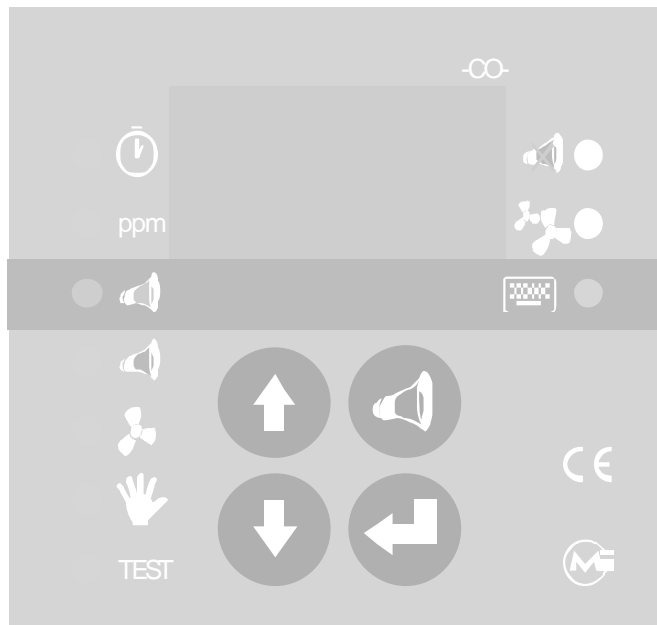




CERCO 300 EQ CARBON MONOXIDE ELECTROCHEMICAL DETECTION SYSTEM

Installation, operation and maintenance manual.



Please, read this manual carefully before installing or operating this equipment, and keep it for futures references

Contents

| | |
|--|----|
| 1- GENERAL DESCRIPTION..... | 4 |
| 2- SAFETY ISSUES..... | 4 |
| 3- COMPONENTS AND REFERENCES..... | 4 |
| 4- CERCO 300 EQ ZONE MODULE KEYPAD DESCRIPTION..... | 5 |
| 5- WORKING PRINCIPLES..... | 5 |
| 6- POWER SUPPLY..... | 6 |
| 7- ELECTROCHEMICAL SENSOR'S DESCRIPTION AND OPERATING PRINCIPLE..... | 7 |
| 8- MOUNTING THE CONTROL PANEL..... | 7 |
| 9- CONNECTION BETWEEN ZONE MODULES..... | 9 |
| 10-CONNECTING MAINS TO THE CONTROL PANEL..... | 9 |
| 11- MOUNTING AND CONNECTING THE DETECTORS..... | 10 |
| 12- FIRST COMMISSIONING AND OPERATING INSTRUCTIONS..... | 11 |
| 13- IMPORTANT NOTES:..... | 14 |
| 14- MAINTENANCE..... | 15 |
| 15- TECHNICAL SPECIFICATIONS..... | 15 |

NOTES:

1. General description

The CERCO 300 detection system has been developed for Carbon Monoxide (CO) monitoring in toxic gas risk areas, and to activate automatic ventilation systems in garages, car parking, road tunnels, load facilities, etc.

The system consists in a panel with up to 5 zone modules and a maximum of 16 detectors for zone module. Each detector is self addressed and identified by the panel

Each zone module can be individually programmed in 3 different levels, operating 3 different relay outputs for ventilation control and alarm output..

Other toxic gas detectors can be integrated to the system, like Nitrogen Dioxide (NO₂) for enhanced detection capability. Please refer to the specific gas detector's manual to connect and operate.

2. Safety issues:

This product has been certified and manufactured according UNE-23300:1984 and other applicable CE directives. Installation and maintenance must be performed by a competent technician who is familiar with the system, according this manual and /or any other guidelines or regulation authority.

Inspection and maintenance must be carried regularly according this manual or regulation authority.

3. Components and references:

CERCO 300 EQ SYSTEM:

ME300D: Electrochemical cell CO detector (High profile base included)

ME300M: 1 zone module for control panel

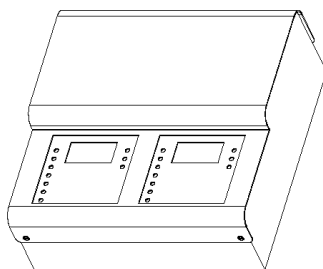
ME302-1: 1 zone Control Panel expansible to 2 zones (Panel + 1 module)

ME302-2: 2 zones Control Panel not expansible (Panel + 2 modules)

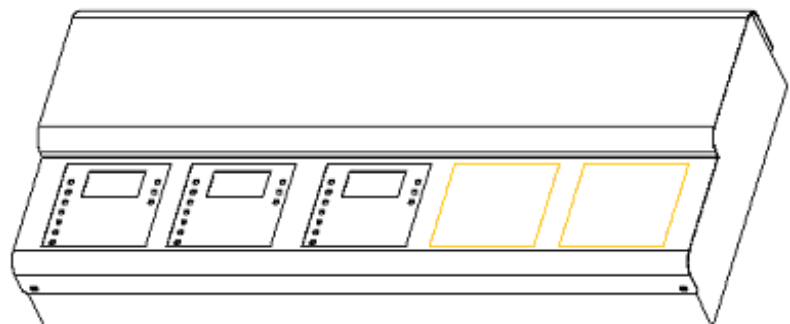
ME305-3: 3 zones Control Panel expansible to 5 zones (panel + 3 modules)

ME305-4: 4 zones Control Panel expansible to 5 zones (panel + 4 modules)

ME305-5: 5 zones Control Panel not expansible (panel + 5 modules)

