DET-TRONICS®

INSTRUCTIONS

Toxic Gas Detector with HART Output DEC-THZ

DESCRIPTION

The DEC-THZ Toxic Gas Transmitter is a Class I, Division 1 approved device when used with an approved sensor, and is compatible with the entire line of Det-Tronics electrochemical toxic gas sensors. It provides a linear 4-20 mA output proportional to the sensor input, as well as a large digital display for indicating the detected gas level.

The model DEC-THZ Toxic Gas Detector is comprised of two assemblies:

- A Det-Tronics Model C7064X electrochemical gas sensor, which is a two-wire, loop-powered gas sensor providing a linear 4-20 milliampere output.
- A Model THZ Transmitter, which is specially configured to accept the 4-20 mA signal from the C7064X gas detector. The Model THZ provides the HART signal along with the analog signal.

TRANSMITTER COMMUNICATION

The DEC-THZ transmitter output is ready for direct interface with HART or non-HART based DCSs, PLCs, and other computer-based SCADA systems. The DEC-THZ is easily configured, monitored, or calibrated from anywhere on the 4-20 mA loop using a standard hand-held HART Communicator (such as a Model HC275), a HART-based control system, or an Asset Management System (AMS).

AUTOMATIC DIAGNOSTICS

The transmitter performs continuous sensor diagnostics. If the sensor fails or otherwise stops sending a signal during operation, the transmitter warns of a trouble condition, and provides a HART digital error message that can be read by a HART communicator or system. The transmitter uses a modular electronics design, which allows for easy removal and replacement in the event of a malfunction.

TRANSMITTER ENCLOSURE

The transmitter's aluminum enclosure features a sealed, dual-compartment interior to isolate and protect the electronics from humidity, moisture, or corrosive agents that could possibly enter through the cable conduit entry. The enclosure also has a screw-on front cover with glass window to enable easy viewing of the detected gas level, and a screw-on rear enclosure cover to enable easy access to the wiring termination area. The enclosure provides two 3/4 inch NPT conduit entries — one for the sensor, and one for field cabling.

SPECIFICATIONS

DETECTION RANGE—
Depends on sensor selected. Refer to form number 90-1079 (Specification Data sheet for Det-Tronics electrochemical sensors) for details.

COMPATIBLE SENSORS—
Sensors available for use with the THZ Transmitter include Hydrogen Sulfide, Oxygen, Carbon Monoxide, Sulfur Dioxide, Nitrogen Dioxide, and Chlorine gases. Refer to form number 90-1079 for additional information.

INPUT VOLTAGE—
24 vdc.

POWER CONSUMPTION (with Sensor)—
0.5 watts nominal, 1 watt maximum.

CURRENT OUTPUT—
Linear 4 to 20 ma output proportional to detection range, non-isolated; three-conductor field wiring required.

DIGITAL DISPLAY—
Two rows of five alphanumeric characters are provided: characters on top row are 18 mm (0.7 inch) high black digits on a reflective background; bottom row display are 10 mm (0.4 inch) high digits on a reflective background. Two digits are provided to show HART address indication; and % of measurement span is shown on a bar graph with upper and lower out-of-range indicators.

H_2S SENSOR TEMPERATURE RANGE—
Refer to form number 90-1079 for details.

TRANSMITTER TEMPERATURE RANGE—
Operating: –40°F to +185°F (–40°C to +85°C).
Storage: –40°F to +185°F (–40°C to +85°C).

SENSOR ENCLOSURE MATERIAL—
316 stainless steel.

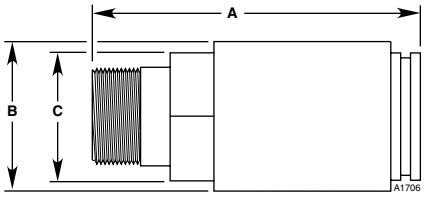
TRANSMITTER ENCLOSURE MATERIAL—
Copper-free aluminum with chromatic conversion seal undercoat and polyurethane top coat.

DIMENSIONS—
Refer to Figure 1 for dimensions of the sensor and Figure 2 for dimensions of the THZ transmitter.

CERTIFICATIONS—
Sensor: Refer to form no. 90-1079 for details.

