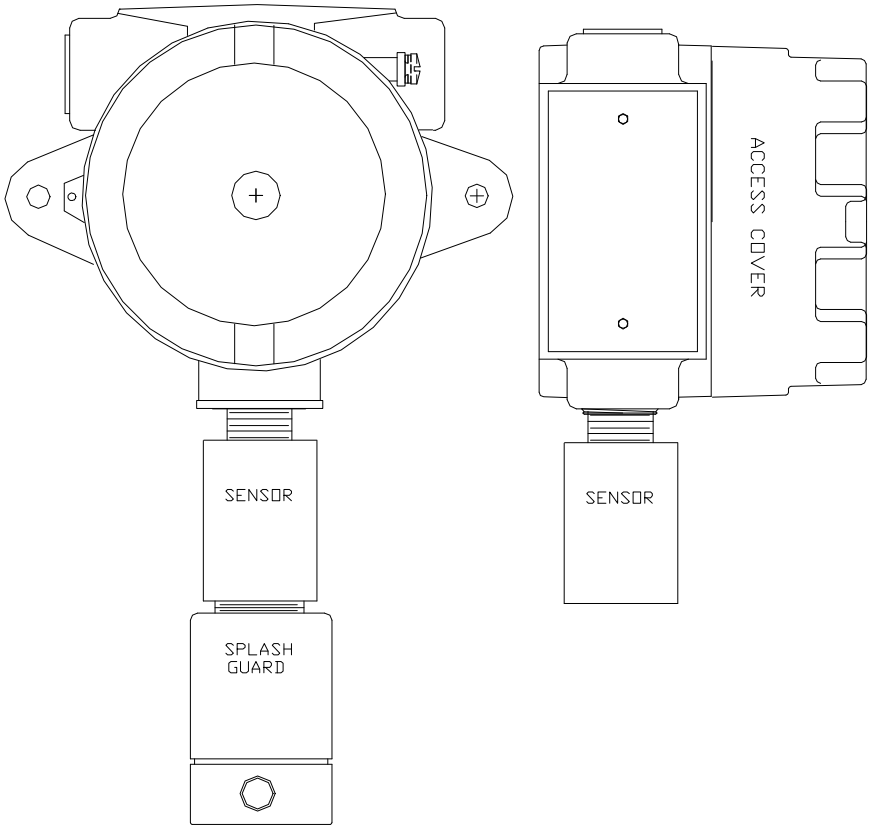
MODEL ITS-1710 SERIES COMBUSTIBLE GAS TRANSMITTER/SENSOR



INSTALLATION OPERATION AND MAINTENANCE MANUAL

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ITS-1710 TRANSMITTER/SENSOR

1. GENERAL SPECIFICATIONS

Power Supply 24 VDC
(12 to 30 VDC)
125 mA Max
80 mA typical

Signal 4 - 20 mA Linear
0 - 100% LEL

Wiring 3 wires: Power (+)
Signal
Common (-)

Max. Signal Load (Burden resistance)
700 Ohms at 24 VDC
500 Ohms at 20 VDC
200 Ohms at 12 VDC

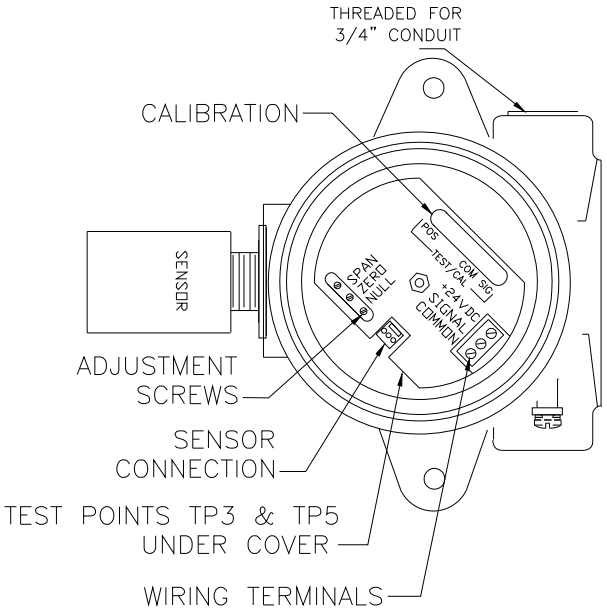

Figure 1 Connection and Adjustments

Hazardous Locations Enclosures:
Expl. Proof: CL1. Div 1, Gr. A, B, C, D
CSA, FM, ATEX Approval

