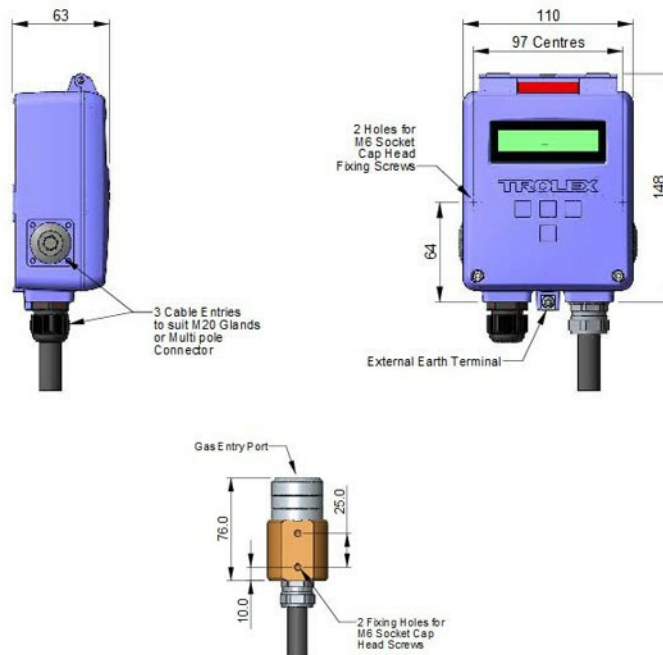
3 DIMENSIONS

3.1 STX3261.01 FLAMMABLE GAS SENSOR/TRANSMITTER



ALL DIMENSIONS IN MM

3.2 STX3261.01.84 FLAMMABLE GAS SENSOR/TRANSMITTER with Remote Gas Sensing Module.



ALL DIMENSIONS IN MM

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4 TECHNICAL DETAILS

4.1 Specification

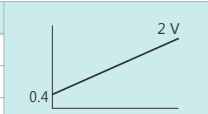
Operating Temperature Limits:	-10 to +40°C.
Humidity:	95% non condensing.
Storage Temperature Limits:	-20 to +60°C.
Ambient Pressure Limits:	1013 mb ± 100 mb absolute.
Protection Classification:	Dust & waterproof to IP66. Gas inlet port to IP54.
Housing Material:	Reinforced Polymer - EMC protected and proof against electrostatic charge.
Cable Entries:	M20 x 1.5
Sensing Principle:	Catalytic combustion.
Electrical Connections:	4 mm barrier/clamp terminals.
Information Display:	Graphic LCD.
Impact Limits:	20 joules (housing).
Nett Weight:	450 g.


GAS SENSING MODULE

Measuring Range:	0 to 4% v/v CH ₄ . Calibrated for Methane. Alternative sensing ranges available to specification.
Linearity:	LINEAR: 0 to 3% v/v. ±5% from 60% up to 100% FULL SCALE. ±0.2% v/v: 3 to 4% v/v.
Maximum Drift @ 25°C:	±0.25% v/v per month.
Response time (T90):	<20 secs.
Sensing Element Life:	>5 years in clean atmosphere.
Warm Up Time:	<5 mins in air or 1% v/v CH ₄ . (To 95% of stated accuracy).
Over range:	If the measured gas concentration exceeds the calibration range of the sensor: The display will indicate TRIPPED at full scale. The transmitted output signal will be CLAMPED at full scale.
Pellistor Protection:	The supply to the gas sensing element will be switched off to prevent oxidation damage occurring if the gas concentration exceeds safe limits. The sensor will remain switched off until reset.

4.2 Electrical Details

STX3261.01 GROUP I APPLICATIONS (12 V dc)

Output:	0.4 to 2 V dc	
Min Load	10 k ohms	
Supply	8.2 to 14.4 V dc	
Max Supply Current	60 mA (@12 V)	

Output:	4 to 20 mA	
Max Load @12 V	250 ohms @12 V	
Supply	8.2 to 14.4 V dc	
Max Supply Current	80 mA (@12 V)	

INSTALLATION & OPERATING DATA

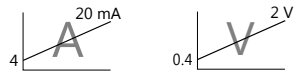
5 INSTALLATION

5.1 Conformity Check



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(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 Is the correct supply voltage available for the sensor?

0 to 4% v/v CH₄ Is the type of gas 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?

STANDARD OPTIONS AVAILABLE



STX3261.01 FLAMMABLE GAS SENSOR/ TRANSMITTER

TYPE OF GAS	Refer to Section 4.1	
OUTPUT SIGNAL	0.4 to 2 V	(11)
	4 to 20 mA	(12)



STX3261.01.84 FLAMMABLE GAS SENSOR/ TRANSMITTER with Remote Gas Sensing Module.

