DET-TRONICS
United Technologies

Instructions

Nanotechnology
Metal Oxide Semiconductor (NTMOS)
H_2S Gas Detector

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INSTRUCTIONS

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APPLICATION

The Det-Tronics Nanotechnology Metal Oxide Semiconductor (NTMOS) Hydrogen Sulfide (H_2S) stand-alone gas detector delivers an ideal detection solution in challenging environments where electrochemical sensing technologies are not preferred.

The NTMOS H_2S Detector uses the latest Nanotechnology (NT) to ensure the highest performance and reliability. The sensing element is packaged and protected in a rugged stainless steel housing, making it suitable for installation in hazardous locations.

The NTMOS Detector is tested to the ANSI/ISA 92.0.01 performance standard for H_2S detection. The standard is utilized for the protection of personnel working in hazardous industries, such as in the on/off shore production of oil and gas.

This recommended practice applies to all toxic gas detection instruments that satisfy the performance requirements in ANSI/ISA 92.0.01, Part I-1998, Performance Requirements for Toxic Gas-Detection Instruments: Hydrogen Sulfide. It establishes user criteria for the installation, operation, and maintenance of toxic gas detection instruments, while meeting API requirements 14C, RP92.0.02 and others. Refer to Appendix A for ANSI/ISA 92.0.01 test results.

FEATURES

- Fast response to all H_2S concentrations
- Linear 4-20 mA output signal corresponding to H_2S concentration (non-isolated)
- Performance approved to ANSI/ISA 92.0.01
- Non-intrusive calibration using the internal magnetic reed switch on the GDTB or UD10
- Automatic fault diagnostics via current output
- Detector approved as a stand alone unit and provides automatic calibration initiation capability
- Easily integrated with the Eagle Quantum Premier® (EQP) system using the Analog Input Module (AIM) to provide display and control capabilities
- Easily retrofitted into existing R8471B Series control/display card systems
- Model with sinter guard provides protection for sintered filter in high impact risk installations
- Ideal for extreme environmental conditions.

DESCRIPTION

The NTMOS detector uses the latest nanotechnology for detecting the presence of hydrogen sulfide gas. The sensor provides improved accuracy, reliability, and extended calibration intervals when compared to ordinary solid state type sensors. Unlike typical metal oxide sensors, the sensor in the NTMOS detector will not fall asleep during operation.

The NTMOS detector has multiple third party related approvals. Refer to the Appendices section for more details.

DETECTOR OUTPUT

The non-isolated 4-20 mA dc drive circuitry is rated at a maximum 600 ohms loop resistance with 24 Vdc supply voltage.

MODEL GDTB TERMINATION BOX

When not connected directly to a transmitter/control device, the NTMOS detector can be connected to a GDTB Termination Box. The GDTB contains a circuit board with the required connectors for proper field wiring, as well as an internal magnetic switch for non-intrusive detector calibration and an LED to indicate calibration status. Refer to the GDTB Instruction Manual (number 95-8644) for complete information regarding the GDTB.

DET-TRONICS TRANSMITTERS

The NTMOS detector integrates easily with the following Det-Tronics transmitters:

FlexVu Model UD10

The FlexVu® Model UD10 Display Unit is recommended for applications where a gas detector with digital read-out of detected gas levels and analog, relay contact, and/or Modbus RS485 signal outputs are required. The Model UD10 performs all the functions of a gas controller.

Gas concentrations are displayed on an alphanumeric display in ppm. The UD10 provides a linear isolated/ non-isolated 4-20 mA DC output signal (with HART) that corresponds to the detected gas concentration or indicates a fault condition.

All electronics are enclosed in an explosion-proof aluminum or stainless steel housing. The display unit is used with a single detector that may be either coupled directly to the UD10, or remotely located using an STB or GDTB.

The UD10 features non-intrusive calibration. A magnet is used to perform calibration as well as to navigate the internal configuration menu. Refer to the UD10 Instruction Manual (number 95-8618) for complete information regarding the FlexVu UD10 Display Unit.

U9500 Infiniti Transmitter

The U9500B Infiniti® transmitter is a single channel device. In addition to the standard 4-20 mA analog signal output, the U9500B offers 4 optional relay outputs for fault and alarm indications. The 4 outputs are: fault, high alarm, low alarm, and auxiliary alarm. The relays have form C (SPDT) contacts. The alarm relay contacts are selectable as a group for latching or non-latching. During normal operation, the fault relay is non-latching, but for initialization faults, the fault relay latches. The alarm relays are also selectable, as a group, for normally energized or de-energized (no alarms). The fault relay is always normally energized (no fault). Refer to the Infiniti Transmitter Instruction Manual (number 95-8444) for complete information regarding the transmitter.

INSTALLATION

CAUTION

The wiring procedures in this manual are intended to ensure proper functioning of the device under normal conditions. However, because of the many variations in wiring codes and regulations, total compliance to these ordinances cannot be guaranteed. Be certain that all wiring complies with applicable regulations that relate to the installation of electrical equipment in a hazardous area. If in doubt, consult the authority having jurisdiction before wiring the system.

NOTE

The NTMOS detector shall be connected to a performance certified control unit with latching alarms.