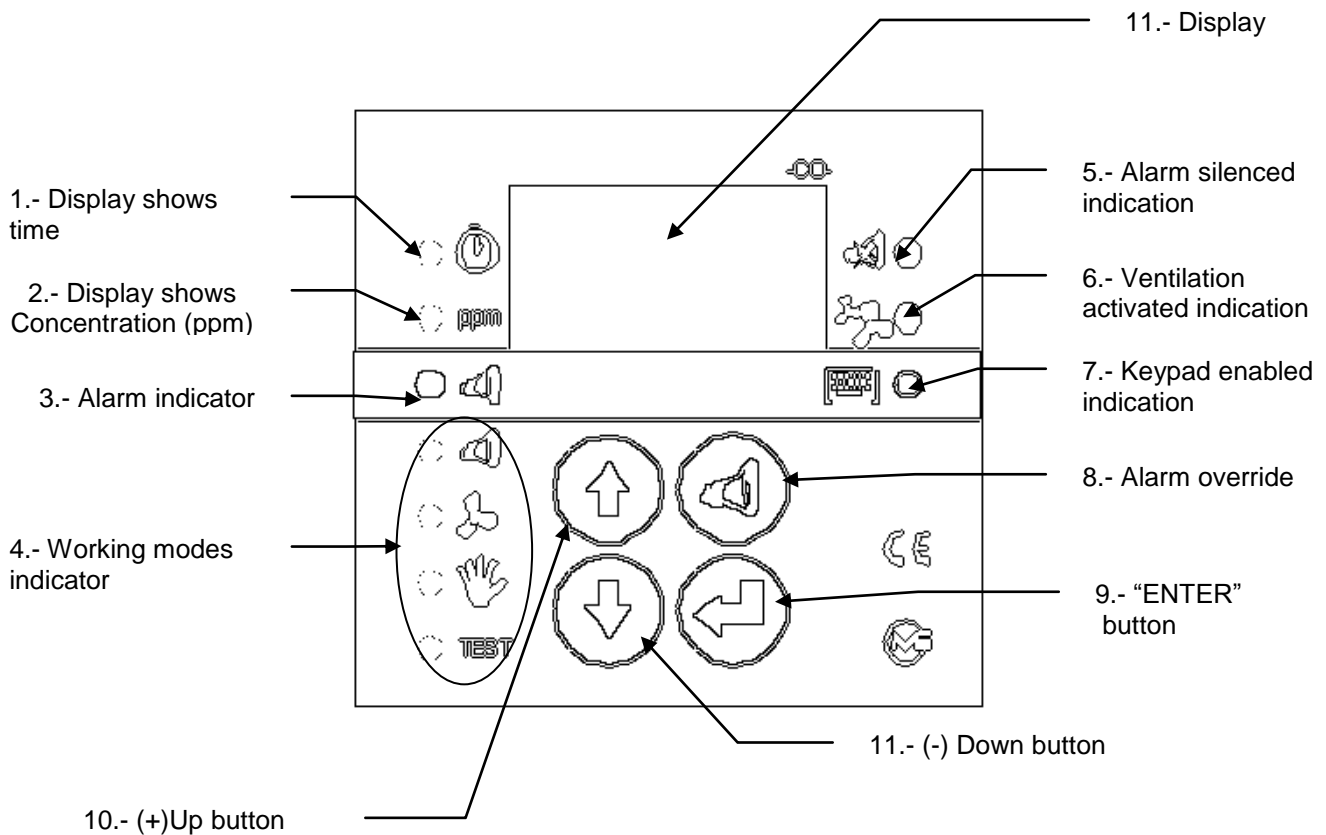


Mod. ME302-2



Mod. ME305-3

4. CERCO 300 EQ zone module keypad description



5. Working principles

The control panels are offered in two sizes for up to 2 zones modules (ME302) or up to 5 zones module (ME305). Each control panel uses the same zone module, so all functions and controls are the same in any model.

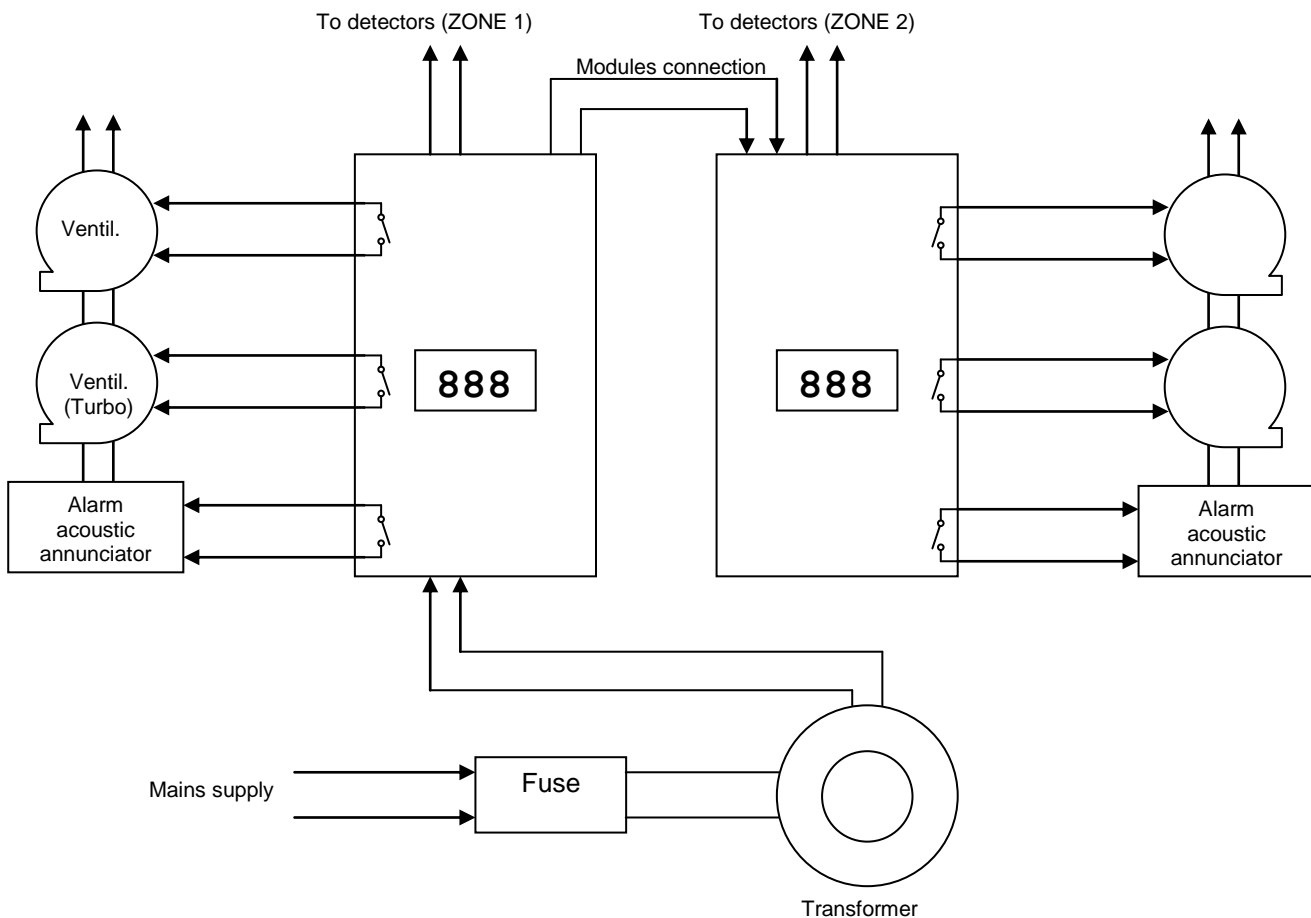
Each zone module is designed to communicate and operate with the detectors, using a ASK – FSK processing. All protocols are included in the performing data with value information and error detection codes. All readings of the detectors (16 maximum) are taken at regular intervals of 25 seconds., as specified in this kind of detectors

The connections between zone modules and detectors, and the supply from the transformer **don't need to be polarised**, in order to prevent possible errors and for easy installing.

