

**DESIGN MANUAL**  
**INSTALLATION • OPERATION • MAINTENANCE**



**MODEL GC803**

**COMBUSTIBLE GAS DETECTOR  
WITH BUILT-IN 4-20 MA  
TRANSMITTER**

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# Quick Finder

## MODEL GC803

### Combustible Gas Detector with 4-20 mA Transmitter

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# MODEL GC803

## Combustible Gas Detector with 4-20 mA Transmitter

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### SAFETY INFORMATION

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Please read and understand this Design Manual **BEFORE** installing, operating, or conducting maintenance on the gas detector.

Pay close attention to important messages marked as WARNINGS and IMPORTANT throughout the Design Manual.

Failure to follow the instructions and safety precautions in this Design Manual can result in serious injury or death.

Equipment that has been repaired or modified by the user, damaged as a result of an accident, improper installation or used in an environment for which it was not intended will void the warranty.

#### INSTALLATION WARNINGS

Installation of the detector must only be conducted by trained and in some cases a licensed personnel.

Observe the recognized standards of the appropriate authority in the in the country concerned. Follow all appropriate standards to maintain the overall certification of the detector. Ensure all local regulations and site safety procedures are followed.

Declassify the area or disconnect the equipment from the power supply before accessing the interior of the detector. Ensure that the cover for the housing is closed tight during operation.

DO NOT open the housing/enclosure or replace the sensor in potentially hazardous atmospheres while the POWER is still applied to the electronics module.

DO NOT tamper, modify, repair, or disassemble the electronics module or the sensor.

DO NOT expose the detector to temperatures outside the recommended ranges. Damage or failure may occur.

Every effort has been made to ensure the accuracy of this Design Manual. However, Safety Systems Technology assumes no responsibility for any errors or omissions in this document. Please report any errors or omissions found in the content of the Design Manual.

Safety Systems Technology reserve the right to change or revise this Design Manual without notice and without obligation to notify any person or organization of such changes. You may request any additional information required that is not included in the Design Manual through the local distributor or Safety Systems Technology.

## QUICK INSTALLATION GUIDE

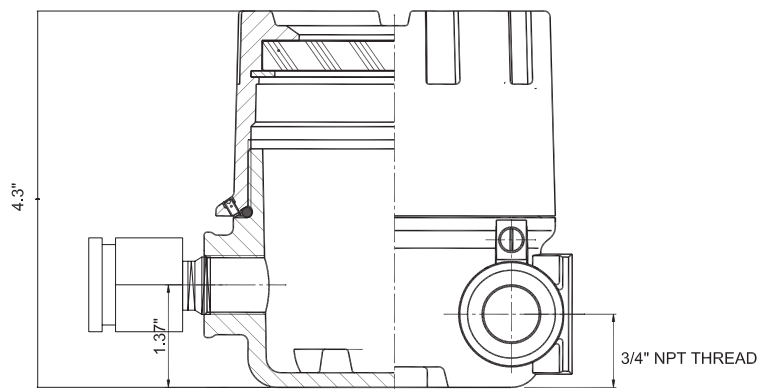
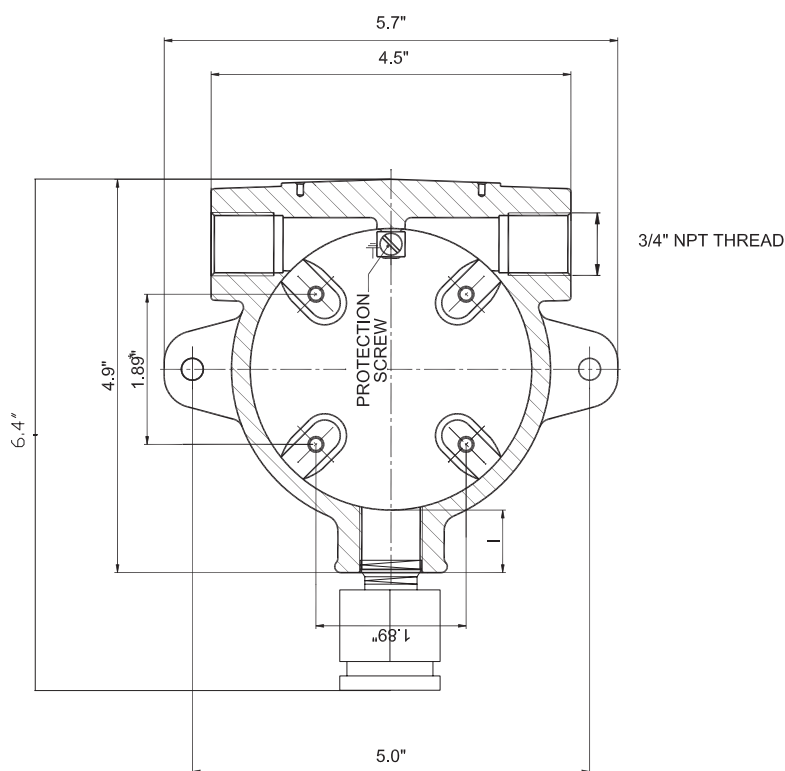
### Tools Required

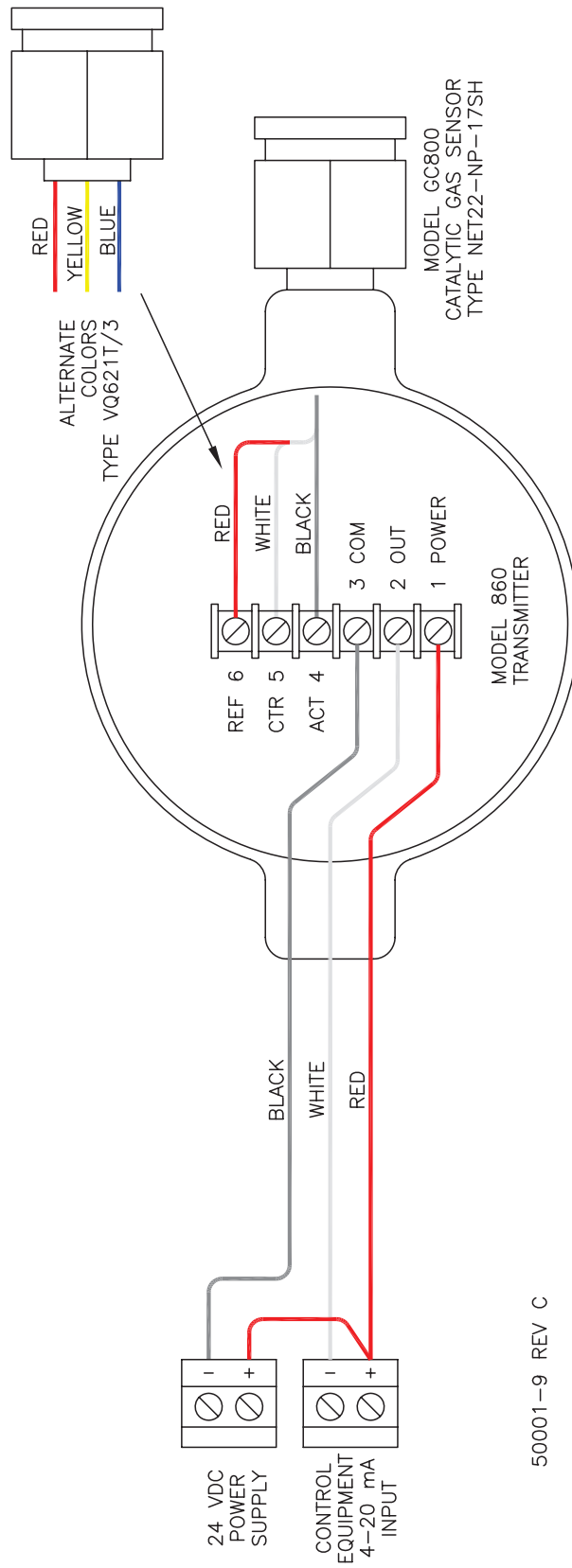
1.5 mm hex wrench is required for the aluminum housing and 2.0 mm for the stainless steel housing.

Slotted head screw driver blade 1/16" width (1.5 mm) width for terminal block connections.

Adjustable wrench for conduit or cable gland connections.

**WARNING:** De-classify the area to reduce the risk of ignition of hazardous atmosphere. Combustible and flammable gases and vapors are very dangerous. Extreme caution should be taken when these hazards are present.

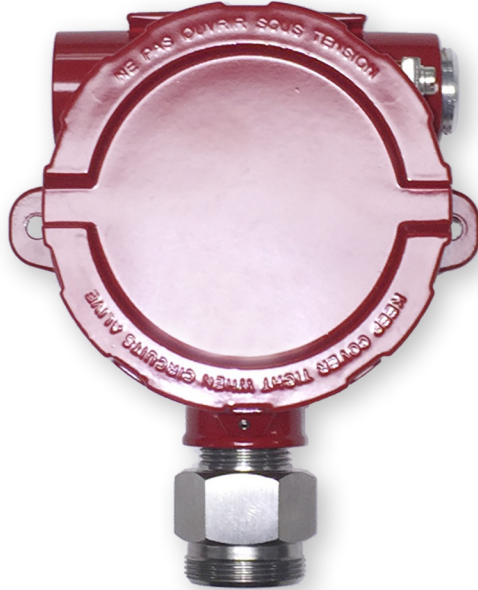




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## GENERAL DESCRIPTION

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The Model GC803 Combustible Gas Detector with built-in 4-20 mA transmitter measures the concentration of gas in a protected area and transmits this information to a central control point. The transmitter is located inside an explosion-proof housing and converts the output from a standard catalytic sensor to a standard 4-20 mA signal. The input to the transmitter is a nominal 24 volt DC supply. This detector uses a catalytic poison-resistant sensing element, and provides accurate measurements in atmospheres where traces of silicone or other poisoning agents may be present. Readings are unaffected by humidity or carbon dioxide. The output signal may be connected to a suitable VulcanGuard Gas Detection module, or to any other control panel or device with a standard 4-20 mA sourcing input.

The sensing elements are mounted inside a stainless steel flameproof housing. Gas is sensed through the porous metal flame arrestor in the front of the housing. There is a matched pair of elements, one of which is an active catalytic detector and the other a non-active compensating element. Each element consists of a coil of very fine platinum wire embedded in a bead of alumina. The detecting element is treated with a catalytic mixture that will allow oxidation of gas to occur. In operation, a constant DC current heats the detector element temperature to a value which allows an adequate rate of oxidation. The detector coil also functions as a resistance thermometer wire and when methane or other combustible gas is burning on the catalytic detector the resultant temperature rise increases the coil resistance. The associated transmitter senses this change in resistance and converts it to a standard 4-20 mA signal which is proportional to the gas concentration. The 4-20 mA signal, when connected to a control module in the VulcanGuard Systems or any gas control panel, is used to display the gas concentration as percent of the Lower Explosive Limit (%LEL).



## SPECIFICATIONS

### System Specifications

Sensor Type .....	Catalytic bead / pellistor with excellent long term zero and sensitivity stability
Poison Resistance .....	Highly Resistant
Gases Detected .....	Most combustible gases and vapors
Sensor Life .....	Typical 5+ years
Measuring Ranges .....	0-100% LEL (Lower Explosive Limit)
Accuracy: .....	+/- 1% LEL (CH <sub>4</sub> )
Zero Drift .....	<+/- 1/2 mV/Month
Linearity.....	Effectively Linear to 100% LEL (to within 5%)
Response Time .....	T <sub>90</sub> <30 seconds
Modes .....	Normal Operation, Calibration, Set-up
Warranty.....	5 Years
Electronics Enclosure .....	Class I, Division I, Groups A, B, C, D Class I, Zone I, AEx d IIC; Type 4X ATEX: II 2G Ex IIC Gb
Gas Sensor Head.....	II 2G Ex d IIC GB

### Electrical Specifications

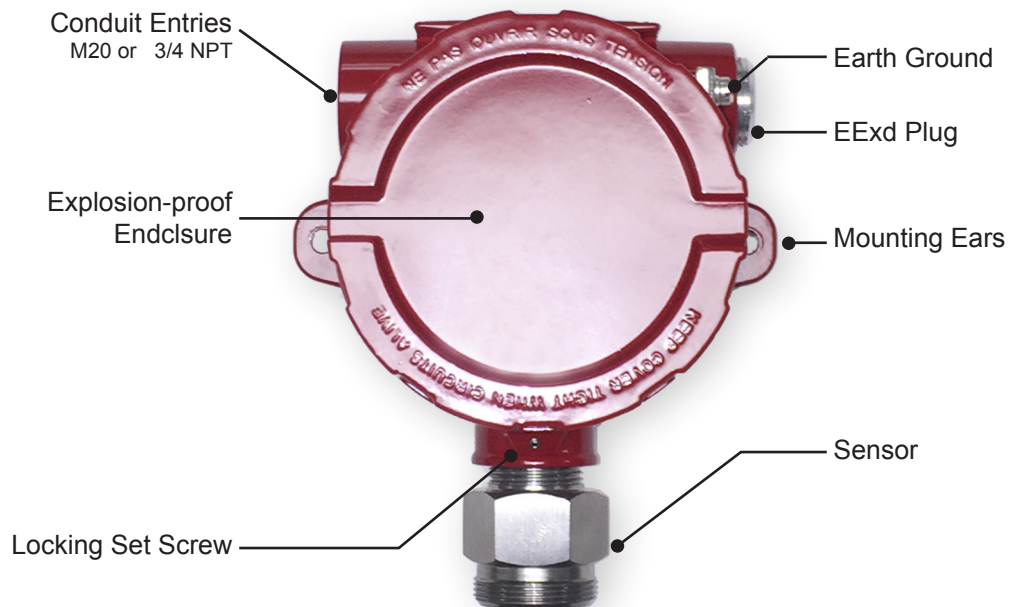
Input Power .....	24 VDC nominal, 16 to 32 VDC 92 mA standby, 120 mA alarm
Analog Signal .....	0-20 mA (600 Ohms or less) Malfunction                      0 mA Setup Mode/Calibrate        4 mA Zero Reading                    4 mA 0-100% LEL                      4-20 mA Over-range                        > 20 mA
Field Connections .....	4-20 mA output and power - three-wire shielded cable or three conductors in metal conduit. All connections: 22 AWG (.35 mm <sup>2</sup> ) to 12 AWG (4.0 mm <sup>2</sup> )
Wireless Communication .....	Available with optional wireless transmitter with text, e-mail notification features

### Environmental Specifications

Operating Temperature .....	Electronics: -40°F to 185°F (-40°C to 85°C) Sensor: -40°F to 266°F (-40°C to 130°C)
Operating Humidity .....	0-100% RH, non-condensing
Ingress Protection .....	IP40 to IP66 with accessories

### Mechanical Specifications

Dimensions .....	6.4 x 5.7 x 4.3 inches (163 x 145 x 109 mm)
Weight .....	3.0 lbs (1.4 kg) Aluminum 7.5 lbs (3.4 kg) Stainless Steel
Controller Housing .....	Aluminum or Stainless Steel
Sensor Housing.....	Stainless Steel



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## SELECTING A LOCATION FOR THE GAS DETECTOR

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**NOTE:** The determination of the location of gas detectors should be made in accordance with any relevant local, municipal, and national standards, codes, or legislation. Seek the advice of professionals or experts with knowledge of process plant systems and/or safety and engineering personnel.

