cofem, s.a.
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Carbon Monoxide (CO) detection system

CARBON MONOXIDE DETECTION SYSTEM

Presentation

DESIGN GUIDE AND SELECTION OF CO SYSTEMS

The basic purpose of a CO detection system, resides in ensuring a minimum conditions of sanitation of air in terms of carbon monoxide (CO) is concerned.

The main sources of CO are the engines of gasoline and diesel vehicles.

The basic applications are garages and tunnels, although not for this reason it can be used in other venues.

According to the rules, although the CO detection systems may arise technologically from fire detection systems, they are not collected by these.

By R/D 2367/1985 requirement, all CO detection systems must be certified according to standard UNE 23.300.

According to their installation, some useful references may include the following:

Buildings and garages: CTE Basic Document of Salubrity, Section Indoor quality air: DB HS 3.

It should be installed in mechanically ventilated car parks:
- With more than 5 places.
- Activation of the ventilation with concentration of 100 ppm.
- If there are employees, with 50 ppm.

Tunnels: *Real Decreto 635/2006* on minimum requirements for safety in tunnels.

Installation requirements:
Reglamento Electrotécnico de Baja Tensión (REBT).

Recommendations and clarifications.

- Coverage between 200 and 300 $m^{2.}$
- Install the detectors between 1,5 and 2 m high.

MiniCO control panel

CARBON MONOXIDE DETECTION SYSTEM

Conventional Control panel with diffusion sensors of carbon monoxide (CO) and nitrogen dioxide (NO_2) UNE 23300 certified.

This control panel provides the MiniCO110 (Ref. MCO110), MiniCO120 (Ref. MCO120) and MiniCO120DVB (Ref. MCO120DVB) references with 10 and 20 sensors respectively.

They are particularly suitable for parking or areas that need only 1 ventilation zone or installation of a few sensors in it.

The control panel displays the maximum concentration of CO in the detection zone, activating the ventilation and alarm when a specific concentration is reached after expiry of the set delay.

It has dry contact outputs for ventilation and a 24 Vdc alarm output.

The system works with CO sensor ("SCO" reference) and NO_2 sensors ("SDN" reference) in the same area.

NO_2 sensors transform measures of NO_2 concentration in an equivalent measure of CO, and shown it in the display as a single concentration of CO, activating the ventilation and alarm when established CO levels are reached.

The control panel allows manual activation and deactivation of ventilation.

The equipment is designed for using diffusion sensors calibrated at factory for operation throughout the operational life of their sensors, and UNE 23300 certified.

Features:

- Control panel of 1 ventilation zone with diffusion sensor brand COsensor model SCO (CO sensor) and SDN (NO_2 sensor).
- Dry contact output (COM / NA) for ventilation 1 and ventilation 2 (DVB model only).
- Alarm output 24 Vdc 0.8 A.
- Space for 2x12 Vdc 2 Ah batteries (DVB model only)
- Display 3-digit, 7-segment.
- Dimensions: 280 x 225 x 105 mm.
- UNE 23300 certified.

TECHNICAL FEATURES

Power supply	230V 50-60Hz/AC	*Intensity alarm output*	24 Vdc 0,8 A
Maximum consumption	20 VA. 230 Vac	*Alarm output fuse*	Resettable
Batteries (only DVB model)	2 x 12 Vdc 2 Ah SLA	*Zone output voltage*	26 Vdc
Power supply fuse	4 A	*Zone fuse*	2 A
Battery charger	500 mA 27Vdc 20ºC	*Dry contact fault*	230 Vac / 30 Vdc 1 A
Sensors by zone	10 CO / NO_2 (MCO110)	*Environmental conditions*	-10ºC +50ºC
	20 CO / NO_2 (MCO120)	*Dimensions*	280x225x105 mm
IP	30	*Weight*	3,45 kg
Dry contact ventilation	230 Vac / 30 Vdc 2A	*Standard*	UNE 23300