Temperature -40 C to +50 C (-40 F to +122 F)

Humidity 0 - 99 % RH (Non- Condensing)

Calibration recommendation: every 90 days max.

* Please allow 24 hours warm-up time period before calibrating

2. INSTALLATION

Sensor orientation should be pointing downwards.

Mounting height is dependent upon whether a gas is heavier or lighter than air: Methane (natural gas), Hydrogen and Ammonia are lighter than air, sensors should be placed close to the ceiling. Most other combustible gases are heavier than air and the sensor should be placed close to the floor.

Take note of any barriers, which may cause the gas to collect. Note likely sources of gas and place the sensors near them.

Procedure

Remove electronics module for pulling wires and reinstall for connection. Undo the centre nut and disconnect the sensor wire from the jack. Pull outward.

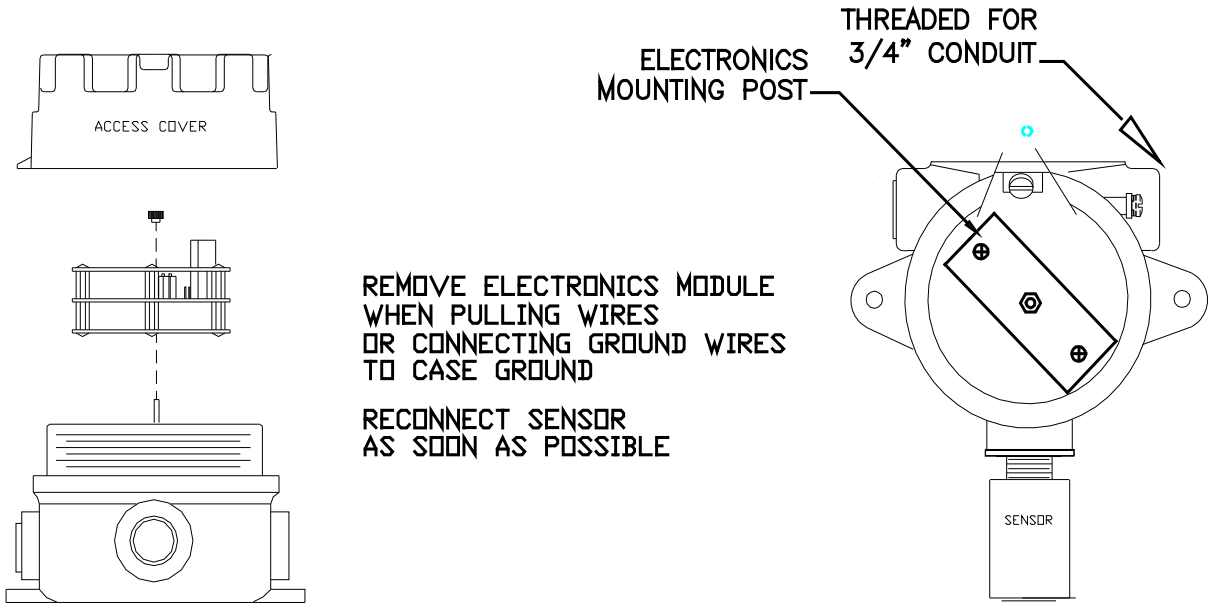

Figure 2 Enclosure Access

3. FILTERS AND SENSOR POISONS

Catalytic bead sensors such as are used in these instruments are subject to certain poisoning effects from some gases. Some gas classes, notably silicones are permanent poisons: they coat the surface of the sensor, preventing the sensor from interacting with the hydrocarbon gases being measured. There is no "cure" for sensors poisoned with silicones.