Each zone module had 3 programmable voltage-free relay outputs to control the different equipment of the system.

The concentration level is monitored in a 3 digit red display, **indicating always the maximum level** readings and the correspondent **address number** of the detector of this reading

Component connection diagram:



6. Power Supply

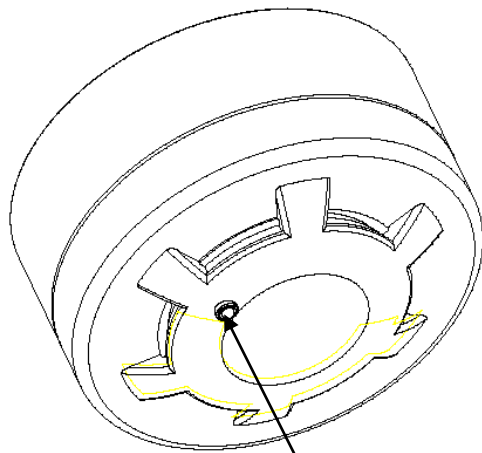
The power supply for each zone module of the panel is provided by a 3VA (13V–2,5A) toroidal transformer, with power enough for up to 5 zone modules.

The regulation and control of the different working voltages is achieved in each zone module, in order to be complete independent from each other.

The zone modules is protected against short-circuit by a thermo fuse preventing any transformer or modules damage.

The module's power supply is carried out by a parallel connection, so power circulates from one module to another through the connectors situated in each PCB.

7- Electrochemical sensor's description and operating principle



Mod. ME300D

Red led diode

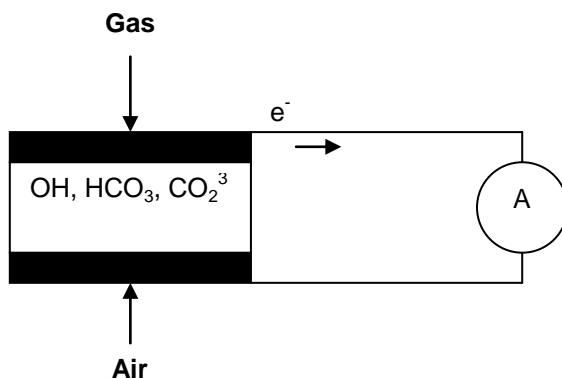
The carbon monoxide detection in the ME300D detectors are performed by an electrochemical cell. The electrochemical cell is housed in a circular plastic casing with the PCB and electronic control components. A groove allows the air to penetrate exposing the cell to the different CO concentrations to be measured.

Proper fixing and connection is provided by a mounting base with 20 mm knockouts for surface wire mounting, and the electric terminals.

Operating principle:

The electrochemical sensor detects toxic gases in a very low concentration level (part per million: PPM). A gas sensitive electrode formed by a permeable membrane and a specific electrolytic solution allows to read a linear output proportional to the amount of gas detected.

Electrochemical cell provides more accurate detection of CO, more life expectancy, less interference (other gases, humidity, changes of temperature) and less maintenance than the semiconductor equivalent.



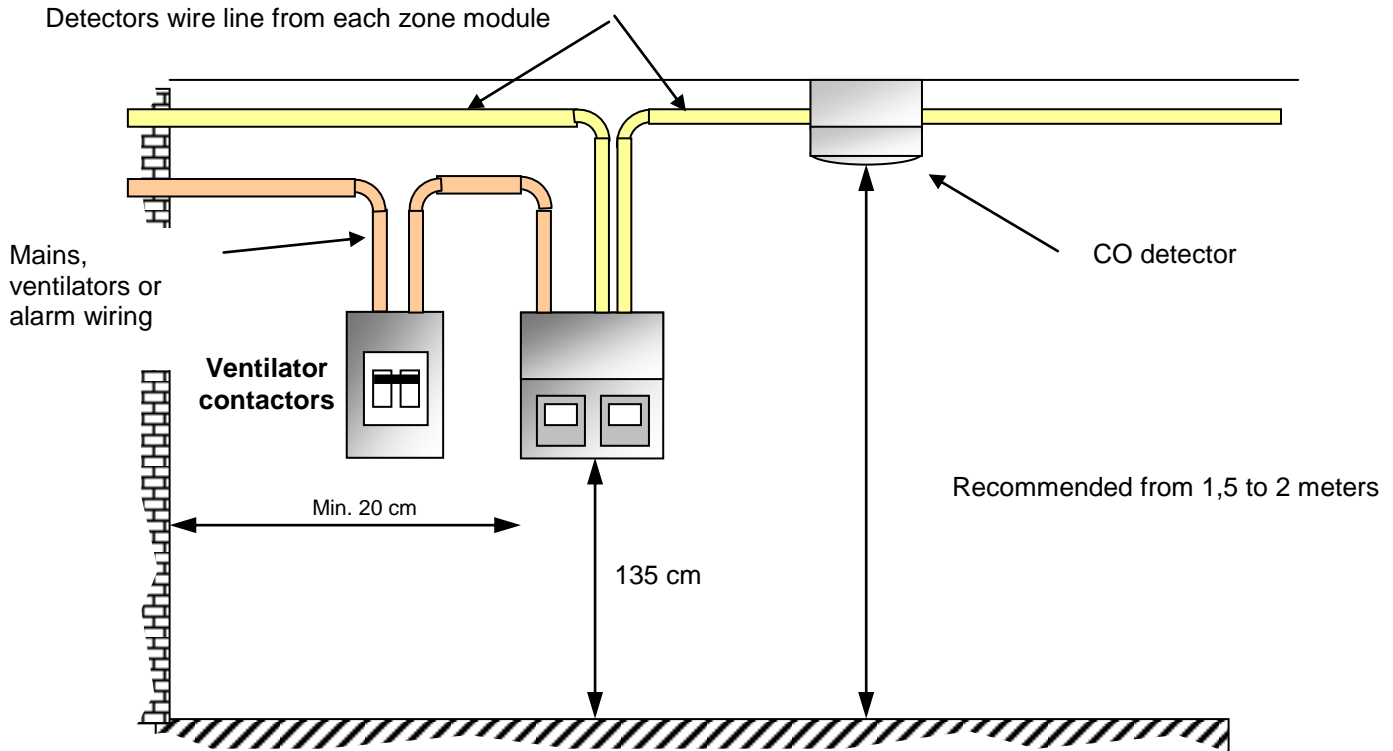
Electrochemical cell

Electrochemical cell characteristics:

| | |
|----------------------------------|----------------|
| Cell model: | TGS5042 |
| Manufacturer: | FIGARO.INC |
| Expected sensor life: | 7 years |
| Reading time: | Instantaneous |
| Response time with 16 detectors: | 60 seconds |
| Weight: | 12 grams |
| Operating temperature: | -10°C to 60°C |

