

SGY-CO-V4NC Carbon Monoxide Transmitters

SGY-CO-V4NC are gas concentration transmitters with 4 .. 20 mA current output (three wires), designed for the detection of Carbon Monoxide. Its plastic housing contains an electronic circuit and a sensor that is securely protected by a sintered filter placed on the lower side of the housing. The appliance is to be installed in Non Classified ATEX Zones.



Features

- Carbon Monoxide Detection
- 4..20mA Trasmmitter Output
- Measurement Element Protected behind sintered filter
- Wall Mounting

| Model Type | Model | Description |
|-----------------------|------------------------------|-------------------------------------|
| | SGY-CO0-V4NC | 4..20mA Carbon Monoxide Transmitter |
| Technical Data | Power Supply | 12V= -10% .. 24V= +10% |
| | Power Consumption | 50mA |
| | Detected Gas | Carbon Monoxide (CO) |
| | Sensor type | Electrochemical Cell |
| | Output | 4 .. 20 mA |
| | Measurement unit | 0 .. 200 ppm |
| | Load resistance at 10,8V= | max. 350 Ohm |
| | Repeatability: | <=5% of signal |
| | Long term drift in clean air | Typically 5% of signal per year |
| | Response Time T50 | <150 seconds |
| | Operating Temp | 0..+40°C |
| | Humidity Range | 20..80%rH non-condensing |
| | Storage Temp | -10..+50°C |
| | Protection Class | IP54 |
| Weight | 0.5 kg | |
| Dimensions | W155 x H107 x D62mm | |

Operation

This device measures CO concentration for which it has been calibrated and converts it into a current value ranging from 4.0 to 20.0 mA, thus in compliance with a widely diffused industrial standard.

The sensing element works with the electrochemical cell principle, thus resulting in a good linearity and repeatability. Once power supply is applied, a 30 seconds pre-heat phase is initiated, but the best stability is obtained after 48 hours operation.operation

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.

This feature provides a secure and reliable fault condition which, in addition, can be easily distinguished from a fault related to the current loop interruption, which would appear at the central unit side as 0.0 mA.

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 electrochemical sensor features good long term stability, i.e. 5 years from the installation and first operation date.

Periodical Check. In order to verify the gas detection system correct operation this transmitter must be checked (controlled) every 3 .. 6 months following 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 highly suggested to take advantage of the check and calibration kit available from the manufacturer.

Special attention must be payed to an 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 lead to a worse overall behaviour and therefore to a more frequent need for calibration.

Installation

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

For what concerns the position of the sensors inside theenvironment that has to be protected special attention must be payed to:

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

In addition to this, as the Carbon Monoxide is a gas with the same density as that of the air, it is advisable to install the sensor at the same height of human head (i.e. about 1.5 .. 1.8 m. above the floor level).

Electrical wiring must be done with 3-cores copper cable according to the distances shown in the following table. 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.

| <i>Resistance per km. for insulated stranded copper cables (according to CEI 20-29 1997) and max. distance allowed.</i> | | |
|-------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------------------------------------------|
| Cable cross section | Electrical resistance (ohm / km) | Sensor-Central Unit maximum theoretical allowed distance (m) |
| 0.50 mm ² | 36.5 (x 2) | 684 |
| 0.75 mm ² | 24.5 (x 2) | 1.020 |
| 1.00 mm ² | 18.1 (x 2) | 1.381 |
| 1.50 mm ² | 12.1 (x 2) | 2.066 |
| 2.50 mm ² | 7.41 (x 2) | 3.373 |

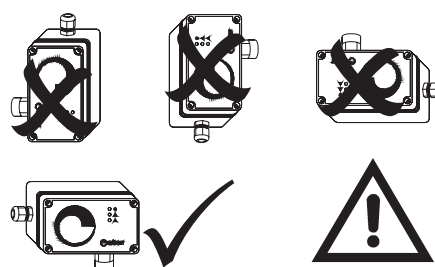
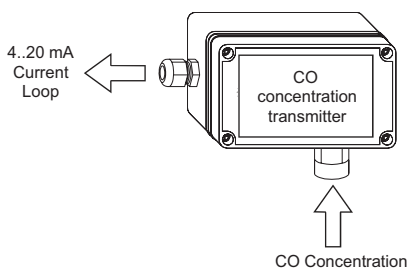


Fig. 2: Correct installation.

