Instructions

Nanotechnology

Metal Oxide Semiconductor (NTMOS)

H$_2$S Gas Detector
APPLICATION

Detector Electronics Corporation’s (Det-Tronics) NTMOS stand-alone gas detector delivers an ideal detection solution in environments where electrochemical sensing technologies are not suitable and extreme temperature or humidity variations exist.

The NTMOS H2S 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, Part I-1998, Performance Requirements for Toxic Gas-Detection Instruments: Hydrogen Sulfide. 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. 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 H2S concentrations
- Linear 4–20 mA output signal corresponding to H2S concentration (non-isolated)
- Performance approved to ANSI/ISA 92.0.01
- Non-intrusive calibration using the internal magnetic reed switch on the Gas Detector Termination Box model GDTB or FlexVu® 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
- Ideal for extreme environmental conditions (onshore and offshore applications)
- Ingress Protection level of IP66/IP67 suitable for outdoor applications.

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 0–20 mA dc drive circuitry is rated at a maximum 600 ohms loop resistance with 24 Vdc supply voltage.

DET-TRONICS OPTIONAL JUNCTION BOXES
When not connected directly to a transmitter/control device, the NTMOS Gas Detector can be connected to a Gas Detector Termination Box (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 DISPLAYS/TRANSMITTERS
The NTMOS Gas Detector integrates easily with the following Det-Tronics transmitters:

FlexVu Model UD10
The FlexVu UD10 Display Unit provides the approved function of a low concentration gas controller for the NTMOS Detector. The UD10 is designed and approved as a stand-alone controller when connected to a certified gas detector, such as the NTMOS, and 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 0–20 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 a Sensor Termination Box model 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 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 0-20 mA analog signal output, the U9500B offers four optional relay outputs for fault and alarm indications. The four 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 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.

**IMPORTANT**
Considering that H₂S is heavier than air, and in order to maintain IP66/IP67 Ingress Protection rating, the detector must be mounted vertically at a maximum height of 18 inches from surfaces below.

**NOTE**
The NTMOS Detector shall be connected to a performance certified low concentration gas controller, with latching alarms.

**CAUTION**
Exposing the NTMOS Detector to silicones will dramatically reduce its sensor response and sensor life, 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 the most likely release point of the hazard is located. Use local or recommended practices to identify these locations.

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 H₂S gas diffuse into the air? Select a location for the detector as close as practical to an anticipated leak source. As gas disperses it becomes difficult to detect as it is diluted.

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 must always be installed pointing straight down (see Figure 1).

6. The detector must be accessible for testing and calibration. Allow adequate space for attaching the NTMOS approved H₂S calibration device. See Specifications section of this manual for dimensions.

7. 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>
<thead>
<tr>
<th>Wire Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>24 Vdc +</td>
</tr>
<tr>
<td>Black</td>
<td>24 Vdc –</td>
</tr>
<tr>
<td>White</td>
<td>4–20 mA Signal</td>
</tr>
<tr>
<td>Yellow*</td>
<td>Calibrate Line</td>
</tr>
<tr>
<td>Orange**</td>
<td>Connect to Isolated Spare</td>
</tr>
<tr>
<td>Grey**</td>
<td>Connect to Isolated Spare</td>
</tr>
</tbody>
</table>

* 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.
1. Determine the best mounting locations for the detector. Mount the detector with the sensing element pointing down (18 inches from surfaces below). 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 Teflon tape for the male threads of the detector. The Lubriplate grease (see the “Ordering Information” section of this manual for part number) is used to lubricate the threads on the junction box cover. 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 2 to 5 for wiring details:
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 nominally. Measure the delivered voltage at the detector, especially for long cable runs, to ensure that possible voltage drops have not compromised the necessary 24 Vdc supply voltage. This should be considered during system design and commissioning.

   **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.

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Figure 4—NTMOS Detector Wired to GDTB Termination Box for Stand-Alone Operation

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Figure 5—NTMOS Detector Wired to U9500 Infiniti Transmitter
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.
2. Remove the (red) protective cap and desiccant bag from the detector.