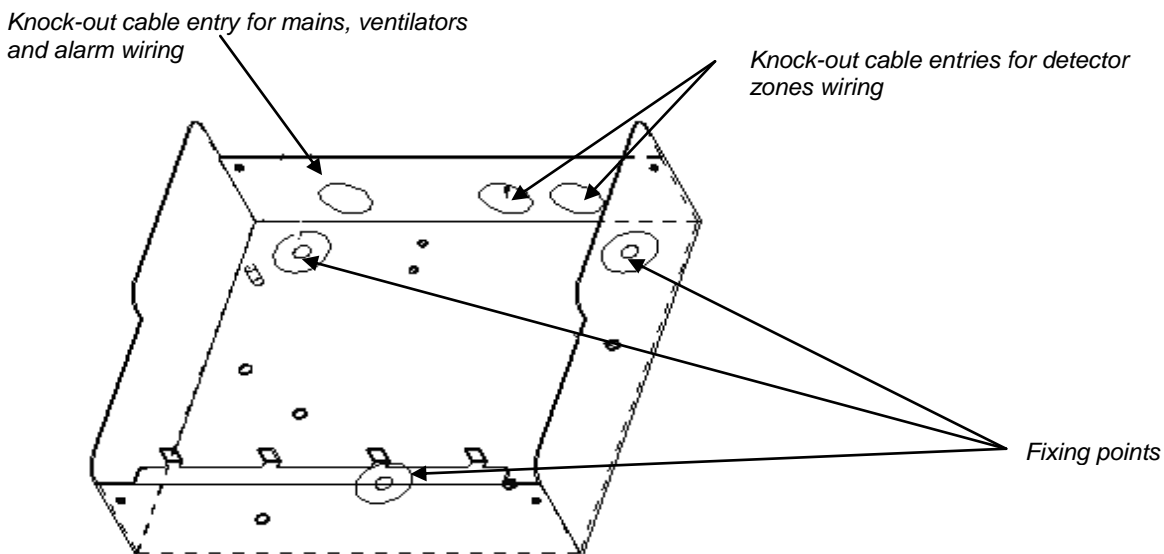
8- Mounting the Control Panel

It is advisable not to mount the control panel in a place exposed to humidity, direct sun or in hot places. The figure below shows typical recommended distances (Not at scale)



The figure below shows the 3 mounting holes for proper screw fixing to a suitable wall, and the location of cable entries for the planned wiring.

It is recommended to remove previously the zones modules or other electronic circuits to avoid accidental damage, mostly if any additional hole should be drilled in the enclosure.

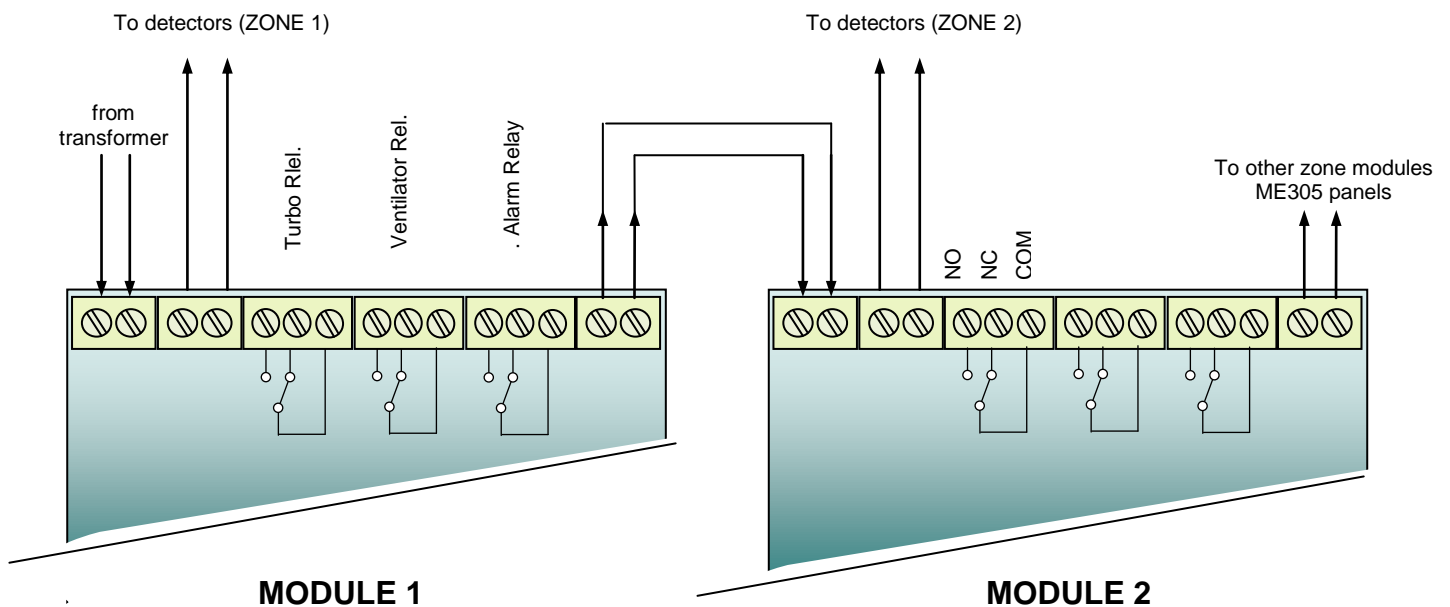


9. Connection between zone modules

The figure below shows a typical connexion between modules in a ME302 control panel, consisting in 2 simple wires connecting adjacent terminals

Power supplied from the transformer and from one module to another are AC current so **don't need to be polarised**

All the terminal connections are adapted to receive wires or metal points from 0,5 m/m² to 1,5 m/m².



