

**[d] OPERATING LIMITATIONS**

- This transmitter must be used for measurement of the gas for which it has been calibrated (see marking on the device for type and range).
- The cross sensitivities to most common gases are described in the following table relative to Methane (CH<sub>4</sub>=1 - L.E.L. values shown refer to standard EN60079-20-1):

	CAS Number	50% L.E.L. (in % v/v)	K
Methane	74.82.8	2.2 %	1
n-Butane	106.97.8	0.7 %	0.70
Propane	74.98.6	0.85 %	0.75
Gasoline	8006.61.9	0.7 %	2
Hydrogen	1333.74.0	2.0 %	1.10

- Response time T<sub>90</sub>: < 60 s (CH<sub>4</sub>).
- Temperature operating range: -20°C .. +55°C.
- Humidity operating range: 20% .. 90% RH (non condensing).
- Pressure operating range: 800 .. 1100 hPa.
- Power supply range: 12V= -10% .. 24V=+10%.
- Current absorption: 100mA max.
- Electrical wiring must be done with 3-cores copper cable with 1.5 mm<sup>2</sup> minimum cross section and no longer than 25m. Even if no shielded cable is actually required, nonetheless it is advisable to lay down the transmitter signal cables separately from other mains or power cables.
- Not applicable.
- Not applicable.
- Warm-up time: 30 s.
- Stabilization time: 48 h.

Output: 4 .. 20 mA (measuring range)  
 0 mA: loop fault  
 2 mA: sensor fault  
 22 mA: over range

Load resistance at 12V= -15%: max. 350 Ohm  
 Protection degree: IP 65 (acc. to EN 60529)  
 Dimensions: 135 x 101 x 72 mm  
 Weight: ~ 767 gr.

**[e] STORAGE**

Temperature: -20°C .. +55°C.  
 Humidity: 20% .. 90% RH (non condensing)  
 Pressure: 800 .. 1100 hPa.  
 Long term drift in clean air: typ. -5% of signal per year.

**[f] % L.E.L. to % v/v conversion**

See table at point [a].

**[g] CONTAMINANTS**

The sensor response can be temporarily impaired in case it sniffs substances named 'inhibitors': among these can be found halogenous gases, Sulphurate Hydrogen, Chlorine, Chlorinated Hydrocarbons (Trichloroethylene or Carbon Tetrachloride). Please ask the distributor in case of doubts.

The sensor response can be permanently damaged in case it sniffs substances named 'poisonous': among these can be found several Silicone compounds, Tetraethyl Lead, Phosphate Esters.

**[i] SAMPLING LINES**

Not applicable.

**[j] ALARM AND FAULT SIGNALS**

Being this transmitter simply a converter of the gas concentration into a current level, the function of detecting alarm levels, fault or over-range is assigned to the relevant Central Unit, on which the threshold levels are set and to which Instruction Manual the user is addressed.

**[k] TROUBLESHOOTING**

- Problem.**  
The central unit reads a null current value from the transmitter.

**Possible cause:**  
The connection between the transmitter and the central unit is faulty.  
**Remedy:**  
Check for integrity of electrical wirings between transmitter and central unit. Check for correct insertion of terminal block inside its socket. Check with a multimeter for presence of power supply on terminals '+' and '-' of the sensor.

- Problem.**  
Gas concentration measured by the transmitter is incorrect.  
**Possible cause:**  
The transmitter needs recalibration.  
**Remedy:**  
Proceed with check and calibration as described in the relevant paragraph. If this does not solve the problem contact the distributor.
- Possible cause:**  
The sensor filter is dirty or wet.  
**Remedy:**  
Remove dirt and/or condensate. If this does not solve the problem contact the distributor.

**[l] AUTOMATIC RESET**

This transmitter only converts gas concentration into current, therefore does not latch any alarm condition. This function is devoted to the central unit connected to the transmitter.

**[m] BATTERIES MAINTENANCE**

Not applicable.

**[n] SPARE PARTS**

This transmitter has no replaceable parts. When the sensor life is at its end the whole transmitter must be replaced with a new one.