NOTE

Exposure to silicones can adversely affect the NTMOS detector and must be avoided.

DETECTOR POSITIONING

Proper detector location is essential for providing maximum protection. The most effective number and placement of detectors varies depending on the conditions at the job site. The individual designing the installation must rely on experience and common sense to determine the number of detectors needed and the best locations to adequately protect the area. The following factors are important and should be considered for every installation:

1. Since hydrogen sulfide is a highly toxic gas, a primary consideration in determining optimum detector locations is to identify where people are most likely to first come into contact with the toxic gas. This contact point is typically a prime location for an H_2S gas detector.
2. Factors such as vapor density should also be considered when determining detector locations. Hydrogen sulfide is slightly heavier than clean air, and therefore may tend to settle near the floor or ground, unless it is heated, mixed with other gases that are lighter than air, or prevented from doing so by ambient air movement patterns.
3. How rapidly will the H_2S gas diffuse into the air? Select a location for the detector as close as practical to an anticipated source.
4. Detectors should be placed where the most concentrated accumulation of hydrogen sulfide gas is anticipated. Also consider the fact that some ventilation systems do not operate continuously, and therefore areas with poor circulation should be evaluated for toxic gas accumulation.
5. The detector should be located where it is safe from potential sources of contamination. Allow adequate clearance from the mounting surface to prevent rain or hosedowns from splashing onto the sintered filter.
6. The detector should always be installed pointing straight down.
7. The detector must be accessible for testing and calibration. Allow adequate space for attaching the NTMOS approved H_2S calibration device. See Specifications section of this manual for dimensions.
8. Exposure to excessive heat or vibration can cause premature failure of electronic devices, and should be avoided if possible. Shielding the device from intense sunlight will reduce solar heating. For details regarding the operating and storage temperatures of the NTMOS detector, refer to “Temperature Range” in the Specifications section.

WIRING REQUIREMENTS

The maximum allowable distance between the NTMOS detector and transmitter/control device is limited by the resistance of the cabling used. To ensure proper operation, a minimum of 18 Vdc is required at the detector.

When mounted remotely from the transmitter/controller, shielded cable or dedicated conduit is required for wiring the detector. Ground the shield at the transmitter/controller end only.

In applications where the detector cable is installed in conduit, the conduit should not be used for wiring to other electrical equipment whenever possible. If other equipment power wiring is run in the same conduit, the detector cabling **must** be shielded.

If an additional signal conditioning or relay output transmitter is being used along with the NTMOS detector, refer to the specific transmitter manual for detailed wiring instructions.

It is important that moisture not be allowed to come in contact with the electrical connections of the system.

Use proper piping techniques, breathers, glands, and seals as required to prevent water ingress and/or maintain explosion-proof ratings.

Table 1—NTMOS Detector Wiring Identification

Wire Color	Function
Red	24 Vdc +
Black	24 Vdc –
White	4-20 mA Signal
Yellow*	Calibrate Line
Orange**	Connect to Isolated Spare
Grey**	Connect to Isolated Spare

* If the yellow wire is not being used, do not connect it to dc minus.
** For factory use only. Connect to isolated Spare terminal or tape off to prevent contact to any conductor.

INSTALLATION AND WIRING

1. Determine the best mounting locations for the detector. Mount the detector with the sintered end pointing down. The junction box (GDTB or transmitter housing) is intended for flat-surface mounting, such as on a wall or post. A spacer or stand-off (1/4 to 1/2 inch) may be needed to allow adequate clearance for the detector and calibration cup. The junction box should be electrically connected to earth ground.

NOTE

To ease installation and future removal, use either teflon tape or Lubriplate grease (see Ordering Information for part number) to lubricate the junction box cover and detector threads. The use of silicone grease must be avoided.

2. Terminate all detector wiring at the proper terminals and verify that bonding between detector housing-to-ground terminal is less than 0.1 ohm. Refer to Table 1 and Figures 1 to 4 for wiring details:

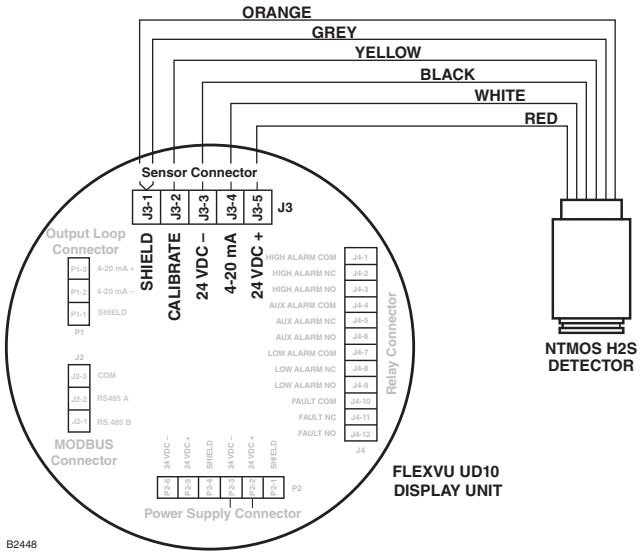

Figure 1—NTMOS Detector Wired to FlexVu Model UD10

3. Confirm that the power and signal cabling for the gas detector is the proper size and type, and is appropriate for the application requirements. After all electrical connections are made, double check the terminations against the wiring diagrams to ensure that all connections are properly terminated.

