

**TOC-10 © FLAMMABLE
GAS DETECTOR
ADDITIONAL INFORMATION
FOR
DISTRIBUTORS
AND ENGINEERS**

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Who should read this manual.

This manual is intended for use by trained installers of gas detection systems who are technically competent and have all necessary tools to undertake installation and maintenance on this type of equipment.

Failure to install and maintain the equipment properly can render the detector ineffective.

You should not undertake any of the procedures in this manual if you do not have access to the correct equipment, have not undertaken training on this or similar equipment or are not technically qualified to install this equipment.

Calibration gases and test equipment is available from Oliver IGD using the following order codes.

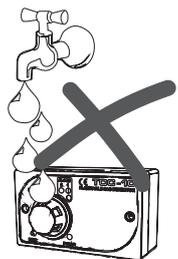
Part Number	Description
GASKITLPG	Calibration gas kit comprising bottled zero and cal gas with regulator, hoses, calibration adaptor and carry case. Note this kit is for undertaking Methane calibrations.
GASKITCH4	Calibration gas kit comprising bottled zero and cal gas with regulator, hoses, calibration adaptor and carry case. Note this kit is for undertaking LPG calibrations.
G-AIR	Replacement Instrument Air Cylinder
G-LPG	Replacement LPG Cylinder
G-CH4	Replacement Methane Cylinder
REGKIT	Replacement Regulator hose and cal adaptor.

Specification.

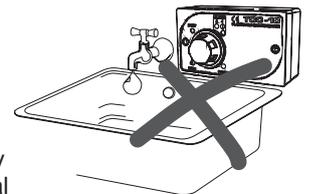
Power Supply: (check SN label)	230V AC +/-10% 50/60Hz 110V AC +/-10% 50/60Hz (Option) 12V DC (Option)
Environmental:	-10 to +55 Degrees Centigrade 0-95%RH Non-condensing Enclosure IP52
Response Time:	<30 Seconds
Nominal Alarm Levels:	Alarm 1 10% LEL Alarm Level 1 Relay Active SPCO 5A @ 230V AC Non inductive Alarm 2 25% LEL Alarm Level 2 Relay Active SPCO 5A @ 230V AC Non inductive
Expected Life:	>2 Years
Target Gas:	Check Labelling as: LPG-I (Integral sensor) LPG-R (Remote sensor) Methane CH4-I (Integral sensor) CH4-R (Remote sensor)
Service:	This equipment must only be serviced by competent persons and checked periodically using traceable calibration gases. Do not test using lighter fuel or similar fuel gases as this can give misleading results. In extreme cases this can result in sensor damage.
Standards Applied:	EN50194-1:2009 EN50270 EN60335-1:2000

Location Guidance

When choosing a location for the detector observe the following:



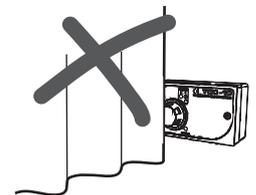
Do not mount where liquid may regularly come into contact with the detector.



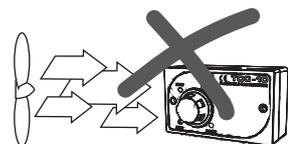
Do not mount in close proximity to sinks or similar, observe local wiring regulations in this respect.



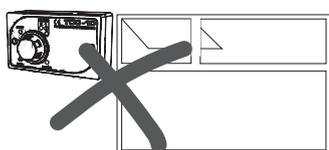
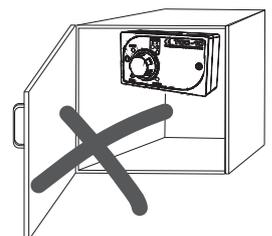
Do not mount where vapour is continuously present for periods of time.



Do not obscure the front of the detector with curtains or other covers, or mount the detector into small cupboards or similar as this will severely limit the detectors detection ability.



Do not mount in direct draughts



Mount away from windows and doors where external draughts may influence results.

The following guidance notes are based on extracts from British Standard EN50244:2000. Reference should be made in full to this standard.

There are three main hazards arising from combustible gases: explosion, poisoning and annoxia (insufficient oxygen). The TOC-10 © is intended to deal only with the explosion hazard of combustible gases.

Usually, distributed gas has an odour to ensure that the general public may recognize any leakages by a characteristic smell. Most people may detect this odour at quite low gas concentration levels (2 % LEL, or less) but some medical infirmities and increasing age may result in a reduction in the sense of smell. A gradually increasing gas concentration may also go unnoticed due to olfactory fatigue.

The conditions under which combustion occurs are variable and depend on gas composition.

When the concentration level of gas is between the LEL (Lower Explosive Limit) and UEL (Upper Explosive Limit) and there is a source of ignition, the gas mixture will burn or explode.