Transmitter: FM Approval:
Class I, Division 1, Groups A, B, C, D;
Class II & III, Division 1, Groups E, F, G.
NEMA Type 4X.
IP66.
Temperature Code: T6 @ 60°C Max.
Operating Ambient Temperature.

SHIPPING WEIGHT—
Sensor: 2.5 pounds (1.28 kilograms).
Transmitter w/encl.: 3 lbs, 2.5 oz (1.42 kilograms).



Sensor	A	B	C
H_2S	3.75 (9.6)	2.0 (5.0)	1.75 (4.5)
O_2	6.1 (15.5)	2.2 (5.6)	1.1 (2.8)
CO	5.0 (12.7)	2.2 (5.6)	1.1 (2.8)
Cl_2	5.0 (12.7)	2.2 (5.6)	1.1 (2.8)
SO_2	3.75 (9.6)	2.0 (5.0)	1.75 (4.5)
NO_2	3.75 (9.6)	2.0 (5.0)	1.75 (4.5)
Available thread sizes = 3/4 inch NPT or 20 mm			

Figure 1—Sensor Dimensions in Inches (Centimeters)

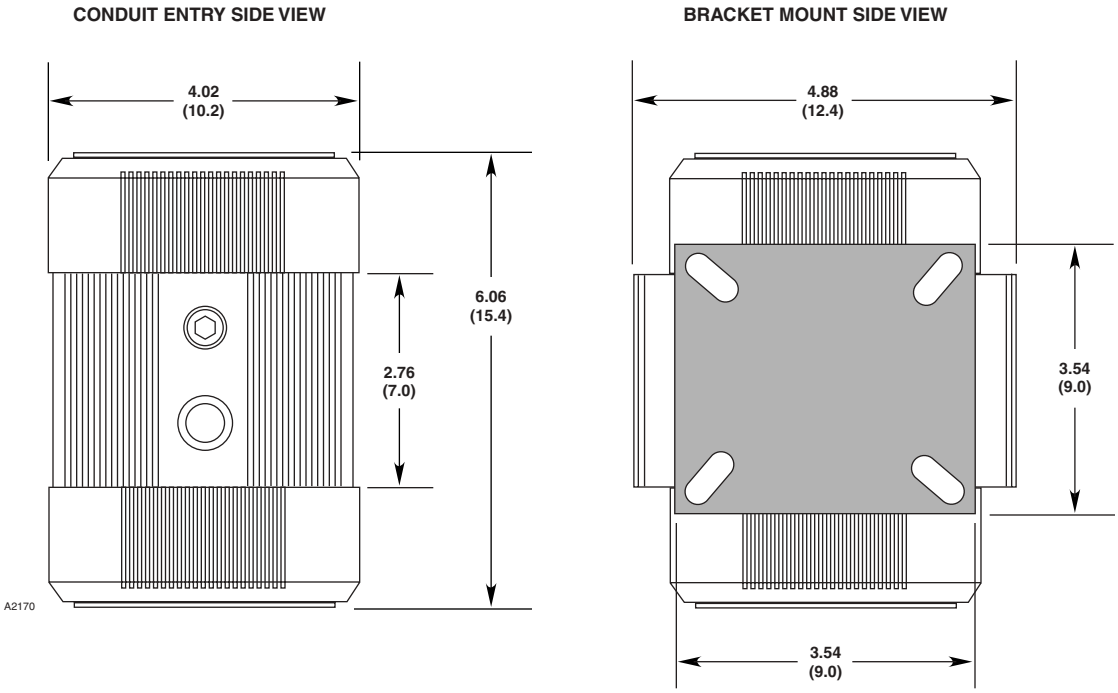


Figure 2—Dimensions of THZ Transmitter in Inches (Centimeters)

INSTALLATION

DETECTOR LOCATION AND ORIENTATION

The gas sensor used with the THZ transmitter is a diffusion-based gas sensor. Therefore, it must contact the target gas in order to provide an accurate gas measurement. Always remember this when selecting locations for gas sensor installation.

NOTE

The sensor should be pointed down to prevent the buildup of contaminants on the gas inlet.