**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 H₂S may be indicated. Keep all output loads that are actuated by the system in bypass until all alarms clear.*

3. 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.
4. Complete any additional startup/commissioning requirements as described in the manual provided with the transmitter/control device.
5. Place the system in normal operation.

CALIBRATION

**FREQUENCY OF CALIBRATION**

The calibration frequency required in different applications can vary depending upon the amount of background gas, concentration of H₂S, 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 to ensure reliable operation in most applications:

1. 24 hours after initial power-up (initial calibration)
2. 30 days after initial calibration
3. 60 days after initial calibration
4. 90 days after initial calibration

If all recommended calibration/bump tests are within the acceptable limits, the tests can be performed at (maximum) 90-day intervals thereafter. If large adjustments occur (greater than 10%), calibration intervals should be reduced.

**CALIBRATION GAS**

The NTMOS H₂S detector must be calibrated using the humidification tube with bottled H₂S in air (Figure 6), or with the ampoule calibration kit.

![Figure 6—Humidification Tube Assembly](image)
IMPORTANT CALIBRATION NOTES

- Proper calibration requires the use of either Det-Tronics’ NTMOS calibration kit with humidification tube and bottled H₂S in air (p/n 010272-001), or the ampoule calibration kit (p/n 007098-005).
- When calibrating with bottled H₂S in air, the humidification tube must be utilized, or inaccurate readings will occur.
- WARNING: Using a gas mixture other than 50% span of H₂S in air will produce inaccurate calibration results, possibly resulting in a dangerous condition if the detector under-reports the level of H₂S. Do not use bottled H₂S with nitrogen.
- Prevent all contact of any oil based material from the humidification tube.

If background H₂S 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 NTMOS calibration kit or the ampoule calibration kit. It is highly recommended that the FlexVu UD10 Display Unit, GDTB Termination Box, or Model U9500B Transmitter be utilized with the NTMOS Detector to enable non-intrusive field calibration. When using the UD10 or U9500B 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 0–20 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 H₂S 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 Table 2 for the calibration sequence.

Table 2—NTMOS Detector Calibration Sequence

<table>
<thead>
<tr>
<th>Current Output</th>
<th>Detector Action</th>
<th>Operator Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2 mA</td>
<td>Zero Cal</td>
<td>Actuate Cal Line</td>
</tr>
<tr>
<td>1.6 mA</td>
<td>Cal Failed</td>
<td>Repeat Calibration</td>
</tr>
<tr>
<td>2.0 mA</td>
<td>Span Cal</td>
<td>Apply Cal gas</td>
</tr>
<tr>
<td>1.8 mA</td>
<td>Cal Complete</td>
<td>Remove Gas</td>
</tr>
<tr>
<td>4.0 mA</td>
<td>Normal Operation</td>
<td></td>
</tr>
</tbody>
</table>

NOTE
If the current output reads 1.6 mA, the calibration has failed. Check the calibration gas expiration date, verify that the calibration gas used is H₂S in air, or replace the detector and repeat the calibration. Be certain that the humidification tube is used during calibration.
MAINTENANCE

The NTMOS Detector is a durable 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 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. The frequency of a visual inspection is determined by the application and environment.

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

FUNCTIONAL (BUMP) TEST

It is acceptable to perform a functional (bump) verification test in place 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 H₂S 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 bump test. If the bump test results are not acceptable, then a complete calibration must be performed.

The NTMOS H₂S 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 H₂S Mixer with thumb screw ampoule breaker and internal mixing fan (p/n 007067-001). When using either method to perform a bump test do not use bottled H₂S with nitrogen. When performing calibrations, validate the expiration date of the gas cylinder.

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 the “Startup Procedure” of this manual.

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.
FILTER REPLACEMENT

**IMPORTANT**
A hydrophobic filter must be installed to maintain the IP66/IP67 Ingress Protection rating. If a filter is not installed, the detector assumes an IP53 rating.

The hydrophobic filter provides protection against the ingress of dust and water, while permitting free flow of gas to the H₂S sensor. The filter assembly is field replaceable. Use the following procedure to replace the filter if it is determined damaged or contaminated after a visual inspection, or a failed bump test.