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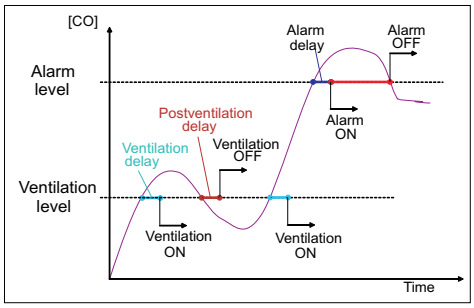
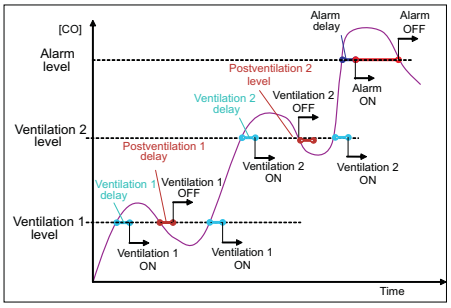
Wiring diagram

MiniCO110 / MiniCO120



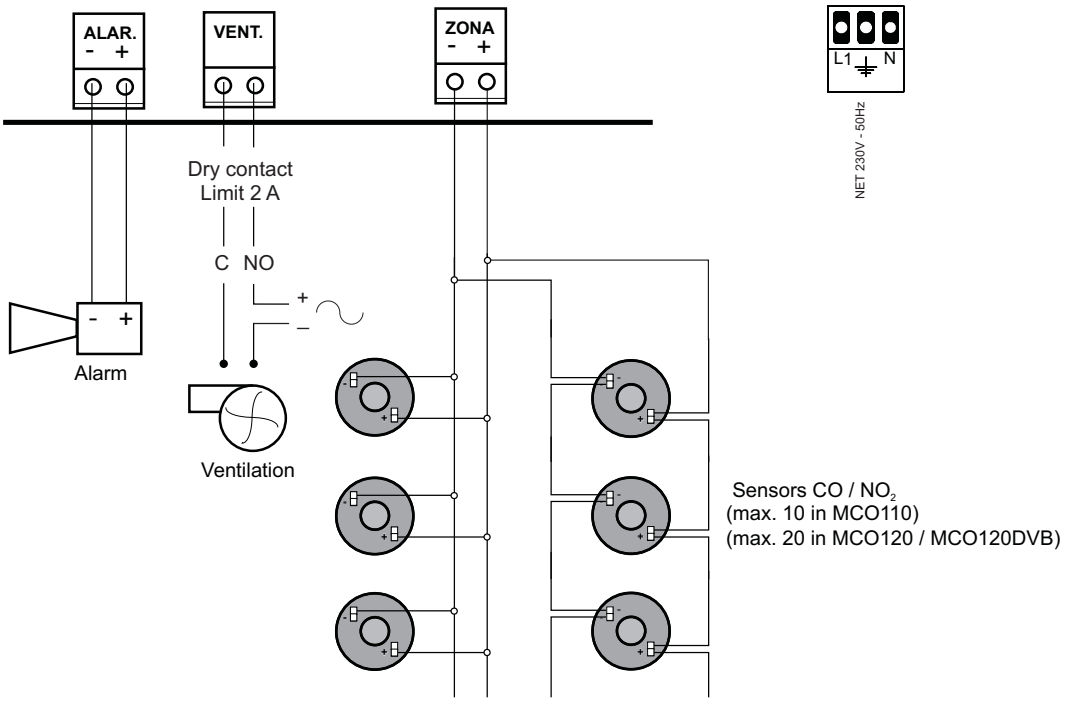
MiniCO120DVB



Parameter	*Value*	*Margin*
Ventilation level:	50 ppm	Programmable(20÷150 ppm, on a 10ppm increase rate)
Ventilation delay:	4 min	Programmable(1÷9 min, on a 1 min increase)
Postventilation delay:	4 min	Fixed
Alarm level:	200 ppm	Fixed
Alarm delay:	1 min	Fixed

Parameter	*Value*	*Margin*
Ventilation 1 level:	50 ppm	Fixed
Ventilation 1 delay	4 min	Programmable (1 ÷ 9 min)
Postventilation 1 delay:	4 min	Fixed
Ventilation 2 level:	100 ppm	Fixed
Ventilation 2 delay:	0 min	Fixed
Postventilation delay:	0 min	Fixed
Alarm level:	200 ppm	Fixed
Alarm delay:	0 min	Fixed

Scheme of operation for control panels with 1 output ventilation



Structure by zone

COsensor ZafirCO control panel

CARBON MONOXIDE DETECTION SYSTEM

Addressable COsensor control panel for carbon monoxide (CO) and di-oxide nitrogen (NO_2) diffusion sensors designed with EN 50545-1 and UNE 23300 certified.

