



Sensigas®

Carbon dioxide (CO₂) detectors
for homes, recreational vehicles, workplaces and more in general, in public or private places with a high concentration of people.

ESN.F.D..

Electronic microprocessor Carbon Dioxide (CO₂) detectors

Display of carbon dioxide measurement in addition to ambient temperature, relative humidity and the operational status of the detector, on large LCD screen

NDIR (nondispersive infrared) carbon dioxide detection technology ABC Logic™ self-calibration system (automatic calibration)

Measuring range 0...20,000 ppm of CO₂ (other ranges on request)

Power supply 230Vac, 115Vac, 24Vac/dc (see models)

Relay command output with potential-free contact (SPST 230Vac / 3A, or 30Vdc / 3A), suitable for any command or alarm device.

Optional measurement outputs 4...20mA or 0...10Vdc (see models)

Use

The ESN.F.D.. detectors can be used to measure the concentration of Carbon Dioxide and to command transmitters or actuating devices where there are abnormal concentrations well below the gas hazard threshold.

The ESN.F.D.. detectors can also be used to monitor Carbon Dioxide as an indication of the quality of the air in hotels, offices, exhibition centres, shops, restaurants, schools, conference rooms, cinemas, theatres and ventilation systems in general.

Operation

At the end of the warm-up phase, during which the detector is inactive, it enters normal operation mode, and will continue in this state until it detects gas. When the gas concentration exceeds the threshold set-points, the detector senses its presence and goes into the alarm condition indicated by the activation of the relay and by the relative display symbol coming on.

Levels of CO₂ and effects on humans

250.....350 ppm level of the air in outdoor environment (normal)
350.....1000 ppm typical level found in living spaces with good air circulation
1000.....2000 ppm level associated with drowsiness and lack of air
2000.....5000 ppm level associated with headache, drowsiness and stale, stagnant air like a closed room. This could cause lack of concentration, loss of attention, increased heartbeat and slight nausea
> 5000 ppm exposure could lead to a serious lack of oxygen resulting in brain damage, coma and death.

Available models and ordering information

Power supply	230Vac	115Vac	24Vac/dc
Outputs			
SPST relay	ESN.F.D.A.R	ESN.F.D.D.R	ESN.F.D.E.R
SPST relay + 4...20mA	ESN.F.D.A.I	ESN.F.D.D.I	ESN.F.D.E.I
SPST relay + 0...10Vdc	ESN.F.D.A.V	ESN.F.D.D.V	ESN.F.D.E.V

For special versions, please contact Customer Service.

Installation and Commissioning

Carefully read the instructions and electronic connection diagrams in this document and follow them to the letter. Keep this document in a safe place for future consultation.

The device must be installed by qualified technicians.