### Considerations

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To insure the fastest possible detection of leaking gases, the location of the sensor is important. There are no standard rules for sensor placement since the optimal placement of the sensor(s) are different for each application. The following considerations should be made when locating gas sensors:

- Sensors should be installed in an area free from wind, dust, water, flooding and vibration if possible. Weatherproof accessories are available to protect the sensor from dust and rain or splashing water. Utilize these accessories to prevent damaging the sensors.
- Clear view and access to the controller to monitor and/or reset or initiate calibration of the gas detector.
- Access to the sensor for calibration, testing, and servicing.
- Effect of wind or forced air within a location. The gas sensor will never respond if air currents blow the leaking gas away from the sensor.
- Preferred orientation of the sensor is with the porous face of the sensor pointing down. The sensor must never be installed pointing upwards.
- Gas detectors should be mounted closest to the source of a potential hazard of gas leaking.

### Gas Vapor Density

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Additional consideration should be made to the vapor density of the gas. The density of air is 1.0.

Any gas whose vapor density is greater than 1.0 is heavier than air. These heavier than air gasses will tend to accumulate first at the floor or ground level (assuming no air movement).

Any gas whose vapor density is less than 1.0 is lighter than air. These lighter than air gasses will tend to accumulate at the highest point in an enclosed space.

### Gases Heavier than Air

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For heavier than air gases, locate the sensor below the potential source of a leak or near the floor or ground for earliest detection. We recommend placing the sensor 1 foot from the ground surface to prevent plugging of the sintered metal filter on the sensor by dirt or water.

Weatherproof accessories are available to protect the sensor from dust, rain, and/or splashing water.

Typical gases heavier than air:

<b>Combustible Gas</b>	<b>Density</b>
Methanol	1.1
Propane	1.6
Ethanol	1.6
Butane	2.0
Acetone	2.0
Isopropyl Alcohol	2.1
Pentane	2.5
Hexane	3.0
Toluene	3.1
Heptane	3.5
Octane	3.9
Gasoline	3-4

### Gases with Density of Air

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These gases mix readily with air, locate the sensor as close to the source of a potential leak for fastest response.

Typical gases with density of air:

<b>Combustible Gas</b>	<b>Density</b>
Ethane	1.0

### Gases Lighter than Air

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For lighter than air gases, locate the sensor above the source of a potential leak or if within an enclosed space, at the highest point in the room. Consider obstructions that could trap a "pocket" of gas or air when locating sensors. The preferred orientation of the sensor is with the face pointing down. If necessary, it may be installed at an angle or horizontally. The sensor must never be installed pointing upwards.

An available gas collection cone accessory is available and can be utilized to allow the gas to accumulate in order to detect the gas immediately.

Typical gases lighter than air:

<b>Combustible Gas</b>	<b>Density</b>
Acetylene	0.9
Methane	0.6
Hydrogen	0.1

**NOTE: Data in above tables is from reliable sources that are believed to be accurate, but is not guaranteed by Safety Systems Technology.**



## High Gas Concentrations

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Gas detectors may be operated in high gas concentrations for short periods of time. For periods up to about 2 minutes, 10 second bursts of methane in excess of 100% LEL has no adverse effects. Prolonged exposure can result in zero drift which may be reversible by operation for a short period in air or low methane concentration (about 1%). Exposure to high concentration for longer periods will begin to destroy the detector surface, altering the zero reading and reducing the sensitivity. Whenever the sensor is exposed to high concentrations of combustible gas, the calibration should be rechecked as soon as possible.

## Presence of Contaminants

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Sensors may be adversely affected by prolonged exposure to certain contaminants. It can result in the loss of sensitivity and may be gradual in low concentrations, or it may be rapid at high concentrations. Materials that may adversely affect the sensors are:

- Caustic and acidic liquids and vapors
- Silicones
- Constant presence of high concentrations of hydrogen sulfide gas
- Constant presence of high concentrations of combustible gases

Sensors exposed to these contaminants usually require more frequent calibration checks than normal and may reduce the life of the sensor, requiring replacement.

The Model GC804 sensor is poison resistant. It can be used in atmospheres where traces of silicone oils, greases, phosphate esters, and sulphur based compounds may be present.

## Coverage Area

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Sensors should be placed closest to the possible source of a gas leak, taking into consideration the air density of the target gas. The distance of the sensor from the source of the leak will affect the response time of the detector. The farther the sensor is away from the source of the leak the more time it will take the gas to travel or accumulate for the sensor to react.

The coverage area of a single detector is a circle of 42.4 feet in diameter.

## Distance Between Multiple Sensors

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The factory recommended distance between multiple sensors is 30 feet, center to center.

## High Wind Areas

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For areas that experience high winds, the sensor may not detect any leaking gas if the air currents blow the gas away.

Locate the sensors as close to the source of the leak if possible. If necessary, a wind barrier may need to be installed or constructed around the source of the leak and the gas detector to allow the gas to accumulate for the sensor to detect.

The same should be done for indoor applications with high velocity forced air. In some cases, monitoring for gas leaks can be done through the exhaust duct. The sensor can be installed on the exhaust duct where the air passes by using a duct mount that will take sample air to monitor for leaking gas.

### High Temperature and Confined Spaces

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An available gas sampling block may be used to take air samples from a confined area or applications with extreme temperatures to monitor for the presence of combustible gases. Requires a vacuum pump to draw an air sample.

The detector and/or sensor should never be installed in applications with extreme temperatures as damage may occur.

The feasibility of using a gas detector in such areas must be determined by an analysis of the specific factors. Please consult with Safety Systems Technology before attempting such installation.

## ELECTRICAL WIRING

The GC803 transmitter is wired in Current SINK configuration.

### Terminal Connections

Terminal Number	Marking	Connection	Description
1	POWER	(+) Power Input	To Power Source 16 to 32 volts DC
2	OUT	Analog Output	Current Sink
3	COM	(-) Power Input	To Power Source 16 to 32 volts DC
4	ACT	Sensitive	Active Pellistor
5	CTR	Sensor Common	Pellistor Common
6	REF	Non-Sensitive	Non-Active Pellistor

### Power

The transmitter requires a power supply of between 16 VDC and 32 VDC. A minimum supply of 16 VDC is required at the sensor, taking into account the voltage drop due to cable resistance.

### Wiring Considerations

A multi-conductor cable is required.

A minimum of three conductors are required for the power and analog output. In general, the following rules should be observed:

- Always use the same wire type and length for all connections.
- The cable should be shielded or screened to prevent interference pickup if not installed in metal conduit.
- The 3 individual conductors must be installed in a metal conduit that is grounded. The GC803 enclosure must also be properly grounded.
- Avoid running the cable close to high-powered cables or equipment or close to radio transmitters or antennas.
- Splices should be avoided and connections in junction boxes must be absolutely clean with terminal screws tight.
- All sensor cable connections using crimp on terminals must be crimped and SOLDERED for stable operation. Improperly terminated cables will result in corrosion, resistance changes, drift, and inaccurate calibrations.

**IMPORTANT:** Any electrical conduit connected to the electronics enclosure must have a conduit seal installed within 18 inches (45.7 cm) of the enclosure.

## Maximum Cable Lengths

### Cable length between Transmitter and Sensor

The total DC resistance of the wires must be less than 3.0 ohms. The maximum cable lengths (for 3.0 ohms) for various wire sizes are listed below:

Cable Size	Maximum Cable Length (L)	
	Feet	Meters
22 AWG (.35 mm <sup>2</sup> )	700	200
20 AWG (.50 mm <sup>2</sup> )	1,100	330
18 AWG (.75 mm <sup>2</sup> )	1,800	520
16 AWG (1.5 mm <sup>2</sup> )	2,900	875
14 AWG (2.5 mm <sup>2</sup> )	4,600	1,400
12 AWG (4.0 mm <sup>2</sup> )	7,300	2,200

### Cable length between 4-20 mA Transmitter and External Equipment

The total DC resistance of the wires must be less than 325 ohms. The maximum cable lengths (for 325 ohms) for various wire sizes are listed below:

Cable Size	Maximum Cable Length (L)	
	Feet	Meters
26 AWG (.14 mm <sup>2</sup> )	7,736	2,359
24 AWG (.20 mm <sup>2</sup> )	12,305	3,751
22 AWG (.35 mm <sup>2</sup> )	21,746	6,630
20 AWG (0.5 mm <sup>2</sup> )	31,797	9,694
18 AWG (1.0 mm <sup>2</sup> )	59,026	17,996
16 AWG (1.5 mm <sup>2</sup> )	81,503	24,849
14 AWG (2.5 mm <sup>2</sup> )	129,138	39,371
12 AWG (4.0 mm <sup>2</sup> )	202,845	61,843

## DEFAULT CONFIGURATION

The Model GC803 Combustible Gas Detector is supplied with the following default configuration.

Function	Setting	Description
Sensor Type	Catalytic Bead	Pre-assembled
Signal Output	0 mA	Fault/Malfunction
	4 mA	Normal / No Gas
	12 mA	50% LEL
	20 mA	100% LEL



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## INSTALLATION

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### 1. Shipment

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Gas detectors shipped by Safety Systems Technology are fully assembled, quality tested, pre-calibrated, and packaged in special containers to protect against physical damage.

Upon receipt of the shipment, contents should be carefully removed and checked against the packing list. Contact Safety Systems Technology immediately if any damage has occurred or if there is any discrepancy in the order.

### 2. Tools Required

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- 1.5 mm hex wrench to remove the enclosure cover for aluminum housing or 2.0 mm for stainless steel housing
- Slotted head screw driver 1/16" or 1.55 mm width for terminal block connections
- Slotted head screw driver 3/64" to adjust potentiometers
- Adjustable wrench for conduit or cable gland connections
- Multi-meter to verify voltage on the terminals

### 3. Mount the Detector

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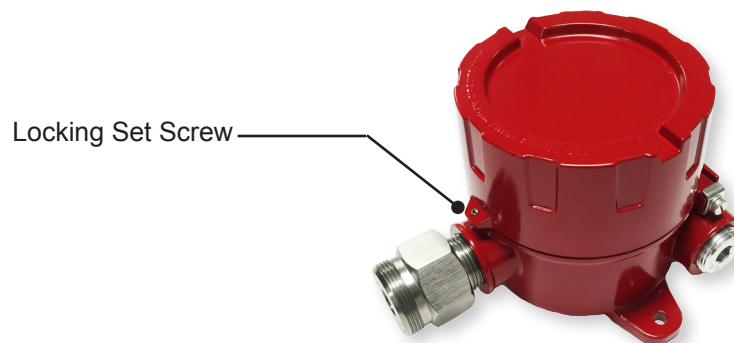
The detector is shipped fully assembled and pre-calibrated. Secure the detector to a wall or bracket, using bolts through the two mounting holes.

To mount to a pipe, a mounting pipe bracket accessory is available.

### 4. Loosen the Hex Head Set Screw from the Cover

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Loosen the hex head set screw on the detector cover (a 1.5 mm for aluminum housing or 2.0 mm for stainless steel hex wrench is required) and turn the cover counter-clockwise to remove.



## 5. Unplug the Electronics Module

An integrated metal bar is connected on the electronics module. Pull on the metal bar to remove the electronics module.



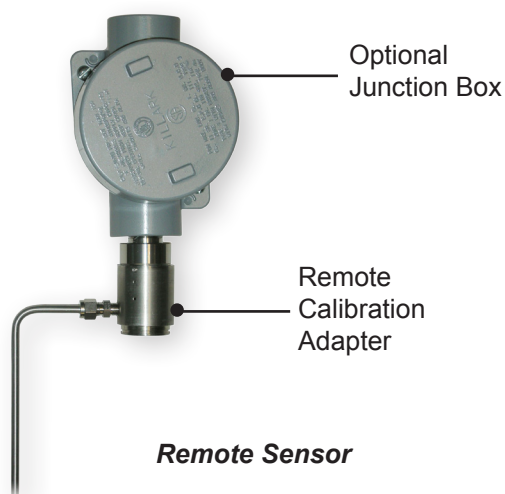
## 6. OPTIONAL: Mount the Remote Gas Sensor

For applications requiring a remote sensor, the sensor head can be removed and installed in a junction box for remote mounting.

If a junction box for remote sensor mounting is ordered from SST, it will be shipped with the required terminal blocks pre-installed.

### Remove the Sensor Head

1. Remove the sensor wiring connected to the terminal block inside the housing. Using a flat-head screwdriver, loosen the following terminal connections:



Terminal Number	Marking	NET22-NP-17SH Sensor (Standard)	VQ21T/3 Sensor
4	ACT	Black	Blue
5	CTR	White	Yellow
6	REF	Red	Red

2. Unscrew the sensor head by turning it counter-clockwise and remove it completely from the main enclosure.
3. Install the sensor head onto the junction box.
4. Wire the sensor head onto the terminal blocks of the junction box.

### Install the Remote Sensor

1. Install the remote sensor at the desired location. Preferred orientation of the sensor head is with the porous metal sensing face pointed downward. Never point the sensor face upwards to insure that no moisture or dust collects on the sensor face to reduce sensitivity and damage the sensor.
2. Install the accessories. For lighter than air gases, consider using a gas collection cone. Other weather protection accessories are available to protect the sensor from rain, dust, and splashing water.

For remote sensor applications, a remote calibration adapter is recommended. A tygon or stainless steel tubing can be connected to the remote calibration adapter to deliver calibration test gas to the sensor without having to access the sensor directly.

### Connect the Remote Sensor to the Electronics Module

**WARNING:** Failure to wire the sensor properly can damage the sensor. Note the wire color and the terminal connections.

1. Connect the 3 wires from the sensor head to the terminal blocks on the main enclosure.

Terminal Number	Marking	NET22-NP-17SH Sensor (Standard)	VQ21T/3 Sensor
4	ACT	Black	Blue
5	CTR	White	Yellow
6	REF	Red	Red

Three conductors are required between the sensor and the electronics module. All 3 conductors must be same wire type and length .

The cable/wires should be installed in a metal conduit or be shielded or screened cable with shield/screen connected to CHASSIS screw inside the electronics housing.

Avoid running the cable close to high powered cables or equipment or close to radio transmitters or antennas.

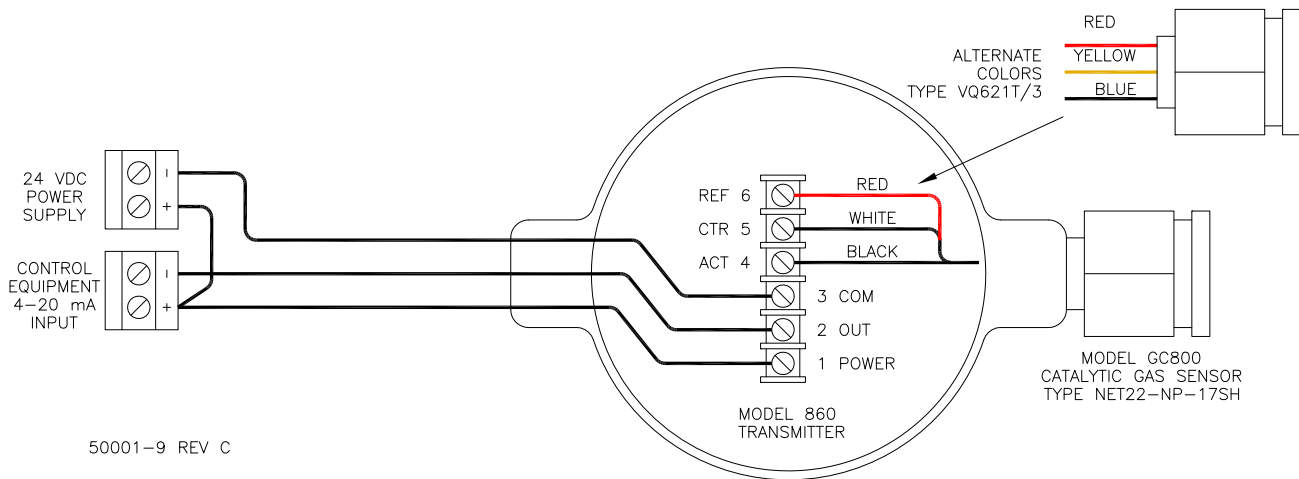
Splices should be avoided and connections in junction boxes must be absolutely clean with terminal screws tight. All sensor cable connections using crimp on terminals must be crimped and soldered for stable operation. Improperly terminated cables will result in corrosion, resistance changes, drift, and inaccurate calibrations.