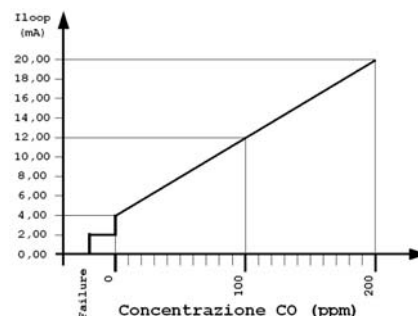
Concentration Current Relationship

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 table and graph:

| Relationship table between CO concentration (ppm) and the output loop current (mA) | |
|------------------------------------------------------------------------------------|-------------|
| ppm | Output (mA) |
| Current Loop Broken | |
| 0 % | 4.0 |
| 25 % | 12.0 |
| 50 % | 20.0 |



Check (Control)

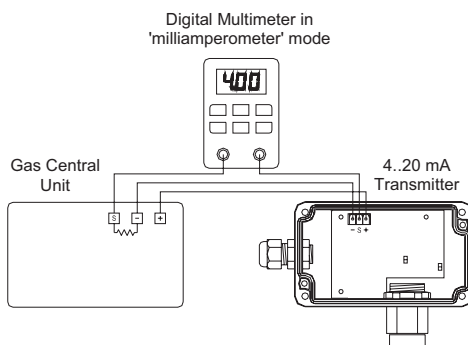
The transmitter periodical check aims to verify its correct operation, both for general functionalities and for measurement accuracy (current set in the loop against the relevant measured gas concentration).

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.

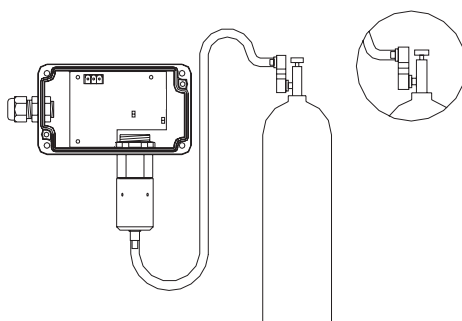
Check is performed by applying to the transmitter sample gas whose concentration is known and certified and measuring, at the same time, the current set in the output loop.

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:



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 $4\text{mA} \pm 0.2\text{mA}$. 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 following picture.



The gas flow to the transmitter sensor must remain constant during the entire the test in the 0.2 .. 0.5 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; the gas concentration value employed for such purpose is usually 100ppm.

The measured current value can differ from the theoretical one by max. ± 0.4 mA. In case the measured current is not found in this interval a new Span calibration is required, as described in the following.

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 these have been found as incorrect or misaligned during the former 'check' procedure.

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.

For calibration procedure it is necessary to open the case, therefore it is mandatory to respect all the safety warnings explained in the following.

The test gas concentration that must be mandatorily be used in the following calibration procedure for CO is 200 ppm.

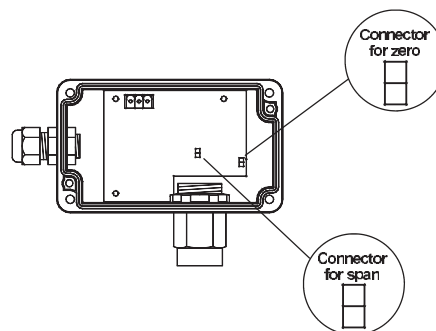
⚠ WARNING

During the maintenance operations described in the following it is mandatory to adopt all measures needed to secure the area in which the transmitter is installed.

These may eventually consist in additional or alternative gas detection systems with respect to the one under maintenance, whenever it is impossible to remove (even temporarily) all causes of a possible gas leakage.

Moreover if the transmitter case must be opened for performing the maintenance or calibration operations, please consider that the safety against explosion inherent with the case itself is lost.

For these reasons it is responsibility of the maintenance people to adopt all countermeasures which might grant an acceptable safety level for people involved as well as for the environment itself.



In order to perform Zero and Span calibration please perform at first the following preliminary steps:

- Power the transmitter

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

Zero Level Configuration. 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 4 screws from the case cover, then remove the cover itself.
- 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 turn on and then off.
- Remove the jumper: the 'Zero' adjustment is completed.
- Proceed with the 'Span' adjustment.

In case the measured zero current value is still not in a valid range the transmitter must be considered as defective and subsequently must be returned to an authorized service center for repairing or replacing.