It has the following models ZafirCO2 (Ref. ZCO2), ZafirCO3 (Ref. ZCO3) and ZafirCO4 (Ref. ZCO4). They correspond with 2, 3 or 4 zones and up to 25 CO and/or 25 NO_2 sensors by zone. These models have DVB version (Double Ventilation and Batteries).

The COsensor ZafirCO control panel allows setting the activation concentration for ventilation level 1, 2 and alarm, as well as the delays for the activation and delays for the stop of these levels/alarm.

It has independent dry contact outputs per zone for each level of ventilation and alarm, as well as general fault output and auxiliary supply 30 Vdc.

The control panel has a maintenance mode for easy testing the operation of sensors by watching the flashing LEDs of the sensors when they face to the test gas.

The control panel can identify all sensors at the installation by their programming number. The auto configuration feature of the control panel will automatically detect all sensors and display a summary in the display. Confirming this information, control panel goes directly into "work" mode.

The philosophy and operation mode of the equipment is designed according to European standard EN 50545-1, using diffusion sensors and factory calibration for operation during the operational life of the sensors, and UNE 23300 certified.

Features:

- Control panel up to 4 ventilation zones with diffusion sensors brand COsensor model SCO (CO sensor) and SDN (NO_2 sensor).
- Dry contact output (COM/NO) Ventilation 1, Ventilation 2 (DVB models only) and alarm.
- Fault dry contact output (COM/NO/NC).
- Auxiliary 30 Vdc 1A power output.
- Concentration measures averaged according to EN 50545-1 up to 60 minutes.
- Ventilation level 1, ventilation level 2 (models DVB) and alarm selectable from 5 to 300 ppm of CO and from 0,1 to 30 ppm of NO_2.
- Delay time for activation and delay time to stop of ventilation 1 and ventilation 2 (models DVB), selectables between 0 and 10 minutes.
- Delay time for activation and delay time to stop of the alarm selectable between 0 and 5 minutes.
- Maintenance mode to check operation of sensors.
- System with auto configuration functionality.
- Space for batteries 2 x 12 Vdc 7 Ah (DVB models only).
- Backlit LCD Display 4 lines and 40 characters.
- Dimensions: 418 x 324 x 150 mm.
- Designed according to European standard EN 50545-1.
- UNE 23300 Certified.

Power supply	230V AC 50 Hz / AC	*Maximum current per zone*	150 mA / 26 at 32 Vdc
Maximum comsumption	70 VA a 230 V / AC	*Ventilation dry contact*	230 Vac / 30 Vdc 1 A
Control panel power supply	2,5 A	*Alarm dry contact*	230 Vac / 30 Vdc 1 A
Batteries (only DVB model)	2 x 12 V 7 Ah SLA	*Fault dry contact*	230 Vac / 30 Vdc 1 A
Supply fuse	4 A	*Environmental conditions*	-10ºC +50ºC
Battery charger	500 mA 27 V/DC 20ºC	*Dimensions*	418x324x150 mm
Sensors per zone	25 CO and/or 25 NO_2	*Weight (without batteries)*	7 kg
IP	30	*Standar*	EN 50545-1 & UNE 23300
		Max. output current at 30 V	1 A

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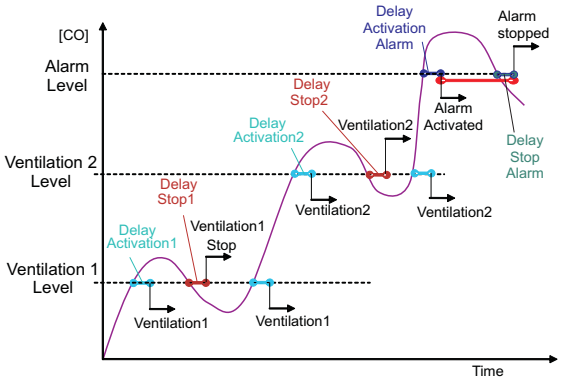
Wiring diagram

