



BX116 Gas Detector



- Microprocessor control
- Wall mounted
- 16 zone protection (across 2 zones)
- 4 - 20mA signal input
- Measuring range 0 - 20% LEL / 0 - 300ppm
- IP55 protective rating
- EN50194 for explosive gases
- EN50291 for toxic gases
- 3 year guarantee

Application

Duomo is recognised within the gas industry for providing a comprehensive range of low cost, high reliability gas detection for many applications. We have installed and commissioned natural gas and carbon monoxide sensors in applications such as boiler rooms, kitchens, car parks, aircraft hangers, factories and shopping centres. The BX116 is the command centre for the complete range of Duomo gas sensors. All Duomo products are manufactured to meet relevant European Normatives and proposals for explosive and toxic gases.

Operation

When the remote sensor detects the presence of the target gas a 4 - 20mA signal is sent to the detector, proportional to the level of gas. The BX116 then operates a pre-alarm relay - used for remote sirens or visual indicators. If the level of gas continues to rise then the second pre-alarm is actuated. In the case of explosive gases, when the level of gas reaches 20% LEL, the main alarm relay is activated to break the electrical supply to the gas safety shut-off valve (SSOV). The BX116 also has a separate volt-free sensor fault relay that actuates if the correct return signal is not sensed by the detector. The BX116 can detect both explosive and toxic gases.

Features

The BX116 is a wall mounted microprocessor based gas detector control unit. It can be configured to meet customer requirements. The following parameters can be changed using on board DIP switches:

- Number of sensors from 1 to 16
- Type of gas to be sensed (explosive or toxic)
- Main alarm delay period (3 or 20 seconds)
- Main alarm relay action (latching or auto-reset)

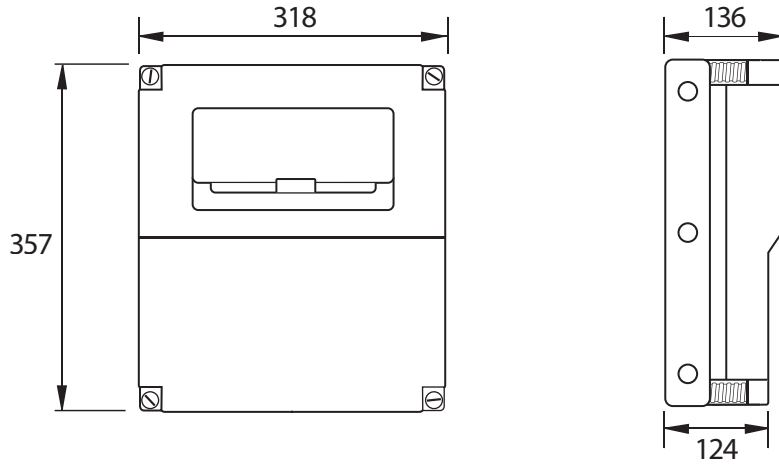
The BX116 has two plug in terminal blocks. One is for the incoming mains supply and alarm circuit wiring and the second is for connecting the sensor wiring. This reduces the chance of incorrect site wiring. The front panel has two banks of eight lights indicating, in rotation, which probe is currently monitoring and a bright display showing the LEL or PPM gas concentration measured.