Monophase ventilators upper than 800W , must be operated with external contactors connected the voltage free relay outputs

10. Connecting Mains to the Control Panel

Once fixed the control panel, it should be connected to a 230 VAC (+/- 10%) mains power with a 0,75m/m² to 2 m/m² 3 core cable, and conveniently earthed. Live, neutral and earth connections are marked in the appropriate terminal located in the back plate of the housing with a 0,5 A rated fuse protection.

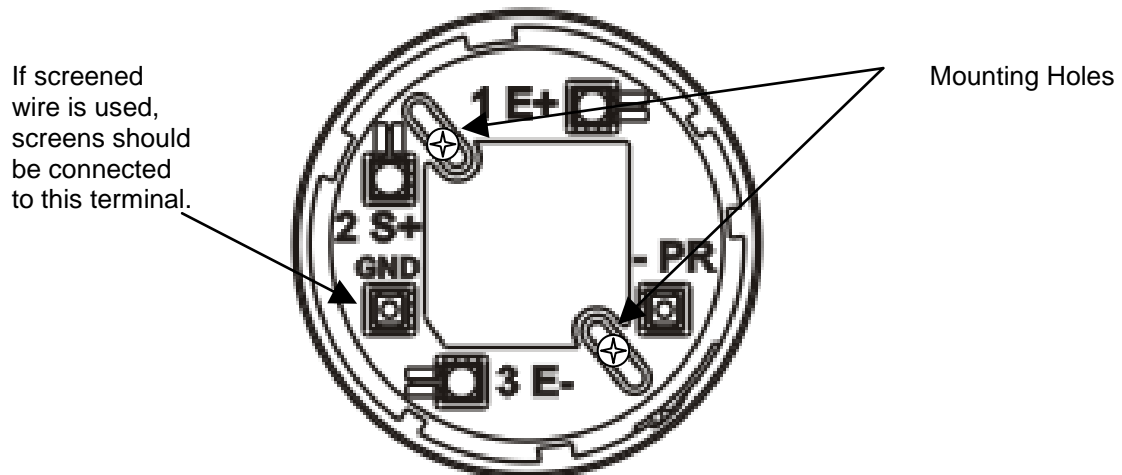
Mains cable should be separated to any other wires in order to prevent interferences and insulating cover should remain avoiding the chance of any electric shock.

Once connected all the components and correct operation checked, the cover should be fitted after connecting the earth wire to the provided terminal.

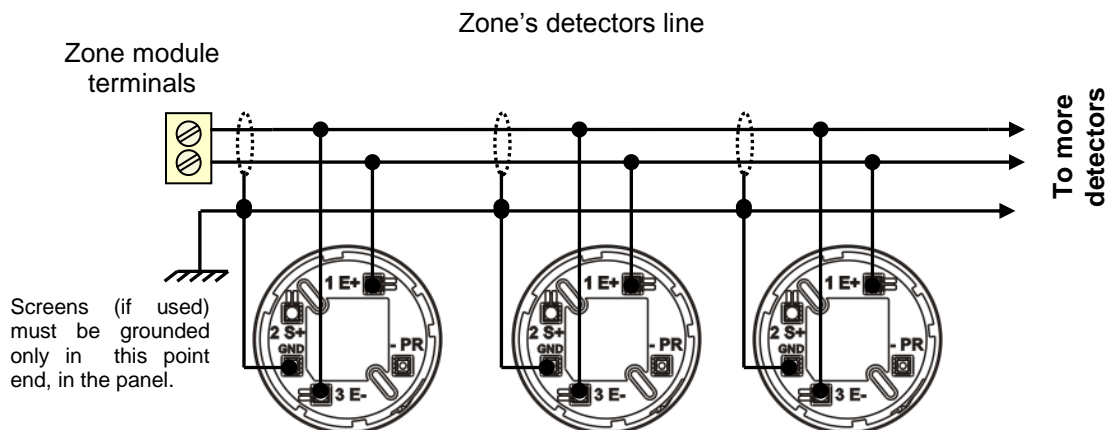
11. Mounting and connecting the detectors

The detectors should be mounted from 1,5 m to 2 m height in ceilings, walls or pillars with a maximum of 200 m² covered by 1 detector in car parking or garages, or anywhere can be expected the presence of CO toxic gas. Relevant Standards Authority can specify other mounting regulations, so must be consulted before mounting..

The detectors must be mounted in clean and dry places as far as possible of other electric equipment like fluorescent lights, with the specific bases provided. Bases should be fixed with 2 proper screws fitted in the mounting holes.



Wiring and connecting detectors to the zone module



Only 2 non polarised wires are required to connect the detectors to the panel. It is recommended 1,5 m/m² sections.

Maximum distance between the panel and detectors are determinate by the characteristics of the wire. It is recommended a twisted wire, better if screened. Proper work is obtained with 1,5 m/m² non-twisted/screened wire in distances less than 300 meters long if it is installed avoiding any origin of electromagnetic interferences, and separated from other electric circuits like illumination, electric machinery, etc.

If more than 500 meters is needed, or 2 or more zone's wiring are installed in the same tube, each zone's wires should be twisted, and better screened if suspected electromagnetic interferences.

The system allows to be wired in non-polarized free installation architecture, as detectors don't need to be serial connected and no end of line is required. Any open spur can be installed if it is connected a detector at the end.

Any connection between different zone's wiring must be avoided to prevent communication errors or module's damage.

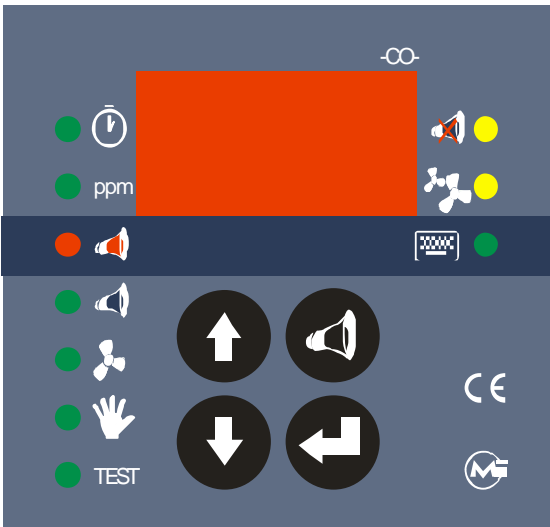






National standards should require any other special characteristics for wires, if applicable.