**IMPORTANT:** Any electrical conduit connected to the electronics enclosure must have a conduit seal installed within 18 inches (45.7 cm) of the enclosure.

## 7. Connect Power and Analog Signal Wiring

**WARNING:** The determination of the location of gas detectors should be made in accordance with any relevant local, municipal, and national standards, codes, or legislation. Seek the advice of professionals or experts with knowledge of process plant systems and/or safety and engineering personnel.

A typical installation is shown in the drawing below.



This setup uses three wires between the sensor and the associated control modules. These wires carry the 24 VDC operating power for the sensor, and transmit the 20 mA signal to the controls.

The wires should be shielded (screened) or installed in a metal conduit to prevent undesirable noise pickup.

Note that the black wire shown in the drawing provides the return path for both the 24 volt operating power and the 4-20 mA analog output.

**IMPORTANT:** Any electrical conduit connected to the electronics enclosure must have a conduit seal installed within 18 inches (45.7 cm) of the enclosure.

## 8. Apply Power

**WARNING:** Verify that there are NO combustible gases present before power to the gas detector is turned on.

A source of 24 volt DC is required to power the detector.

### Activate Power

Activate the source of 24 volt DC operating power for the detector.

### Verify Power

Use a multi-meter to verify that voltage is available at terminals # 1 and #3 marked POWER and COM respectively.

## **9. Install the Electronics Module**

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Plug the electronics module into the connectors in the enclosure. Be sure that the sensor serial number on the electronics matches the serial number on the sensor.

Push down on the metal bar to be sure the module is completely pushed into the connectors.

At this time, do not install the housing cover.

### Powering Up

Once the electronic module is installed, the LED power indicator located on the electronic module will light up.

## **10. Set the ZERO and SPAN Calibration**

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**! IMPORTANT: Make sure the 4-20 mA output is connected to the external equipment prior to adjusting for the Zero Calibration.**

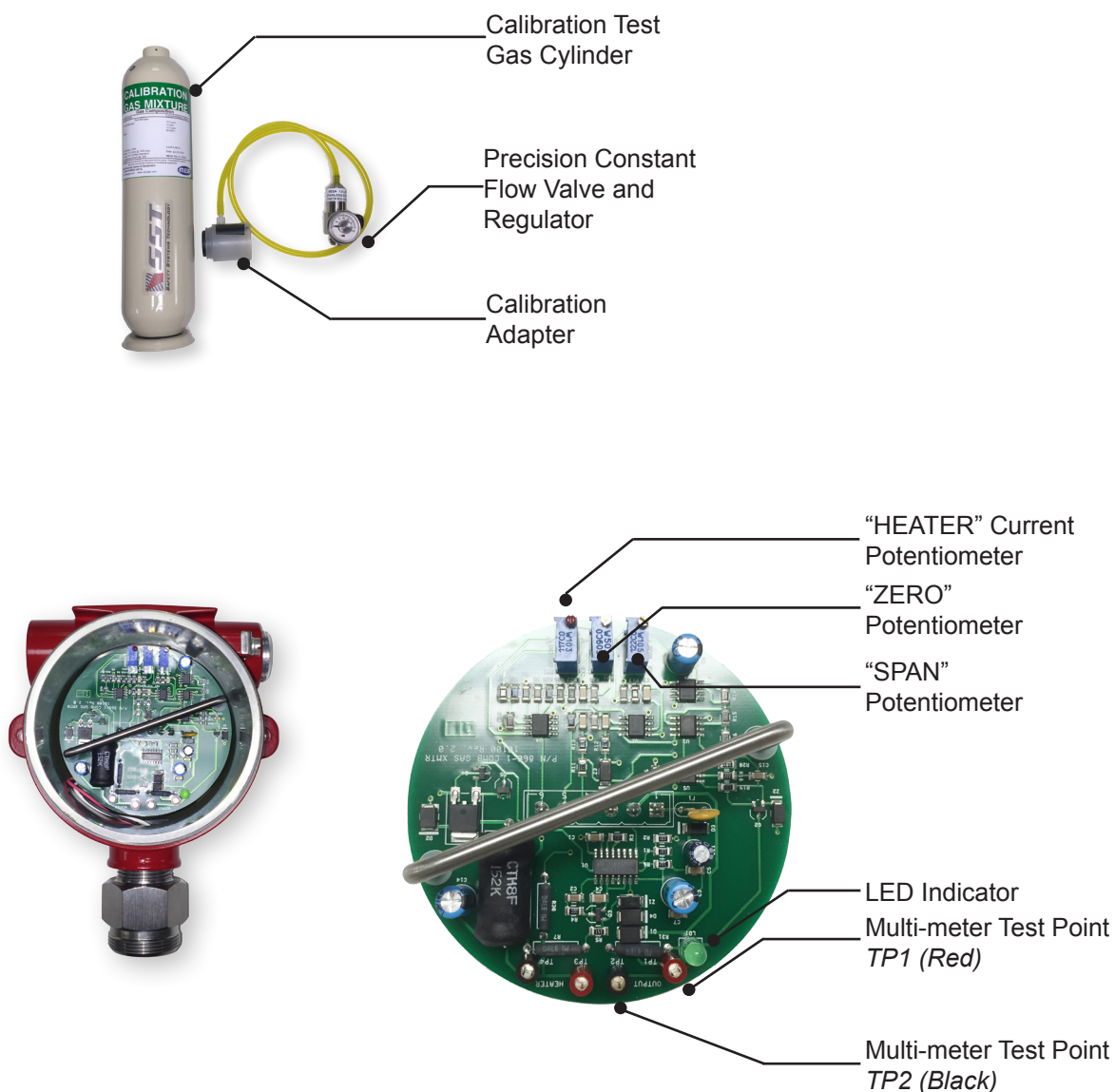
**! CAUTION: When calibrating the gas sensor, you must use the test gas corresponding to the gas to be detected, or calibration will not be accurate. For instance, if the expected gas to be detected is Methane, you must calibrate with Methane. If there is a possibility that several different gases could be present, always calibrate with the gas having the lowest LEL (Lower Explosive Limit) rating.**

### Tools Required

1. Multi-meter
2. Slotted head screw driver 3/64" to adjust potentiometers or "pots"
3. A cylinder of 50% LEL, balance air calibration gas
4. OPTIONAL: A cylinder of clean air will be required if there are "background" gases or clean air cannot be assured.
5. Calibration Kit which includes a precision constant flow valve and regulator, tubing, calibration adapter and carrying case for two cylinder of gas. Calibration test gas is sold separately. See below for ordering information.

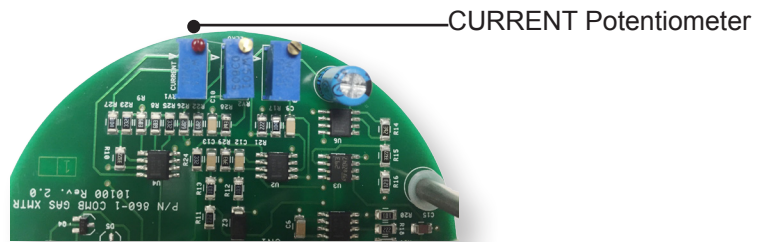
## Calibration Parts and Ordering Information

SST Part #	Description
857-01	Model 857 Calibration Kit (test gas sold separately) Complete kit includes calibration adapter, flow regulator and carrying case for two cylinders of calibration test gas
866-1S	Calibration adapter cup
857-02	Methane 50% LEL (balance air)
857-03	Propane 50% LEL (balance air)
857-04	Hydrogen 50% LEL (balance air)
857-05	Butane 50% LEL (balance air)
857-06	Butadiene 50% LEL (balance air)
857-07	Ethane 50% LEL (balance air)
857-08	Pentane 50% LEL (balance air)
857-85	Zero air 0% LEL
857-(Gas)	For other gases, please specify gas upon ordering



### About the CURRENT Potentiometer

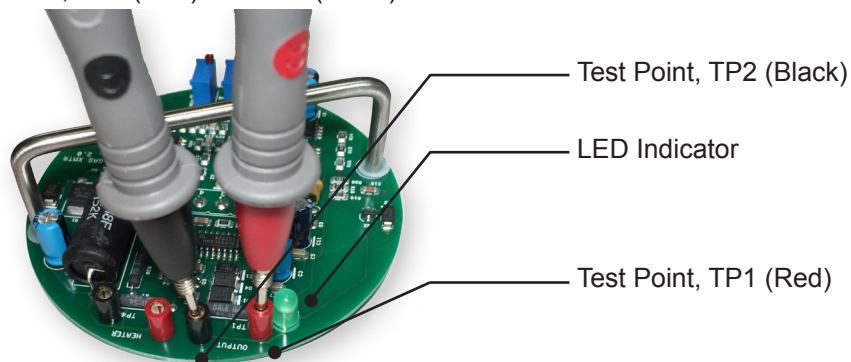
**WARNING:** Tampering or removing the factory seal on the CURRENT Potentiometer will invalidate the warranty on the gas detector. Adjusting the CURRENT pot can result in damaging the sensor.



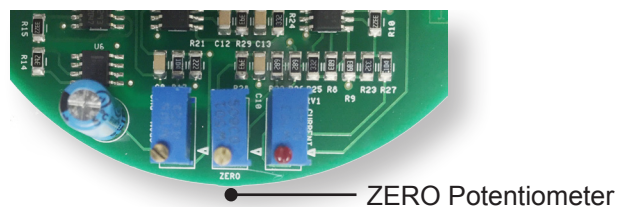
The CURRENT Potentiometer provides the 170 mA heater current required by the sensor. This pot is adjusted at the factory based on the sensor requirement. The “pot” is then sealed to prevent any changes to the heater current. No adjustments are required on this pot.

### Set Zero Calibration

1. Set your Multi-meter to its mV DC. Place the meter probes to the output current test points, TP1 (Red) and TP2 (Black).



2. If clean air cannot be assured and there are “background” gases to set the ZERO, use a cylinder of clean source of zero gas or compressed air.
3. Apply the Zero Gas at this time.
4. Adjust the ZERO Potentiometer or “pot” to 4.0 +/- 0.05 mV output voltage. 4.0 mV on the test point corresponds to 4.0 mA analog sink current. Use a slotted head screw driver 3/64” to adjust the ZERO pot located on top of the electronics module. SEE figure below. The middle pot is marked “ZERO” on the printed circuit board.





### Set SPAN Calibration

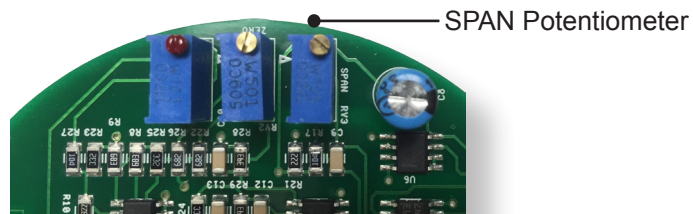
- Keep the multi-meter probes to the output current test points, TP1 (Red) and TP2 (Black).

**NOTE:** The output voltage to be read on the Multi-meter depends on the concentration of test gas used. Factory recommended test gas for calibration is 50% LEL of the target gas.

### Using 50% LEL Test Gas

**WARNING:** Ensure you have enough calibration gas in the cylinder. If calibration gas cylinder is low, there may not be enough gas in the cylinder to accurately calibrate the detector. Calibration will not be correct if insufficient gas is used during the calibration procedure.

- Apply the 50% LEL Test Gas to the sensor. The reading on the Multi-meter will increase as the sensor responds to the test gas.
- Wait until the Multi-meter reading becomes constant.



- Adjust the SPAN Potentiometer or “pot” to 12 mV output voltage. The 12 mV on the test point corresponds to 12 mA analog sink current. The brightness of the green LED on the electronic module will change as the SPAN pot is adjusted. Use a slotted head screw driver 3/64” to adjust the SPAN pot located on top of the electronics module. SEE figure below. The last pot on the right is marked “SPAN” on the printed circuit board.
- Remove the test gas from the sensor.
- The Multi-meter reading should go down to 4.0 mV. If the reading is lower or higher than the 4.0 mV, go back to STEP 4 above to adjust the ZERO pot and repeat the SPAN Calibration steps.

### Using Other Concentrations of Test Gas

The sensor can also be calibrated using other concentrations of test gas. If 50% LEL test gas is not available, the transmitter target output needs to be calculated as follows:

$$4 + (0.16 \times P) \text{ mV}$$

Where “P” is the full range of the test gas.

For example, the sensor is being calibrated with 60% LEL Methane test gas. The target output voltage is  $4 + (0.16 \times 60) = 13.6 \text{ mV}$ . This output voltage corresponds to an actual output of 13.6 mA from the transmitter.

- Calculate the output voltage based on the test gas being used.
- Apply the Test Gas to the sensor. The reading on the Multi-meter will increase as the sensor responds to the test gas.



3. Wait until the Multi-meter reading becomes constant.
4. Adjust the SPAN Potentiometer or “pot” to the calculated output voltage. Use a slotted head screw driver 3/64” to adjust the SPAN pot located on top of the electronics module. SEE figure above. The last pot on the right is marked “SPAN” on the printed circuit board.
5. Remove the test gas from the sensor.
6. The Multi-meter reading should go down to 4.0 mV. If the reading is lower or higher than the 4.0 mV, go back to the Set ZERO Calibration steps and repeat the Set SPAN Calibration steps.

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## 11. Install the Housing Cover of the Detector

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At this time, the gas detector is fully functional.

Apply the Housing Cover. Twist the cover until you have a tight fit.

Secure the cover by using your Allen hex wrench on the lock located just on the edge of the cover.

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## 12. Perform a Bump Test and Functional Checkout

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The gas detector has been pre-calibrated to the desired target at the factory, and no further calibration will normally be required when it is initially installed.

As a final check to be sure that the gas detector is working properly, factory recommends to conduct a “Bump Test” and briefly expose the gas sensor to a weak concentration of a combustible gas.

Observe the reading at the central control point to determine if the sensor is reading the test gas.

By most definitions, a “BUMP TEST” is a brief exposure of the sensor to gas in order to verify that the sensor responds and the instrument alarms function accordingly. The BUMP TEST, by this definition, does not check the accuracy of the instrument.

**NOTE: When performing a Bump Test, DO NOT use or apply pure gas to the catalytic sensor. The high concentration of the pure gas will shorten the life of the sensor.**

The BUMP TEST could be performed by using the 50% LEL gas mixture used for calibrating the sensor.

The gas detector is now fully operational.

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## 13. Install Accessories

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Once the gas detector is fully operation, all the associated accessories can be installed.

## ROUTINE OPERATION

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The Model GC803 Combustible Gas Detector is designed to provide protection of personnel and property from gas leaks 24 hours a day, 7 days a week with no regular intervention required.

The built-in 4-20 mA transmitter converts the output from a standard catalytic sensor to a standard 4-20 mA signal to a central control point. The field wiring between the sensor and the transmitter is continuously “supervised” for open or short circuits.