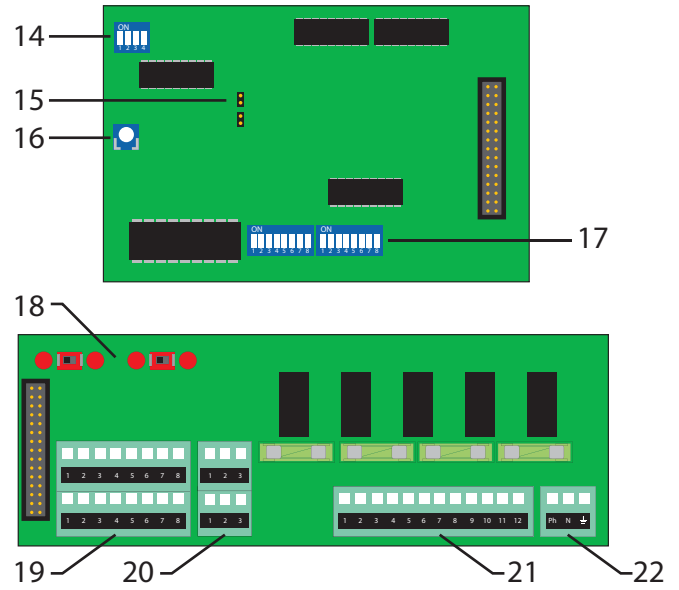
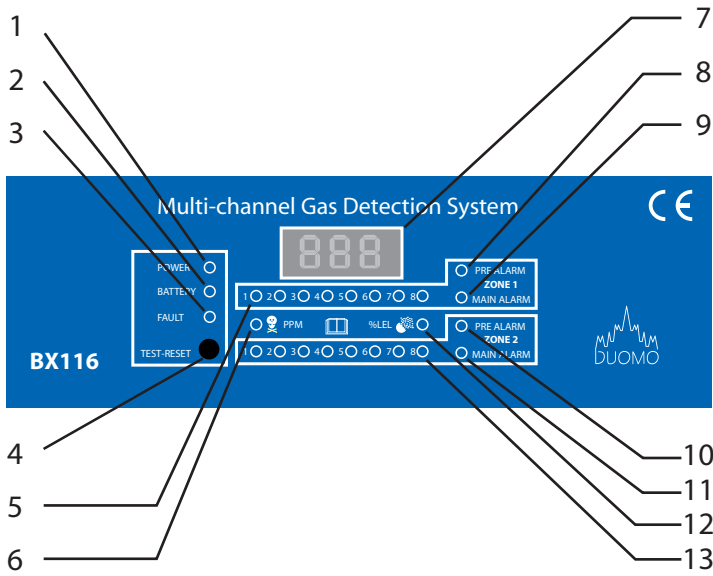
CAUTION!

Carefully read the following instructions prior to installation of this device. Always keep this pamphlet for future reference. Ensure that the gas detection system is wired correctly and is only used for the purpose for which it is intended.