For natural gas, the LEL is about 4 % V/V to 5 % V/V of gas in air (UEL is about 15 % V/V of gas in air).

For LPG, the LEL is about 1 % V/V to 2 % V/V of gas in air (UEL is about 10 % V/V of gas in air).

Each TOC-10 © model is calibrated for its target gas hence it is essential that a TOC-10 ©, calibrated for one target gas, is not used to detect another.

Combustible gases used in domestic premises generally fall into two categories, lighter than air (typically Methane) and heavier than air (typically LPG).

To select a position for a gas detector, the source and nature of the possible gas release should be considered.

Source of the gas escape

The most likely origin for an escape in domestic premises are the appliances and the connections between appliances and the fixed installation in the buildings.

Appliances are the more common origin of escapes because they may be moved and suffer damage. Another cause of gas release, especially if cookers or boilers without flame failure control are in use, is the extinction of the flame, or its non-ignition, whether by spilling of liquid, or draughts. In the case of portable gas bottles, in the process of disconnection before connecting to a new bottle. The fixed distribution system inside the building, assuming that it has been correctly installed, and tested, is usually gas-tight as long as the building integrity is maintained or the pipes are not damaged by works, shocks, etc. Except when earth movement may damage the building an escape on these installations is very unlikely.

It is possible that gas may penetrate inside a building by migrating along pipes or cables from an escape in the mains. In this case, gas may be released in any ground-floor or underground room in the building depending on the escape position and the underground structure, etc. There is a possibility that the gas detector will be located in another room where there is no significant gas concentration and therefore will not detect the gas.

In the majority of the cases, gas will be released at low pressure, even if the flow is high hence the effect of pressure on its dispersion behaviour will be unimportant.

Examples of behaviour of gas releases

Room having poor or no ventilation

The typical case is the one of a single room, with its doors and windows closed and without any ventilation. In this case, gas will tend to fill all the volume above the level of the escape. In the case of Methane the gas concentration below the level of the escape will be much lower than the concentration above the escape (the opposite would be true for LPG). The speed at which the gas concentration increases depends upon the gas flow rate and the volume of the room. Eventually if there is no ventilation, the gas concentration may reach a very high value. However it may be considered that above the level of the escape the gas concentration is rather uniform wherever it is measured. Such poorly ventilated areas will contravene the requirements of EN 1775 regarding new installations and extensions to existing installations.

Ventilated Room

This case describes a room with ventilation or with its doors or windows open or slightly open. The airflow, which brings clean air into the room, will limit the maximum concentration of the gas to a value depending upon the gas to airflow ratio. The size of the room will only have an influence on the time needed to reach this maximum concentration, i.e. the smaller the room, the shorter is this time. The same distribution of concentration with height as described in the previous example will be observed. An upward airflow will tend to accentuate the concentration difference between the ground and the ceiling; conversely, a downward airflow will tend to make the concentration more uniform along the height of the room. The same effect may be observed with a heat source such as a radiator which will create an upward draught due to the heat generated and a downward draught along the walls thereby mixing the air.

Multiple rooms

This is the general case of an apartment with several rooms with opened communicating doors on the same floor or different floors. This situation is much more complicated and only general observations may be formulated. The gas concentration will be higher in the room where the escape occurs and will decrease in the other rooms further away from the origin of the escape. For Methane then in all the rooms, the gas concentration distribution with height will be uniform or slightly higher near the ceiling.

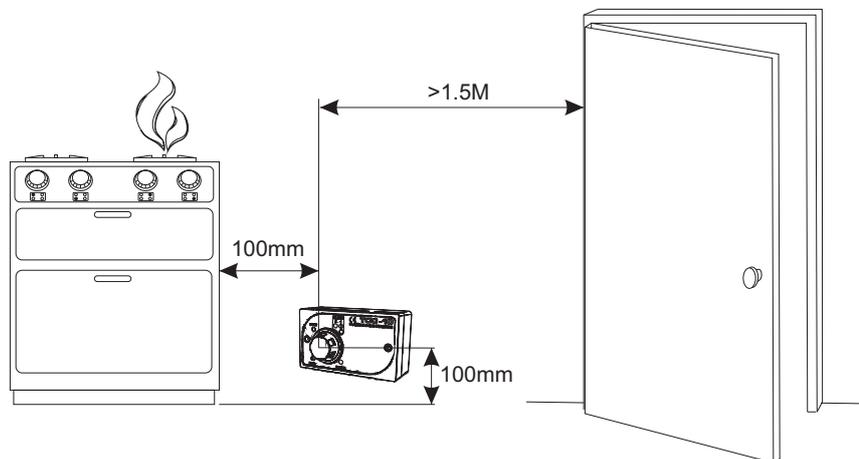
However, where the room in which the escape occurs is connected, for example, by a staircase to a lower room or basement, LPG will tend towards the lowest level and could eventually accumulate to become the maximum concentration.