4. The NTMOS detector is designed to operate at 24 Vdc. Before proceeding with complete system commissioning, measure the delivered voltage at the detector to ensure that possible voltage drops have not compromised the necessary 24 Vdc supply voltage.

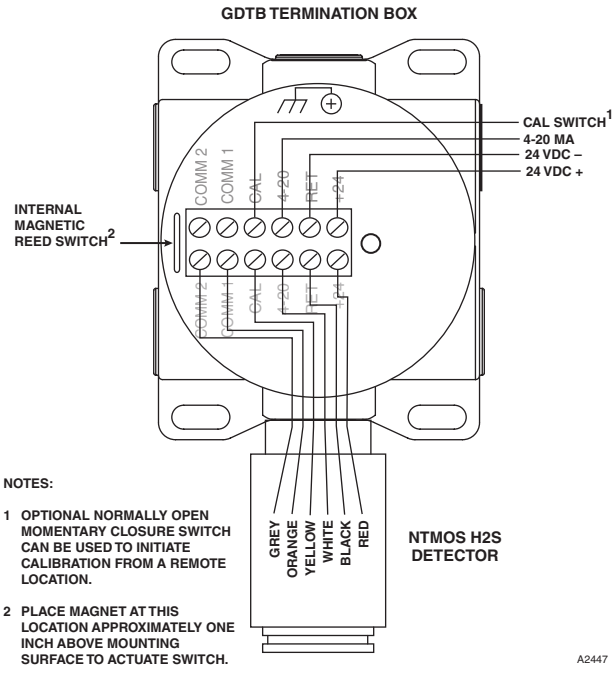

Figure 2—NTMOS Detector Wired to GDTB Termination Box for Stand-Alone Operation

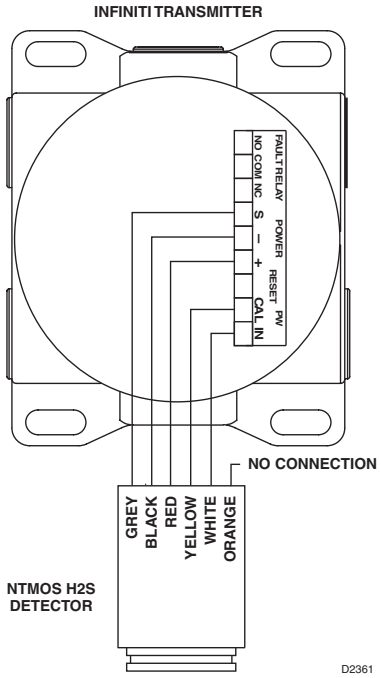

Figure 3—NTMOS Detector Wired to U9500 Infiniti Transmitter

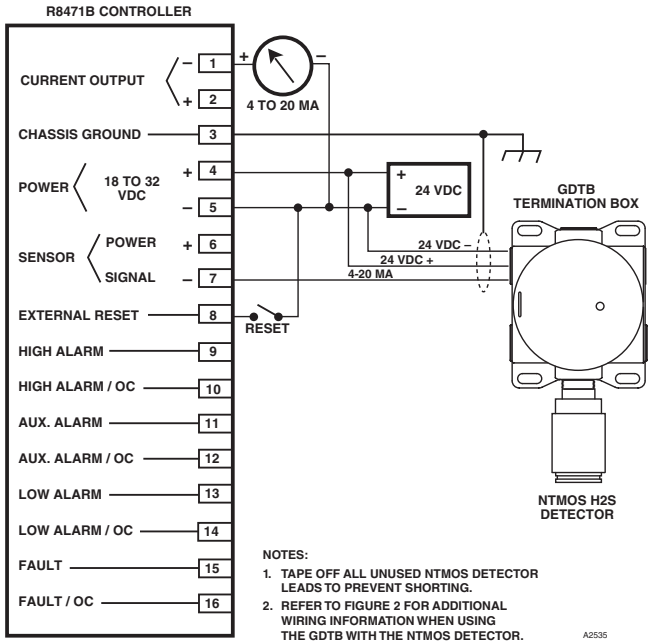

Figure 4—NTMOS Detector Wired to Model R8471B Controller through the GDTB Termination Box

NOTE

Do not apply power to the system with the junction box cover removed unless the area has been de-classified.

5. After confirming that the detector is properly installed and wired, all electrical terminations are properly made, and proper operating voltage is provided to the detector, the installer may conduct the startup procedure.

STARTUP PROCEDURE

WARNING

Ensure that any output loads actuated by the detection system are bypassed to prevent accidental or unnecessary activation of these devices.

1. Apply power to the system.

NOTE

Transmitters and display/control devices typically have a "warm-up" period to allow the detector to stabilize before beginning normal operation (the NTMOS detector can remain in warm-up for up to 30 minutes). After long periods without power, the detector output may still not have returned to zero ppm by the end of the warm-up period. In some cases, an alarm level of H_2S may be indicated. Keep all output loads that are actuated by the system in bypass until all alarms clear.