Overall Dimensions



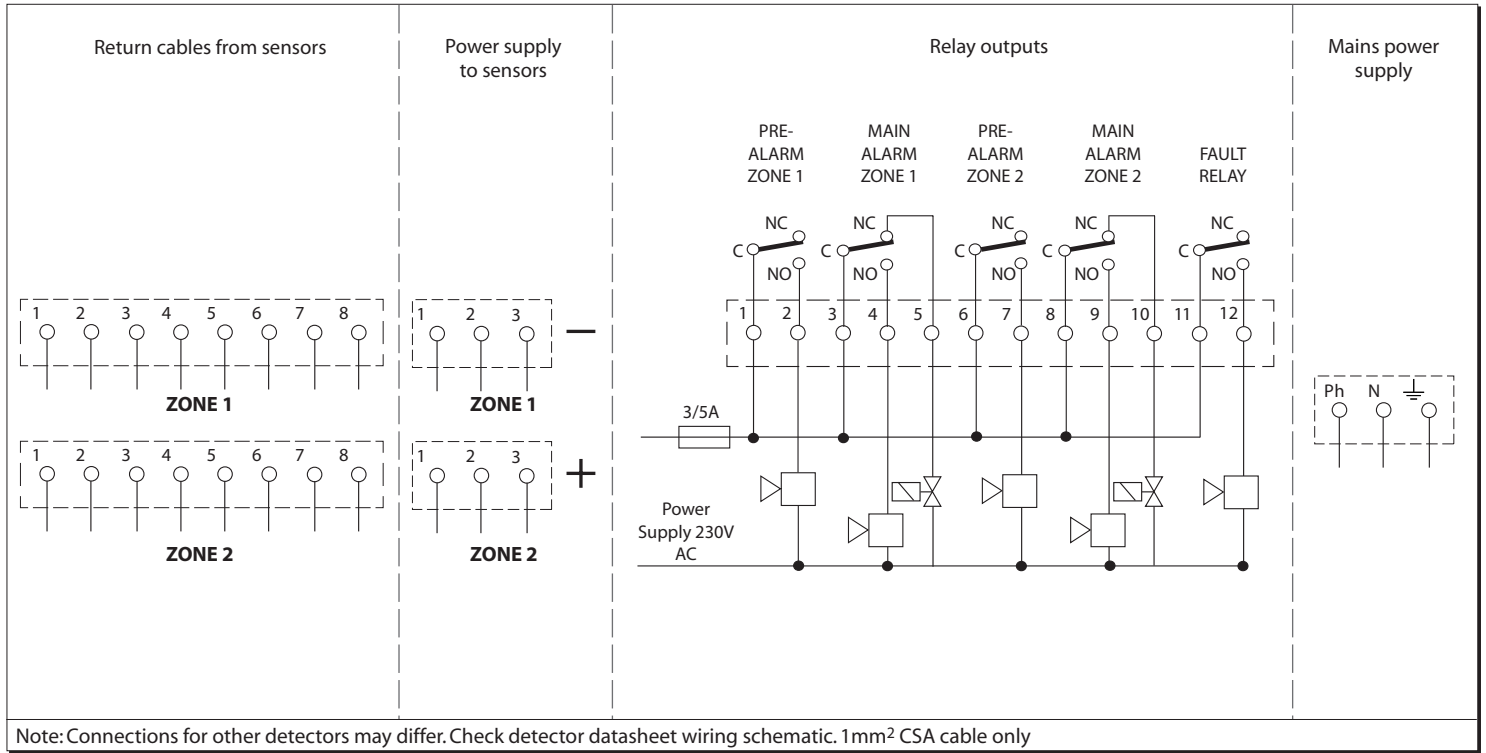
GS300M Fascia & PCB Layout



Key

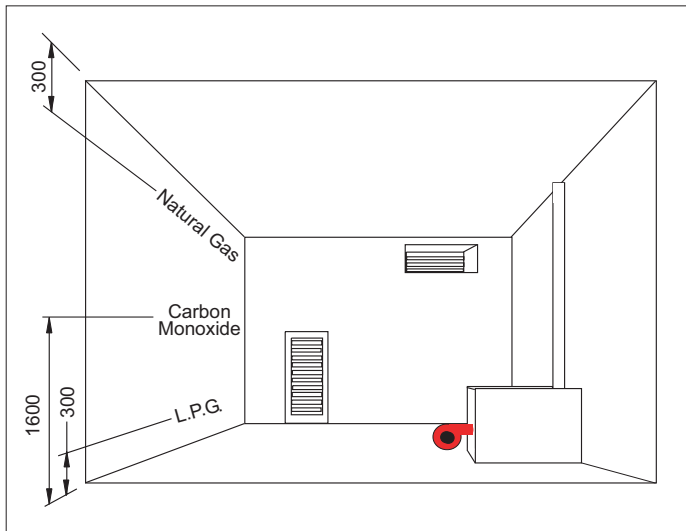
1. **Power On** - Lights when supply voltage is applied. This light flashes during self diagnostics start up.
2. **Battery** - Lights when the BX116 is powered by the standby battery. When flashing the standby battery has low charge.
3. **Fault** - Indicates a short circuit, sensor fault, loss of signal or incorrect connection of the sensor.
4. **Test/Reset** - When pressed checks the sequence and function of the BX116 / Press this to reset the detector after an alarm or sensor fault condition
5. **Zone 1 Indication** - These LED's represent the Zone 1 sensors and flash when a sensor is connected.
6. **PPM LED** - This lights when the jumper switch for display data is set to read in parts per million (PPM).
7. **Display** - Shows the current reading of gas concentration for the current sensor displayed.
8. **Pre-Alarm (Zone 1)** - 13/15/18% LEL (user selected) concentration of gas detected in Zone 1. Pre-alarm relay actuated.
9. **Main Alarm (Zone 1)** - 20% LEL concentration of gas detected in Zone 1. Main alarm relay actuated.
10. **Pre-Alarm (Zone 2)** - 13/15/18% LEL (user selected) concentration of gas detected in Zone 2. Pre-alarm relay actuated.
11. **Main Alarm (Zone 2)** - 20% LEL concentration of gas detected in Zone 2. Main alarm relay actuated.
12. **% LEL LED** - This lights when the jumper switch for display data is set to read in lower explosive limit (LEL).
13. **Zone 2 Indication** - These LED's represent the Zone 2 sensors and flash when a sensor is connected.
14. **No. of Sensors Switches** - DIP switches allowing you to select how many sensors can be attached to the BX116.
15. **Display Data Jumper** - Allows you to select (via a jumper) whether the display reads in PPM or LEL.
16. **Alarm Threshold Selector** - Allows you to change the threshold at which the unit goes into alarm.
17. **Sensor Selector Switches** - Determines which sensors are currently working. **MUST BE OFF TO ACTIVATE SENSOR.**
18. **Memory Switches** - Determines whether or not the unit automatically resets after the gas concentration levels drop.
19. **Sensor Connection Plug** - Connection for the incoming return cable from the sensor.
20. **Sensor Power Supply** - Connections to power the sensors.
21. **Relays** - Connections for the relay outputs and fault relay.
22. **Power Supply** - Incoming power supply.