TYPE OF GAS	Refer to Section 4.1	
OUTPUT SIGNAL	0.4 to 2 V	(11)
	4 to 20 mA	(12)

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.

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.



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5 INSTALLATION continued

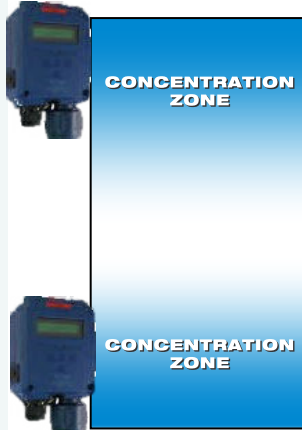
5.5 Relative Density

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 highly flammable 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.



Hydrogen	LIGHTER THAN AIR
Town gas	
Methane	
Ammonia	
Acetylene	
Carbon monoxide	
Ethylene	HEAVIER THAN AIR
Methyl alcohol	
Propane	
Ethanol	
Acetone	
Butane	
Pentane	
Benzene	
Hexane	
Ethyl acetate	
Toluene	
Petrol	
O-Xylene	
Octane	

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 Operating Limits of Catalytic Combustion Sensors

Catalytic combustion gas 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.

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INSTALLATION & OPERATING DATA

5 INSTALLATION *continued*

5.9 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.

5.10 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 carbons may also cause temporary inhibition.

5.11 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 sensitivity.

5.12 High Concentrations of Flammable Gas

Exposure of 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.



If the gas concentration does exceed 100% FULL SCALE, the supply voltage to the catalytic combustion sensing element will be automatically switched off to prevent damage to the element.

The sensor output signal will be CLAMPED at full scale, the display will indicate TRIPPED.

5.13 Toxicity

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

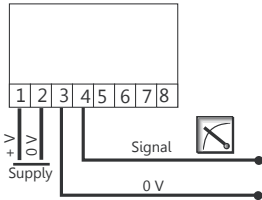
5.14 Ingress Protection

The Ingress Protection of the sensor housing and the cable entry must be maintained in order to comply with EX requirements.



6 CONNECTIONS

OUTPUT SIGNAL OPTIONS

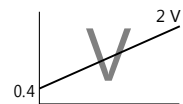
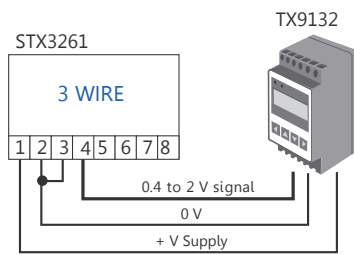


STX3261.01 FLAMMABLE GAS SENSOR/ TRANSMITTER **GROUP I**

6.1

0.4 to 2 V Output Signal

3 WIRE CONNECTION

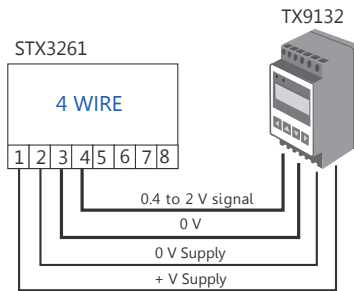


A low impedance two-wire voltage output signal requiring a separate power supply to the sensor.

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 10 metres distance between the sensor and the monitoring equipment.

4 WIRE CONNECTION



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.

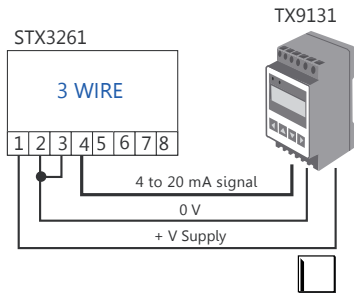
This effect can be reduced on long distance connections by increasing the size of the cable cores, or even better, running a separate 0 V conductor to power the sensor enabling operating distances up to 1000 m.



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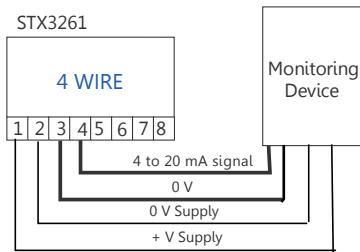
6 CONNECTIONS *continued*

6.2 4 to 20 mA Output Signal



The sensor may be connected in 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.



6.3 Using Gas Sensors in Hazardous Areas

GROUP I HAZARDOUS AREAS (MINING)

STX3261.01 FLAMMABLE GAS SENSOR/ TRANSMITTER



All options of the STX3261.01 sensor (0.4 to 2 V, 4 to 20 mA) are certified Intrinsically Safe for use in Group I hazardous areas (Mining) when used with approved equipment. eg. TX9131 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 mm².