**[o] ACCESSORIES**

The only accessory (optional) is the field calibration kit which allows to properly couple the test gas to the sensor. Please contact the distributor in case of need.

**[p] MARKING**

Transmitter CE Type Certificate: BVI 11 ATEX 0000  
 Ex d Case Type Certificate: FTZU 05 ATEX 0262 U  
 Sensing Element: CESI 01 ATEX 066 U

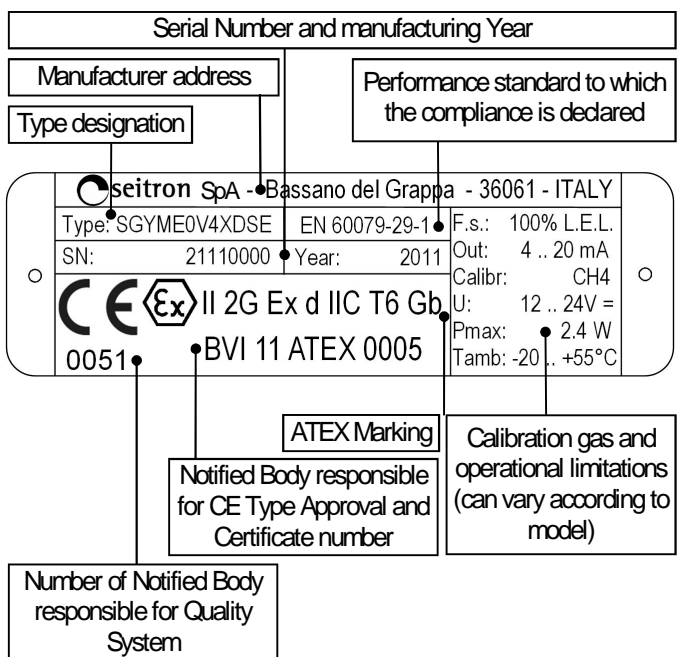


Fig. 5: Marking label example.

**[q] ADDITIONAL INFORMATIONS**

No additional informations regarding any special nature of the device are needed.

In the view of a constant development of their products, the manufacturer reserves the right for changing technical data and features without prior notice. The consumer is guaranteed against any lack of conformity according to the European Directive 1999/44/EC as well as to the manufacturer's document about the warranty policy. The full text of warranty is available on request from the seller.

**SGY ME0 V4 XD**



Combustible gas concentration transmitter with 4 .. 20 mA output for Zone 1 ATEX (Cat. 2).

**Ex II 2G Ex d IIC T6 Gb**

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**[a] OPERATION, INSTALLATION AND MAINTENANCE**

**Operation**

This sensor is a 3-wires transmitter for combustible gases concentration which measures the combustible gas concentration for which it has been calibrated and converts it into a current value ranging from 4.0 to 20.0 mA. The device is made of a bulky Ex d approved metal case carrying the electronic board and the gas sensor, properly protected with a sintered filter, located in the lower side of the case itself (according to installation directions). The sensing element is based on the catalytic principle. As the sensor can detect several types of HydroCarbons (HC) at the same time, it is mandatory for the user to take into account the summing effect deriving from this and to evaluate the cross sensitivity of the sensor to various gases. Once power supply is applied, a warm-up phase is initiated, during which the sensor cannot detect gas.

**WARNING**

- It is extremely important to stress that all catalytic sensors can properly work only with presence of Oxygen (O<sub>2</sub>); for this reason, in order to get proper results from the device, the installer must absolutely be sure that in the environment in which the sensor is installed a sufficient concentration of Oxygen is present, that is around the usual concentration in the atmosphere (20.9% v/v).
- Both during normal operation and maintenance the presence in the atmosphere of other gases, different from those under detection, could possibly influence the measurement accuracy or operation. Please always consider that all catalytic sensors exhibit cross-sensitivity with respect to several different gases. In case of doubts please contact the distributor.