Positioning of the gas detector

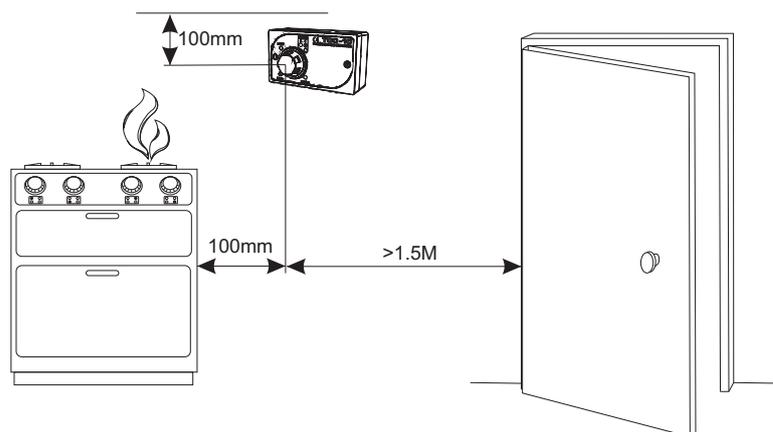
The gas detector should be installed in the room where the most frequently used appliance is accommodated and where an escape is most likely to occur. In most domestic premises, this room may be the kitchen because of the presence of a gas cooker and possibly other gas appliances.

Escapes in boiler rooms are more unlikely because boilers are themselves fixed appliances. Gas releases from connections to storage containers are likely to occur for brief periods when containers are changed.

For LPG the gas detector should be mounted as low as possible (typically 0,1 m above the floor)



For Methane the gas detector should be mounted as high as possible (typically 0,1 m from the ceiling)



In all cases:

Locate in a place where air movements are not impeded by furniture.

Have free access to the TOC-10© to clear alarms.

The location should not be vulnerable to impact or splashing during normal routine operations such as cleaning in the area.

The detector should not be installed:

- in an enclosed space (e.g. in a cupboard or behind a curtain) Note in some circumstances gas meters are placed in small rooms or cupboards which may be acceptable;
- directly below a sink;
- next to a door or window;
- next to an extractor fan;
- in an area where the temperature may drop below -10 °C or exceed +40 °C;
- where dirt and dust may block the sensor;
- in damp or humid location.

General Information

The TOC-10 © is pre-calibrated for its indicated target gas, usually LPG or Methane. The TOC-10 © will respond to any flammable gas to a greater or lesser degree. The following list indicates typical materials that may be commonly present which the unit may respond to in operation:

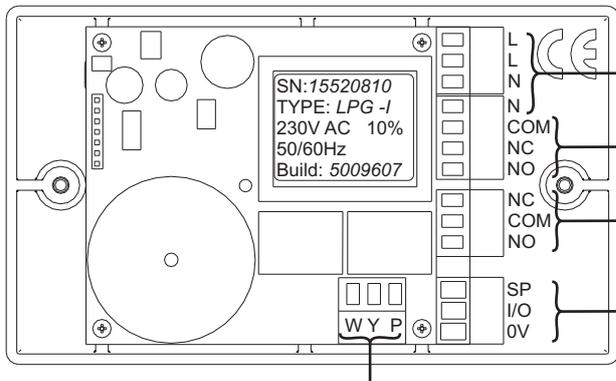
Aerosol Propellants (Butane)
 Paint Solvents (VOC's)
 Hot Cooking Oils
 Nail Varnish
 Solvent Based Adhesives (VOC's)

Some commonly occurring substances may cause long term detector damage, typically:

Silicones (furniture polishes)
 Hair sprays (Silicones, VOC's etc)
 Chlorinated Cleaning Agents

Installation requirements

Terminal Functions



Remote sensor terminals if applicable see SN label

Power Supply With Auxiliary Output Terminals

Alarm Level 1 Relay Terminals Active at Nominally 10% LEL

Alarm Level 2 Relay Terminals Active at Nominally 25% LEL

Data interconnect between Toc-10 units for linked operation

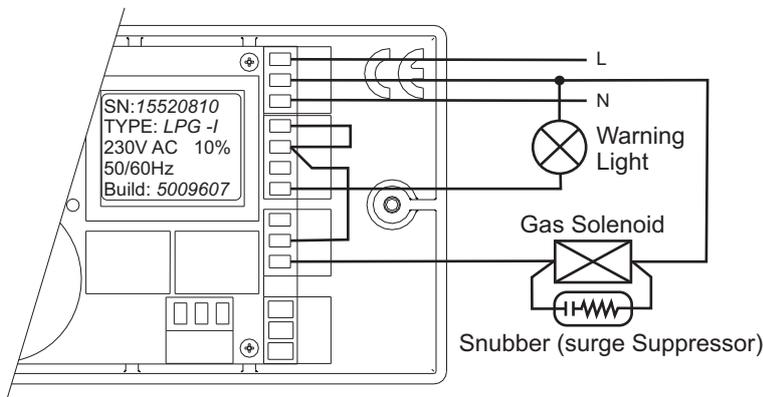
! Warning !