WIRING CONNECTIONS

To provide satisfactory operation, the DEC-THZ toxic gas detector must be installed as a three-wire device, as shown in Figure 3. This is due to the fact that electrical isolation is required in order to utilize two current limiting devices in a single device signal input configuration. For this reason, a separate DC common connection is required in addition to the signal input connection.

50 OHM RESISTOR INSTALLATION

When the THZ is used with the Det-Tronics two-wire C706X line of electrochemical sensors, a 50 ohm resistor must be installed across the transmitter input to convert the milliampere signal input to a millivolt input. During the THZ setup routine using the HART communication protocol, the user simply scales the device input for 0-1000 millivolt full scale range, which is proportional to the 4-20 ma signal output.

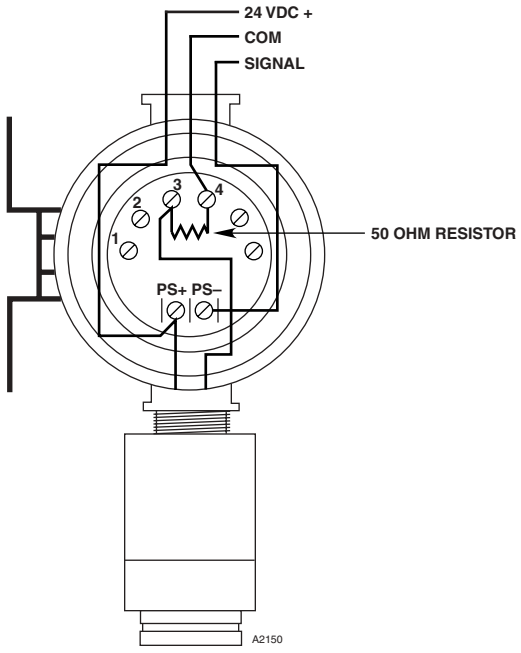


Figure 3—Rear View of Wiring Compartment

CONFIGURATION USING HART COMMUNICATION

The DEC-THZ gas detector is shipped from the factory pre-configured. If it is necessary to change any HART configurations, the following items are required:

1. 275 handheld HART communicator with the Device Descriptor (DD) software.

— OR —

2. THZ configuration software loaded into a Windows based PC and a HART modem (as manufactured by SMAR Research Corp., Model HI311 HART Serial Interface).

Using either of these HART communication devices, it is possible to change the HART configuration parameters of the DEC-THZ gas detector. Contact Detector Electronics for copies of the DEC-THZ configuration program.

CAUTION

Changing certain HART configuration parameters such as input/output range and custom response curve data will result in improper operation of the DEC-THZ gas detector.

CALIBRATION

CALIBRATION RECOMMENDATIONS

When to Perform Calibration

- When a new system is initially put into service.
- When the sensor is replaced.
- Periodically to verify proper sensor performance — typically at 90 day intervals, however, this frequency is dependent upon the requirements of each application. Refer to Table 1 for the recommended calibration frequency for DEC sensors.

Calibration Gas Sources

For optimum performance, only use Det-Tronics calibration gases.

For toxic gas sensor calibration, the calibration gas type must match the sensor cell type. The calibration gas concentration should be one half of the full scale measurement range of the sensor in use.

For oxygen sensor calibration, normal ambient air may be used for span calibration if it is known to be clean and not depleted of O_2 (21% vol.). Compressed clean air is available from Det-Tronics if required. It is not necessary to utilize an O_2 free gas such as compressed nitrogen to calibrate the O_2 sensor zero level. An electronic zero switch is provided within the C7065E sensor housing for this function. Refer to the O_2 sensor instruction manual for details.

Table 1—Recommended Frequency of Calibration for DEC Sensors

Sensor Type	After 1 Hour Warm-up	After 24 Hours	After 1 Week	Every 90 Days
H2S	Req	Opt	Opt	Opt
Chlorine	Req	Req	NR	Req
Oxygen	Req	Opt	Opt	Opt
Carbon Monoxide	Req	Opt	Opt	Opt
Nitrogen Dioxide	Req	Opt	Opt	Opt
Sulfur Dioxide	Req	Opt	Opt	Opt