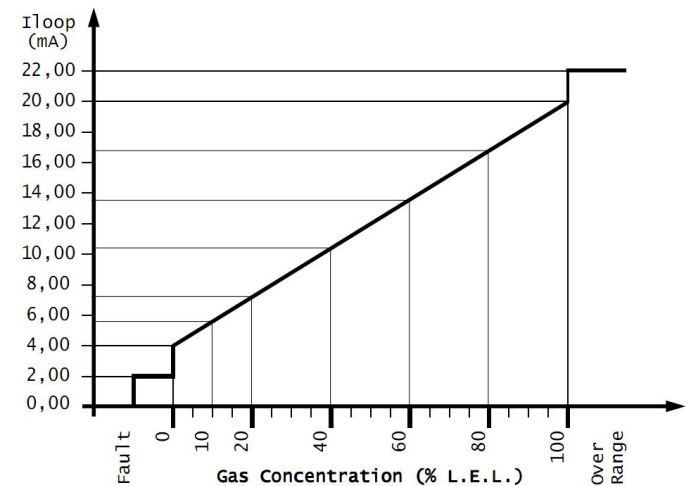
**Concentration - Current relationship**

A gas concentration transmitter is a device capable of 'converting' the gas concentration level into an appropriate current value of the electrical mesh (or loop) which links the sensor to the measurement central unit. The advantage behind such a technique stands both in the immunity against disturbances which might possibly be coupled in industrial environments and in the inherent tolerance against the wiring cables resistance. The relationship which links the gas concentration and the current set in the output loop is explained in the following chart and table.

**Fault condition:** In case the sensor inside the transmitter has a failure, the electronics detects the irregular condition and sets the output current at 2.0 mA (in case the 'Compare' and 'Detector' section of the sensor is damaged). This feature provides a fault condition which can be distinguished from a fault related to the current loop interruption, which would appear at the central unit side as 0.0 mA. In other words this feature allows a 'differential diagnosis' thus making the solution easier.

**Over-range condition:** In case the gas concentration goes above the upper range limit, the current value on the output loop is set to 22mA, thus allowing to detect an 'Over Range' situation from the central unit to which the sensor is to be wired.

**Long Term stability:** under normal operation conditions and in absence of potential poisonous substances in the operating environment, which might eventually alter the correct operation, the catalytic sensor exhibits good long term stability, i.e. 5 years from the installation and first operation date.



% L.E.L.	% v/v n-Butane (CAS 106.97.8)	% v/v Methane (CAS 74.82.8)	Output (mA)
Fault in Current Loop			0.0
Sensor Fault			2.0
0 %	0 %	0.00 %	4.0
10 %	0.14 %	0.44 %	5.6
25.0 %	0.35 %	1.10 %	8.0
50.0 %	0.70 %	2.20 %	12.0
75.0 %	1.05 %	3.30 %	16.0
100.0 %	1.40 %	4.40 %	20.0
Over Range (>100% L.E.L.)			22.0

**Installation**

The device must be installed with the sensing part facing downward, so that the possible condensate is automatically expelled and the sensor is maintained protected (see picture). For what concerns the position of the sensors inside the environment that has to be protected special attention must be paid to:

- Gas density (heavier or lighter than air).
- Gas emission speed (flow).
- Possible openings in walls and ceiling and air streams.
- Room configuration - shape.
- Area to protect.

The response time of the sensor is strictly related to its position in the room and to the type of the gas to detect. For 'heavy' gases like L.P.G. it is suggested to install the transmitter 20 cm. above the floor, while for 'light' gases like Methane the correct position is 20 cm. below the ceiling.

**WARNING**

- Installation and electrical wirings of this transmitter must be carried out in compliance with the existing standards for electrical installations as well as relevant safety procedures.

- Always check for possible national installation standards which could state additional requirements about the positioning of the sensor.
- Installation and electrical wirings of this appliance must be made by qualified technicians and in compliance with the current standards.
- The transmitter features one opening for the cable entry. Its thread is 3/4" NPT. A proper cable gland with correct thread must mandatorily be used in order to make the whole installation tight to condensate, water and gas and therefore to reach the stated IP protection rating.
- Before wiring the appliance be sure to turn the mains power off.