### Mode Structure

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The GC803 has 3 operating modes:

1. Protection Mode
2. Alarm Mode
3. Fault Mode
4. Calibration Mode

### Protection Mode

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This is the normal operating mode, and the GC803 will be in this mode when all conditions are normal. Inside the gas detector housing is a green LED indicator, not viewable from the outside which is lit up during normal operation.

The gas detector can be monitored at the central control point which is providing an output signal of 4 mA which indicates no gas is present.

### Alarm Mode

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When gas is starting to accumulate in the protected area, the 4-20 mA signal to a central control point increases to report the present gas concentration.

When the output signal rises to 12 mA, the gas detector is reporting 50% LEL. (This will be the case if the sensor is calibrated using a gas concentration of 50% LEL.)

When the output signal rises to 20 mA, the gas detector is now reporting 100% LEL.

The gas detector will return to report 4 mA once no gas is detected.

### Fault Mode

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The built-in transmitter is monitored for open and short circuit conditions.

#### 0 mA Signal

If the central control point is reporting 0 mA, this may signify that a failure has occurred in the transmitter or an Open Circuit exists in the wire.

#### Greater than 25 mA Signal

If the central control point is reporting an output of greater than 25 mA, this may signify either a failure has occurred in the transmitter or a Short Circuit exists.

- ! WARNING:** If the gas detector is reporting any of the conditions above which signifies a **FAULT**, the gas detector will not be able to report an alarm condition.
- The source of fault conditions should be corrected as soon as possible for safety reasons.

## CALIBRATION MODE

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To calibrate the gas detector, manual adjustments can be made on the ZERO and SPAN potentiometers or “pots” inside the enclosure of the gas detector or at the central control point, provided those adjustments are available.

- ! CAUTION:** During the calibration procedure, the central control point's outputs (analog and relay contacts) may be activated. Before starting, notify affected
- personnel and bypass any shutdowns if required.

During the Calibration Mode, the gas detector will continuously report the output signal to the central control point. The calibration can be performed by two persons with the gas detector operating in the hazardous area. One person can monitor the output signal from the central control point while the other applies the test gas on the gas detector.

## MAINTENANCE

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### Factory Recommended Maintenance

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The GC803 has been designed with very little to no required maintenance. Depending on your application and safety guidelines in your facility, additional maintenance may be necessary to ensure the installed equipment are functioning properly.

Periodic maintenance should be performed per the manufacturer's recommendations and instructions. Factory recommended regular maintenance schedule is as follows:

- 90-day Recalibration
- Annual Verification

Optional maintenance:

- 30-day "Bump" Tests

Maintenance intervals should be independently established through a documented procedure such as a maintenance log maintained by plant/safety personnel or third party testing services.

### 30-Day "Bump" Tests

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We recommend that a short performance test be performed at least every 30 days to verify that your gas detector is operational. This is commonly called a Bump Test in the industry. During this test, you expose the detector to a small amount of test gas, just enough to see that the sensor is reading the gas concentration. It is not necessary to perform a complete recalibration of the detector.

**NOTE:** During the bump test all of the central control point's outputs (analog and relay contacts) may be activated. Before starting, notify affected personnel and bypass any shutdowns if required.

You may use calibrating test gas (50% LEL) or any other test gas at any concentrations less than 100% LEL.

**IMPORTANT:** Do not use gas from a cigarette lighter, butane or propane fuel, or any other gases at high concentrations, as these will considerably shorten the life of the gas sensor head.

Expose the sensor head to the bump gas. Monitor for the concentration readings on the central control point. You do not need to continue beyond this point, you just want to be sure that there is a response. If you have test gas with concentrations higher than the alarm trip points, you may leave the gas on until they are activated by the central control point if desired.

### 90-Day Recalibration

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The gas detector has been pre-calibrated to Methane at the factory, and no further calibration will be required if your target gas is Methane. If using a different target gas, the gas detector must be recalibrated using the appropriate target gas.

Under normal operating conditions, SST gas detectors should be recalibrated every 90 days. However, the change in calibration over time is a function of how much “background” gas is present during normal operation, and how often the detector is exposed to higher concentrations. When the gas sensor is initially installed, we recommend that the calibration be checked on a more frequent basis to determine how much the calibration is changing. To check, expose the detector to the same calibration gas as was used for the original calibration. Use the data taken over several tests to determine how often you should recalibrate the detector to keep the desired accuracy.

### Annual Verification

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Factory recommends a system verification should be performed at least annually to verify wiring, terminal connections and stability of mounting for all integral safety equipment including but not limited to:

- Power supplies
- Field detection devices
- Control modules
- Audible and visual alarm devices
- Installed accessories

## CALIBRATION INSTRUCTIONS

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Calibration will take care of changes in sensor performance and drift. The Model GC803 is calibrated by adjusting the ZERO and SPAN “pots” located on the electronics module.

### Factory Recommended Calibration Schedule

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Under normal operating conditions, the factory recommends recalibrating the gas sensor every 90 days.

### Factors to Consider for Frequency of Recalibration

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The gas detector may require more frequent or less frequent recalibration based on your application. When the gas detector is initially installed, it is recommended to verify the reading on the detector every 30 days. Any constant reading  $\pm 4\%$  LEL may indicate the sensor sensitivity has changed and requires recalibration. This is due to the function of how much “background” gas is present during normal operation, and how often the detector is exposed to higher concentrations.

Sensors exposed to “background” gas during normal operation will affect the sensitivity of the sensor and will require more frequent calibration.

### When to Recalibrate the Gas Detector

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The following lists when to recalibrate the gas detector:

- Every 90 days after the last calibration
- Constant reading of  $\pm 4$  or any negative reading
- Constant exposure to combustible gas will affect the sensitivity of the sensor and require the sensor to be recalibrated more frequently
- After exposure to high concentrations of combustible gas
- After a gas leak has occurred triggering the LOW ALARM or HIGH ALARM set points of the gas detector

During the calibration procedure, clean air as well as calibrated test gas are applied to the detector. If clean air cannot be assured, you may need to “purge” the sensor with clean air from a gas bottle.

## Tools Required for Calibration

**IMPORTANT:** Calibration gas with a concentration of exactly one-half of the rated full scale of the gas detector mixed with air is required for the calibration procedure (e.g. 50% LEL balance air calibration gas for a 100% LEL combustible gas sensor).

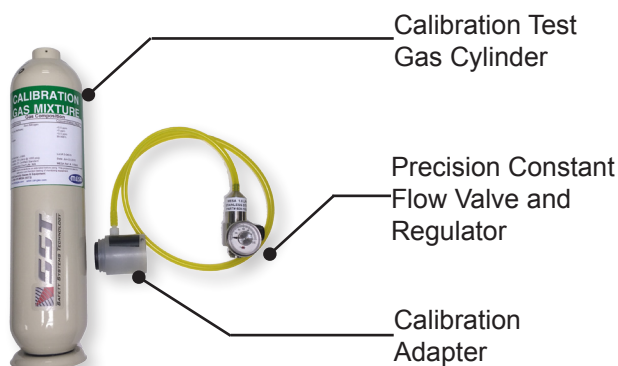
**WARNING:** Ensure you have enough calibration gas in the cylinder. If calibration gas cylinder is low, there may not be enough gas in the cylinder to accurately calibrate the detector. Calibration will not be correct if insufficient gas is used during the calibration procedure.

The following are required to recalibrate the gas detector:

- A cylinder of 50% LEL, balance air calibration gas
- OPTIONAL: A cylinder of clean air will be required if there are “background” gases or clean air cannot be assured. DO NOT use Nitrogen to purge the sensor, false reading may result!
- Calibration Kit which includes a precision constant flow valve and regulator, tubing, calibration adapter and carrying case for two cylinder of gas. Calibration test gas is sold separately. See below for ordering information.
- A 1.5 mm hex wrench to remove the enclosure cover for aluminum housing or 2.0 mm for stainless steel housing

## Calibration Parts and Ordering Information

SST Part #	Description
857-01	Model 857 Calibration Kit (test gas sold separately) Complete kit includes calibration adapter, flow regulator and carrying case for two cylinders of calibration test gas
866-1S	Calibration adapter cup
857-02	Methane 50% LEL (balance air)
857-03	Propane 50% LEL (balance air)
857-04	Hydrogen 50% LEL (balance air)
857-05	Butane 50% LEL (balance air)
857-06	Butadiene 50% LEL (balance air)
857-07	Ethane 50% LEL (balance air)
857-08	Pentane 50% LEL (balance air)
857-85	Zero air 0% LEL
857-(Gas)	For other gases, please specify gas upon ordering



## Step-by-Step Calibration Procedure

The Model GC803 will respond to almost any combustible gas or vapor. Make sure to use a calibration test gas that matches the target gas the gas detector is supposed to detect. If the gas detector is supposed to detect Methane gas leaks, make sure the calibration test gas is Methane.

To calibrate the gas detector, manual adjustments can be made on the ZERO and SPAN potentiometers or “pots” inside the enclosure of the gas detector or at the central control point, provided those adjustments are available.

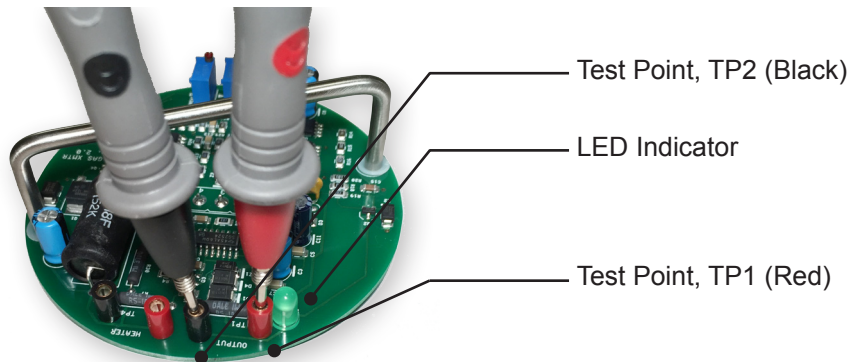
The preceding calibration instructions details the adjustments made on the gas detector.

### Open the Enclosure Cover

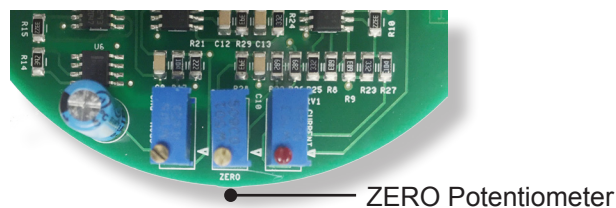
1. Using a 1.5 mm hex wrench (or 2.0 mm for stainless steel housing), unlock the set screw on the enclosure cover.
2. Twist the cover counter clockwise and fully remove and set aside.

### Set Zero Calibration

1. Set your Multi-meter to its mV DC. Place the meter probes to the output current test points, TP1 (Red) and TP2 (Black).



2. If clean air cannot be assured and there are “background” gases to set the ZERO, use a cylinder of clean source of zero gas or compressed air.
3. Apply the Zero Gas at this time.
4. Adjust the ZERO Potentiometer or “pot” to 4.0 +/- 0.05 mV output voltage. The 4.0 mV on the test point corresponds to 4.0 mA analog sink current. Use a slotted head screw driver 3/64” to adjust the ZERO pot located on top of the electronics module. SEE figure above. The middle pot is marked “ZERO” on the printed circuit board.





### Set SPAN Calibration

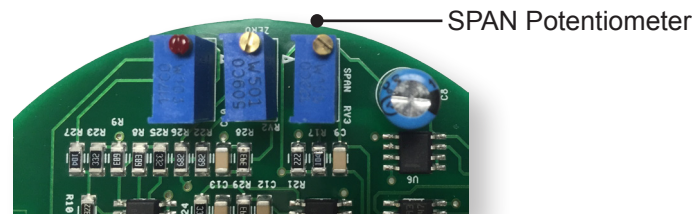
5. Keep the multi-meter probes to the output current test points, TP1 (Red) and TP2 (Black).

**NOTE:** The output voltage to be read on the Multi-meter depends on the concentration of test gas used. Factory recommended test gas for calibration is 50% LEL of the target gas.

### Using 50% LEL Test Gas

**WARNING:** Ensure you have enough calibration gas in the cylinder. If calibration gas cylinder is low, there may not be enough gas in the cylinder to accurately calibrate the detector. Calibration will not be correct if insufficient gas is used during the calibration procedure.

6. Apply the 50% LEL Test Gas to the sensor. The reading on the Multi-meter will increase as the sensor responds to the test gas.
7. Wait until the Multi-meter reading becomes constant.
8. Adjust the SPAN Potentiometer or “pot” to 12 mV output voltage. The 12 mV on the test point corresponds to 12 mA analog sink current. Use a slotted head screw driver 3/64” to adjust the SPAN pot located on top of the electronics module. SEE figure below. The last pot on the right is marked “SPAN” on the printed circuit board.



9. Remove the test gas from the sensor.
10. The Multi-meter reading should go down to 4.0 mV. If the reading is lower or higher than the 4.0 mV, go back to STEP 4 above to adjust the ZERO pot and repeat the SPAN Calibration steps.

### Using Other Concentrations of Test Gas

The sensor can also be calibrated using other concentrations of test gas. If 50% LEL test gas is not available, the transmitter target output needs to be calculated as follows:

$$4 + (0.16 \times P) \text{ mV}$$

Where “P” is the full range of the test gas.

For example, the sensor is being calibrated with 60% LEL Methane test gas. The target output voltage is  $4 + (0.16 \times 60) = 13.6$  mV. This output voltage corresponds to an actual output of 13.6 mA from the transmitter.

1. Calculate the output voltage based on the test gas being used.
2. Apply the Test Gas to the sensor. The reading on the Multi-meter will increase as the sensor responds to the test gas.
3. Wait until the Multi-meter reading becomes constant.
4. Adjust the SPAN Potentiometer or “pot” to the calculated output voltage. Use a slotted head screw driver 3/64” to adjust the SPAN pot located on top of the electronics module. SEE figure above. The last pot on the right is marked “SPAN” on the printed circuit board.
5. Remove the test gas from the sensor.
6. The Multi-meter reading should go down to 4.0 mV. If the reading is lower or higher than the 4.0 mV, go back to the Set ZERO Calibration steps and repeat the Set SPAN Calibration steps.

### Install the Housing Cover of the Detector

At this time, the gas detector is fully functional.

Apply the Housing Cover. Twist the cover clockwise until you have a tight fit.

Secure the cover by using your hex wrench on the lock located just on the edge of the cover.

## **Failed or Incomplete Calibrations**

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Make sure to complete the entire calibration procedure. Failure to do so will result in inaccurate readings.

### **Causes of Failed or Incomplete Calibrations**

- No test gas is reaching the gas sensor.

Check for any blockage in the porous metal filter on the opening of the gas sensor. Debris, dust, or mud could be blocking the sensor. Weather protection accessories are available to protect the sensor and should be used to prevent any damage to the sensor.

- Gas sensor is damaged.

Exposure to water, silicones or other “poisoning” substances can damage the sensor. If the sensor is unable to detect the calibration test gas, the sensor may have been damaged and must be replaced.

- Gas sensor has reduced sensitivity.

Extended exposure to high concentration of combustible gas over a very long time period will affect the sensor and will no longer calibrate. Replacement of the sensor is required.

- Calibration test gas applied during Zero calibration

Applying the calibration test gas during Zero calibration will result in negative displays and inaccurate readings.

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## CALIBRATING THE DETECTOR TO A DIFFERENT TARGET GAS

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The Model GC803 Combustible Gas Detector will respond to almost any combustible gas or vapor. However, the gas detector is calibrated to the target gas to ensure accurate readings.

