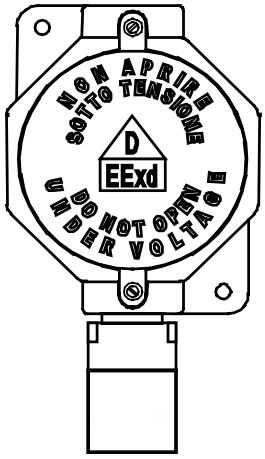
BS-393
TS-293EA

Trasmettitore 4÷20mA per Ammoniaca
4÷20mA transmitter for Ammonia
Trasmetteur 4÷20mA pour Ammoniac



Caratterizzati dal modo di protezione
Have the following protection rate
Sont caractérisés par le mode de protection suivant
II 2G EEx d IIC T6

Numero di Certificazione
Certificate number
Numéro du certificat
CESI 03 ATEX 323

Caratteristiche tecniche / *Technical specifications* / *Caractéristiques techniques*

Alimentazione / *Power supply* / *Alimentation*	12÷24Vdc (-10/+15%)
Uscita / *Output* / *Sortie*	4÷20mA Lineare / *Linear* / *Linéaire*
Campo di misura / *Standard range* / *Champ de mesure*	0 ÷ 300ppm
Massimo sovraccarico / Max overload / maximum surcharge	1000ppm
Ripetibilità / *Repeatability* / *Répétitivité*	± 10 %
Tempo di risposta T_{50} / *Response time* T_{50} / *Temps de résponse* T_{50}	< 30 secondi / *seconds* / *secondes*
Deriva a lungo termine in aria pulita *Long time drift in pure air* / *Dérive à long terme en air non pollué*	<20% anno <20% *year* / <20% *an*
Vita media in aria pulita Expected life in pure air / Durée de vie moyenne en air non pullué	18 mesi / month / mois
Temp./umidità di funzionamento *Operation Temp./Humidity / Température et humidité de fonctionnement*	-10 ÷ +40 °C / 5÷90 % r.h. 40°C
Temp./umidità di immagazzinamento *Storage Temp./Humidity / Température et humidité de stockage*	+5 ÷ +20°C / 5÷95 % r.h.
Variazione dello Zero / Zero Shift / Dérive du Zero	<15ppm
Dimensioni / *Size* / *Dimensions*	190 x 105 x 83 mm

GB DESCRIPTION

The TS293EA consists of a two-wire 4÷20mA linear transmitter able to detect Ammonia (NH_3).

The **Ammonia (NH_3)** is a colourless gas with a very sharp smell. A concentration of 50÷100 ppm causes irritation of the respiratory system; beyond a concentration of 100ppm it causes eyes irritation. At 5,000 ppm the Ammonia is lethal.

Its density as to air is 0.6, therefore it is lighter than air and it normally spreads upwards in the environment. Its LEL (Lower Explosivity Limit) is 15% v/v. The TWA is 25 ppm and the STEL is 35 ppm an "electrochemical" sensor calibrated in ppm NH_3.

The instrument comprises of a certified enclosure in which the electronic circuit and the connecting terminals are mounted. This unit has a downward facing cylindrical section housing the sensor behind a sintered stainless steel flame trap. The TS293EA is designed to be connected to TECNOCONTROL gas detecting central systems.

OPERATIONAL DESCRIPTION

The sensitive element used is an "*electrochemical*" sensor. The calibration is carried out with Ammonia.

When powered, the sensor *the sensor is able to detect gas even if it attains the optimum stability conditions after about 48 hours continual functioning. After that time we advise to check in clean air the "4mA" output. If necessary the "4mA calibration" can be carried out as explained on page 6. This calibration is necessary to adjust the sensor to the environment conditions.*

***Faults*:** In case of failure, the "S" output falls down to 0mA (FAULT). The signal is then indicated as a damage situation. The same happens also when an interruption to the connection wires between the sensor and the detector occurs.

Average life: The sensitive element used in this type of sensor has an excellent stability in time. In fresh air and in normal working condition the sensor's life should be about 18 month from the date of the installation.

Periodical testing: we advise to carry out working tests every six months. After 1 year, we advise to proceed to the circuit recalibration with Gas/Air mixture, as explained on page 4.

INSTALLATION

The TS293EA is designed for standard two-wire operation where the output is supplied via the same wire pair as the power supply.