Installation of this device to the mains power supply should only be made by a competent person. The unit is supplied pre-calibrated but should be checked regularly, at least monthly using the test feature. Clean only with a damp cloth do not use any cleaning products



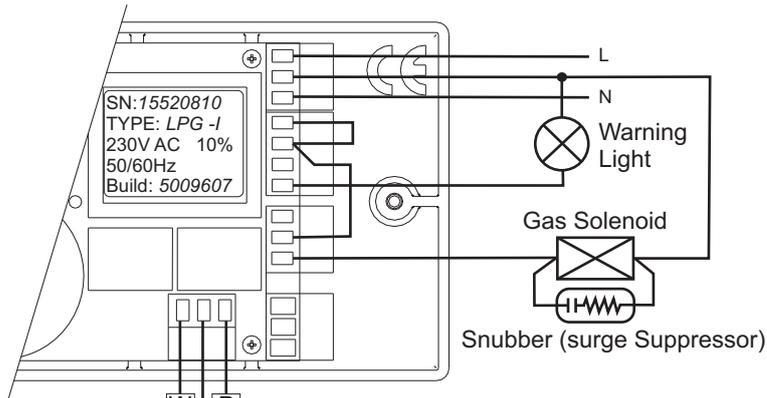
Do not tamper with this equipment to do so may risk electric shock or incorrect operation

Typical Stand Alone Operation (Onboard Sensor)

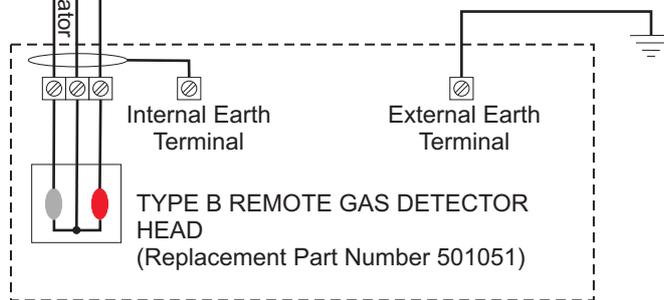


Example shows a Toc-10 © Wired to a gas supply solenoid valve and warning light. The warning light is active in this example when the first alarm level is reached (10%) and the gas solenoid is de-activated when the second alarm level is reached (25%). Note in this example a surge suppressor is fitted to the gas solenoid to extend the life of the relay. For DC solenoids a diode could be fitted. Any such installation must comply with the national regulations in force in the country EN1775 refers

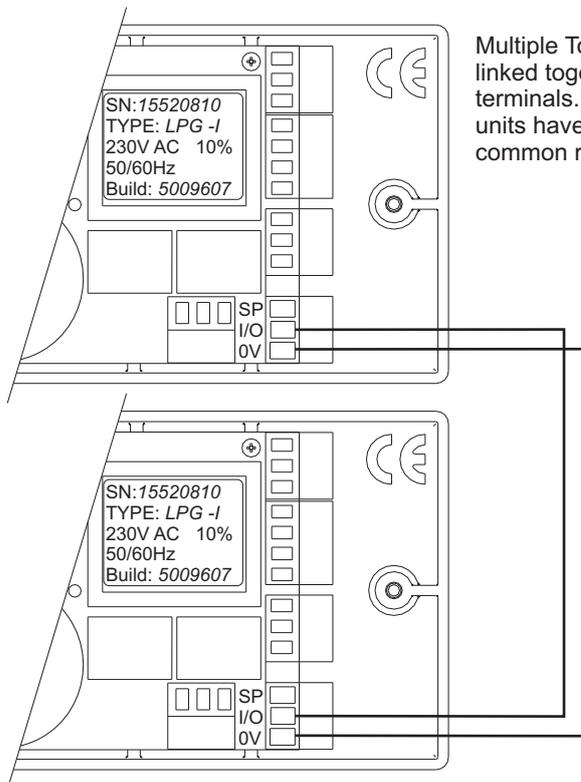
Typical Stand Alone Operation (Remote Sensor)



When installing use 1.5mmSQ screened cable. Ensure the cable screen is earthed to the junction box internal earth terminal and that the junction box is earthed externally via its external earth terminal.