The user has the option to recalibrate the gas detector to a different target gas. For example, if the gas detector was originally purchased to detect Methane leaks but now has to detect Butane, it has to be recalibrated using Butane test gas.

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### Tools Required for Calibrating to a Different Target Gas

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The following are required to recalibrate the gas detector to a different target gas:

- A cylinder of 50% LEL, balance air calibration gas
- OPTIONAL: A cylinder of clean air will be required if there are “background” gases or clean air cannot be assured.
- Calibration Kit which includes a precision constant flow valve and regulator, tubing, calibration adapter and carrying case for two cylinder of gas. Calibration test gas is sold separately. See below for ordering information.
- A 1.5 mm hex wrench to remove the enclosure cover for aluminum housing or 2.0 mm for stainless steel housing

### Steps to Calibrate the Gas Detector to a New Target Gas

**! WARNING: Access to the interior of the gas detector or removal of the electronic module must only be conducted by trained personnel.**

**! WARNING: De-classify the area to reduce the risk of ignition of hazardous atmosphere. Combustible and flammable gases and vapors are very dangerous. Extreme caution should be taken when these hazards are present.**

1. De-classify the area. Power to the gas detector can be left on.
2. Remove the housing cover. Open the housing cover by using the Allen wrench to unlock the set screw on the cover. Twist the cover all the way until it is completely off.
3. Recalibrate the gas detector to the new target gas. SEE “Step-by-Step Calibration Procedure”.

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## REPLACING THE ELECTRONIC MODULE

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**! WARNING:** Access to the interior of the gas detector or removal of the electronic module must only be conducted by trained personnel.

**! WARNING:** De-classify the area to reduce the risk of ignition of hazardous atmosphere. Combustible and flammable gases and vapors are very dangerous. Extreme caution should be taken when these hazards are present.

The electronic module is located within the gas detector housing. Contact the factory to order a new replacement electronic module for the gas detector.

### Ordering Information

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SST Part #	Description
860-1	Replacement plug-in Combustible Gas electronic module.

### Tools Required to Replace the Electronic Module

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The following are required to replace the electronic module:

1. A 1.5 mm hex wrench to remove the enclosure cover for aluminum housing or 2.0 mm for stainless steel housing
2. Multi-meter
3. Slotted head screw driver 3/64" to adjust potentiometers or "pots"
4. A cylinder of 50% LEL, balance air calibration gas
5. OPTIONAL: A cylinder of clean air will be required if there are "background" gases or clean air cannot be assured.
6. Calibration Kit which includes a precision constant flow valve and regulator, tubing, calibration adapter and carrying case for two cylinder of gas. Calibration test gas is sold separately.

## Steps to Replace the Electronic Module

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**! WARNING:** Access to the interior of the gas detector or removal of the electronic module must only be conducted by trained personnel.

**! WARNING:** De-classify the area to reduce the risk of ignition of hazardous atmosphere. Combustible and flammable gases and vapors are very dangerous. Extreme caution should be taken when these hazards are present.

1. De-classify the area. Power to the gas detector can be left on.
2. Remove the housing cover. Open the housing cover by using the Allen wrench to unlock the set screw on the cover. Twist the cover all the way until it is completely off.
3. Remove the existing electronics module.
4. Install the new electronics module in the housing.
5. Close the housing cover. Twist the cover tight.
6. Use the hex wrench to lock the set screw on the housing cover.

### Set Zero Calibration

7. Set your Multi-meter to its mV DC. Place the meter probes to the output current test points, TP1 (Red) and TP2 (Black).
8. If clean air cannot be assured and there are "background" gases to set the ZERO, use a cylinder of clean source of zero gas or compressed air.
9. Apply the Zero Gas at this time.
10. Adjust the ZERO Potentiometer or "pot" to 4.0 +/- 0.05 mV output voltage. Use a slotted head screw driver 3/64" to adjust the ZERO pot located on top of the electronics module. SEE figure above. The middle pot is marked "ZERO" on the printed circuit board.

### Set SPAN Calibration

11. Keep the multi-meter probes to the output current test points, TP1 (Red) and TP2 (Black).

**! NOTE:** The output voltage to be read on the Multi-meter depends on the concentration of test gas used. Factory recommended test gas for calibration is 50% LEL of the target gas.

### Using 50% LEL Test Gas

**! WARNING:** Ensure you have enough calibration gas in the cylinder. If calibration gas cylinder is low, there may not be enough gas in the cylinder to accurately calibrate the detector. Calibration will not be correct if insufficient gas is used during the calibration procedure.

12. Apply the 50% LEL Test Gas to the sensor. The reading on the Multi-meter will increase as the sensor responds to the test gas.
13. Wait until the Multi-meter reading becomes constant.
14. Adjust the SPAN Potentiometer or "pot" to 12 mV output voltage. Use a slotted head

screw driver 3/64" to adjust the SPAN pot located on top of the electronics module. SEE figure above. The last pot on the right is marked "SPAN" on the printed circuit board.

15. Remove the test gas from the sensor.
16. The Multi-meter reading should go down to 4.0 mV. If the reading is lower or higher than the 4.0 mV, go back to STEP 4 above to adjust the ZERO pot and repeat the SPAN Calibration steps.

### Using Other Concentrations of Test Gas

The sensor can also be calibrated using other concentrations of test gas. If 50% LEL test gas is not available, the transmitter target output needs to be calculated as follows:

$$4 + (0.16 \times P) \text{ mV}$$

Where "P" is the full range of the test gas.

For example, the sensor is being calibrated with 60% LEL Methane test gas. The target output voltage is  $4 + (0.16 \times 60) = 13.6$  mV. This output voltage corresponds to an actual output of 13.6 mA from the transmitter.

1. Calculate the output voltage based on the test gas being used.
2. Apply the Test Gas to the sensor. The reading on the Multi-meter will increase as the sensor responds to the test gas.
3. Wait until the Multi-meter reading becomes constant.
4. Adjust the SPAN Potentiometer or "pot" to the calculated output voltage. Use a slotted head screw driver 3/64" to adjust the SPAN pot located on top of the electronics module. SEE figure above. The last pot on the right is marked "SPAN" on the printed circuit board.
5. Remove the test gas from the sensor.
6. The Multi-meter reading should go down to 4.0 mV. If the reading is lower or higher than the 4.0 mV, go back to the Set ZERO Calibration steps and repeat the Set SPAN Calibration steps.

### Install the Housing Cover of the Detector

At this time, the gas detector is fully functional.

Apply the Housing Cover. Twist the cover clockwise until you have a tight fit.

Secure the cover by using your hex wrench on the lock located just on the edge of the cover.

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## REPLACING THE SENSOR

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The sensor used with the gas detector have no serviceable parts. The sensor must be replaced when it has reached the end of their operational life.

### Ordering Information

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SST Part #	Description
800-4	Model GC804-4 standard replacement sensor, catalytic type, stainless steel, ATEX listed. <i>Use only to replace sensors marked NET22-NP-17SH.</i>
800-2	Model GC804-2 replacement sensor, catalytic type, stainless steel, ATEX and CSA listed. <i>Use only to replace sensors marked VQ21T/3.</i>

**! WARNING:** Order the correct replacement sensor for your unit. These sensors cannot be interchanged. Failure to install the correct item may damage the sensor.  
■ To ensure the correct sensor is ordered, please contact the factory and provide the Serial Number of your existing unit.

**! WARNING:** Handle sensors with care as they may contain corrosive solutions. Do not tamper or in any way disassemble the sensor. Do not expose to temperatures outside the recommended range. Do not expose sensor to organic solvents or flammable liquids. Dispose sensors in an environmentally safe manner. Disposal should be according to local waste management requirements and environmental guidelines or legislation. You may return sensors to Safety Systems Technology clearly marked for environmental disposal.

### Tools Required to Replace the Sensor

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The following are required to replace the electronic module:

- A 1.5 mm hex wrench to remove the enclosure cover for aluminum housing or 2.0 mm for stainless steel housing
- Flat-head screwdriver maximum 3/16" (5 mm) width



## Steps to Replace the Sensor

**! WARNING:** Access to the interior of the gas detector, removal of the electronic module and replacing the sensor must only be conducted by trained personnel.

**! WARNING:** De-classify the area to reduce the risk of ignition of hazardous atmosphere. Combustible and flammable gases and vapors are very dangerous. Extreme caution should be taken when these hazards are present.

1. De-classify the area. Power to the gas detector can be left on.
2. Remove the housing cover. Open the housing cover by using the Allen wrench to unlock the set screw on the cover. Twist the cover all the way until it is completely off.
3. Remove the existing electronics module by pulling on the metal handle. Set it aside.
4. Remove the sensor wiring connected to the terminal block inside the housing. Using a flat-head screwdriver, loosen the following terminal connections:



Terminal Number	Marking	NET22-NP-17SH Sensor (Standard)	VQ21T/3 Sensor
4	ACT	Black	Blue
5	CTR	White	Yellow
6	REF	Red	Red

5. Turn the sensor head counter clockwise. If necessary, use a wrench to remove the sensor from the detector housing.
6. Connect the wiring of the new sensor to the terminal blocks as follows:

Terminal Number	Marking	NET22-NP-17SH Sensor (Standard)	VQ21T/3 Sensor
4	ACT	Black	Blue
5	CTR	White	Yellow
6	REF	Red	Red

7. Re-install the electronics module in the housing.
8. The electronics module will power up and the green LED indicator will light up.
9. Calibrate the new sensor. SEE "Calibration Instructions" section of this manual.
10. Close the housing cover. Twist the cover tight.
11. Use the hex wrench to lock the set screw on the housing cover.
12. The gas detector is now fully operational.

## TROUBLESHOOTING

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**CAUTION:** All repairs shall only be performed at a Safety Systems Technology facility and by its authorized service personnel. Failure to comply will invalidate the warranty on the gas detector.

Disconnect or inhibit external alarm wiring before troubleshooting the unit, which might send the detector into alarm.

### LED Indicator

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A non-functioning LED indicator on the electronic module may indicate damage. Send the electronics module to the factory for repair or replacement. SEE "REPAIRS" section of this manual for instructions.

### Drifting or Unstable % LEL Readings

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Drifting or unstable % LEL readings may result from loose wires. Check the 3 wires connecting the sensor to the electronics module inside the housing. Screw terminals, crimped connectors or wire nuts on these wires must be extremely tight to maintain the low resistance connections between the head and the electronics.

### False Alarms

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If you are having an "unreasonable" number of false alarms, verify the gas concentration near the gas detector using a personal gas monitor. If there is no gas or very little gas, recalibrate the gas detector. Extended exposure to combustible gas will require recalibration of the gas sensor.

In some cases, false alarms may be the result of the sensor head losing sensitivity and the system has tried to compensate by increasing the amplifier sensitivity. If this is the case, the sensor should be replaced and a new calibration performed.

### Fault

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There are several factors that may trigger a system fault:

- A problem with the power supply. The 24 volt DC power supplied to the detector may be less than 16 volts or greater than 32 volts. Replace or service the power supply.
- The sensor may have failed. This may indicate the sensor has been damaged. Check to make sure the wiring inside the enclosure has not been disconnected or damaged. If the sensor is damaged, replace the sensor.
- An internal failure has occurred in the electronics module. Replace the electronics module and send to factory for repairs.

## **Technical Support**

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### **Headquarters**

Safety Systems Technology, Inc.  
23282 Mill Creek Drive, Suite 215  
Laguna Hills, CA 92653  
U.S.A.

### **Phone Numbers**

1.866.507.2264 Toll-free (USA only)  
+1.949.583.1857 Main  
+1.949.340.6643 FAX

### **E-mail Addresses**

techalert@safetysys.com	Technical Support
sales@safetysys.com	Sales

## SPARE PARTS AND ACCESSORIES

To order spare parts and/or accessories, please contact the nearest Safety Systems Technology's authorized distributor or Safety Systems Technology Customer Care Department and provide the following information:

- Part number
- Description
- Quantity

### Replacement Sensors

800-4	Model GC804-4 standard replacement sensor, catalytic type, stainless steel, ATEX listed. <i>Use only to replace sensors marked NET22-NP-17SH.</i>
800-2	Model GC804-2 replacement sensor, catalytic type, stainless steel, ATEX and CSA listed. <i>Use only to replace sensors marked VQ21T/3.</i>

### Replacement Electronics Module

860-2	Model 860 4-20 mA transmitter replacement electronics module. <i>Use only with sensors marked NET22-NP-17SH.</i>
860-1	Model 860 4-20 mA transmitter replacement electronics module. <i>Use only with sensors marked VQ21T/3.</i>

### Replacement Housing

850-5	Replacement housing, aluminum
850-6	Replacement housing, stainless steel
870-020	Pipe mounting adapter

### Test Equipment

857-01	Model 857 Calibration Kit (test gas sold separately) Complete kit includes calibration adapter, flow regulator and carrying case for two cylinders of calibration test gas
866-1S	Calibration adapter cup
857-02	Methane 50% LEL (balance air)
857-03	Propane 50% LEL (balance air)
857-04	Hydrogen 50% LEL (balance air)
857-05	Butane 50% LEL (balance air)
857-06	Butadiene 50% LEL (balance air)
857-07	Ethane 50% LEL (balance air)
857-08	Pentane 50% LEL (balance air)
857-85	Zero air 0% LEL
857-(Gas)	For other gases, please specify gas upon ordering

## Accessories

Accessories for Model GC804-4. Order from this list with sensors marked NET22-NP-17SH:

851-5-4	Waterspray shield
852-1-4	Dust cover
853-1-4	Gas sensor sampling block
854-1-4	Duct mounting assembly, aluminum 5 inch sampling tube
859-1-4	Gas collection cone
858-1-4	Remote calibration adapter

Accessories for Model GC804-2. Order from this list with sensors marked VQ21T/3:

851-5-2	Waterspray shield
852-1-2	Dust cover
853-1-2	Gas sensor sampling block
854-1-2	Duct mounting assembly, aluminum 5 inch sampling tube
859-1-2	Gas collection cone
858-1-2	Remote calibration adapter

Other accessories:

862-1	Calibration certificate
20231-2	Stainless steel tag

## Junction Boxes for Remote Sensor Installation

850-2	Mounts on end of conduit run. For Group B, C, D locations. UL and CSA approved.
850-98	With wall mounting flange. For Group A, B, C, D locations.
850-99	With wall mounting flange. For Group C, D locations.
850-4	Mounts on end of conduit run. For Group B, C, D locations. UL, CSA, ATEX, and IEC approved.

## Power Supplies

**NOTE:** The required power supply is based on the number of gas detector units and other devices installed. Contact the factory to determine the appropriate power supply for your application.

NEMA4 weatherproof enclosure for use in non-hazardous locations. 120/240 VAC input.

35501-17	24 VDC @ 1.7 amps DC Output
35501-34	24 VDC @ 3.4 amps DC Output
35501-63	24 VDC @ 6.3 amps DC Output
35503-07	24 VDC @ 1.7 amps Output w/ 7 amp-hour backup battery provides up to 24 hours reserve power

Rated explosion-proof for Class I Group C or D hazardous locations.

35502-06	24 VDC @ 0.6 amps DC Output
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## WARRANTY

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Safety Systems Technology, Inc. warrants the Model GC804 to be free of defects in materials or workmanship under normal use and will repair or replace any unit that is found to be defective for five years after the date of manufacture. Gas detection elements that are damaged by exposure to poisoning contaminants, incorrect hookup, abuse, accident, or abnormal operating conditions are not covered by this warranty.

Defective or damaged equipment must be shipped to Safety Systems Technology accompanied by a detailed description of any issue.