Base removal protection

In order to prevent the removal of the detectors, The bases could be blocked by cutting the extreme of the tongue in the side. The detector can be removed pressing the tongue with a screwdriver, allowing to turn off the detector.

12. First commissioning and operating instructions

Panel indications and controls:

| | indication | function |
|---|---|---|
|  |  | When lights the display shows time in minutes units. |
| |  | When lights the display shows CO concentration in PPM,s (parts per million) |
| |  | When lights indicates that alarm level has been overcome |
| |  | Different working modes: |
| | | <ul style="list-style-type: none"> • Only alarm • Service • Manual • Test |
| |  | |
| |  | |

Starting the system:

Once connected and verified, **when mains power is first time connected** to the panel all the detector's led will turn on for a while and the display will show numbers from 1 to 16 as the detectors are checked by the panel. After that will show the number of detectors founded, and the buzzer will sound. This process can be repeated a few times, as the panel must found and address all the detectors connected in each system zones.

Selecting different working modes:

The panel starts in “NORMAL SERVICE” mode and with the keypad controls disabled (to prevent unauthorised use). To enable the keypad controls and to access to the different working modes, the “**arrow up**” and “**arrow down**” buttons must be pressed simultaneously for 5 seconds. After that, the internal buzzer sounds and the “keypad led” turns “on” to indicate that the keypad is active. To leave the accessed estate, press again both “**arrow up**” and “**arrow down**” buttons for 5 seconds simultaneously and the “keypad led” will turn “off” indicating that the controls are now disabled.

Once the keypad controls are enabled, the **different working modes can be selected** by pressing “**arrow up**” and “**arrow down**” buttons. Once a working mode has been selected, it must be confirmed pressing “**enter**”. Each button pressing is confirmed by the internal buzzer. If a selected working mode is not confirmed by pressing “enter” the panel turns automatically to the previous selected and confirmed working mode.

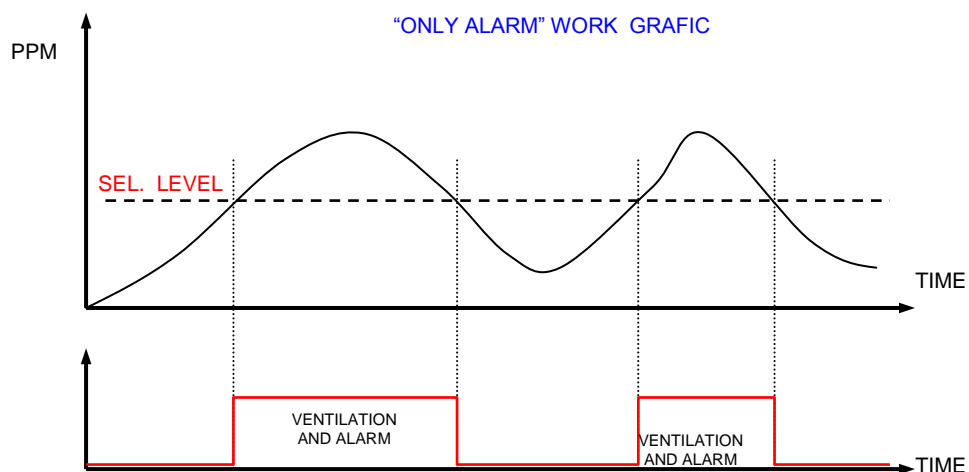
Different working modes description:

“Only alarm” mode:

When the system is working in “**only alarm**” mode, the panel checks constantly the concentration level measured by the different detectors, indicating the highest level (3 digits) and the address number of his detector (2 digits) (time required for a good reading with 16 detectors connected is 60 seconds) When the selected alarm level is overcome the “**alarm relay**” output and “**ventilator relay**” output will be activated simultaneously. In this stage, the “**alarm relay**” output can be disconnected (**not the ventilator output**) by pressing the “**bell**” button, and the correspondent led indicator will activate. Both relay outputs will be automatically disconnected when the level falls down the selected alarm level.

Once in the “**only alarm**” working mode, the “**alarm level**” can be **programmed**. To select it, the “**enter**” button must be pressed continuously for 5 seconds and the display will show the current “**alarm level**”, and the “**ppm led indicator**” flashing. Then the “**alarm level**” can be selected by pressing the “**arrow up**” or “**arrow down**” buttons. Once the “alarm level” has been selected, it must be confirmed pressing the “**enter**” button.

It must be noted that the “alarm level” selected will continue operative in all other different working modes “normal service” and “manual” activating the correspondent “alarm relay” output.



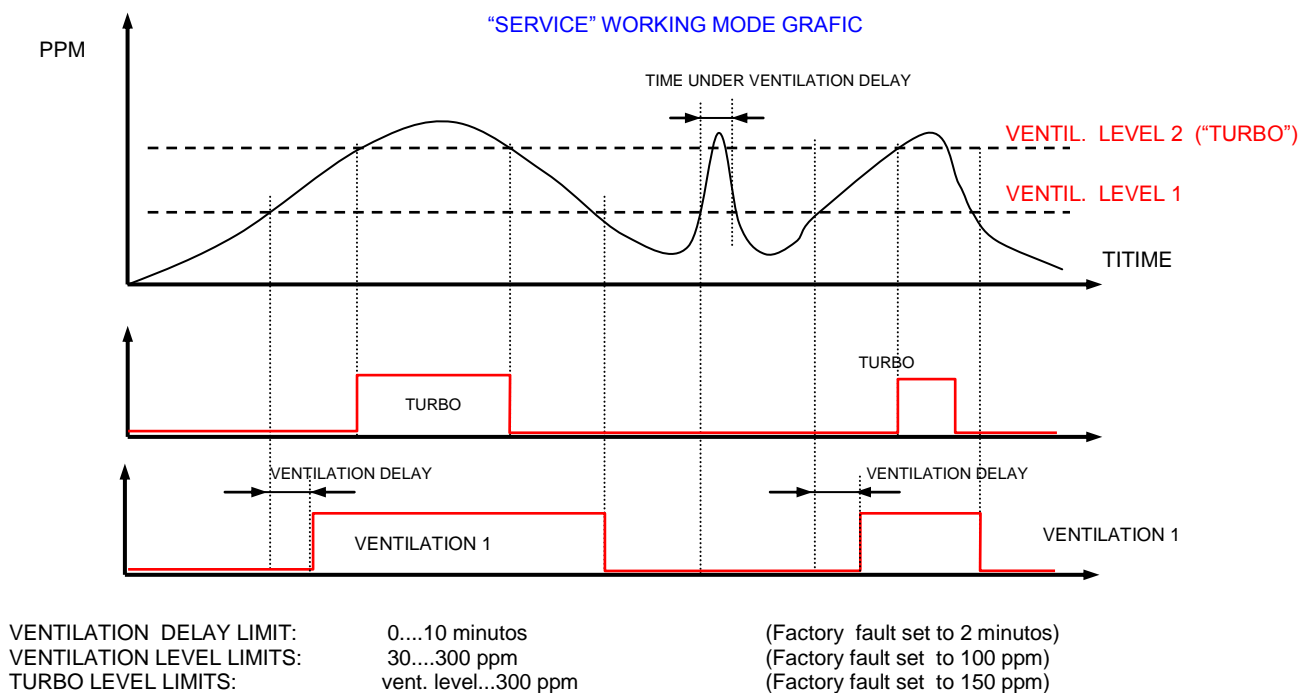
Alarm level can be selected from 30 to 300ppm (in 10 ppm steps)
 Factory fault alarm level adjusted to 200 ppm