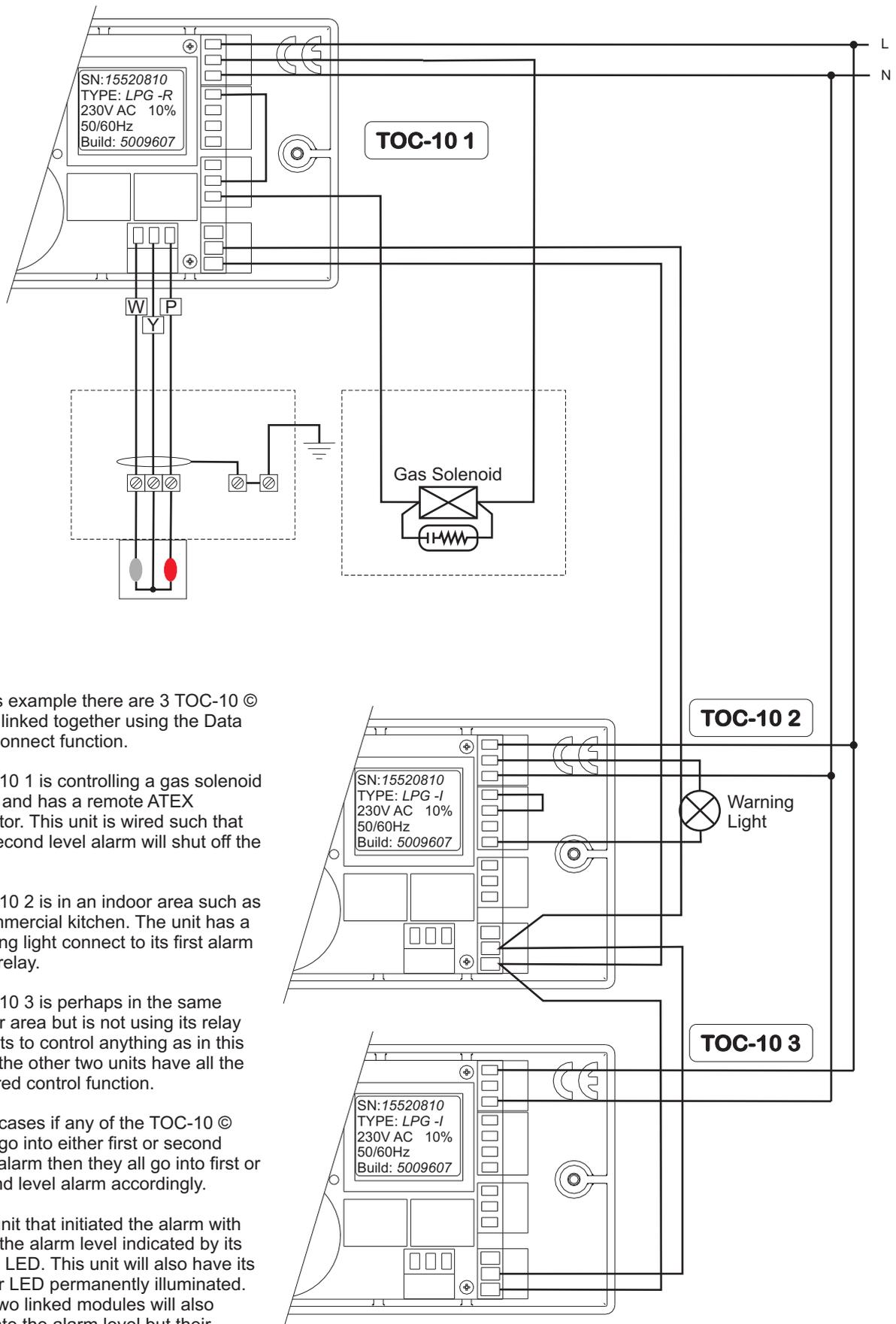
Linked Operation



Multiple Toc-10 © units can be linked together using the I/O and 0V terminals. When linked the Toc-10 © units have common alarm and common reset function.

Use minimum 0.75mmSQ Cable

Linked Operation, Multiple Units



In this example there are 3 TOC-10 © Units linked together using the Data Interconnect function.

TOC-10 1 is controlling a gas solenoid valve and has a remote ATEX detector. This unit is wired such that the second level alarm will shut off the relay.

TOC-10 2 is in an indoor area such as a commercial kitchen. The unit has a warning light connect to its first alarm level relay.

TOC-10 3 is perhaps in the same indoor area but is not using its relay outputs to control anything as in this case the other two units have all the required control function.

In all cases if any of the TOC-10 © units go into either first or second level alarm then they all go into first or second level alarm accordingly.