Safety Systems Technology reserves the right to make the final determination of the nature of and responsibility for defective or damaged equipment. Equipment that has been repaired or modified by the user, damaged as the result of an accident, incorrectly installed or used in an application or environment for which it was not intended is not covered by this warranty. Safety Systems Technology's responsibility under this warranty shall be limited to the repair or replacement of the defective equipment at its option when it is returned to the factory transportation prepaid. The defective unit will be repaired or replaced free of charge to the customer and returned transportation prepaid. In all cases, this warranty is limited to the cost of the equipment.

To determine the warranty expiration date, look for the serial number (SN) on the electronics module. The first 2 digits of the serial number are the year of manufacture and the next 2 digits are the week of manufacture. As an example, for number SN1242001, the product was manufactured in the 24th week of year 2012 (October 19, 2012). The warranty would expire 5 years from that date on October 18, 2017.

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## REPAIRS

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All equipment requiring repair must be shipped to Safety Systems Technology accompanied by a Return Material Authorization (RMA) form. The form can be downloaded through SST's website at [www.safetysys.com](http://www.safetysys.com).

**1. The following information is required:**

- Model Number or Part Number
- Serial Number
- Brief description of the problem
- Contact information
- Complete shipping address for the return of the repaired items

**2. Contact Safety Systems Technology to obtain an RMA number at:**

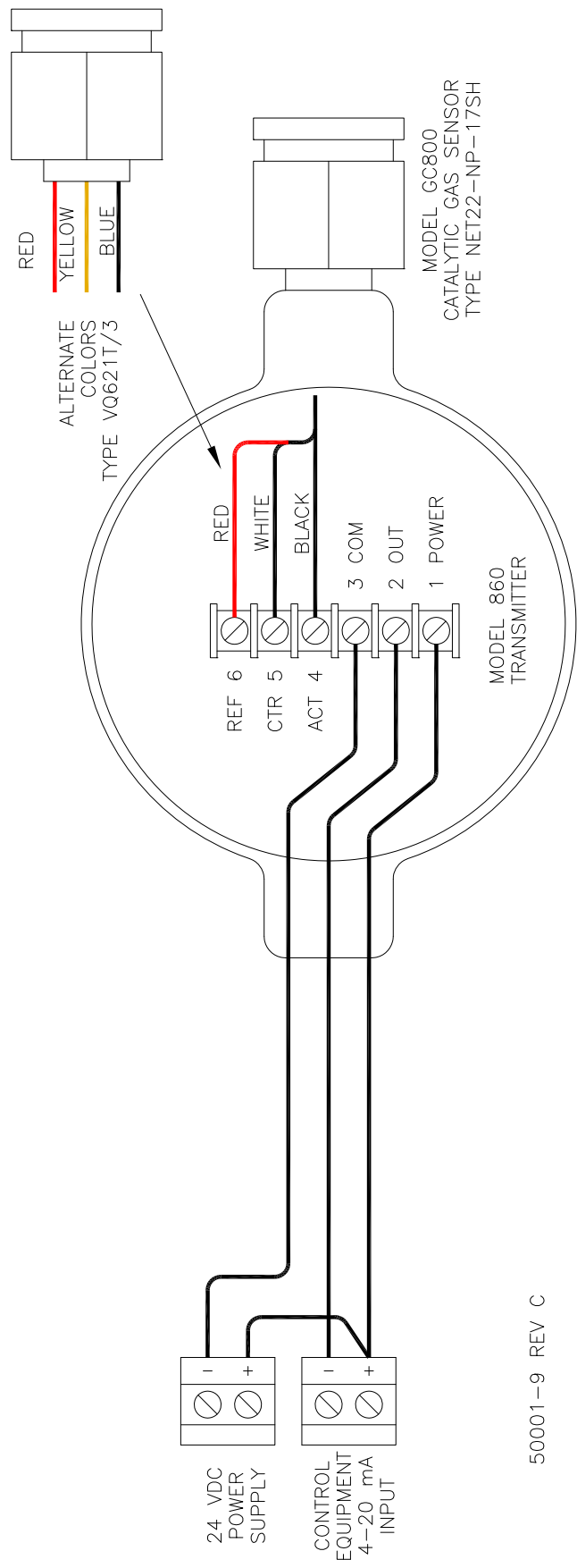
+1.949.583.1857 Main  
+1.866.507.2264 Toll-free number (USA only)  
or via e-mail at [techalert@safetysys.com](mailto:techalert@safetysys.com)

**3. Ship the unit(s) prepaid with a copy of the RMA form inside the package to:**

**Safety Systems Technology  
Attention: Repair Department  
23282 Mill Creek Drive, Suite 215  
Laguna Hills, California 92653  
U.S.A.  
+1.949.583.1857 Phone**

Upon receipt of your equipment, a repair estimate will be sent to you and repairs will be made only after your authorization. Repair and shipping costs will be invoiced to account holders or charged to a credit card.

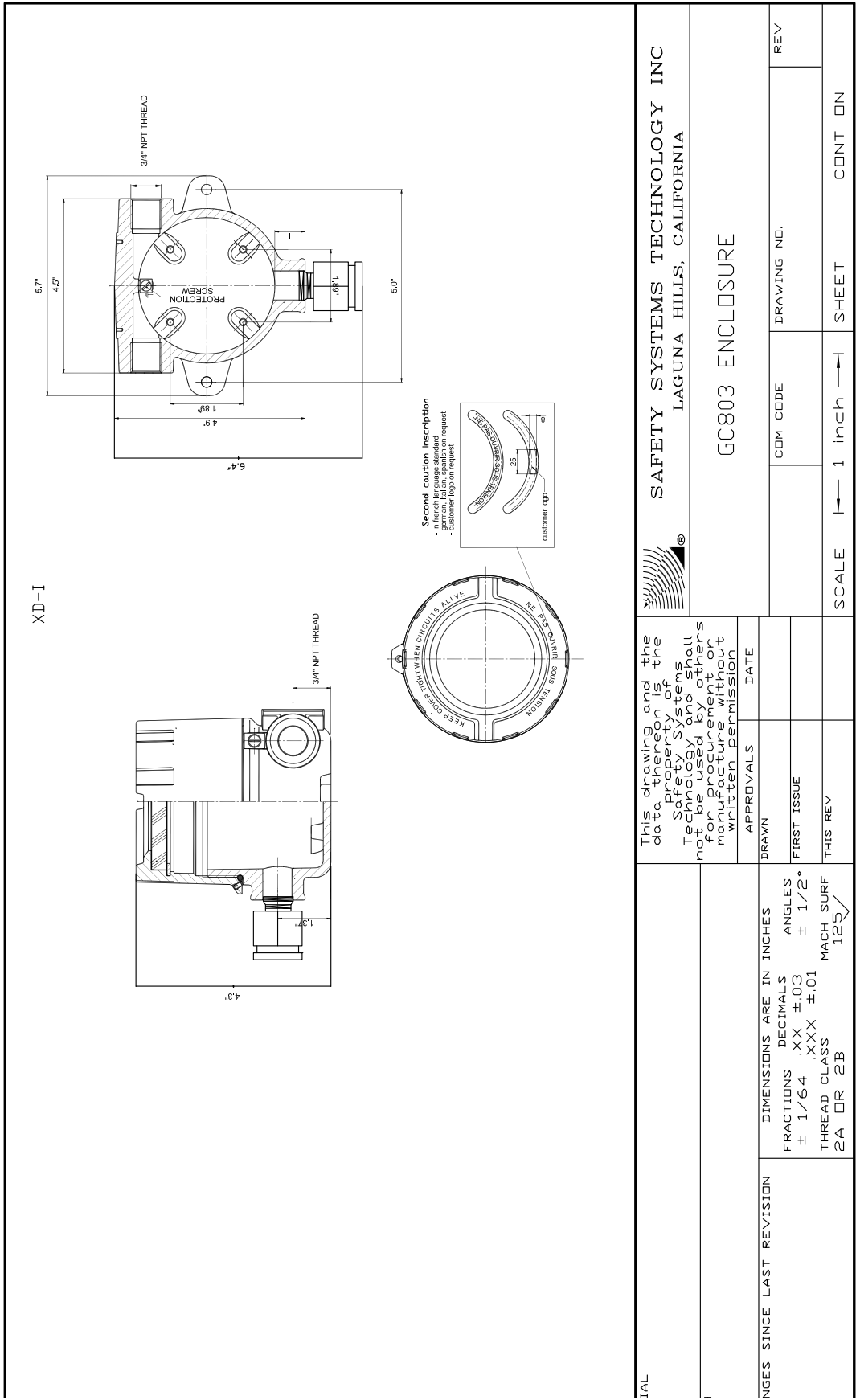
WIRING DIAGRAM



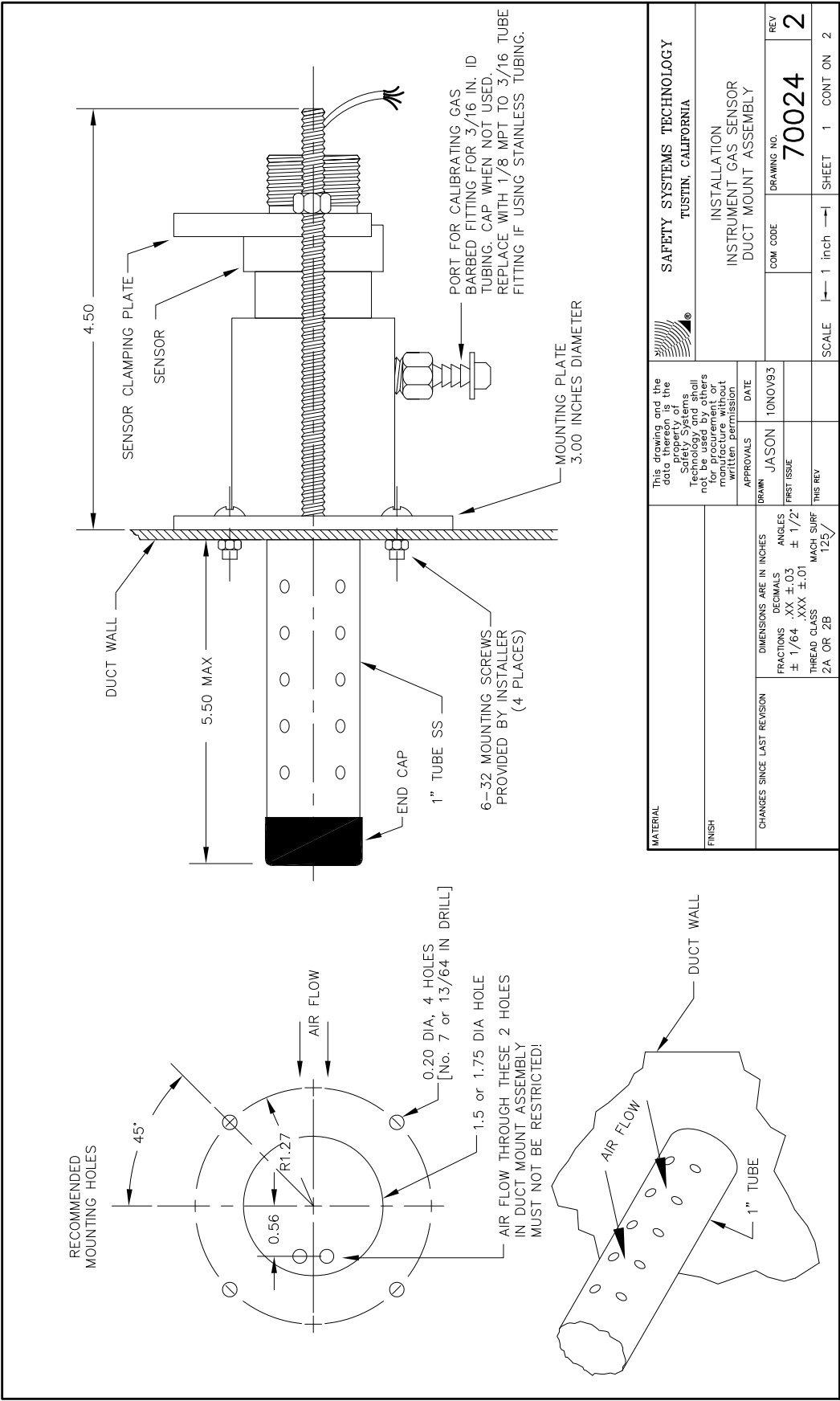
50001-9 REV C




ENCLOSURE DRAWING

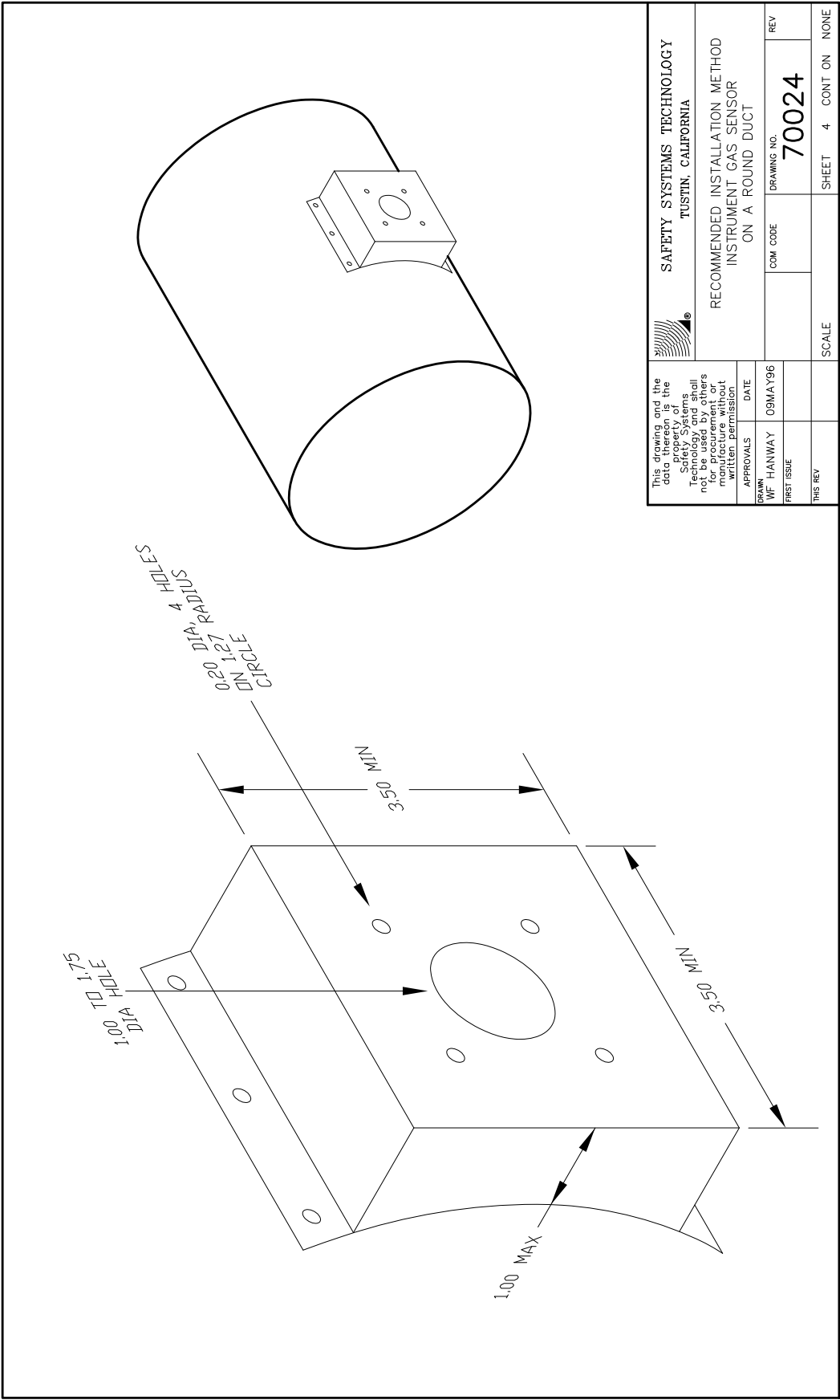


DUCT MOUNT DRAWING



MATERIAL		This drawing and the data thereon is the property of Safety Systems Technology and shall not be used by others for procurement or manufacture without written permission				SAFETY SYSTEMS TECHNOLOGY TUSTIN, CALIFORNIA	
FINISH		APPROVALS		DATE		INSTALLATION INSTRUMENT GAS SENSOR DUCT MOUNT ASSEMBLY	
CHANGES SINCE LAST REVISION		DRAWN		JASON		10NOV93	
		FRACTIONS XX ±.03 ± 1/64		DECIMALS XXX ±.01		ANGLES ± 1/2°	
		THREAD CLASS 2A OR 2B		MACH SURF 125/		THIS REV	
		COM CODE		DRAWING NO.		REV	
		SCALE		1 inch = 1 inch		SHEET 1 CONT ON 2	

ROUND DUCT ASSY DRAWING





[1] **EC-TYPE EXAMINATION CERTIFICATE**

[2] **Component intended for use on/in equipment or protective system  
intended for use in potentially explosive atmospheres  
Directive 94/9/EC**

[3] EC-Type Examination Certificate number:

**CESI 01 ATEX 066 U**

[4] Component: Gas detectors type NET....