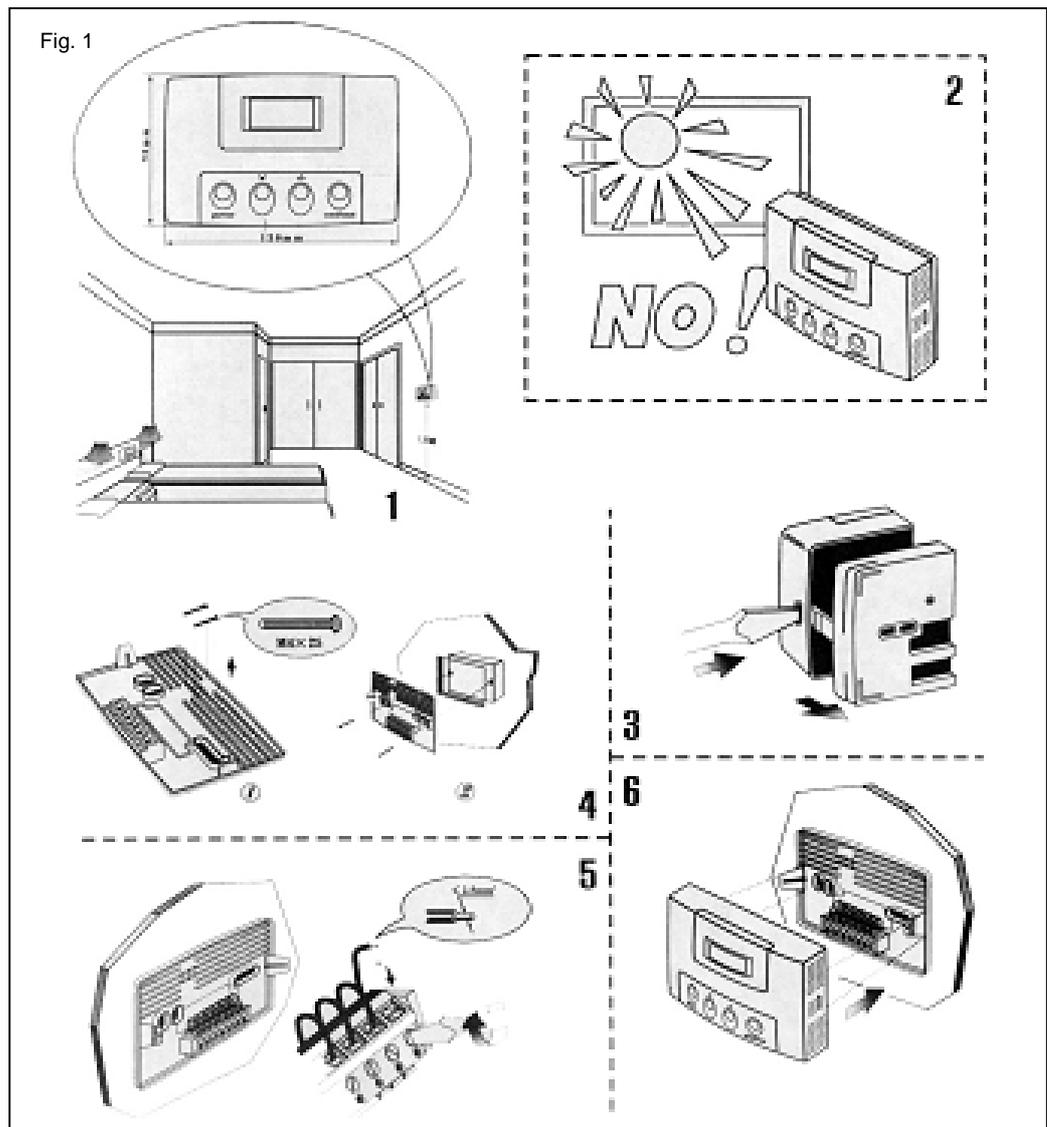
Installation guidelines

The detector **must** be installed (See also fig. 1, step 1):

Since Carbon Dioxide is heavier than air, it will be concentrated close to the floor. This device has a display screen, so if it is positioned too low it would not be easy to use; we suggest installing it about 1.2-1.3m from the floor.

The detector **must not** be installed (See also fig. 1, step 2):

- exposed to direct sunlight or outdoors
- near stoves and cooking appliances
- near sinks and taps
- near exhaust hoods, windows, fans etc.
- in areas where dirt and/or dust can clog the bottom and side grille of the detector
- where the temperature or humidity exceeds the detector's operating limits
- in closed spaces (behind curtains, inside cupboards etc.).



Installation

Install the detector as follows (See also fig. 1, steps 3-6):

Use the tip of a screwdriver to lightly push down the side tabs of the detector until the wall mounting plate is separated from the detector body

Fix the mounting plate to the wall with the screws supplied or a suitable wall bracket, or to the recessed mounting cabinet used.

Connect the wiring on the wall mounting plate as shown in the connection diagram (Fig.2) in **Electrical Installation**

Remount the detector body onto the wall-mounting plate; make sure the tabs click into place.