The unit that initiated the alarm will have the alarm level indicated by its alarm LED. This unit will also have its power LED permanently illuminated. The two linked modules will also indicate the alarm level but their power LEDs will be flashing to show that they did NOT initiate the alarm. The module that initiated the alarm must be reset first.

Alarm Indications

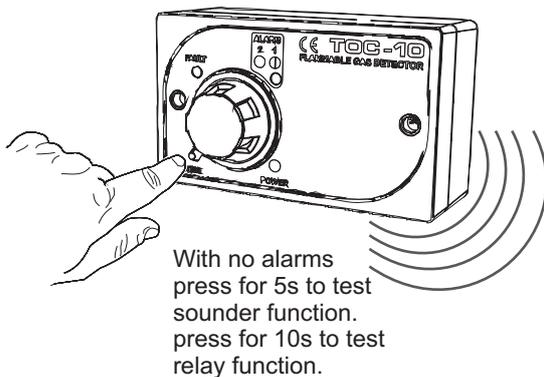
NOTE: A flashing power LED plus an alarm LED indicates the alarm has been set from another unit linked to the module. Reset the TOC 10 that initiated the alarm first before resetting the linked units.

	Alarm Level 1 relay	Alarm Level 2 relay	Sounder	Power LED	Fault LED	Alarm LED
FOLLOW EMERGENCY ACTIONS	Alarm 1 ~10% LEL	✓	✓	☀️ ☀️		☀️
	Alarm 2 ~25% LEL	✓	✓	☀️ ☀️		☀️
	Normal			☀️		
	Fault			☀️	☀️	
				No Power LED		

CALL FOR SERVICE

Note that the power LED will flash during warm up for 1 minute.

Test Function



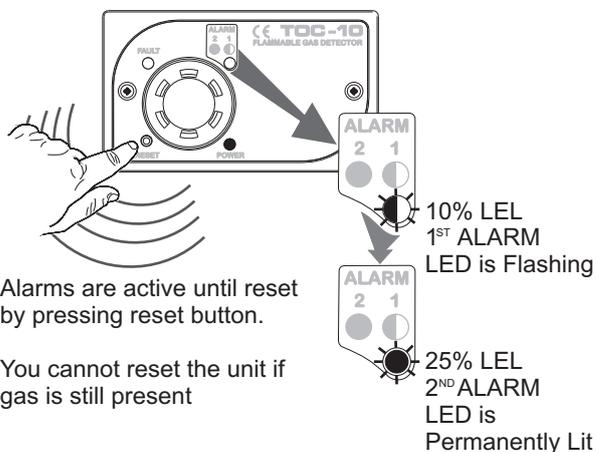
Emergency actions

It is important the operator of the TOC-10 © understands what action to take in response to an alarm.

If the TOC-10 © initiates an alarm signal or there is a smell of gas, keep calm and carry out the following actions, not necessarily in this order.

- Extinguish all naked flames, including all smoking material.
- Turn off all gas appliances.
- Do not switch on or off any electrical equipment; including gas detection apparatus.
- Turn off the gas supply at the gas main control and/or, with a LPG supply, the storage tank.
- Open doors and windows to increase ventilation.
- Do not use a telephone in the building where the presence of gas is suspected.

OPERATION



If the alarm continues to operate, even after an alarm resetting action, where appropriate, and the cause of the leak is not apparent and/or cannot be corrected, vacate the premises and IMMEDIATELY NOTIFY the gas supplier and/or the gas emergency 24 hour service in order that the installation may be tested and made safe and any necessary repair carried out.

If the alarm can be reset and the reason for the alarm having operated is identified, (for example a gas tap switched on with the burner unlit), after stopping the gas release and ensuring all appliances are turned off, the main gas supply may be reinstated.