2. **Allow the detector to operate for 16 to 24 hours prior to an initial calibration**, then perform the "Calibration Procedure" as described in the following section. It may be necessary to refer to other transmitter and/or controller manuals to complete calibration.
3. Complete any additional startup/commissioning requirements as described in the manual provided with the transmitter/control device.
4. Place the system in normal operation.

CALIBRATION

FREQUENCY OF CALIBRATION

The NTMOS detector is typically utilized to protect human life. For this reason, frequent calibration inspections are recommended. The specific frequency required in different applications can vary depending upon the amount of background gas, concentration of exposed H_2S, and ambient environmental conditions.

Calibration **must** be performed:

— When a new system is initially put into service.

— When the detector is replaced.

— If a transmitter, controller or other device used in conjunction with the NTMOS detector is replaced.

The following calibration/bump test schedule is recommended and will ensure reliable operation in most applications:

1. 30 days after initial calibration.
2. Every 90 days thereafter, or as required by the application and environment.

IMPORTANT

To ensure adequate protection, the H_2S detection system must be calibrated on a regularly scheduled basis.

CALIBRATION GAS

The NTMOS H_2S detector must be calibrated using the humidification tube with bottled H_2S in air (Figure 8), or with the ampoule calibration kit.

IMPORTANT CALIBRATION NOTES

- *Proper calibration requires the use of either Det-Tronics' NTMOS calibration kit with humidification tube and bottled H_2S in air (p/n 010272-001), or the ampoule calibration kit (p/n 007098-005).*
- *When calibrating with bottled H_2S in air, the humidification tube **must** be utilized, or inaccurate readings will occur.*
- *WARNING: Using a gas mixture other than 50% span of H_2S in air will produce inaccurate calibration results, possibly resulting in a dangerous condition if the detector under-reports the level of H_2S.* ***Do not use bottled H_2S with nitrogen.***
- *Prevent all contact of any oil based material from the humidification tube.*
- *When kept clean, there is a 2 year life expectancy on the humidification tube.*

If background H_2S gas is present, it may be necessary to purge the detector with clean air to ensure that an accurate zero or "clean air" condition is present prior to initiating calibration.

CALIBRATION PROCEDURE

The NTMOS detector requires zero and span calibration, achievable with the humidification tube kit or the ampoule calibration kit. It is highly recommended that the FlexVu UD10 Display Unit, Model U9500B Transmitter, or Model R8471B Controller be utilized with the NTMOS detector to enable non-intrusive field calibration. When using the UD10, U9500B, or R8471B for calibration, refer to the related manual for specific calibration instructions.

Calibrating a Stand-Alone NTMOS Detector

1. A dc current meter capable of measuring 4-20 mA must be connected to the current loop output. This can be accomplished by connecting a dc ammeter in series with the load or by connecting a digital dc voltmeter across a known load resistance and calculating the current flow using the formula: current (I) = voltage/load resistance.
2. If the detector is powered-up after a shutdown, it must be allowed to warm-up for a period of 16 hours prior to calibration. (Before calibrating a new detector, allow a 24 hour warm-up period after initial power-up).
3. Initiate calibration by activating the calibration line.
4. The current output goes to 2.2 mA while the detector automatically calibrates the zero output.
5. When the current output goes to 2.0 mA, apply 50% span of H_2S gas in air to the detector using the humidification tube kit, or the ampoule calibration kit. When using the humidification tube it **must** be attached to the detector via a cal cup before applying gas, and ensure that the flow rate is set to 0.5 liters/min.
6. Upon successful calibration, the current output will go to 1.8 mA. Remove the calibration gas. The output will go to 4 mA. Reference the following table:

Calibration Sequence for NTMOS Detector

Current Output	Detector Action	Operator Action
		Actuate Cal Line
2.2	Zero Cal	None
2.0	Span Cal	Apply Cal gas
1.8	Cal Complete	Remove Gas
4.0	Normal Operation	

NOTE

If the current meter reads 1.6 mA, the calibration has failed. Replace the detector and repeat the calibration.

MAINTENANCE

The NTMOS detector is an industrial-grade device, suitable for a wide variety of challenging environmental conditions. However, a routine maintenance schedule is recommended to ensure that the detector is in peak operating condition at all times. To ensure top performance, service the device as follows.

VISUAL INSPECTION

A visual inspection approximately once per week is recommended to ensure that physical obstructions such as trash, debris, mud, snow, or oil have not blocked or impeded hazardous gas access to the detector.

SINTERED METAL FILTER

H_2S gas enters the detector through the sintered metal filter on the front of the detector housing. A dirty filter can significantly reduce the amount of H_2S gas that is able to reach the sensing element, thereby impairing the ability of the system to respond to a hazardous condition. If the filter becomes dirty and cannot be properly cleaned or if it is damaged, the detector must be replaced.

NOTE

If the device cannot be calibrated or responds slowly to the calibration gas, check the condition of the filter before replacing the detector.

FUNCTIONAL (RESPONSE) TEST

It is acceptable to perform a functional (response) verification test in lieu of a complete calibration if the detector output in clean air appears stable and has been calibrated recently.