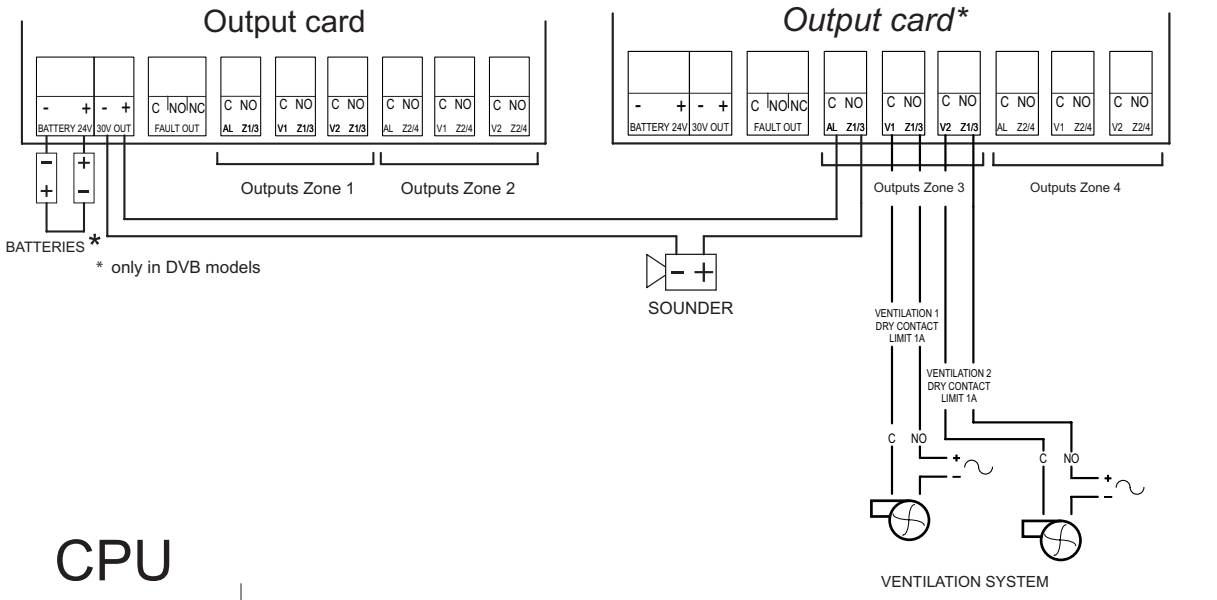


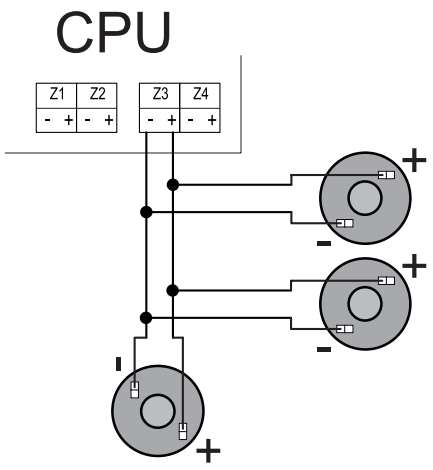
Parameter	*Value*	*Margin*
Ventilation 1 level	50 ppm (CO) 1 ppm (NO_2)	5-300 ppm (CO) 0,1-30 ppm (NO_2)
Vent. 1 activation delay	4 min	0-10 min
Vent. 1 stop delay	4 min	0-10 min
Vent. 2 level	100 ppm (CO) 3 ppm (NO_2)	Vent1-300 ppm (CO) Vent1-30 ppm
Vent. 2 activation delay	4 min	0-10 min
Vent. 2 stop delay	4 min	0-10 min
Alarm level	200 ppm (CO) 5 ppm (NO_2)	Vent1/vent2-300 ppm (CO) Vent1/vent2-30 ppm
Alarm activation delay	1 min	0-5 min
Alarm stop delay	1 min	0-5 min
Concentration average	0 min (instantaneous)	0-60 min

NOTE: Don't have in consideration ventilation 2 in models of only 1 ventialtion

Operation scheme of DVB control panels

* NOTE: Only in 3 and 4 zones control panels.