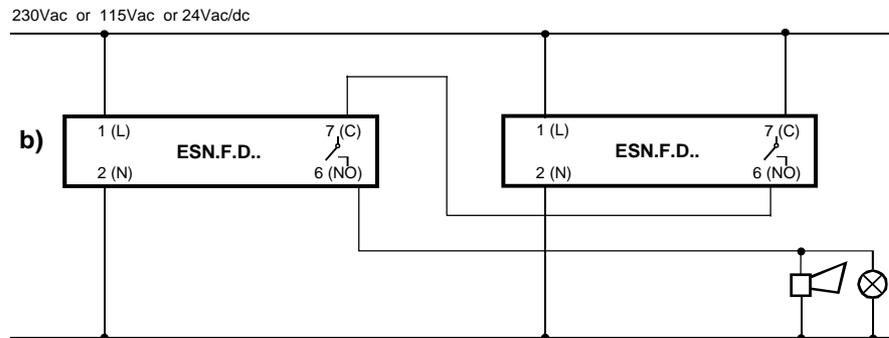
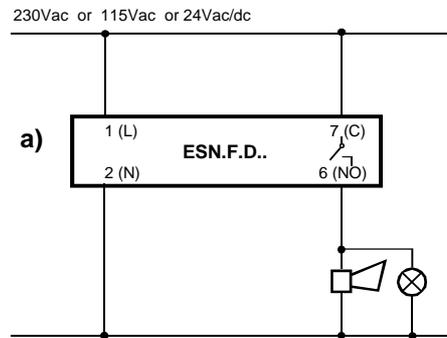
Electrical Installation

Make sure the wiring conforms to the standards in force.
The devices must be connected to the mains power supply and remain permanently powered.
Omnipolar disconnection must be included in the mains.

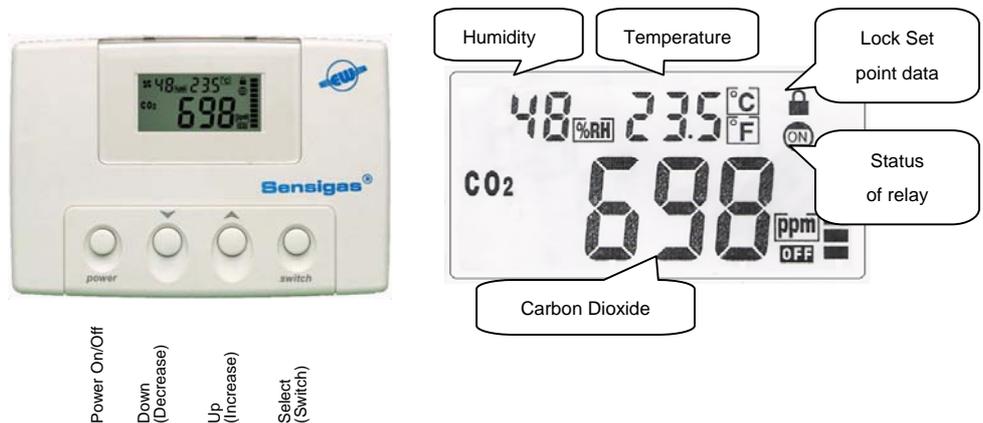
Some possible wiring diagrams:

Example a): - Command of an audible alarm from a detection point.

Example b): - Command of a visual alarm from several detection points.



Operator interface



Commissioning

Power-up the detector by holding the (power) button pressed for about 2 seconds and check that the display shows the measurements in the format as above.

To select the threshold set-points and the set-points for all the other parameters, first press the selection (switch) and then the (up) and (down) buttons to set the value for each one.

The set-points can only be changed if its value is flashing; to rapidly increase the set-points, hold the (down) or (up) button pressed for more than 3 seconds.

After selecting and changing the set-points and any other parameters, lock them in so they are not accidentally changed by pressing the (down) and (up) buttons together and holding them down for more than 5 seconds; the set-points are locked in when the display shows this symbol .

To restore the possibility of changing set-points, once more press down on the (down) and (up) buttons at the same time; the set-points can be changed when the display no longer shows this symbol .

Carry out an operational test using a CO₂ gas canister with dosage valve; release a small amount of gas close to the grille below and control the correct engagement of the command and/or alarm device connected to the relay as well as the appearance on the display of the symbol .