There are other gases which have similar effects, but which are to some degree reversible. These are Chlorinated solvents, sulphur based products and some others. The symptoms are the same, in that the sensor becomes non-responsive; however, it is possible to "burn off" the coating by applying an "overdose" by, for instance a short exposure to pure butane. The procedure is always slightly damaging to the sensor, so it should not be done indiscriminately, and the sensor should be recalibrated afterwards.

It is important to note that THE ONLY WAY TO DETERMINE WHETHER A SENSOR IS POISONED

IS TO APPLY A TEST GAS.

3.1 Poison Resistant Sensors

Improved catalytic bead sensors are used, which are very resistant to poison of this sort; however, they are not proof against poisons and should be tested regularly.

3.2 Filters

The use of poison filters of activated charcoal impregnated cloth has been instituted. These supply good protection against most poisons; however, they are not proof against poisons and should be changed regularly in an area known to have poisons present. When installing be certain that the filter presses firmly up against the flame arrestor face.

Activated charcoal filters may not be used when the gas being tested is of a type which will be absorbed by the filter. General use for methane and Hydrogen detection, use with propane detection is recommended for non hazardous area such a parking garages, as the response time may be slowed.

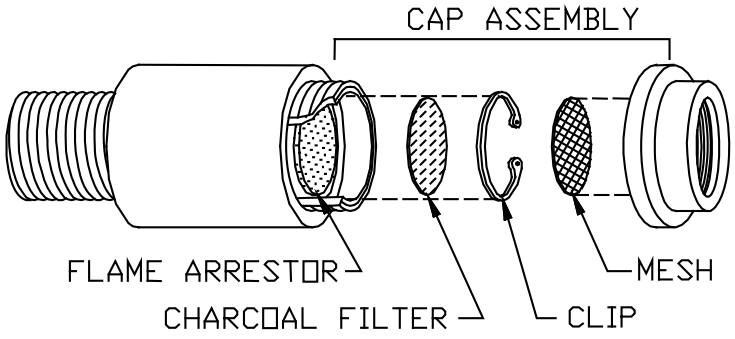

Figure 3 Sensor Head Assembly

4. CALIBRATION PROCEDURES

Equipment: Digital Multimeter c/w Pos and Neg probes with:
a) 20.0 mA scale
b) 200 mV scale
Source of clean air
Source of appropriate span gas (usually 40 - 50 % LEL, Balance air)
Small adjustment screwdriver.

Clean air adjustments:

1. If sensor is NEW, pull out electronics module slightly and measure voltage between NULL testpoints TP3 & TP5 (use 200 mV scale) and adjust NULL to get 000.0 mV. (See Figure 1.)

2. Set multimeter to 20 mA scale, attach probes, and insert Pos probe to "POS" jack, Neg probe to

"SIG" jack. If Transmitter is connected to our controller, insert Neg probe into "COM" jack to avoid fault condition. Adjust Zero to get 4.00 mA in clean air.

Span Adjustments:

3. Multimeter still attached as in (2) apply appropriate calibration gas to sensor and adjust SPAN to read appropriate signal on the multimeter.

4. Wait 2 or 3 hours and check (2) and (3) again, if required.

Conversion Formula:

$$\text{Signal(mA)} = \frac{\text{Conc.(\% LEL) x 16}}{100} + 4$$

5. CALIBRATION WITH METHANE STANDARD GAS FOR OTHER COMBUSTIBLE GASES.

Most combustible gas detection systems are concerned with %LEL (Lower Explosive Limit). 100 % LEL of Methane (Natural Gas) is 5% by volume in air. If the gas shipped to you is not labelled in %LEL, divide the concentration by 5 to get % LEL.

$$\text{e.g. } \frac{\text{2.36\% vol}}{5} \text{ x } 100 = 47.2 \text{ \%LEL}$$

ITS-1710 combustible transmitter/sensor respond to all gaseous hydrocarbons, but to each in different degree. Methane may be used to calibrate by referring to the table below and applying the formulas given. For gases not in the list consult factory.