This test involves applying calibration gas to the detector while in normal operating mode and confirming correct detector response. Proper calibration requires the use of either Det-Tronics' NTMOS calibration kit with humidification tube and bottled H_2S in air (p/n 010272-001), or the ampoule calibration kit (p/n 007098-005). It is the operator's responsibility to bypass any and all system alarm output devices, if necessary, prior to conducting the response test. If the response test results are not acceptable, then a complete calibration must be performed.

The NTMOS H_2S detector must be "functional tested" using only Det-Tronics humidification tube kit or the ampoule kit. All ampoule functional tests must be performed using the Det-Tronics H_2S Mixer with thumb screw ampoule breaker and internal mixing fan (p/n 007067-001). When using either method to perform a response test **do not use bottled H_2S with nitrogen**.

DETECTOR REPLACEMENT

The NTMOS detector is not repairable. If calibration can no longer be properly performed, the detector must be replaced.

The area must be de-classified and power to the detector should be removed prior to replacing the detector in a hazardous area.

Follow the procedure below to replace the detector.

1. Remove power to the transmitter or controller prior to replacing the detector.
2. Remove the transmitter/termination box cover.
3. Disconnect the detector wiring, then unscrew it from the conduit entry.
4. Thread the wires for the replacement detector through the conduit entry and screw the detector into the conduit entry. Connect the detector wires to the appropriate terminals.
5. Replace the junction box cover.
6. Re-apply power. Refer to "Startup Procedure."

An adequate supply of spare detectors should be kept on hand for field replacement. For maximum protection against contamination and deterioration, they should not be removed from the original protective packaging until the time of installation. To ensure maximum storage life, detectors should be stored in their original packaging, or if the bag has been opened, with the plastic cap and desiccant capsule in place. Always calibrate after replacing the detector.

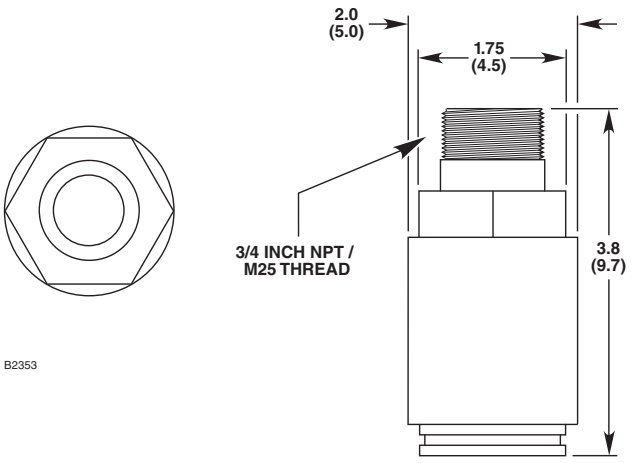

Figure 5—Dimensions of NTMOS Detector without Sinter Guard in Inches (Centimeters)

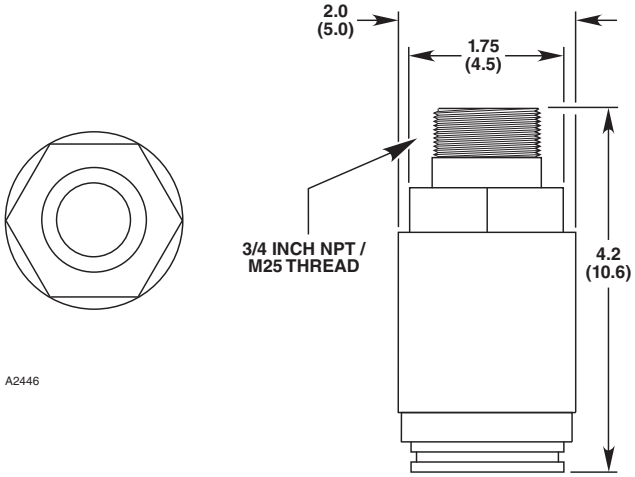

Figure 6—Dimensions of NTMOS Detector with Sinter Guard in Inches (Centimeters)