Req = Required
Opt = Optional
NR = Not Recommended

Important Calibration Notes

- Ensure that the transmitter is properly programmed for the gas concentration being used for calibration.
- Ensure that only clean air is present at the sensor prior to entering the calibration mode. If the possibility of background gases exists, purge the sensor with clean air to ensure accurate calibration.
- Ensure that the concentration of the calibration gas matches the calibration gas setting. Typically, calibration gas concentration equal to 50% full scale is used.
- Inspect the sensor. Loss of sensitivity can be caused by various factors. One common cause is by clogging of the hydrophobic or sintered filters by dirt, oil, paint, etc. If the filter is dirty or plugged, it should be replaced.
- When calibrating a C7065E O_2 Sensor, the initial “zero” calibration requires activation of a switch located inside the sensor housing. Subsequent calibrations of the sensor do not require switch activation. Always calibrate the sensor using 20.9% O_2 if ambient air is less than 20.9% O_2.

CALIBRATION PROCEDURE

The DEC-THZ gas detector is calibrated using the HART communication menu's "Sensor Trim" function. The Sensor Trim function is found in the HART online menu, under the Device Setup selection within the Diagnostics & Service menu selection. Be sure to select the "user trim" mode and the "two-point" trim option. After selecting the 2-point sensor trim command, it is critical that the values "200" and "600" be entered for the corresponding low and high trim points. When the HART menu instructs the operator to enter the low (1) trim point signal, simply ensure that the sensor is exposed to clean air, which will result in a 4 ma signal output level, and then enter the low (1) trim command. When the HART menu instructs the operator to enter the high (2) trim point signal, the operator should apply 50% full scale calibration gas to the sensor for approximately 60 seconds, and then enter the high (2) trim point command. After the two trim points have been set and adjusted, the calibration is complete.

DEC-THZ calibration can be conducted using a HART HC275 communicator, a PC using a HART modem and the DEC-THZ configuration program, or a HART compatible system such as the Emerson Asset Manager System.

For additional information and guidance, please refer to specific instruction manuals or contact Detector Electronics Corporation Product Marketing department.

MAINTENANCE

ROUTINE MAINTENANCE

The DEC-THZ requires no routine maintenance, except for periodic checks to ensure proper calibration. The frequency of these checks is determined by the requirements of the particular installation. Calibration gas kits are required for these checks.

CAUTION

Be sure to secure all output devices that are actuated by the system to prevent unwanted activation of this equipment, and remember to place these same output devices back into service when the checkout is complete.

SENSOR / HYDROPHOBIC FILTER REPLACEMENT

Electrochemical Sensor Cell Replacement

Follow the procedure below to replace the sensor cell.

1. Remove power to the transmitter prior to replacing the sensor cell.

2. Remove the cap from the sensor base. See Figure 4. (There is no need to remove the sensor base from the junction box for this operation.)

NOTE

Compare part numbers to be sure that the correct replacement cell is being used.

3. Remove the old sensor cell. The sensor cell contains a small amount of lead – dispose of properly. Check for corrosion or contamination on the terminals of the sensor base, and clean if necessary.

4. Determine proper orientation for the new cell, then **carefully** plug it in.

NOTE

Handle the sensor cell carefully. To avoid possible damage, observe the normally accepted procedures for handling electrostatic sensitive devices. See form 75-1005 for additional information.