“Service” mode:

“Service” is the normal working mode of the system. In “Service” mode 2 different ventilation levels can be selected to activate the two different outputs in the module (“ventilator” and “turbo” relays) in order to operate different ventilation equipment. Also a ventilation activation delay can be programmed at this step

Once in “service mode” the ventilation level can be programmed pressing the “enter” button for 5 seconds. Then the “ventilation” level can be selected pressing the “arrow up” or “arrow down” buttons. Once selected, it must be confirmed pressing “enter” button. After that, display will show the current “ventilation delay” in minutes that can be modified pressing “arrow up” or “arrow down”. After confirmed the “ventilation delay” pressing “enter” button the display will show the ventilation “Turbo” level that can be modified pressing “arrow up” or “arrow down” buttons and confirmed pressing “enter”.

The “ventilation delay” is an important feature for energy saving to prevent the system to initiated the ventilation in case of momentary peaks of CO levels that can be dissipated by themselves. The second ventilation output “turbo” is useful when the system is designed with two-speed ventilators or supplementary ventilation equipment that must be activated at different CO levels.




“Manual” mode:

When the system is in “manual” mode, the different outputs (“Ventilation”, “Turbo” and “Alarm”) can be operated manually from the panel:

Once selected “manual” mode it must be confirmed by pressing “enter” button and the “alarm disabled” led will light indicating that the alarm output is not active.



When pressing  button the alarm and ventilation output will be activated and deactivated when pressing again.

When pressing “**enter**” button, the “**ventilation**” output will activate, and the correspondent led will light. Pressing again the “**enter**” button the “**turbo**” output will be activated and the led will be flashing. Pressing one more time again both “**ventilation**” and “**turbo**” outputs will be activated and the flashing led will change.

To stop the “**ventilation**” and “**Turbo**” outputs, the “**Enter**” button must be pressed again

“Test” mode: Detector’s identification.

With the “**test**” mode selected the detectors can be tested (Injecting CO aerosol) without any activation of the different outputs in order to check the measures of the detectors.

In “**test**” mode all the detectors of the system can be identified knowing the physical situation of each detector’s address number.

To identify the detectors, being in “**test**” mode, press “**enter**” button for 5 seconds until the buzzer sounds. Then the display will show a number and the corresponding detector’s led will illuminate. Pressing “**arrow up**” and “**arrow down**” the different detectors can be selected and identified. (When passing from one detector to another, the detector’s led can take 25 seconds to deactivate). To return to “**test**” mode, press again “**enter**” button.

13. IMPORTANT NOTES:

(Essential reading)

When the system is in operating mode, the display will show continuously a 3 digit number (Level in ppm) alternating with a 2 digit number (the number of the detector which corresponds the reading)

When operating in “**Service**” mode and with the “**ventilation**” relay output active as a result of a CO detection higher then the selected level, the relay will continue active until the reading drops 30 ppm down under the selected ventilation level, to prevent a continue “turn on–turn off” process. Not the same with the “**turbo**” relay output that will turn off at the instant that the CO readings drops down the selected level.

All the detectors will show a light **blinking** (in 25 seconds intervals) indicating normal operation Any detector reading levels higher than the selected “**ventilation**” level will show his led illuminated permanently.

The panel checks constantly the concentration level measured by the different detectors, **indicating in the display the highest level (3 digits) and the address number of his detector (2 digits).**

When a **communication failure** overcomes between the detectors and the control panel, the display will show an “**error message**” (**E**) and the **failings detector’s number**. The buzzer also will sound to alert. If the failure remains more than 3 consecutive readings (about 75 seconds), the buzzer’s sound will continue for up to 5 minutes, after silencing (the error message in the display will remain).

If a detector is removed, the display will show a “**error**” (E) message as the panel cannot find a previously installed (and addressed) detector (buzzer will not sound). The same should happen if a new or previously used detector is added or substituted to the system. **To eliminate the failure and restart the system, the zone module should be reset.**

To RESET any zone module , disconnect the mains power and then connect again pressing simultaneously the “enter” button. The display will show “888” and then “353” until the “enter” button is depressed and pressed again, to restart behind.

When the display shows detection levels upper 330 ppm , the display will blink to indicate that the level is near or out the top end of the measure range (300 ppm)

14. Maintenance:

Es the CERCO 300 CO detection system uses electrochemical cells, it is recommended to check their calibration in periods no longer than 2 years using a specific test aerosol.

Annual inspection and test should be carried out at last by authorised personnel. Other routine of test and inspection should be carried out according to the National Standard, if any.

Please contact to your distributor to consult the recycling and substitution program of detectors.