Speed of response will be impeded by the presence of heavy levels of contamination on the filter, so periodic inspection is necessary. If the filter is wet, simply let it dry to restore peak performance. Dry dust can usually be blown off the filter, but if the filter is contaminated with oil and dirt, replacement is necessary.

1. Loosen the set-screw that retains the impact guard with a 1/16” Allen wrench (see Figure 8).
2. Loosen the impact guard by rotating it counter-clock-wise.
3. Remove the filter assembly.

4. Inspect the O-ring that seals the filter assembly to the housing and also the O-ring that seals the filter assembly to the impact guard. Make sure that the O-rings are clean, properly seated and in good condition. Replace the O-rings (p/n 011364-001) if they are damaged.
5. Install the replacement filter in the impact guard so that the reinforcing ribs are facing toward the sensing element, as illustrated in Figure 7.
6. Install the impact guard on the NTMOS Detector, by rotating it clockwise until firmly tight. Use care when tightening the setscrew to prevent damage to the threads on the impact guard.

See the “Ordering Information” section of this manual for replacement parts and accessories.

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**Figure 8—NTMOS Detector Disassembly**

**Figure 7—Hydrophobic Filter Placement**
Figure 9—Dimensions of NTMOS Detector in Inches (Centimeters)

Figure 10—Dimensions of NTMOS Detector with Ampoule Calibration Kit with Mixer Attached in Inches (Centimeters)
SPECIFICATIONS

CURRENT OUTPUT—
0–20 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: –40°F to +149°F (–40°C to +65°C).

HUMIDITY RANGE—
5 to 95% RH.

RESPONSE TIME—
T20 ≤ 5.4 seconds with full scale gas applied
T50 ≤ 10.8 seconds with full scale gas applied
T90 ≤ 33 seconds with full scale gas applied.

ENVIRONMENTAL LOCATION—
Exposing the detector to certain materials or environments can adversely affect its performance. These materials and environments include: Silicones, Halides (Fluoride, Chlorine, Bromine, and Iodine based compounds), Heavy metals, and Acidic environments.

INGRESS PROTECTION—
See appendices for details.

CROSS SENSITIVITY—
500 ppm CO ≤ or = 10 ppm H2S
50 ppm H2 ≤ or = 5 ppm H2S
5 ppm NO2 ≤ or = 1 ppm H2S
100 ppm Methanol ≤ or = 50 ppm H2S
Cross sensitivity to Aromatic Volatile Organic Compounds (e.g. Xylene, Toluene, and Benzene).

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 9 for NTMOS Detector
See Figure 10 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 Conditions.

SHIPPING WEIGHT—
1.7 pounds (0.77 kilogram).

CERTIFICATION—

For complete approval details, refer to the appropriate Appendix:

Appendix A - FM
Appendix B - CSA
Appendix C - ATEX/IECEx
Appendix D - Additional Approvals

NOTE
The NTMOS Gas Detector is designed and approved as a “stand alone” toxic gas detector.
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
Det-Tronics reserves the right to apply a service charge for repairing returned product damaged as a result of improper packaging.

Return all equipment transportation prepaid to the factory in Minneapolis.

NOTE
It is highly recommended that a complete spare be kept on hand for field replacement to ensure continuous protection.

ORDERING INFORMATION

When ordering, please refer to the NTMOS H2S Gas Detector Model Matrix:

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>NTM</td>
<td>Nanotechnology MOS H2S Gas Detector</td>
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<table>
<thead>
<tr>
<th>TYPE</th>
<th>MATERIAL</th>
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<tbody>
<tr>
<td>S</td>
<td>Stainless Steel</td>
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<table>
<thead>
<tr>
<th>TYPE</th>
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<tbody>
<tr>
<td>N</td>
<td>3/4 NPT</td>
</tr>
<tr>
<td>M</td>
<td>Metric M25</td>
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<table>
<thead>
<tr>
<th>TYPE</th>
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<tbody>
<tr>
<td>10</td>
<td>0-100 ppm</td>
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<table>
<thead>
<tr>
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<th>APPROVALS</th>
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<tr>
<td>B</td>
<td>INMETRO (Brazil)</td>
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<tr>
<td>R</td>
<td>VNIIFTRI (Russia)</td>
</tr>
<tr>
<td>W</td>
<td>FM/CSA/ATEX/IECEx</td>
</tr>
</tbody>
</table>

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

Display Unit: FlexVu UD10, Includes relays, 0–20 mA w/HART. Specify aluminum or stainless steel housing.