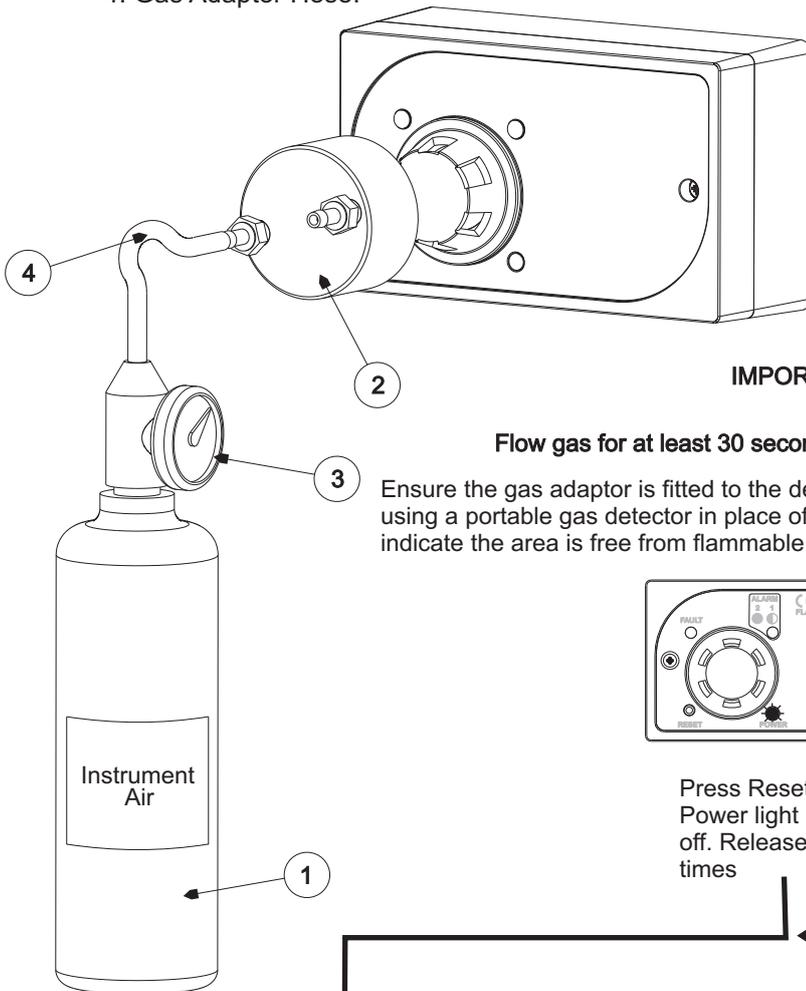
Zero Function

The TOC-10 © uses an innovative Automatic Zero Drift Compensation system which continuously checks and compensates for any drift in the detectors zero point. This provides for long term stability and freedom from spurious alarms.

In the event that the installation or service technician wants to reset the zero point, for instance as part of a maintenance schedule, then the following procedure can be followed.

Required Equipment to undertake reset of the zero point.

1. Zero Grade Instrument Air Bottle (or alternatively a portable flammable gas detector)
2. If using zero grade instrument air a calibration gas adaptor
3. Gas Bottle Regulator
4. Gas Adaptor Hose.

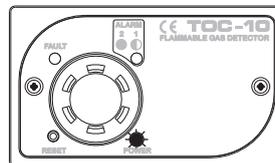


Note that if using an Oliver IGD supplied calibration kit, the pressure gauge will indicate the remaining contents of the gas bottle. Ensure there is sufficient gas in the cylinder and that the cylinder expiry date is valid before proceeding. The regulator is a fixed flow device and will deliver 0.5 to 0.8 L/Min once the tap is opened. Do not store the bottle with the regulator attached

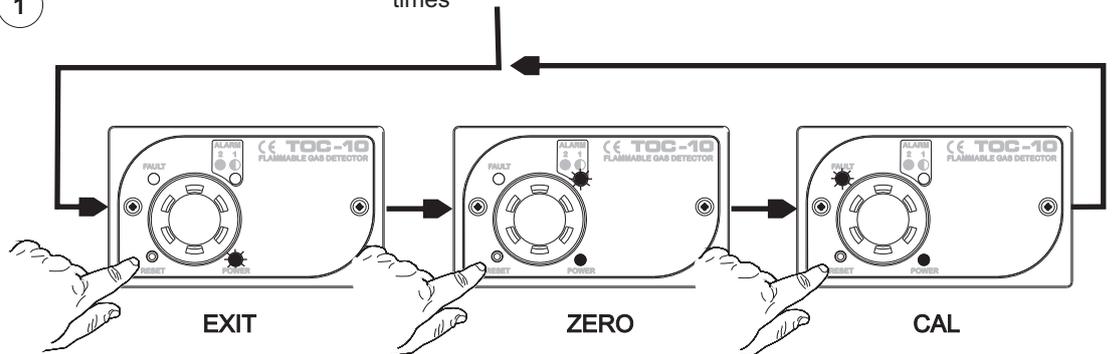
IMPORTANT

Flow gas for at least 30 seconds before starting this sequence.