The max load resistance (RLMax) will be the sum of the central system input impedances (RL) and the connection wire total resistance (going and return) (see Fig. 1).

To calculate the RL_{max} refer both to the diagram of Fig. 3 and to the following formula:

$$RLmax = \frac{(\text{Power Supply Voltage} - 10) \times 1000}{20}$$

As an example, the RLMax of a 24 Vdc Power Supply will be what follows:

$$RLmax = \frac{(24 - 10) \times 1000}{20} = 700 \text{ Ohm}$$

To this purpose, it is recommended to use a shielded wire.

The Table below shows the average resistance of some wires depending on their section:

Section	Resistance
2 x 0,75mm^2	26Ohm/Km
2 x 1 mm^2	20 Ohm/Km
2x1,5mm^2	14 Ohm/Km
2x2,5mm^2	8 Ohm/Km

Positioning: The TS293EA must be installed in the vertical position with the sensor housing placed downward.

Normally the transmitter should be installed at about 30÷50cm from the ceiling to protect people from the Ammonia toxicity. Wall-mount the unit by two screw anchors.

Electric connections: are to be carried out using the three-pole terminal (See special instructions enclosed with the gas detectors). It is not necessary to use shielded cables.

Transmitters can be mounted at a max. distance of 300 meters from the gas detector when 3x1.5mm^2 cables are used, and 600 meters with 3x2.5 mm^2 cables. (With 12Vdc gas detectors power supply output).

WARNING

Warning: When the transmitter is powered for the first time of after a long time inactivity, the sensor needs about 10-30 seconds to be reset to the normal operational conditions.

Cross-sensitivity: A cross-sensitivity phenomenon with other gases may occur (see Table 1).

IMPORTANT WARNING: **in case of alarm situation, owing to an Ammonia leakage, it have to be always checked the sensor working, as indicated in this page. If the Ammonia concentration is higher than full scale (300ppm), it could be necessary to replace the sensor.**

Calibration and/or Verification

We advise to carry out working testing and/or calibration, every 6/12 months. ***The gas to use should be a mixture of 200 to 300 ppm Ammonia and the rest of Nitrogen.***

Warnings*: The calibration routine is to be carried out only in clean air and after about 8 hour' instrument continual working. Any calibration routines are to be carried out by trained or authorised personnel only. For the trimmer adjustment, a suitable-sized screwdriver should be used.*

"Zero Calibration": Open the housing cover, and then connect a digital multimeter (20mA scale) in-series to the Power Supply. (**Important:** by disconnecting the loop, the Alarm and Fault relays of the central system the transmitter is connected to will activate).

Wait for about five minutes to allow the transmitter to get a steady condition. When in fresh air, the value to read should be 4mA (±0.5). *If the readout is not 4mA, only if necessary, adjust the P1 "ZERO" trimmer to get 4mA.*

Warning: Be sure that there are not toxic gases in the environment. In case of doubt, you should execute either the 4mA verification using an air/20.9% O_2 gas bottle or a synthetic/air gas bottle with the Calibration Tester. Connect the Calibration Tester to the gas bottle (see Fig.4) and insert it on the sensor. Open the gas bottle reducer cock so as the flow meter is between the two stamps (about 0.2-0.3 l/m). Wait for about 5 minutes, and then check the value on the multimeter is 4 mA (± 0.2 mA).

"Full scale calibration": Connect the Calibration Tester to the NH_3 gas bottle and insert it on the Sensor (see Fig.4). Open the gas bottle reducers cock so as the flow indicator is between the two stamps (0.2÷0.3 l/m). Wait for about 3 to 5 minutes. Then check the value on the multimeter corresponds to the value calculated following the formula here below:

$$mA = \frac{16 \times (\text{gas concentration})}{\text{trnsmitter range}} + 4$$

Example: if the gas bottle is 245ppm and the transmitter range is 300ppm, the corresponding mA value will be as follows:

$$mA = \frac{16x245}{300} + 4 = 17{,}06$$

If necessary, adjust the P2 "SPAN" trimmer to the required mA value. Remove the Calibration Tester. Wait again for about 5 to 10 minutes, and then check the digital multimeter shows 4 mA. Disconnect the digital multimeter, connect the wire and place again the instrument box cover