NOTE: Scheme applicable only to zone 3.
The other zones are connected in the same way.
Control panels with other capacities should not have some connectors.

Connection scheme for 4 zones DVB control panel

SCO Carbon monoxide sensor

CARBON MONOXIDE DETECTION SYSTEM

Carbon monoxide (CO) diffusion sensor for COsensor system designed according to the ***European standard EN 50545-1 and UNE 23300 certified***.

The sensor is designed to work with all models of COsensor control panels, both conventional (CCO and MiniCO models) and addressable (ZafirCO). In this way, when control panel start up , the sensor recognizes control panel and adapts its communication.

The sensor is based on electrochemical technology that allows adequately answer to CO concentration in the environment, and send this information to the control panel. Then, control panel active properly activate ventilation and alarms.

The sensor has a red LED red that flashes every 10 seconds in normal operation. Connected with conventional control panel, it makes double flash to indicate that it has reached a concentration of 50 ppm of CO, and fix light when the concentration reaches 200 ppm of CO. Connected with addressable control panel, it makes double flash when the concentration read by the sensor is equal or higher than the ventilation level programmed at control panel, and fixed light when concentration read by the sensor is equal or higher than the alarm level programmed at control panel.

CO sensors must be distributed at the installation in accordance with standards and/or regulation. A recommendable coverage for these devices are between 200 and 300 $m^{2,}$ and place in a height between 1,5 and 2 m from the floor.

In addressable control panels with maintenance mode active, it can be easily checked the operation of sensors by observing flashing of sensor led when faces to test gas.

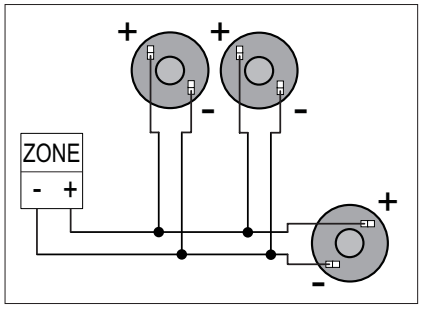
The philosophy and operation mode of the equipment is designed according to European standard EN 50545-1, using diffusion sensors and factory calibration for operation during the operational life of the sensors, and UNE 23300 certified.

Features:

- Compatible with conventional control panel CCO and MiniCO models and addressable control panel ZafirCO.
- The sensor base support installations with 16 mm diameter pipe.
- It has red LED which identifies the sensor communication and concentrations of ventilations and alarm.
- Connected with addressable control panels, it supports maintenance mode to check the status of the sensor when face to test gas.
- It contains programming number to allow identification of sensor at addressable control panel.
- Designed according to European standard EN 50545-1.
- UNE 23300 certified.

TECHNICAL FEATURES:

Supply	24 - 34V with polarity
Current in standby	2 mA
Current in alarm	4 mA
Activation indicator	Red led
Dimensions	Ø 115 mm / 60 mm
Humidity	20 - 95 % RH
Temperature	-10ºC +50ºC
Standards	UNE 23300 / EN 50545-1
IP	30
Life time	Up to 10 years



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CARBON MONOXIDE DETECTION SYSTEM

SDN Nitrogen dioxide detector

Dioxide Nitrogen (NO_2) diffusion sensor for COsensor system designed according to the ***European standard EN 50545-1 and UNE 23300 certified***.

The sensor is designed to work with all models of COsensor control panels, both conventional (CCO and MiniCO models) and addressable (ZafirCO). In this way, when control panel start up , the sensor recognizes control panel and adapts its communication.

The sensor is based on electrochemical technology that allows adequately answer to CO concentration in the environment, and send this information to the control panel. Then, control panel active properly activate ventilation and alarms.

The sensor has a red LED red that flashes every 10 seconds in normal operation. Connected with conventional control panel, the measures of NO_2 are transformed in a equivalent ppm CO concentration. In this way, it is allowed installation of CO and NO_2 sensors in the same detection zone line. Relation between NO_2 and CO is lineal indicating 100 ppm of CO with 2,5 ppm of NO_2. SDN sensor makes double led flash when reaches measures of equivalent 50 ppm CO concentration, and fix light led when reaches measures of equivalent 200 ppm CO concentration. Connected with addressable control panel, it makes double flash when the concentration read by the sensor is equal or higher than the ventilation level programmed at control panel, and fixed light when concentration read by the sensor is equal or higher than the alarm level programmed at control panel.