[5] Manufacturer: **NEMOTO ENVIRONMENTAL TECNOLOGY s.r.l. (N.E.T. s.r.l.)**

[6] Address: Via A. Manzoni, 19  
20010 Pogliano Milanese (MI) - Italy

[7] This component and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] CESI, notified body n. 0722 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this component has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of components intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report n. EX-A1/027148.

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 50014: 1997 + A1..A2**

**EN 50018: 2000**

[10] The sign "U" placed after the certificate number indicates that this certificate must not be mistaken for a certificate intended for an equipment or protective system. This partial certification may be used as a basis for certification of an equipment or protective system.

[11] This EC-TYPE EXAMINATION CERTIFICATE relates only to the design, examination and tests of the specified component in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this component. These are not covered by this certificate.

[12] The marking of the component shall include the following:

**II 2 G EEx d IIC**

This certificate may only be reproduced in its entirety and without any change, schedule included.

date September 17<sup>th</sup>, 2001 – traslation issued on September 19<sup>th</sup>, 2001

prepared CERT – M. Balaz

approved CERT – U. Colombo

**CESI**

**CENTRO ELETTROTECNICO SPERIMENTALE ITALIANO**

Business Unit Certificazione

Il Responsabile

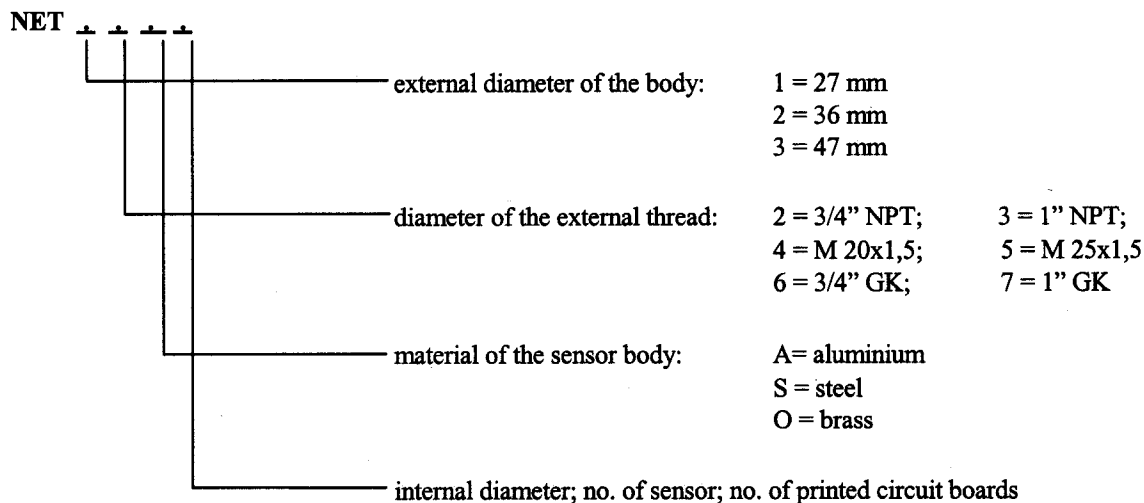
page 1/3

[13] **Schedule**

[14] **EC-TYPE EXAMINATION CERTIFICATE n. CESI 01 ATEX 066 U**

[15] **Description of component**

The gas detectors type NET.... are identified by a code as follow:



A complete identification of the subjected apparatus is reported in the documents annexed to this EC type examination certificate.

**Electrical characteristics**

- Rated supply voltage: 5 V
- Maximum supply current: 200 mA

[16] **Report n. EX-A1/027148**

**Routine tests**

The manufacturer shall carry out the routine tests prescribed at clause 24 of EN 50014 Standard.

**Descriptive documents (prot. EX-A1/027173)**

- Document	no. ST718 rev. 6	(4 pages)	dated	13.02.2001
- Document	Tabella 1	(2 pages)	dated	26.02.2001
- Drawing	no. NET ME CE 002	(3 pages)	dated	17.09.2001
- Drawing	no. NET ME CE 001	(3 pages)	dated	17.09.2001
- Document	Manuale d'uso	(3 pages)	dated	26.02.2001
- Document	Attestato di conformità del componente		dated	26.02.2001

One copy of all documents is kept in CESI files.

This certificate may only be reproduced in its entirety and without any change, schedule included.

[13]

## **Schedule**

[14] **EC-TYPE EXAMINATION CERTIFICATE n. CESI 01 ATEX 066 U**

[17] **Schedule of limitations**

The gas detectors type NET.... shall be used with an operating temperature of  $-20 \div +80$  °C.

[18] **Essential Health and Safety Requirements**

Assured by compliance to the Standards indicated at page 1.



# IECEx Certificate of Conformity

## INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit [www.iecex.com](http://www.iecex.com)

Certificate No.: IECEx CES 12.0009X issue No.: 0 Certificate history:

Status: Current

Date of Issue: 2012-06-15 Page 1 of 4

Applicant: **N.E.T. S.r.l.**  
Via Legnano 2  
I-20010 Cornaredo (MI)  
Italy

Electrical Apparatus: Gas detectors, series NET 1, 2 or 3  
Optional accessory:

Type of Protection: Flameproof enclosures 'd', Dust ignition protection by enclosure 't'

Marking: Ex d IIC T6 or T5 Gb  
Ex tb IIIC T85°C or T100°C Db  
IP65

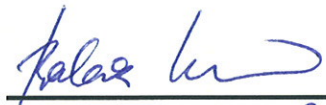
Approved for issue on behalf of the IECEx  
Certification Body:

Mirko Balaz

Position:

Head of IECEx CB

Signature:  
(for printed version)

  
12-6-2012

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the [Official IECEx Website](http://www.iecex.com).

Certificate issued by:

**CESI**  
Centro Elettrotecnico  
Sperimentale Italiano S.p.A.  
Via Rubattino 54  
20134 Milano  
Italy

**CESI**  
**CESI S.p.A.**  
Testing & Certification Division  
Business Area Certification  
Il Responsabile  
  
Fiorenzo Bregani



# IECEx Certificate of Conformity

Certificate No.: IECEx CES 12.0009X

Date of Issue: 2012-06-15

Issue No.: 0

Page 2 of 4

Manufacturer: **N.E.T. S.r.l.**  
Via Legnano 2  
I-20010 Cornaredo (MI)  
**Italy**

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

#### STANDARDS:

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

<b>IEC 60079-0 : 2011</b> Edition: 6.0	Explosive atmospheres - Part 0: General requirements
<b>IEC 60079-1 : 2007-04</b> Edition: 6	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
<b>IEC 60079-31 : 2008</b> Edition: 1	Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure "t"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

#### TEST & ASSESSMENT REPORTS:

*A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in*

##### Test Report:

[IT/CES/ExTR12.0009/00](#)

##### Quality Assessment Report:

[IT/CES/QAR08.0001/04](#)





# IECEx Certificate of Conformity

Certificate No.: IECEx CES 12.0009X

Date of Issue: 2012-06-15

Issue No.: 0

Page 3 of 4

## Schedule

### EQUIPMENT:

*Equipment and systems covered by this certificate are as follows:*

Gas detectors series NET 1,2 or 3 are devices used for the detection of flammable or toxic gases. They are manufactured with a flameproof enclosure inside which are installed the sensing element and any electronic circuitry for the signal amplification or transmission.

The equipment is provided with a multi-core cable permanently connected to (non detachable) that through a sealed bushing allows connection to external circuits for supply/measure.

The gas detectors type NET2 and type NET3 may be equipped with a device (GD adapter) for the dust ingress protection of the sintered element. In this configuration the Db Equipment Protection Level is assigned to the gas detector.

### Electrical characteristics:

- Maximum supply voltage: 30 Vdc
- Maximum absorbed current: 400 mA
- Maximum dissipated power: 0,7 W (type NET1 and NET2) and 1,4 W (type NET3)
- Ambient temperature range: from -40 /-30 /-20°C to +50 /+55 / +60°C
- Degree of protection (IEC 60529): IP 65 (only model with GD Adapter).

The ambient temperature values above reported represent the upper and lower limits of the applicable temperature range, taking into account the constructional (type of resin and dissipated power) and functional (sensing element) characteristics of the gas detectors, as specified in in the Manufacturer's documents.

### CONDITIONS OF CERTIFICATION: YES as shown below:

- The supply cable of the gas detector must be protected against mechanical damages caused by impact or friction.
- User side connection of the supply cable must be in a safe area or be protected by one of the types of protection listed in IEC 60079-0 standard.
- The installation of the gas detector shall guarantee the equipotential bonding and metal continuity of the enclosure.
- The gas detectors series NET are designed for stationary installation and shall not be used for portable applications.
- The flamepaths are specified in the manufacturer drawings. For information regarding the dimensions of the flameproof joints the manufacturer shall be contacted.
- The conditions of the installation of the equipment are included within the safety instructions. For a safe use these mounting instructions are to be followed precisely.
- In case of use with enclosure subject of a separate certification for a type of protection listed in IEC 60079-0 standard, the coupling enclosure/gas detector shall not affect the type of protection of the enclosure. The requested degree of protection IP shall be guaranteed.



# IECEx Certificate of Conformity

Certificate No.: IECEx CES 12.0009X

Date of Issue: 2012-06-15

Issue No.: 0

Page 4 of 4

## EQUIPMENT(continued):

The various type of gas detector series NET are identified by the following code:

**NET** X Y Z

X - Type of the detector body: 1, 2 or 3

Y - External thread connection: 2= 3/4" NPT; 3=1" NPT; 4=M20x1,5 (\*); 5=M25x1,5 (\*)

Z - Detector body version and material:

A = aluminium, standard version;

S = stainless steel AISI 303, standard version;

1 = stainless steel AISI 303, perforated cap version (NET3);

2 = stainless steel AISI 316, standard version (NET3);

3 = stainless steel AISI 316, perforated cap version (NET3);

4 = stainless steel AISI 303, round, small version (NET2);

5 = aluminium, round, small version (NET2);

6 = stainless steel AISI 303, round version (NET1 – NET2);

7 = aluminium, round version (NET1 – NET2).

(\*) only for type NET3

The different types of sensing elements and / or electronic circuitry installed within the flameproof enclosure are given in, are detailed in the Manufacturer's documents.

Gas detectors series NET are provided with a supplementary label plate on which, in addition to electrical parameters of the sensing element, is also specified the type of gas for which they are used.

The temperature class and/or the maximum surface temperatures are reported in the following table:

Type of sensor body	NET 1	NET 2		NET 3	
Max. power inside sensor body	≤ 0.7W	≤ 0.7W		≤ 1.4W	
Max. ambient temperature	Gb	Gb	Db	Gb	Db
+ 60 °C	T6	T5	T100°C	T5	T100°C
+ 55 °C	-	T6	T85°C	T6	T85°C
+ 50 °C	-	T6	T85°C	T6	T85°C

The marking label shows the temperature class and/or the maximum surface temperatures in function of the ambient temperature range assigned to the unit.





PHYSICAL TECHNICAL TESTING INSTITUTE

Ostrava-Radvanice



## EC-Type Examination Certificate

(1)

(2)

Equipment or Protective Systems Intended for use  
in Potentially Explosive Atmospheres  
Directive 94/9/EC

(3) EC-Type Examination Certificate Number:

**FTZÚ 07 ATEX 0002U**

(4) Component: **Model XD-SI, universal instrument housing**

(5) Manufacturer: **Limatherm, S.A.**

(6) Address: **ul. Tarnowska 1, 34-600 Limanowa, Poland**

(7) This Component and any of acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The Physical Technical Testing Institute, notified body number 1026 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report N°

**07/0002 dated January 2007**

(9) Compliance with Essential Health and Safety Requirements has been assured by compliance with:

**EN 60079-0:2006; EN 60079-1:2004; EN 61241-0:2006; EN 61241-1:2004**

(10) The sign „U” placed after the certificate number indicates that this certificate must not be mistaken for a certificate intended for an equipment or protective system. This partial certification may be used as a basis for certification of an equipment or protective system.

(11) This EC-TYPE EXAMINATION CERTIFICATE relates only to design, examination and testing of the specified component in accordance to the directive 94/9/EC. If applicable, further requirements of the Directive apply to the manufacture and supply of this component.

(12) The marking of the component shall include following:



**I M 2 Ex d I  
II 2G Ex d IIC  
II 2D Ex tD**

This EC-Type Examination Certificate is valid till: **31 March 2012**

Responsible person:

*Šindler*  
Dipl. Ing. Šindler Jaroslav  
Head of certification body



Date of issue: 07 March 2007

Number of pages: 4  
Number of pages: 1/4

This certificate is granted subject to the general conditions of the Physical Technical Testing Institute.  
This certificate may only be reproduced in its entirety and without any change, schedule included.





# PHYSICAL TECHNICAL TESTING INSTITUTE

Ostrava-Radvanice

(13)

## Schedule

(14) **EC-Type Examination Certificate N° FTZÚ 07 ATEX 0002U**

(15) Description of Component:

XD-SI universal instrument housing is designed to accommodate different electronics instruments or devices for working in hazardous areas with flammable gases, vapours and dusts. The housing and cover are made as stainless steel investment casting.

There are three flameproof joints in XD-SI instrument body:

- On the cover is used thread M100x2/6H;
- D<sub>2</sub>, D<sub>3</sub> on the conduit openings for cable gland (various type of threaded holes);
- D<sub>1</sub> on process opening for thermowell (D<sub>1</sub> - various type of threaded holes).

The cover is locked by screw with hex socket using hex spanner. Each cover is sealed with "O" ring.

The unused holes can be blinded with a certified stopping plug.