Ensure the gas adaptor is fitted to the detector and that instrument air is flowing. If you are using a portable gas detector in place of instrument air, ensure that it is reading zero to indicate the area is free from flammable gas before proceeding



Press Reset Button Until Power light blinks on and off. Release and repeat 3 times



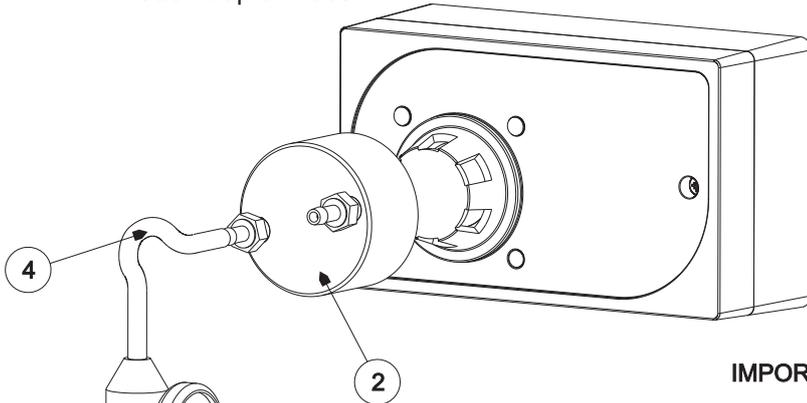
With the LED ON for the desired option press the reset button to either EXIT ZERO or CALIBRATE the detector. Note that the selected option is executed immediately so if you want to zero or calibrate the gas must be flowing before you enter this sequence.

Calibration Function

In the event that the installation or service technician wants to reset the zero point, for instance as part of a maintenance schedule, then the following procedure can be followed.

Required Equipment to undertake calibration of the detector

1. Calibration gas with an equivalent LEL of 20%
2. Calibration gas adaptor
3. Gas Bottle Regulator
4. Gas Adaptor Hose.

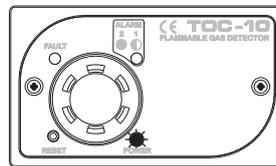


Note that if using an Oliver IGD supplied calibration kit, the pressure gauge will indicate the remaining contents of the gas bottle. Ensure there is sufficient gas in the cylinder and that the cylinder expiry date is valid before proceeding. The regulator is a fixed flow device and will deliver 0.5 to 0.8 L/Min once the tap is opened. Do not store the bottle with the regulator attached

IMPORTANT

Flow gas for at least 30 seconds before starting this sequence.

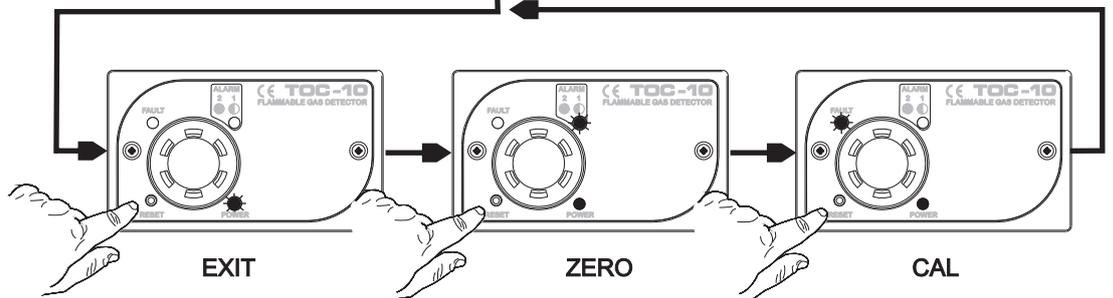
Ensure the gas adaptor is fitted to the detector and that calibration gas is flowing.



Press Reset Button Until Power light blinks on and off. Release and repeat 3 times

Note that for each flammable gas the 20% LEL concentration expressed as a percentage volume fraction will be different. For example.

- 20% LEL Propane = 0.4% Vol
- 20% LEL Methane = 1% Vol
- 20% LEL Hexane = 0.24% Vol



With the LED ON for the desired option press the reset button to either EXIT ZERO or CALIBRATE the detector. Note that the selected option is executed immediately so if you want to zero or calibrate the gas must be flowing before you enter this sequence.

System Part Numbers

Part Number	Description
T10LPG	TOC-10 © Calibrated for LPG, Integrated sensor
T10CH4	TOC-10 © Calibrated for Methane, Integrated sensor
T10LPGATEX	TOC-10 © Calibrated for LPG, external ATEX sensor and junction box
T10CH4ATEX	TOC-10 © Calibrated for Methane, external ATEX sensor and junction box
T10B	Replacement Type B ATEX gas sensor
T10BOX	Replacement TOC-10 © Back Box
T10CA	Back Box 20mm Conduit Adaptor
T10TA	Back Box Mini Trunking Adaptor

Part Number	Description
GASKITLPG	Calibration gas kit comprising bottled zero and cal gas with regulator, hoses, calibration adaptor and carry case. Note this kit is for undertaking Methane calibrations.
GASKITCH4	Calibration gas kit comprising bottled zero and cal gas with regulator, hoses, calibration adaptor and carry case. Note this kit is for undertaking LPG calibrations.
G-AIR	Replacement Instrument Air Cylinder
G-LPG	Replacement LPG Cylinder
G-CH4	Replacement Methane Cylinder
REGKIT	Replacement Regulator hose and cal adaptor.