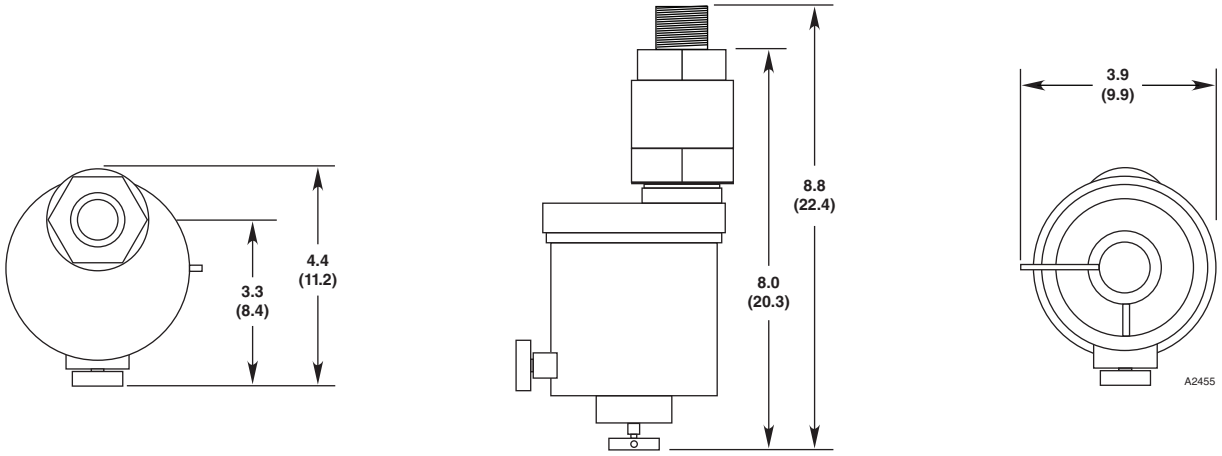

Figure 7—Dimensions of NTMOS Detector with Ampoule Calibration Kit with Mixer Attached in Inches (Centimeters)

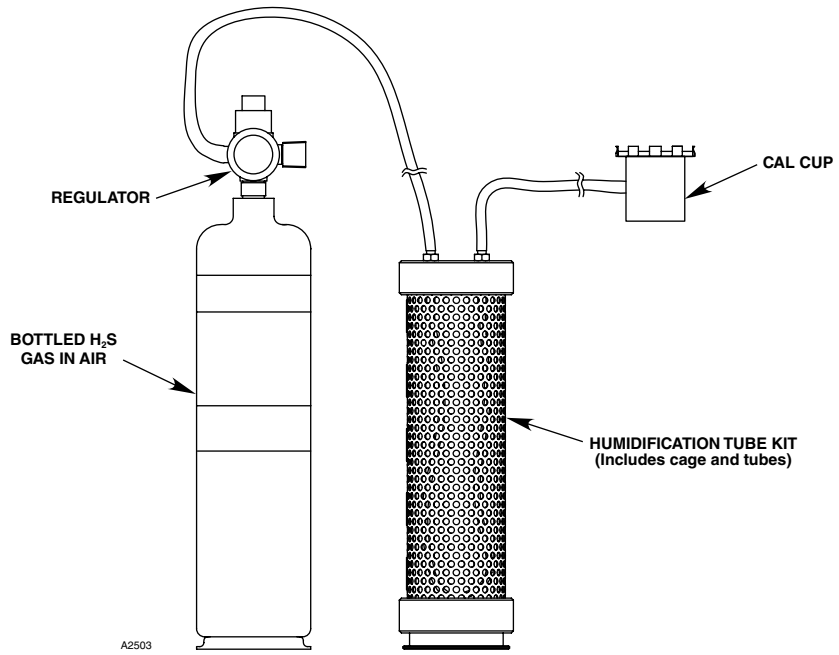

Figure 8—Humidification Tube Assembly

SPECIFICATIONS

CURRENT OUTPUT—
4-20 mA.

MEASUREMENT RANGE—
0 to 100 ppm.

INPUT VOLTAGE—
18 to 30 Vdc, 24 Vdc nominal.

INPUT POWER—
2.5 watts maximum.

TEMPERATURE RANGE—
Operating: –40°F to +149°F (–40°C to +65°C).
Storage: –31°F to +149°F (–35°C to +65°C).

HUMIDITY RANGE—
5 to 95% RH.

RESPONSE TIME—
T50 ≤ 5 seconds with full scale gas applied.
T90 < 10 seconds (typical) with full scale gas applied.

ENVIRONMENTAL LOCATION—
Exposing the detector to certain materials or environments can adversely effect it's performance. These materials and environments include: Silicones, Haliades (Flouride, Chlorine, Bromine and Idonine based compounds), Heavy metals, and Acidic environments.

PERFORMANCE TEST— (FM Verified per ANSI/ISA 92.0.01)

Accuracy
Performance tested to ANSI/ISA-92.0.01:
±10% of applied gas concentration or ±2 ppm whichever is greater

Temperature variation
Performance tested to ANSI/ISA-92.0.01:
–40°C to +50°C, ±8 ppm at 50 ppm of applied gas concentration

Det-Tronics verified:
–40°C to -10°C, ±10 ppm at 50 ppm of applied gas concentration
+50°C to +65°C, ±8 ppm at 50 ppm of applied gas concentration

Humidity variation
Performance tested to ANSI/ISA-92.0.01:
5 to 95% RH: ±5 ppm at 50 ppm of applied gas concentration

Det-Tronics verified:
5 to 15% RH: ±8 ppm at 50 ppm of applied gas concentration

Response time
T50 ≤5 seconds (typical) with full gas scale applied
T90 <10 seconds (typical) with full gas scale applied

Mechanical
Model with and without sinter guard

CROSS SENSITIVITY—
500 ppm CO < or = 10 ppm H_2S
50 ppm H_2 < or = 5 ppm H_2S
5 ppm NO_2 < or = 1 ppm H_2S
100 ppm Methanol < or = 50 ppm H_2S
1000 ppm CH_4 < or = 10 ppm H_2S

BAROMETRIC PRESSURE—
Negligible effect

WARM-UP TIME—
Up to 30 minutes.