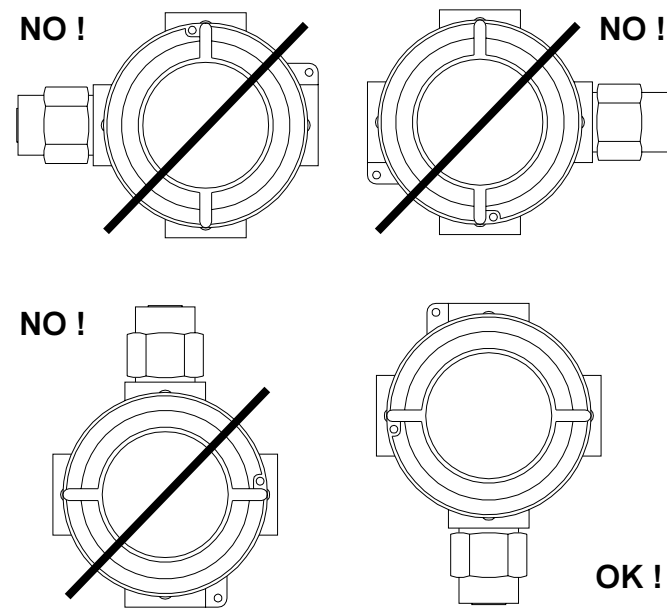


Fig. 1: Correct installation.

### Maintenance

**Periodical Check:** in order to verify the gas detection system correct operation this transmitter must be checked (controlled) every 3 .. 6 months with the procedure described in the following. In case the check ends up with a negative response, it is mandatory to establish again proper operation according to the calibration (adjustment) procedure described in the following. For both procedures it is mandatory to apply gas to the sensor through the proper field calibration kit suggested by the manufacturer.

Normal maintenance operations (apart from those regarding periodic 'check' and 'calibration', described at point c.), consist in the following:

- Accurate examination of types and quantities of the potential poisonous substances (usually compounds based on organics solvents) which might be present in the environment in which the sensor is installed; the presence of such substances can potentially impair the operation or lead to a worse overall behaviour or to a more frequent need for calibration.
- Visual inspection must be carried out on all devices included in the gas detection system. Special care must be paid in checking against dust, dirt, contaminants, solvents or condensate hoards, which might potentially impair the correct sensor operation.
- Visual inspection must be carried out to verify the good condition of the threaded couplings.
- Visual inspection must be carried out to verify the tightness of the case cover and the state of the relevant gasket.
- The frequency of the checks and recalibrations is under the responsibility of the manager of the detection system who has to verify the eventual National standards requirements. As an example in the following is summarized what the Italian standard CEI 31-35 requires:

"The time interval between checks and recalibrations must be stated by the user according to the actual operating conditions and the manufacturer instructions; in any case this must be at least:

- Every three months: for systems monitoring environments with first degree emissions.
- Every six months: for systems monitoring environments with second degree emissions."

### [b] ADJUSTMENT

No adjustment on the transmitter is needed for a proper first operation, apart from the periodic check described at point c.

### [c] CHECK (Control)

The transmitter periodical check aims to verify its correct operation, both for general functionalities and for measurement accuracy (current set in the loop according to the relevant measured gas concentration).

In case this check is passed the following calibration (adjustment) procedure can be skipped.

The check of the transmitter is performed in two following steps:

- Check (control) of Zero value.
- Check (control) of Span value.

Check is performed by applying to the transmitter sample gas whose concentration is known and certified and measuring, at the same time, the current set in the output loop.

### Output current measurement:

The easiest way to measure the output loop current is to 'cut' this loop close to the transmitter and inserting a milliamperometer in series, as shown in the following picture.