It is advisable to repeat the operational test at least once a year, or after a prolonged period of stoppage.

If other test methods are used instead of the one described the detector may generate different, unexpected responses. In particular, the use of inappropriate substances or vapours (alcohol or silicon-based solvents etc.) or in any case, high concentrations of test gases could cause permanent damage to the sensing element and may cause the detector to operate incorrectly.

The detector needs no periodic maintenance, with the exception of the periodic operational test and its replacement 15 years after the installation date.

Please note that in terms of measuring the level of CO₂, the detector will reach maximum precision after 14 days of uninterrupted operation of the device following installation or a long period of stoppage (several months).

Still, acceptable precision is achieved after two days of operation, in other words after the first full calibration cycled according to the ABC Logic™ self-calibration system algorithm.

In order to obtain maximum precision, during the calibration period following installation (or long period of stoppage) do not expose the detector to high quantities of CO₂, for example the ongoing presence of many people in the premises where the detector is installed.

Use a permanent marker to write the replacement date of the detector on the plate provided and place it in a visible position (after installation is completed).

Use a wet cloth and mild detergent to periodically clean the device.

Do not use aggressive detergents like alcohol, ammonia, solvents etc.

Before cleaning the detector, switch off the system power supply to avoid the risk of electric shock.

Warning

The detector and its sensing element have been designed for ongoing use in areas where there is permanent occupation by people, so normally pollution-free.

The presence of gases or vapours from some aggressive substances such as alcohol, silicones or solvents found in some detergents or polishes, or from the fumes generated by cooking or also an excess of steam, may cause inappropriate action of the detector and in the long term could affect the reliability of the device.

Technical specifications

Power supply (see models)		230Vac ±10% or 115Vac ± 10% or 24Vac/dc± 10%
Frequency / Consumption		50/60Hz / 3.5W maximum, 2.5W average
Sensing element	CO ₂ Temperature Relative humidity	<ul style="list-style-type: none"> • NDIR (nondispersive infrared) • NTC thermistor • Capacitive sensor series HS
Measuring range	CO ₂ Temperature Relative humidity	<ul style="list-style-type: none"> • 0...20.000ppm (other ranges on request) • 0...50°C • 0...99% RH
Measuring precision (@25°C)	CO ₂ Temperature Relative humidity	<ul style="list-style-type: none"> • ±100ppm + 3% of the readout • ±3% • ±10%
Measuring stability	(CO ₂)	2% on full scale, for the lifetime of the sensor
Measuring linearity	(CO ₂)	1% of full scale
Dependance on altitude	(CO ₂)	0.13% of the readout per mm of Mercury column
Calibration for altitude	(CO ₂)	0...9.900m at steps of 100m
Dependance on temperature	(CO ₂)	0.2% of full scale
Calibration for temperature	(CO ₂)	Automatic
Response time (T90)	(CO ₂)	2m
Command outputs (see models)		<ul style="list-style-type: none"> • SPDT relay - capacity of the contact 250Vac 3A or 30Vdc 3A • Analogue 4...20mA or 0...10Vdc
Alarm threshold		Settable from interface with operator
Operational lifetime of a detector		15 years from installation
Max detectable area		about 100m ² (approximate; for larger areas install several devices at suitable distances from each other)
Protection Rating		IP40 when correctly installed
Operating temperature / humidity		0...50°C / 0...95% RH (non condensing)
Storage temperature / humidity		- 40...70°C / 0...95% RH (non condensing)
Dimensions and weight		Mounting holes compatible with 503 type flush mounting box Maximum dimensions: 130 x 90 x 40 mm Weight: 360g
Enclosure		ABS/PC UL94-V0 flame retardant
Conformity  EMC Electromagnetic Compatibility Low Voltage (LVD)		EMC 2004/108/EC – EN 61000-6-1 + EN 61000-6-3 LV 2006/95/EC – EN60730-1

<i>To be filled in by Installer</i>		<i>Installer's stamp</i>
Installation site		
Product order number		
Installation date	Replacement date	