CALIBRATION—
Single point, 50% span with Humidification tube kit, or ampoule calibration required.

CALIBRATION CYCLE—
- 30 days after initial calibration.
- Every 90 days thereafter, or as required by the application and environment.

DIMENSIONS—
See Figure 5 for the model without sinter guard.
See Figure 6 for the model with sinter guard.
See Figure 7 for the NTMOS detector with Calibration Gas Mixer attached.

ENCLOSURE MATERIAL—
316 Stainless Steel.

THREAD SIZE—
3/4 inch NPT or M25.

WARRANTY—
24 months from date of manufacture per Terms and Condtions.

SHIPPING WEIGHT—
1.7 pounds (0.77 kilogram).

CERTIFICATION—

FM: Performance tested to ANSI/ISA-92.0.01.
Class I, Div. 1, Groups B, C & D.
Class I, Div. 2, Groups A, B, C & D.
–40°C to +65°C (Performance Verified).
–40°C to +75°C (Haz. Loc. Rating).
IP53.
Acidic atmospheres excluded.

Model with or without sinter guard

For complete FM certification details, refer to Appendix A.

CSA: Class I, Div. 1, Groups B, C & D (T5).
Class I, Div. 2, Groups A, B, C & D (T5).
Tamb –40°C to +75°C (Haz. Loc. Rating).
IP53.
Acidic atmospheres excluded.

Model with sinter guard

For complete CSA certification details, refer to Appendix B.

ATEX: 0539 II 2 G
Ex d IIC T5
FM09ATEX0063X
T5 (Tamb –40°C to +65°C)
IP63.

EN Standards: EN 50270: 2006
EN 60079-0: 2006
EN 60079-1: 2007
EN 60529: 1991+ A1 2000

IECEX: Ex d IIC Gb
IECEx FMG 09.0011X
T5 (Tamb –40°C to +65°C)
IP63.

Model with or without sinter guard

For complete ATEX certification details, refer to Appendix C.

Model without sinter guard

For complete Russian certification details, refer to Appendix D.

CEPEL

Model with or without sinter guard

For complete Brazilian certification details, refer to Appendix E.

DEVICE REPAIR AND RETURN

Prior to returning devices, contact the nearest local Detector Electronics office so that a Return Material Identification (RMI) number can be assigned. **A written statement describing the malfunction must accompany the returned device or component to assist and expedite finding the root cause of the failure.**

Pack the unit properly. Always use sufficient packing material. Where applicable, use an antistatic bag as protection from electrostatic discharge.

NOTE

Inadequate packaging that ultimately causes damage to the returned device during shipment will result in a service charge to repair the damage incurred during shipment.

Return all equipment transportation prepaid to the factory in Minneapolis.

ORDERING INFORMATION

When ordering, please refer to the NTMOS H_2S Gas Detector Model Matrix:

MODEL	DESCRIPTION			
NTM	Nanotechnology MOS H_2S Gas Detector			
	TYPE	**THREAD TYPE**		
	1A	3/4 NPT		
	1B	METRIC M25		
		TYPE	**MEASUREMENT OPTIONS**	
		10	0-100 PPM	
			TYPE	**APPROVALS**
			B	CEPEL (Brazil)
			C	CSA*
			F	FM
			R	VNIIFTRI (Russia)
			W	FM/CSA/ATEX

*Model with sinter guard

Note: not CE compliant

Transmitter: U9500B Infiniti,
Specify with/without relays, aluminum or stainless steel housing.

Display Unit: FlexVu UD10,
Includes relays, 4-20 mA w/HART.
Specify aluminum or stainless steel housing.

Termination Box: Model GDTB,
specify tall or short cover, aluminum or stainless steel.

ACCESSORIES

Part Number	Description
010272-001	Humidification tube kit.
227117-014	Bottled 50 ppm H_2S gas in air.
162552-003	Regulator, for use with humidification tube.
007098-005	Ampoule Calibration Kit, 50 ppm H_2S: Used for performing functional test and calibration.
225741-001	Ampoule: 50 ppm H_2S.
007067-001	H_2S Calibration Gas Mixer with thumb screw ampoule breaker and internal mixing fan.
009700-001	Calibration Magnet: Used for calibrating and programming the UD10 or Infiniti Transmitter.
102868-001	Lubriplate grease, 14 oz.
005003-001	Lubriplate grease, 1 oz.

APPENDIX A

FM Approval

NOTE
The NTMOS gas detector is designed and approved as a 'stand alone' toxic gas detector.