15. TECHNICAL SPECIFICATIONS

FUNCTIONAL SPECIFICATIONS

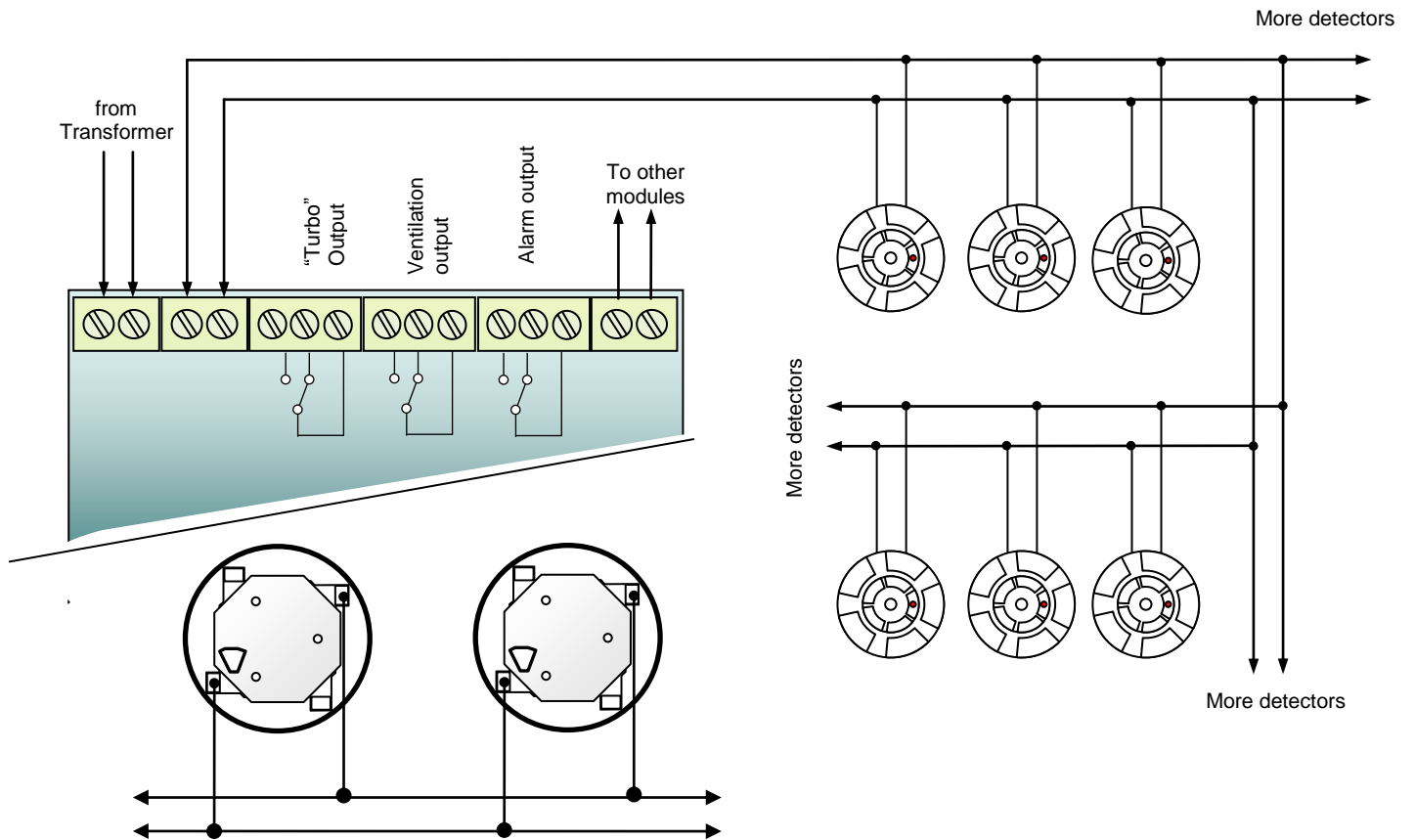
| | |
|---|--|
| Measuring range | 0 to 300 ppm |
| Maximum response time between readings | 25 seconds |
| Alarm indication in detector | Red led continuously illuminated in the correspondent detector |
| Correct work indication in detector | Red led light blinking each 25 seconds |
| Maximum distance from panel to last detector | 500 meters (See point Nr. 10 of this manual) |
| Wiring section in detectors lines (non polarised) | 1,5 mm ² |
| Operating temperature range | 0°C to 50°C |
| Storage temperature range | -10°C to 60°C |
| Operating humidity range | 10% to 95% non condensing |
| ME300D detector accuracy | As specified in UNE23300:1984 standard |
| Programmable levels range (10 ppm steps) | 30...300 ppm |
| Resolution | 1 ppm |
| | |

ELECTRICAL SPECIFICATIONS

| | |
|--|-----------------|
| Power supply | 230V AC ±10% |
| Zone module's voltage | 13 VAC |
| Typical panel's power requirement | Aprox.. 1,5 Wat |
| Typical detector's power requirement at 12V | 6 mA to 40 mA |
| Typical systems power requirement (16 detectors) | 6 W |
| Maximum output relays intensity admittance | 8 A @ 230V |

Ventilation equipment upper than 800W must be operated with external contactors connected the voltage free relay outputs

CONNECTION GRAPHIC:



Certification:



LABORATORIO OFICIAL J. M. MADARIAGA
APARATOS DE DETECCIÓN Y MEDIDA DE GASES

1.- CERTIFICADO DE CONFORMIDAD

2.- Real Decreto 2367/1985 de 22 de Noviembre de 1985

3.- **LOM 07MOGA3141**

4.- Tipo de Equipo y denominación comercial:

Sistema de detección de monóxido de carbono MIRA CERCO 300

5.- Solicitante: **SISTEMAS DE SEGURIDAD MIRA, S.L.**

Dirección: **C/ Emili Roca, 47 At 1ª**
08016 Barcelona

6.- Fabricante: **SISTEMAS DE SEGURIDAD MIRA, S.L.**

Dirección: **Pasaje de Klein 13**
08016 Barcelona

7.- Este equipo así como sus variantes eventuales aceptadas, está especificado en el anexo a este Certificado y en los documentos descriptivos citados en este anexo

8.- El Laboratorio Oficial J.M. Madariaga (LOM), Entidad de Inspección Tipo A para los equipos a los que se refiere el Real Decreto 2367/1985 de 22 de Noviembre de 1985, **CERTIFICA:**

- Que este equipo es conforme a la Norma UNE 23300:1984.
- Haber confeccionado un protocolo confidencial de estas verificaciones y ensayos, de referencia **LOM 06.225 LP.**

9.- Por el hecho de suministrar el equipo marcado como especifica el apartado A6 del Anexo, el solicitante atestigua bajo su propia responsabilidad que ésta se ajusta a los documentos descriptivos citados en el Anexo al presente certificado.

10.- El etiquetado deberá ser visible, legible y duradero.

11.- Si aparece el signo X a continuación del número del certificado de conformidad, ello indica que este equipo está sometido a las condiciones especiales para una segura utilización mencionadas en el anexo al presente certificado.



Carlos Fernández Ramón
DIRECTOR DEL LABORATORIO

Madrid, a 24 de mayo de 2007



Alberto Navarro Izquierdo
Responsable del Área de Detectores de Gases