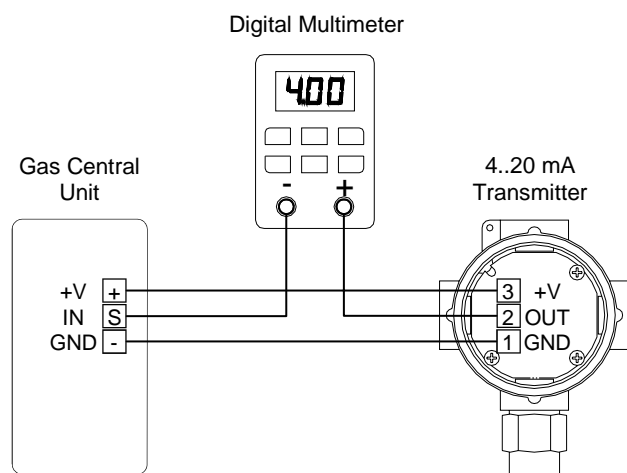


Fig. 2: Connecting the multimeter for current measurement.

### Check of zero value:

The transmitter must have been operated for at least 48 hours in clean air and must be in its normal operation mode. In these conditions the measured output current value must be 4mA, ± 0.2mA.

In case the measured value is not in this interval a calibration (adjustment) is needed in order to reestablish the proper value.

### Check of span value:

The transmitter must have been operated for at least 48 hours in clean air and must be in its normal operation mode and position. Apply through the proper adaptor test gas from a certified accuracy bottle, as shown in the picture.

The gas flow to the transmitter sensor must remain constant during the entire the test in the 0.2 .. 0.4 l/min. interval.

Starting from the moment when the gas arrives to the sensor the output current will gradually increase until it will stabilize at a certain value (after about 1 minute).

At this point the current value corresponding to the gas concentration applied from the sample bottle can be noted. Refer to the concentration-current chart or table to check for the value that must be read on the multimeter (current) or on the display (L.E.L. %).

The measured current value could differ from the theoretical one by ± 0.4mA. In case the measured value falls outside this interval it is mandatory to perform the Span calibration operation as described in the following paragraph.

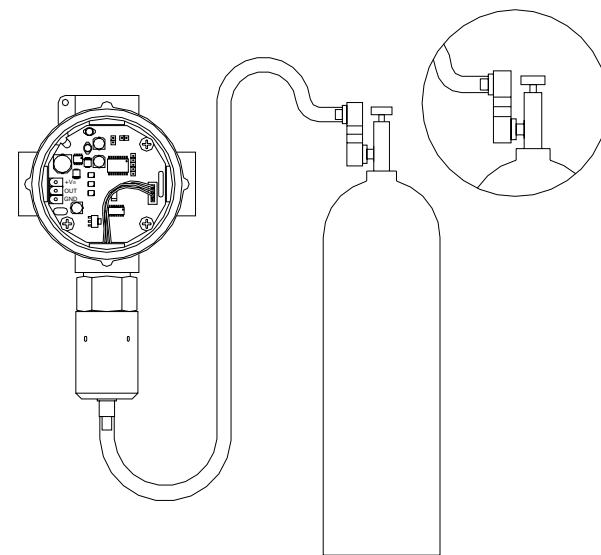


Fig. 3: How to apply test gas to the transmitter.

### CALIBRATION (Adjustment)

With the word 'Calibration' is meant the adjustment procedure that must be performed on the transmitter, eventually with the help of a tool, in order to re-align the current output values into the stated accuracy range whenever this is needed.

A certain level of 'drift' during time for the output current must be considered inevitable for the transmitter, being this caused by small drifts on the sensor itself, both for Zero and for Span.

Before proceeding with the calibration the following preliminary operations must be completed:

- Power the transmitter;
- Wait for the pre-heating time of the sensor, i.e. about 30 seconds, indicated by the flashing of all three LEDs located on the front cover (green-yellow-red).

### Zero level calibration:

When, after the Zero level check is performed, this is found as incorrect or outside the expected interval the following procedure will re-establish the correct Zero value:

- Remove the case cover by unscrewing it.
- Locate the 'Zero' adjustment connector (see picture).
- While keeping the transmitter sensor in clean air wait for the current reading on the ammeter to stabilize, then insert the jumper supplied with the device. The yellow led will flash once.
- Remove the jumper: the 'Zero' adjustment is completed.
- Proceed with the 'Span' adjustment.