FM APPROVED

Hazardous Location
Class I, Division 1, Groups B, C, D
Class I, Division 2, Groups A, B, C, D
–40°C to +65°C (Performance verified)
–40°C to +75°C (Haz Loc Rating)
IP53
Acidic atmospheres excluded

Performance tested to ANSI/ISA-92.0.01 – Sample of test requirements

Gas Detected	ANSI/ISA 92.0.01: 1998 (App. A) H_2S Requirement	Det-Tronics Model NTM Series Approved Performance
Full Scale Range	10 - 100 PPM full scale	10 - 100 PPM full scale*
Operating Temperature Range	–10°C to +50°C	–40°C to +65°C*
Storage Temperature Range	–35°C to +55°C	–35°C to +65°C*
Test Gas Concentration	45 - 55% of full scale	45 - 55% of full scale
Test Gas Tolerance	1 PPM or 5% of concentration[1]	1 PPM or 5% of
Accuracy/repeatability (Readout or display)	2 PPM or 10% of reading[1]	2 PPM or 10% of reading
Accuracy/repeatability (Alarm-only)	2 PPM or 10% of reading[1]	2 PPM or 10% of reading
Alarm setpoint	50% of full scale	10 to 90% of full scale
Time, Response to 20% of Final	10 seconds	3 seconds
Time, Response to 50% of Final	30 seconds	5 seconds
Time, Response to 90% of Final	N/A	10 seconds
Time, Response to 50% of Initial	45 seconds	3 seconds
Time, Response to 10% of Initial	90 per ballot	4 seconds
High Concentration	1000 PPM	1000 PPM
High Concentration Recovery Time	10 minutes	<= 2 minutes

[1]Where two values exist (e.g., 2 PPM or 10% of reading), the value providing the widest tolerance should be used.
*In accordance with FMID 3033318.

Accuracy
Performance tested to ANSI/ISA-92.0.01:
±10% of applied gas concentration or ±2 ppm whichever is greater

Temperature variation
Performance tested to ANSI/ISA-92.0.01:
–10°C to +50°C, ±5 ppm at 50 ppm of applied gas concentration

Det-Tronics verified:
–40°C to -10°C, ±10 ppm at 50 ppm of applied gas concentration
+50°C to +65°C, ±8 ppm at 50 ppm of applied gas concentration

Humidity variation
Performance tested to ANSI/ISA-92.0.01:
5 to 95% RH: ±5 ppm at 50 ppm of applied gas concentration

Response time
T50 ≤5 seconds (typical) with full gas scale applied
T90 <10 seconds (typical) with full gas scale applied

Mechanical
Model with or without sinter guard

APPENDIX B

CSA Approval

NOTE
The NTMOS gas detector is designed and approved as a 'stand alone' toxic gas detector.

Hazardous Location
Class I, Division 1, Groups B, C, D (T5)
Class I, Division 2, Groups A, B, C, D (T5)
–40°C to +75°C (Haz Loc Rating)
IP53
7 joule impact resistant

Mechanical
Model with sinter guard

APPENDIX C

ATEX / CE Approval
(Not CE compliant)

NOTE
The NTMOS gas detector is designed and approved as a 'stand alone' toxic gas detector.

Hazardous Location

ATEX: 0539 ⟨Ex⟩ II 2 G
Ex d IIC G T5
FM09ATEX0063X
T5 (Tamb = –40°C to +65°C)
IP63

EN Standards: EN 50270: 2006
EN 60079-0: 2006
EN 60079-1: 2007
EN 60529: 1991+ A1 2000

IECEX: Ex d IIC Gb
IECEx FMG 09.0011X
T5 (Tamb = –40°C to +65°C)
IP63

Special Conditions for Safe Use (X)

- The NTMOS Hydrogen Sulfide Toxic Gas Detector shall be connected directly to a junction box or instrument suitable for the area of installation to provide protection for the flying leads.
- The NTMOS Hydrogen Sulfide Toxic Gas Detector, when the optional sinter guard is not fitted, meets the impact test requirements according to the low level risk of mechanical danger. Therefore, when the optional guard is not fitted, the NTMOS Hydrogen Sulfide Toxic Gas Detector must be located and installed such that the risk of impact is reduced.

Mechanical
Model with or without sinter guard

APPENDIX D

Russian Approval

NOTE
The NTMOS gas detector is designed and approved as a 'stand alone' toxic gas detector.

GOST-R (VNIIFTRI) Hazardous Location
1ExdIICT5 X
Tamb = –40°C to +65°C
IP53

Pattern Approval Certificate of Measuring Instruments (Performance)

Accuracy
Absolute: ±2 ppm (1-10 ppm)
Relative: ±10% (10-100 ppm)

NOTES
Additional accuracy deviation over temperature and humidity.

Temperature variation
–40°C to +65°C: ±5%

Humidity variation
5 to 95% RH: ±5%

Response time
T50: 5 seconds
T90: 10 seconds

Output range
4 to 20 mA

Input Voltage
18 to 30 Vdc, 24 Vdc nominal

Input power
2.5 watts

Mechanical
Model without sinter guard

APPENDIX E

Brazilian Approval

CEPEL

CERTIFICATION Nº: CEPEL-EX-1964/10X

Hazardous Location
BR-Ex d IIC T5
Tamb = –40°C to +65°C
IP63

IEC Standards: IEC 60079-0/07
IEC 60079-1/07
IEC 60529/01

Mechanical
Model with or without sinter guard

FlexSonic™ Acoustic
Leak Detector

X3301 Multispectrum
IR Flame Detector

PointWatch Eclipse® IR
Combustible Gas Detector

FlexVu® Universal Display
with GT3000 Toxic Gas Detector

Eagle Quantum Premier®
Safety System

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Det-Tronics manufacturing system is certified to ISO 9001—
the world's most recognized quality management standard.

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United Technologies