(16) Report No. : 07/0002

(17) Schedule of Limitations:

17.1 -50°C < T<sub>serv</sub> > 150°C for connection head with "O" ring made from VQM rubber (silicone)

17.2 IP protection 66 ÷ 68 – is depend on applied cable gland. (IP 68 – deep 1 m).

17.3 Max. dissipation power for temperature class are as follow:

T <sub>amb</sub>	Temperature class T6 85°C	Max. power dissipation (W)		
		Pztr (W)	Temperature class T5 100°C	Pztr (W)
		For all variety of enclosures position horizontally/vertically		For all variety of enclosures position horizontally/vertically
40°C	Δ θ ≤ 40 K	14,7 / 14,3	Δ θ ≤ 55 K	21,8 / 21,4
55°C	Δ θ ≤ 25 K	8,3 / 8,1	Δ θ ≤ 40 K	14,7 / 14,3
70°C	Δ θ ≤ 10 K	2,3 / 2,3	Δ θ ≤ 25 K	8,3 / 8,1
85°C	N.A.	- / -	Δ θ ≤ 10 K	2,3 / 2,3

(18) Essential Health and Safety Requirements:

Covered by standards mentioned in (9) of this certificate.

Responsible person: \_\_\_\_\_

Dipl. Ing. Sindler Jaroslav  
Head of certification body



Date of issue: 07 March 2007

Page: 2/4

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**PHYSICAL TECHNICAL TESTING INSTITUTE**  
**Ostrava-Radvanice**

(13)

**Schedule**


(14) **EC-Type Examination Certificate N° FTZÚ 07 ATEX 0002U**

(19)

**LIST OF DOCUMENTATION**

- Application manual N-L3625 dated 18.12.2006
- Catalogue sheets for model: XD-SI dated 03.2007
- Drawings N°: 2-Z-L3586 dated 03.01.2007
- Stainless Steel Specification: 1.4301 AISI 304  
1.4541 AISI 321  
1.4401 AISI 316
- Silicone rubber specification ELASTOSIL R701/40-R701/80

Responsible person:

  
Dipl. Ing. Šindler Jaroslav  
Head of certification body



Date of issue: 07 March 2007

Page: 3/4

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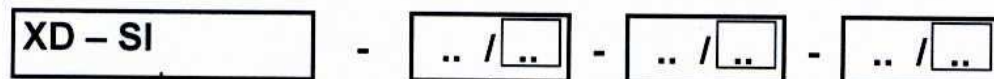
(13)

Schedule

(14) EC-Type Examination Certificate N° FTZÚ 07 ATEX 0002U

(20)

TYPE KEY



TYPE OF INSTRUMENT  
HOUSING

SYMBOL OF CONDUIT THREAD  $D_3 - D_2$

M2 = M20x1,5 6H

M24 = M24x1.5 6H

M25 = M25x1.5 6H

G2 = G 1/2, BSP 1/2

G3 = G 3/4, BSP 3/4

N2 = 1/2 NPTmod – modified ac. to OIT-17/03

N3 = 3/4 NPTmod – modified ac. to OIT-17/03

PD = plugged

**Notice:**

Type: "size of thread / PD" if thread is plugged ex.

M2/PD, etc.

SYMBOL OF PROCESS THREAD  $D_1$

M2 = M20x1,5 6H

M24 = M24x1.5 6H

M25 = M25x1.5 6H

M27 = M27x2 6H

G2 = G 1/2, BSP 1/2

G3 = G 3/4, BSP 3/4

N2 = 1/2 NPTmod – modified ac. to OIT-17/03

N3 = 3/4 NPTmod – modified ac. to OIT-17/03

PD = plugged

**Notice:**

Type: "size of thread / PD" if thread is plugged ex.

M2/PD, etc.







Physical Technical Testing Institute  
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## Supplement No. 1 to EC-Type Examination Certificate

Equipment or Protective Systems Intended for use  
in Potentially Explosive Atmospheres  
Directive 94/9/EC

(3) EC-Type Examination Certificate Number:

**FTZÚ 07 ATEX 0002U**

(4) Component: **Model XD-SI, universal instrument housing**

(5) Manufacturer: **Limatherm, S.A.**

(6) Address: **ul. Tarnowska 1, 34-600 Limanowa, Poland**

(7) This supplement of certificate is valid for: - new model **XD-SIwin** (variant) – extension of series  
- extension of Tserv for XD-SI serie


(8) Modification of certified component and any of its approved variants are specified in documentation, a list of which is mentioned in the schedule of this certificate.

(9) This supplement to type examination relates only to design, examination and testing of the specified component in accordance to the directive 94/9/EC. If applicable, further requirements of the Directive apply to the manufacture and supply of this component.

(10) Safety requirements of modified parts were fulfilled by satisfying of following standards:

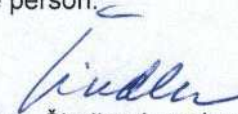
**EN 60079-0:2006; EN 60079-1:2007; EN 61241-0:2006; EN 61241-1:2004**

(11) Marking of component shall contain symbols:

 **I M 2 Ex d I  
II 2G Ex d IIC  
II 2D Ex tD A21**

(12) This type examination certificate is valid till: **31.03.2012**

Responsible person:

  
Dipl. Ing. Šindler Jaroslav  
Head of certification body



Date of issue: 14.01.2009

Number of pages: 3  
Page: 1/3

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**Physical Technical Testing Institute  
Ostrava-Radvanice**

(13)

**Schedule**

(14)

**Supplement No. 1 to  
EC-Type Examination Certificate N° FTZÚ 07 ATEX 0002U**

(15) Description of Component:

- XD-SI win enclosure is alternatively designed with the cover with a window.
- Further is changed a lock screw from M3x6 to M4x8 on the housing XD-SI and XD-SI win.
- It is introduced additional "O" ring made from fluoroelastomer FKM, for temperature range of XD-SI housing from -20°C to +200°C.

(16) Report No. : 07/0002-D1

(17) Schedule of limitations:

17.1  $T_{serv}$  : -20°C to +200°C for XD-SI enclosure (fluoroelastomer rubber FKM )

$T_{serv}$  : -20°C to +85°C for XD-SIwin (fluoroelastomer rubber FKM )

$T_{serv}$  : -50°C to +85°C for XD-SIwin (silicone rubber VQM )

17.2 The conditions, mentioned in the main document are valid in whole range.

17. Max power dissipation (W):

$T_{amb}$	Temperature class T6 85°C	Max. power dissipation (W)		
		Pztr (W)		Pztr (W)
		Cover with window Horizontally / Vertically	Temperature class T5 100°C	Cover with window Horizontally / Vertically
40°C	$\Delta \theta \leq 40$ K	20,0 / 15,0	$\Delta \theta \leq 55$ K	29,0 / 24,0
55°C	$\Delta \theta \leq 25$ K	11,0 / 8,5	$\Delta \theta \leq 40$ K	20,0 / 15,0
70°C	$\Delta \theta \leq 10$ K	3,6 / 3,1	$\Delta \theta \leq 25$ K	11,0 / 8,5
85°C	N.A.	- / -	$\Delta \theta \leq 10$ K	3,6 / 3,1

(18) Essential Health and Safety Requirements:

Covered by standards mentioned in (10) of this supplement.

Responsible person:

  
Dipl. Ing. Šindler Jaroslav  
Head of certification body



Date of issue: 14.01.2009

Number of pages: 3  
Page: 2/3

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Ostrava-Radvanice**

(13)

**Schedule**

(14)

**Supplement No. 1 to  
EC-Type Examination Certificate N° FTZÚ 07 ATEX 0002U**

(19)

**LIST OF DOCUMENTATION**

- Application manual No. N-L3625 dated 28.11.2008
- Data sheet-type XD-SI dated 09.09.2008
- Data sheet-type XD-SI win dated 09.09.2008
- Drawings No.: 2-Z-L3586 dated 27.08.2008
- Drawings No.: 2-Z-L4029 dated 09.09.2008
- Compound data sheet VR1-fluoroelastomer FKM
- Composition and technical information about Soda lime glass

Responsible person:

  
Dipl. Ing. Sindler Jaroslav  
Head of certification body



Date of issue: 14.01.2009

Number of pages: 3

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## Supplement No. 2 to EC-Type Examination Certificate

Equipment or Protective Systems Intended for use  
in Potentially Explosive Atmospheres  
Directive 94/9/EC

(3) EC-Type Examination Certificate Number:

**FTZÚ 07 ATEX 0002U**

(4) Component: **Model XD-SI, XD-SIwin Instrument Housing**

(5) Manufacturer: **Limatherm, S.A.**

(6) Address: **ul.Tarnowska 1, 34-600 Limanowa, Poland**

(7) This supplement of certificate is valid for: - prolongation of certificate validity


(8) Modification of certified component and any of its approved variants are specified in documentation, a list of which is mentioned in the schedule of this certificate.


(9) This supplement to type examination relates only to design, examination and testing of the specified component in accordance to the directive 94/9/EC. If applicable, further requirements of the Directive apply to the manufacture and supply of this component.


(10) Safety requirements of modified parts were fulfilled by satisfying of following standards:

**EN 60079-0:2009    EN 60079-1:2007    EN 60079-31:2009**

(11) Marking of component shall contain symbols:

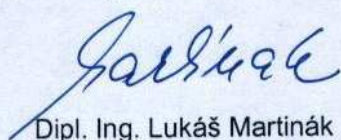
 **I M2 Ex d I Mb**

 **II 2G Ex d IIC Gb**

 **II 2D Ex t IIC Db**

(12) This type examination certificate is valid till: **05.09.2017**

Responsible person:

  
Dipl. Ing. Lukáš Martinák  
Head of certification body



Date of issue: 05.09.2012

Number of pages: 2  
Page: 1/2

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Ostrava-Radvanice**

(13)

**Schedule**

(14)

**Supplement No. 2 to  
EC-Type Examination Certificate N° FTZÚ 07 ATEX 0002U**

(15) Description of Component:

Subject of this supplement is prolongation of certificate validity of newest standards.  
Flameproof housing without changes.

(16) Report No. : 07/0002-D2 (2 pages)

(17) Schedule of limitations:

- 17.1 The special conditions described in main document and the supplement No.1 are valid in all whole range.
- 17.2 Equipment tested for lower mechanical strength for mines area (I M2 Ex d I Mb) 4J.
- 17.3 Maximum design gaps of flameproof joints are smaller than maximum permitted gaps according to standard. Verified values of design gaps are mentioned in documentation.

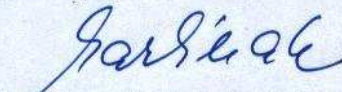
(18) Essential Health and Safety Requirements:

- 18.1 Covered by standards mentioned in (10) of this supplement
- 18.2 The additional test with sealing material were made according to the standard EN 60079-0 and related.

(19) LIST OF DOCUMENTATION

Title:	Drawing No.:	Date:
Application Manual	N-L3625	15.11.2011
XD-SI Data sheet	--	15.11.2011
XD-SI	2-Z-L3586	09.02.2012 - rev. c
XD-SIwin	2-Z-L4029	09.02.2012 - rev. b

Responsible person:

  
Dipl. Ing. Martinák Lukáš  
Head of certification body



Date of issue: 05.09.2012

Page: 2/2

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## Supplement No. 3 to EC-Type Examination Certificate

Equipment or Protective Systems Intended for Use  
in Potentially Explosive Atmospheres  
(Directive 94/9/EC)

(3) EC-Type Examination Certificate Number:

**FTZÚ 07 ATEX 0002U**

(4) Component: **Universal instrument housing type XD-SI, XD-SIwin and XD-SILwin**

(5) Manufacturer: **Limatherm, S.A.**

(6) Address: **ul. Tarnowska 1, 34-600 Limanowa, Poland**

(7) This supplement of certificate is valid for:

- modification of certified component
- verification according to new standards
- prolongation of certificate validity

(8) Modification of certified component and any of its approved variants are specified in documentation, a list of which is mentioned in schedule of this certificate.

(9) This supplement to type examination relates only to design, examination and testing of the specified component in accordance to the directive 94/9/EC. If applicable, further requirements of the Directive apply to the manufacture and supply of this component.

(10) Safety requirements of modified parts were fulfilled by satisfying of the following standards:

**EN 60079-0:2012; EN 60079-1:2007; EN 60079-31:2009**

(11) Marking of component shall contain symbols:



**I M2 Ex d I Mb**

**II 2G Ex d IIC Gb**

**II 2D Ex tb IIIC Db**

(12) This type examination certificate is valid till: **30.09. 2019**

Responsible person:

  
Dipl. Ing. Lukáš Martinák  
Head of Certification Body



Date of issue: **05.09.2014**

Page: 1/3

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Physical Technical Testing Institute  
Ostrava – Radvanice

(13)

Schedule

(14)

Supplement No. 3 to  
EC-Type Examination Certificate N° FTZÚ 07 ATEX 0002U

(15) Description of Component:

Modification of the Universal instrument housing consists of:

- 1) Change the thickness of circlip from 2 mm to 3 mm in types of housing with window;
- 2) Using only M and NPT threads for thread holes D<sub>1</sub>; D<sub>2</sub>; D<sub>3</sub> and the length of NPT threads was changed from 13mm to 16,2mm;
- 3) Introducing new type of housing XD-SILwin.

The types of the Universal instrument housing are recertified according to standards EN 60079-0:2012; EN 60079-1:2007 and EN 60079-31:2009.

(16) Report No.: 07/0002-3

(17) Schedule of Limitations:

17.1 Service temperature according to housing type and used sealing ring:

Housing type	Tserv.	
	VQM rubber	FKM rubber
XD- SI	-50°C to +150°C	-20°C to +200°C
XD- SIwin, XD-SILwin	-50°C to +85°C	-20°C to +85°C

17.2 IP protection 66 – 68 is depend on applied cable gland (max. IP 68 / deep =1 m);


17.3 Max. number, size and position of apertures – see (19) of this supplement;

17.4 The enclosure with Ex component certificate shall be applicated only by assumption of filling requests of the standard EN 60079-1:2009 cl.D.3.10;

17.5 The type static pressure test (four times the reference pressure):

- type XD- SI; XD-SIwin – 41 bar;
- type XD-SILwin – 34 bar.

Responsible person:

  
Dipl. Ing. Lukáš Martinák  
Head of Certification Body



Date of issue: 05.09.2014

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(13)

Schedule

(14)

Supplement No. 3 to  
EC-Type Examination Certificate N° FTZÚ 07 ATEX 0002U

17.6 Max. dissipation power for temperature class are as follow:

Max. power dissipation (W)				
T <sub>amb</sub>	Temperature class T6 85°C	Pztr (W)	Temperature class T5 100°C	Pztr (W)
		For all variety of enclosures position horizontally/vertically		For all variety of enclosures position horizontally/vertically
40°C	$\Delta 0 \leq 40$ K	20,0 / 15,0	$\Delta 0 \leq 55$ K	29,0 / 24,0
55°C	$\Delta 0 \leq 25$ K	11,0 / 8,5	$\Delta 0 \leq 40$ K	20,0 / 15,0
70°C	$\Delta 0 \leq 10$ K	3,6 / 3,1	$\Delta 0 \leq 25$ K	11,0 / 8,5
85°C	N.A.	--	$\Delta 0 \leq 10$ K	3,6 / 3,1

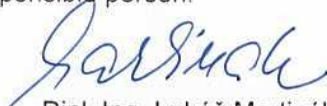
(18) Essential Health and Safety Requirements:

Covered by standards mentioned in (10) of this supplement of certificate.

(19) List of Documentation:

Title	Drawing No.	Date	Revision
Application manual	N-L3625	11.09.2012	
Datasheet	XD-SI	11.09.2012	
Drawing No.: XD-SI	2-Z-L3586	09.02.2012	rev.c
Drawing No.: XD-SIwin	2-Z-L4029	09.02.2012	rev.b
Drawing No.: XD-SILwin	2-Z-L4266	08.11.2012	

Responsible person:

  
Dipl. Ing. Lukáš Martinák  
Head of Certification Body



Date of issue: 05.09.2014

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