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7 CONTROLS AND INDICATORS

7.1 STX3261.01 FLAMMABLE GAS SENSOR/ TRANSMITTER



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STX3261.01.84 FLAMMABLE GAS SENSOR/ TRANSMITTER with REMOTE GAS SENSING MODULE



This version uses the same gas sensing module as the STX3261.01.

The module is fitted into a robust metal housing which can be mounted at a remote location, or on machines where space is constricted and the operating conditions are extremely harsh.



Connections:	2 metres, flexible cable in a flexible armoured conduit. (other lengths available to specification. Max 10 m).
Protection Classification:	Dust & waterproof to IP66. Gas inlet port to IP54.
Housing Material:	Brass.

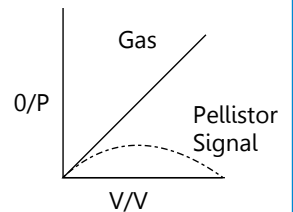
7 CONTROLS AND INDICATORS continued

7.1 STX3261.01 FLAMMABLE GAS SENSOR/ TRANSMITTER

7.3 OVER RANGE INDICATOR

Erroneous readings will be given by a pellistor gas sensing element if it is exposed to gas concentrations that exceed its normal working range of 0 to 4%v/v CH₄.

The increase in gas concentration displaces the oxygen in the atmosphere so the pellistor becomes progressively less effective, to the point where its output signal actually starts to *decrease* as the gas concentration continues to *increase*.

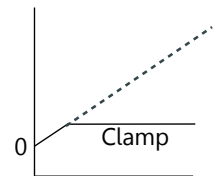


When OVER RANGE is detected, three conditions will be initiated.

The display will indicate a TRIPPED condition to prevent ambiguous readings.

The transmitted output signal will be CLAMPED at FULL SCALE to prevent an ambiguous output signal from being transmitted.

The pellistor will be switched OFF to prevent oxidation damage.



RESET

To RESET the OVER RANGE condition, open the top cover and press the reset button.

This will only be effective when the gas concentration has receded.



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8 CALIBRATION



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

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



Refer to Section 9



New Installations

The aging of the Catalytic Combustion sensing element (Pellistor) means that the sensor will require periodic calibration to maintain a good response accuracy. Monthly calibration intervals will be sufficient for normal working environments.

The Pellistor baseline tends to shift positively as it deteriorating and this effect can be more pronounced during the initial period immediately after installation. Consequently, the sensor may develop a small positive reading in the order of 0.125% v/v in the first month of use, reducing to about 0.075% v/v in the succeeding month.

More frequent calibration may be required during this settling-in period in order to limit the amount of zero offset to a maximum of 0.1% v/v.



8.1 Prepare to Calibrate

The sensor should be powered for a minimum of 30 minute prior to commencing calibration.

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



8.2 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.



8.3 Calibrate 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.



The test gas used must be a minimum concentration of 58% of the full scale measuring value of the sensor.

9 MAINTENANCE

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

9.1 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.

Recalibrate if necessary.

Refer to Section 8



9.2 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.

9.3 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.

9.4 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.



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INSTALLATION & OPERATING DATA



9 MAINTENANCE continued

9.5 Maintenance and Calibration Log

ORDER REF STX3261.01	DATE SUPPLIED
SERIAL No.	USER
GAS TYPE	LOCATION

DATE	SCHEDULED	FAILURE	RE-CALIBRATE	CHANGE GAS SENSING MODULE	RETURN TO MANUFACTURER	COMMENTS
DD/MM/YY	✓	✓	✓	✓	✓	



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10 APPROVALS AND CERTIFICATION

10.1 Intrinsically Safe

10.1.1 ATEX



The instrument is certified Intrinsically Safe Group I apparatus for use in potentially explosive atmospheres to when used with an approved power supply or safety barriers.

The sensor is designed to comply with the ATEX directive (94/9/EEC).

STX3261.01

FLAMMABLE GAS SENSOR/TRANSMITTER

GROUP I: I M1
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Sira 06ATEX2036X
(Ta = -20 to +55°C)

10.1.2 ANZEx

The instrument is certified Intrinsically Safe Group I apparatus for use in potentially explosive atmospheres to when used with an approved power supply or safety barriers.



STX3261.01.11 and STX3261.01.12

FLAMMABLE GAS SENSOR/TRANSMITTER

GROUP I: Ex ia I
ANZEx 07.3066X
(Ta = +55°C)

10.1.3 MASC



The instrument is certified Intrinsically Safe Group I apparatus for use in potentially explosive atmospheres to when used with an approved power supply or safety barriers.

STX3261.01

FLAMMABLE GAS SENSOR/TRANSMITTER

GROUP I: Ex ia I
MASC M/11-361X
(Ta = -20 to +55°C)

10.2 General Conditions for Safe Use

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.

10.3 Special Conditions for Safe Use

The ingress protection rating of the unit is IP54, which must be maintained at all times.

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