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

ACCESSORIES

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>010272-001</td>
<td>NTMOS Calibration Kit, 50 ppm H2S in air</td>
</tr>
<tr>
<td>227117-014</td>
<td>Bottled 50 ppm H2S gas in air</td>
</tr>
<tr>
<td>162552-003</td>
<td>Regulator, 0.5 LPM</td>
</tr>
<tr>
<td>007098-005</td>
<td>Ampoule Calibration Kit, 50 ppm H2S: Used for performing functional test and calibration</td>
</tr>
<tr>
<td>225741-001</td>
<td>Ampoule: 50 ppm H2S</td>
</tr>
<tr>
<td>007067-001</td>
<td>H2S Calibration Gas Mixer with thumb screw ampoule breaker and internal mixing fan</td>
</tr>
<tr>
<td>009700-001</td>
<td>Calibration Magnet: Used for calibrating and programming the UD10 or Infiniti Transmitter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>011364-001</td>
<td>Replacement O-rings Kit (2 provided)</td>
</tr>
<tr>
<td>010851-001</td>
<td>Replacement Impact Guard</td>
</tr>
<tr>
<td>400527-003</td>
<td>Replacement Set-Screw</td>
</tr>
<tr>
<td>010850-001</td>
<td>Hydrophobic filter</td>
</tr>
<tr>
<td>010525-001</td>
<td>Humidification Tube Cage</td>
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</table>
APPENDIX A

FM 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
Class I, Division 2, Groups A, B, C, D
–40°C to +65°C (Performance verified)
–40°C to +75°C (Haz Loc Rating)
IP66/IP67 (with hydrophobic filter)
IP53 (without hydrophobic filter)

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

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Full Scale Range</td>
<td>10 - 100 ppm full scale</td>
<td>10 - 100 ppm full scale*</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>–10°C to +50°C</td>
<td>–40°C to +65°C*</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>–35°C to +55°C</td>
<td>–40°C to +65°C*</td>
</tr>
<tr>
<td>Test Gas Concentration</td>
<td>45 - 55% of full scale</td>
<td>45 - 55% of full scale</td>
</tr>
<tr>
<td>Test Gas Tolerance</td>
<td>1 ppm or 5% of concentration¹</td>
<td>1 PPM or 5% of reading</td>
</tr>
<tr>
<td>Accuracy/repeatability (Readout or display)</td>
<td>2 ppm or 10% of reading¹</td>
<td>2 PPM or 10% of reading</td>
</tr>
<tr>
<td>Accuracy/repeatability (Alarm-only)</td>
<td>2 ppm or 10% of reading¹</td>
<td>2 PPM or 10% of reading</td>
</tr>
<tr>
<td>Alarm setpoint</td>
<td>50% of full scale</td>
<td>10 to 90% of full scale</td>
</tr>
<tr>
<td>Time, Response to 20% of Final</td>
<td>20 seconds</td>
<td>5.4 seconds</td>
</tr>
<tr>
<td>Time, Response to 50% of Final</td>
<td>45 seconds</td>
<td>10.8 seconds</td>
</tr>
<tr>
<td>Time, Response to 90% of Final</td>
<td>60 seconds</td>
<td>33.0 seconds</td>
</tr>
<tr>
<td>Time, Recovery to 50% of Initial</td>
<td>180 seconds</td>
<td>6.7 seconds</td>
</tr>
<tr>
<td>Time, Recovery to 10% of Initial</td>
<td>90 seconds</td>
<td>16.3 seconds</td>
</tr>
<tr>
<td>High Concentration</td>
<td>1000 PPM</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>High Concentration Recovery Time</td>
<td>10 minutes</td>
<td>&lt;= 2 minutes</td>
</tr>
</tbody>
</table>

¹Where two values exist (e.g., 3 PPM or 10% of reading), the value providing the widest tolerance should be used.
*In accordance with FMID 3033318.