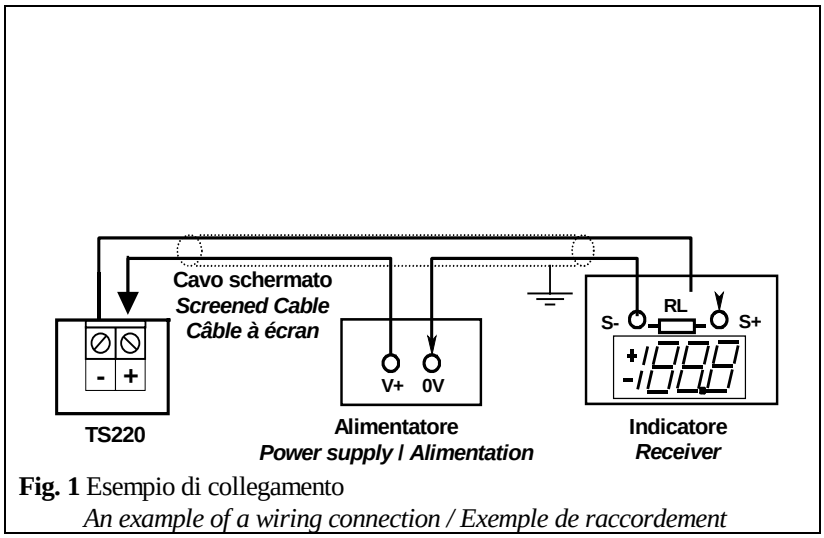


Fig. 1 Esempio di collegamento
An example of a wiring connection / Exemple de raccordement

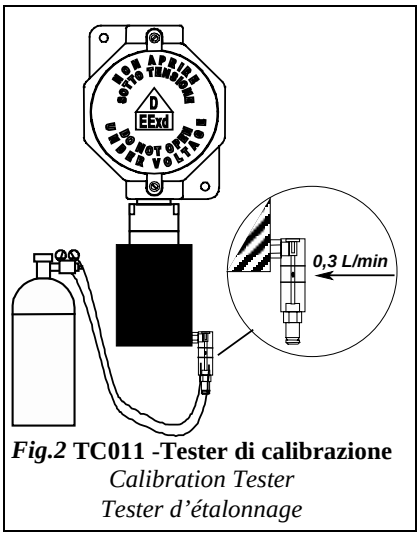
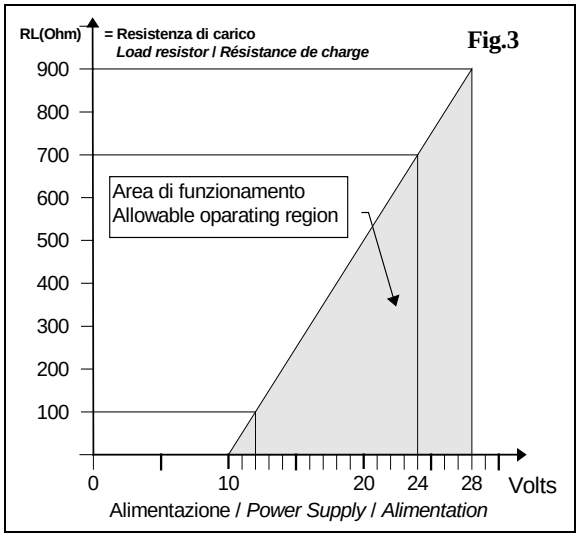


Fig.2 **TC011 -Tester di calibrazione**
Calibration Tester
Tester d'étalonnage



Tab 1 - Interferenza ad altri gas / *Cross-sensitivity Data with other gases / Interférence avec autres gaz*

Gas / *Gaz*	**Concentrazione *Concentration***	**Valore rilevato dal sensore *Sensor value detected Valeur relevée par le capteur***
C_2H_5OH Alcool etilico / *Ethanol*	1000 ppm	≈ 1ppm
CH_3OH Alcool metilico / Me*thanol*	1200 ppm	≈ 3ppm
Cl Cloro / *Chlorine*	5 ppm	0ppm
H_2 Idrogeno / *Hydrogen*	1000 ppm	≈ 25ppm
CO Monossido di carbonio/ *Carbon monoxyde*	300 ppm	≈ 3ppm