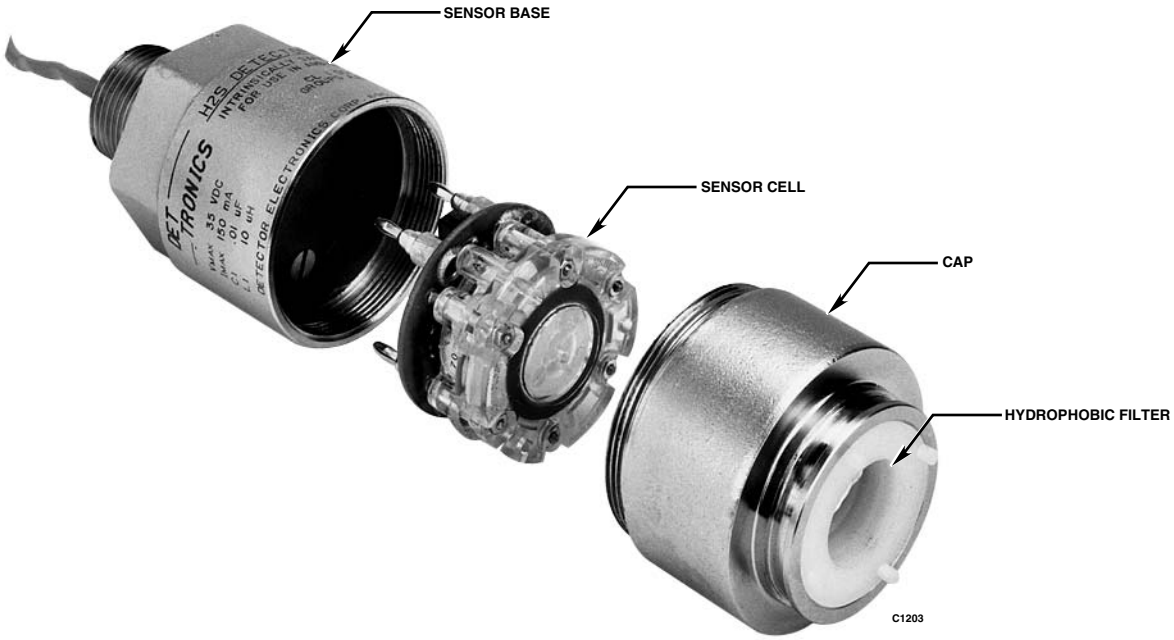


Figure 4—Electrochemical Sensor Parts Identification

5. Be sure that the O-ring inside the sensor base is in good condition, then re-install the cap. Tighten only until snug. **Do not over tighten.**

6. Re-apply power. Allow time for the unit to warm up and stabilize (approximately one hour for best results), then calibrate.

An adequate supply of spare electrochemical sensor cell assemblies 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, electrochemical cells should be stored in the unopened original packaging, at a temperature between 32°F and 68°F (0 to 20°C) and a relative humidity between 15 and 90 percent.

Hydrophobic Filter Replacement

Some electrochemical sensor housings use a hydrophobic filter, which protects the sensor cell from contaminants in the environment, and also enables the operation of the cell in "wet" environments without plugging its screen. The operator should frequently inspect the hydrophobic filter for cleanliness. A dirty filter can significantly reduce the amount of gas that is able to reach the sensor cell, thereby impairing the ability of the system to respond to a hazardous condition. If the filter becomes dirty or if it is damaged, it must be replaced.

To replace the hydrophobic filter, simply unscrew the existing filter from the housing, then replace it with a new filter. Use care not to over tighten.

NOTE

A dirty hydrophobic filter can adversely affect the response of the sensor by blocking the flow of gas to the sensor cell. If the detector cannot be calibrated or responds slowly to the calibration gas, check the condition of the hydrophobic filter before replacing the sensor cell.

REPLACEMENT PARTS

An adequate supply of spare sensors 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.

CAUTION

Always store and transport the sensor in the original factory packaging to ensure proper protection against contamination.

Always calibrate after replacing either the sensor or the transmitter circuit board.

DEVICE REPAIR AND RETURN

Prior to returning devices, contact the nearest local Detector Electronics office so that a Service Order number can be assigned. A written statement describing the malfunction must accompany the returned device to expedite finding the cause of the failure.

Pack the unit properly. Use sufficient packing material in addition to an antistatic bag or aluminum-backed cardboard as protection from electrostatic discharge.

Return all equipment transportation prepaid to the factory in Minneapolis.

ORDERING INFORMATION

Sensor cells and sensor housings must be ordered separately. When multiple gas ranges are available, order matching sensor cells and housings.

For information regarding electrochemical gas sensors, as well as sensor accessories and calibration equipment, refer to form number 90-1079, or contact:

Detector Electronics Corporation
6901 West 110th Street
Minneapolis, Minnesota 55438 USA
Operator: (952) 941-5665 or (800) 765-FIRE
Customer Service: (952) 946-6491
Fax: (952) 829-8750
Web site: www.detronics.com
E-mail: detronics@detronics.com

Detector Electronics Corporation

6901 West 110th Street • Minneapolis, Minnesota 55438 USA
Operator: (952) 941-5665 or (800) 765-FIRE
Customer Service: (952) 946-6491 • Fax (952) 829-8750
http://www.detronics.com • E-mail: detronics@detronics.com