Acidic atmospheres excluded.

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 (with full Ingress Protection applied)
T50 ≤10.8 seconds with full gas scale applied
T90 ≤33.0 seconds with full gas scale applied.

Mechanical
Model with hydrophobic filter and sinter guard (IP66/IP67)
Model with hydrophobic filter removed and sinter guard (IP53).
NOTE

The NTMOS Gas Detector is designed and approved as a “stand alone” toxic gas detector.

PRODUCTS
CLASS 4828 02 – SIGNAL APPLIANCES - Toxic Gas Detection Instrument - For Hazardous Locations

Class I, Div. 1, Groups B, C & D (T5); Class I, Div. 2, Groups A, B, C, and D (T5); IP53 without Filter, IP66 / IP67 with Filter.

NTMOS H2S Toxic Gas Detector, Model NTM Series, input voltage 18-30 Vdc maximum and 2.5 W maximum, output rated 4-20 mA, Tamb= –40°C to +75°C (Haz Loc Rating). Sensors can be used in conjunction with the following DETECTOR ELECTRONICS CORPORATION Gas Detection Equipment: R8471B Series Controller (Ordinary locations), U9500B Series Transmitter, UD10 Universal Display, Models PIRTB, STB or GDTB Termination boxes. Thread type 3/4” NPT or M25.

APPLICABLE REQUIREMENTS
CAN / CSA-C22.2 No. 0-M91 - General Requirements – Canadian Electrical Code, Part II.
C22.2 No. 30-M1986 - Explosion-Proof Enclosures for Use in Class I Hazardous Locations.
IEC Std 60529: 2001-02 Degrees of protection provided by enclosures (IP Code).
APPENDIX C
ATEX/IECEX APPROVALS

NOTE
The NTMOS Gas Detector is designed and approved as a “stand alone” toxic gas detector.

Hazardous Location
ATEX:
Ex d IIC T5 Gb
FM09ATEX0063X
T5 (Tamb= −40°C to +65°C)
IP66/IP67 (with hydrophobic filter and sinter guard)
IP63 (without hydrophobic filter).

EN Standards:
EN 50270: 2006
EN 60079-0: 2009
EN 60079-1: 2007

IECEx:
Ex d IIC T5 Gb
IECEx FMG 09.0011X
T5 (Tamb= −40°C to +65°C)
IP66/IP67 (with hydrophobic filter and sinter guard)
IP63 (without hydrophobic filter).

IEC Standards:
IEC 60079-0: 2007
IEC 60079-1: 2007
IEC 60529: 2001

Special Conditions for Safe Use (X) / Schedule of Limitations:
• 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.
• In order to maintain IP66/IP67 Ingress Protection rating, the detector must be mounted vertically at a maximum height of 18 inches from surfaces below.
APPENDIX D
ADDITIONAL APPROVALS

Hazardous Location
UL-BR 15.0377X
Ex d IIC T5 Gb IP66
T5 (Tamb = –40°C to +65°C)
IP63/IP66/IP67
IEC Standards:  IEC 60079-0: 2007
                   IEC 60079-1: 2007
                   IEC 60529: 01.

Mechanical
Model with or without filter assembly

NOTE
For use with the GDTB, all cable entry devices shall be Brazil certified in the type of explosion protection, flameproof enclosure “d,” suitable for the conditions of use and correctly installed with an ingress protection rating of IP66/IP67. A screw or cover lock is provided for secondary means of fastening the cover.

RUSSIA

VNIIFTRI
CERTIFICATE OF CONFORMITY GOST R 523350.X -2005
No POCC US. ГБ06.В01237
1ExdIIC T5 X
T5 (Tamb = –40°C to +65°C)
IP66/IP67.

Mechanical
Filter assembly is required to maintain IP66/IP67
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