Relative Response to Flammable Gases

Gas	Lower Explosive Limit LEL	Response Relative to Methane	J Methane Multiplier
Acetylene	1.5%	0.57	1.75
Benzene	1.2%	0.40	2.46
Cyclohexane	1.3%	0.45	2.22
Ethanol	3.3%	0.45	2.22
Hexane	1.0%	0.45	2.22
Hydrogen	2.2%	0.95	1.05
iso-Octane	0.95%	0.35	2.86
iso-Propyl Alcohol	2.2%	0.35	2.86
n-Butane	1.8%	0.55	1.82
n-Octane	1.0%	0.55	1.81
Nonane	0.85%	0.25	4.00
n-Propyl Alcohol	2.2%	0.40	2.50
Propane	2.1%	0.60	1.67

5.1 Conversion Formulae:

C = %LEL of Methane Test Gas
R = Equivalent % LEL of Target Gas
S = Signal in milliamps
J = number from the table above

$$R = C * J$$

$$S = 4 + \frac{16 \times R}{100} \text{ mA}$$

e.g. Calibration for propane using 2.46 % Methane Test Gas

2.46 % Methane = 49.2 % LEL Methane

R = 1.67 x 49.2 = 82.2 %LEL Propane

$$S = 4 + \frac{16 \times 82.2}{100} = 17.15 \text{ mA signal}$$

5.2 Calibration Gases

Calibration gas flows of 0.5 litre/minute are acceptable.

Sudden changes in humidity as from dry calibration gases may have a small transient effect on signal, usually gone within a minute.

Long exhaust hoses (more than six inches or so) may cause back pressure conditions at the sensor and enhanced signal, especially at high flow rates.

6. **Wiring**

Wiring is three wires, DC 24 V with one analog signal line.

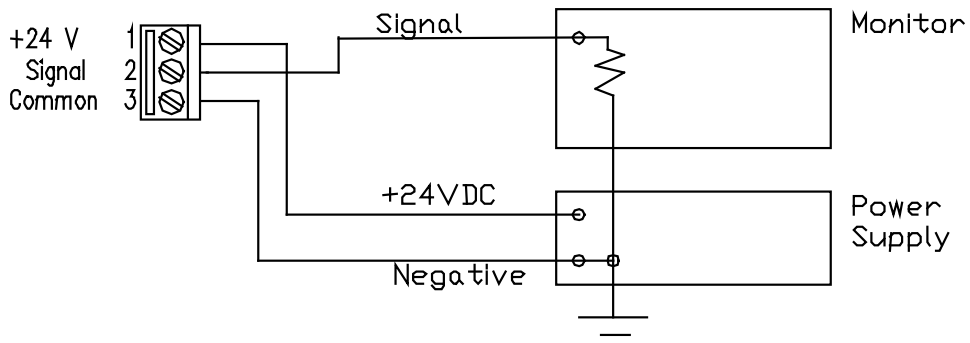

Figure 4 Wiring Hoop-Up

7. Remote Sensor Head Mounting

It is often the case that the sensor must be mounted in an inaccessible location. In these cases it is useful to consider mounting the sensor head remote from the electronics to allow easy access for testing and calibration. This is quite reasonable and considerable distances are possible if proper installation practices are followed.

7.1 Wiring

The sensor head has a very low resistance, so any interposing wiring will have an effect on accuracy and power. One should use the maximum wire diameter practical to minimize voltage drops. e.g.

Maximum suggested distances:

- 16 awg 50 feet (15 meters)
- 14 awg 100 feet (30 meters)
- 12 awg 125 feet (35 meters)

It is simply necessary to extend the wire cable length accordingly. **Use soldered connections** at all wiring joints to prevent resistance changes with age.

7.2 Calibration

For calibration use an adapter to connect a 1/4" o.d. tubing to the sensor for remote application of gas. Note that gas flow should be higher than normal especially if the sensor head is in an area of moving air. **Calibration gas flows of up to 1 liter/minute** are standard.