NO_2 sensors must be distributed at the installation in accordance with standards and/or regulation. A recommendable coverage for these devices are between 200 and 300 m^2 and place in a height between 1,5 and 2 m from the floor.

In addressable control panels with maintenance mode active, it can be easily checked the operation of sensors by observing flashing of sensor leds when faces to test gas.

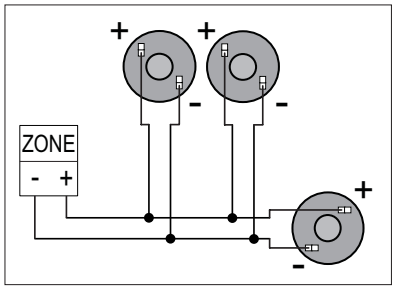
The philosophy and operation mode of the equipment is designed according to European standard EN 50545-1, using diffusion sensors and factory calibration for operation during the operational life of the sensors, and UNE 23300 certified.

Features:

- Compatible with conventional control panel CCO and MiniCO models and addressable control panel ZafirCO.
- The sensor base support installations with 16 mm diameter pipe.
- It has red LED which identifies the sensor communication and concentrations of ventilations and alarm.
- Connected with addressable control panels, it supports maintenance mode to check the status of the sensor when face to test gas.
- It contains programming number to allow identification of sensor at addressable control panel.
- Designed according to European standard EN 50545-1.
- UNE 23300 certified.

TECHNICAL FEATURES:

Supply	24 - 34V with polarity
Current in standby	2 mA
Current in alarm	4 mA
Activation indicator	Red led
Dimensions	Ø 115 mm / 60 mm
Humidity	20 - 95 % RH
Temperature	-10ºC +50ºC
Standards	UNE 23300 / EN 50545-1
IP	30
Life time	Until 4 years



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Sounders for CO / NO_2 system

CARBON MONOXIDE DETECTION SYSTEM

When the CO / NO_2 concentration accumulated in the compound is sufficiently high as to be dangerous to people, COsensor detection control panels activate alarm output.
The function of these sounders is warning its occupants so they leave it and will not come until the alarm stops.
Different models are shown below:

Sign to be directly connected to the output of the control panels or relay modules. With indication adhesive.

LLHCO LIGHT SIGN

Operating voltage	12-30 Vdc
Consumption	80mA at 30Vdc
Power	80dB at 1m
IP protection	IP40
Standard	EN 60598, EN 60598-2-1, EN 61547, EN 55015
Temperature	0 at 40°C
Humidity	95% RH
Size	262x100x51 mm
Weight	340gr
Jumper	Fixed / flashing lighting Active / no active buzzer

Label for light sign

SIR24B

SIR24BL

SIR24F

SIR24P

SIR24B, SIR24BL and SIR24BZA SOUNDERS

- Output and indoor sounder made of red ABS plastic.
- High volume sound. Low consumption.
- 32 tones. Volume control.
- Automatic synchronization.
- SIR24B: Sounder.
- SIR24BL: Sounder with light.
- SIR24BZA: Sounder with high base.