### Span calibration:

When, after the Span check is performed, this is found as incorrect or outside the expected interval, the following procedure will re-establish the correct Span value:

- Remove the case cover by unscrewing it.
- Locate the 'Span' adjustment connector (see picture).
- Apply through the proper adaptor test gas from a certified accuracy bottle as shown in the former picture.

Starting from the moment when the gas arrives to the sensor, the output current will gradually increase until it will stabilize at a certain value (after about 1 minute).

At this point the transmitter span can be calibrated so that the output current is set to the correct value required for the gas concentration inside the sample bottle (see tabel).

- Insert the jumper supplied with the device in the 'Span' connector and wait for the red led to flash, thus showing that the Span calibration is completed.
- Remove the jumper.
- Re-apply the case cover screwing it and double check the tightness of the closure.

It is possible to repeat steps d. to e. for how many times needed, before quitting the calibration procedure.

It is highly suggested to perform a Check (Control) procedure after the calibration, in order to verify that the Calibration (Adjustment)

procedure has been correctly carried out. In case the measured zero current value or the span current value is still not in a valid range after calibration and following check, the transmitter must be considered as defective and subsequently must be returned to an authorized service center for repairing or replacing.

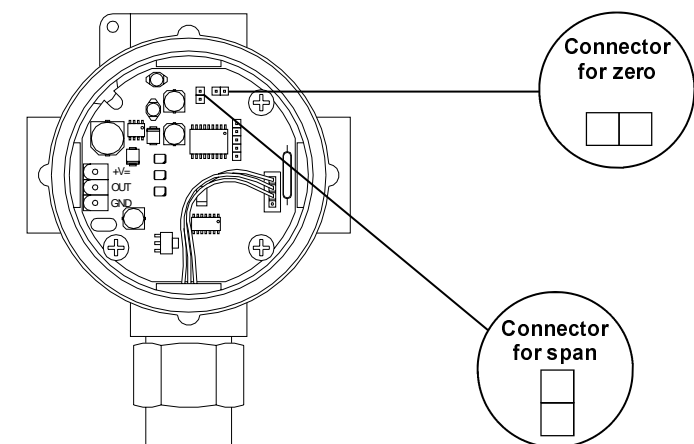


Fig. 4: Location of jumpers for zero and span adjustment.

### ⚠ WARNING

- The test gas concentration used in the check and calibration must mandatorily be 50% L.E.L. of the gas for which the transmitter has been calibrated (see marking on the device). Check and calibration procedures cannot be carried out using pure gases; complement for the gas in the certified bottle must be synthetic air because catalytic sensor need Oxygen for proper operation. Do not use the gas contained in portable cigarette lighters.
- The gas flow to the transmitter sensor must remain constant throughout all the test in the 0.2 .. 0.4 l/min. interval.
- For calibration procedure it is necessary to open the flame-proof case, therefore it is mandatory to respect all the safety warnings explained in the following.
- When, in order to carry out the maintenance procedure, the detection devices must be disabled, even temporarily, special care must be taken in order to activate an alternative detection system which could in turn give continuity to the safety against gas leakages. As an alternative countermeasure during the maintenance operations, either the gas leakage and ignition sources removal or an increased ventilation can be adopted.
- As for the check and calibration procedures it is necessary to open the case thus loosing the ATEX protection mode, it is absolutely mandatory to proceed as follows:
  - Remove the explosion risk by cutting the flow to any possible source of gas.
  - After double checking that atmosphere is safe, open the case.
  - Perform the check and/or calibration procedures.
  - Once the correct functionality of the detection system has been checked close the case.
  - The area is now protected again.
- Maintenance operations must never jeopardize the safety of the area under protection. In case of doubts contact the distributor or the manufacturer before proceeding.
- It is the system manager responsibility to adopt all countermeasures which might grant an acceptable safety level for people involved as well as for the environment itself.
- Never open the case unless the explosion risk has been previously removed and no residual risk is present.
- It is highly advisable to log the results of the maintenance operations on a specific register, according to the current national standards and laws.
- All operations described in this instruction manual must be carried out by skilled personnel, which should have been adequately instructed.