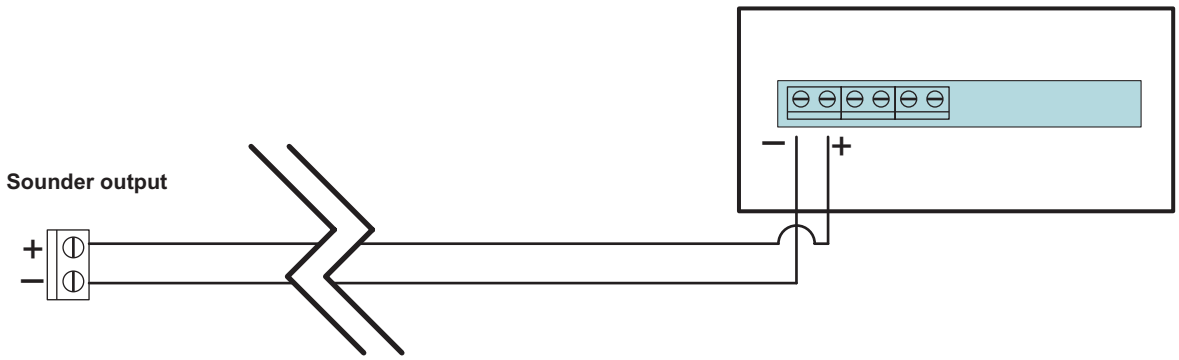
Voltage range	9-28 Vdc
Consumption (using tone 3)	at 24Vdc 16mA (SIR24B)/20mA (SIR24BL)
Consumption (tone 3/0,5Hz/high power)	at 24Vdc 32mA (SIR24B+BSLC)
Output volume (tone 3)	at 24 Vdc 102 dB (A)
Operating temperature	-25ºC at +70ºC
Size	Ø95 x 91 mm Ø95 x 107 mm (SIR24BL/SIR24BZA)
IP protection	IP54-SIR24B IP65-SIR24BL IP65-SIR24BZA

SIR24P and SIR24F SOUNDERS

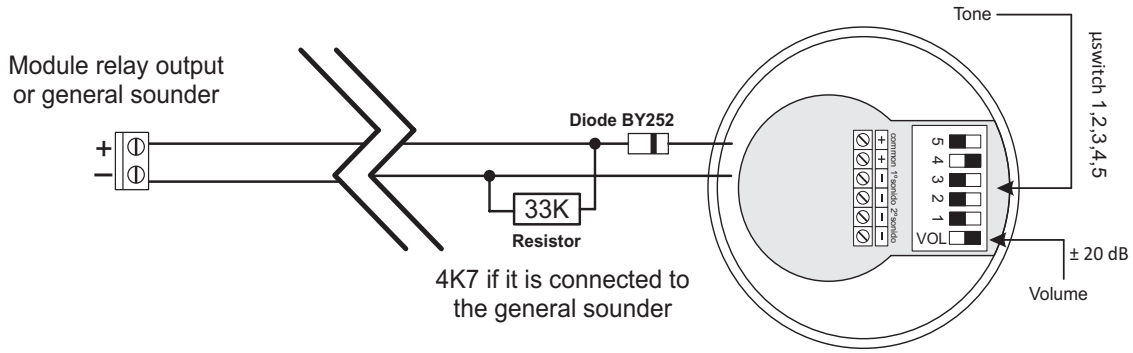
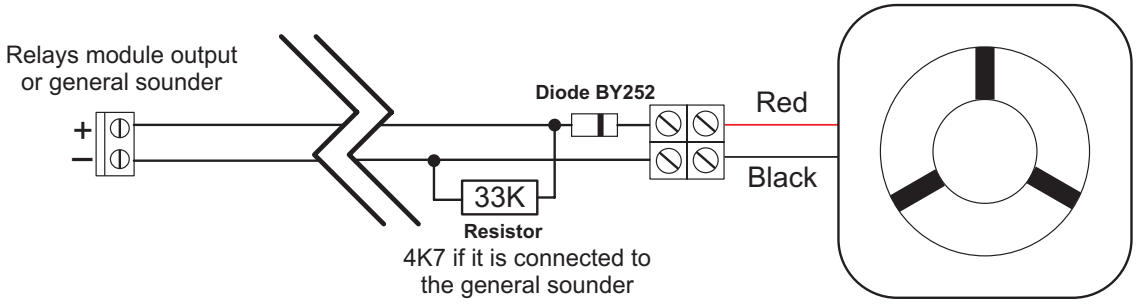
Material	Red P.V.C.
Operating voltage	30 Vdc
Consumption at 30 Vdc	70 mA
Power	85 dB
Operating temperature	5ºC to 40ºC
Size	80 x 80 x 30 mm
With intermittent flash	Only SIR24F model

Wiring diagram

LLHCO LIGHT SIGN



SIR24B, SIR24BL AND SIR24BZA SOUNDERS



SIR24P AND SIR24F SOUNDERS