Typical Wiring Schematic for BX116



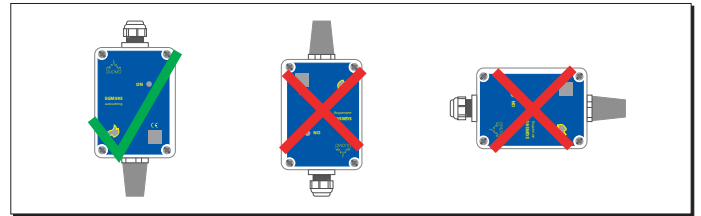
Electrical Installation

The BX116 is a safety device designed to give audible alarms and automatically provide latched electrical isolation of associated gas safety shut off valves in the event of a gas leak or build up of toxic gases. The sensor can be located up to 100m from the gas detector. Cable size should be 1mm² CSA. If the sensor cables are run separately in specific conduit it is not essential to use screened cable but if the cables are routed through conduit or trunking containing other wiring the use of screened cable is advisable. The wiring should be performed by a qualified person in accordance with current regulations. The plug-in terminal rail makes installation easy and quick. Do not mount close to any heat source or in an area where moisture is likely to effect operation. The IP rating of this unit is IP44. Sensors should be positioned as shown below. If you require any guidance on this please call our technical help on 01905 797989.



Installing A Sensor

The sensors must be mounted as shown below with the sintered head pointing vertically down. When replacing sensors never separate a sensing head from its PCB. The sensor will have been calibrated using this particular board and therefore will not function correctly with any other.



Important Notes

Always check the wiring before powering up the system.

Do not test this sensor with anything other than Duomo test gas (see '**BX116 Operation**' section for further information). Concentrations above this will damage the sensor and shorten sensor life. The installation of this gas detector does not release the user from observing all the regulations concerning the characteristics, installation and the use of gas appliances; the ventilation of the environment and the elimination of combustion products in accordance with the local recommendations, regulations and bylaws. For any damage caused to people, property or animals resulting from incorrect connection, installation or application of this gas detector Duomo will not be held responsible or liable. To ensure correct function after installation Duomo provide a commissioning service using calibrated test gases. For this service call 01905 797989.

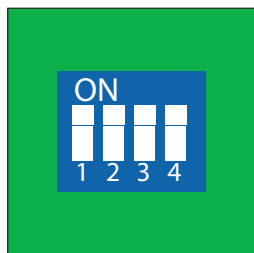
Configuring The BX116

The BX116 has three banks of DIP switches on the PCB. The set of switches on the rear of the front of the unit is used to control the LED's that represent the number of sensors connected to the system. The remaining switches are used to activate/deactivate the sensors themselves.

Controlling the LED's that represent connected sensors

The front of the BX116 has two banks of eight LED's that represent each connected sensor. The LED's cycle through each connected sensor and the associated gas concentration is displayed above. The table below shows what combination the DIP switches must be in to display and cycle through the correct number of LED's.

Sensor Zone 1	Micro Switch			
	1	2	3	4
1	OFF	OFF	OFF	OFF
2	OFF	OFF	OFF	ON
3	OFF	OFF	ON	OFF
4	OFF	OFF	ON	ON
5	OFF	ON	OFF	OFF
6	OFF	ON	OFF	ON
7	OFF	ON	ON	OFF
8	OFF	ON	ON	ON



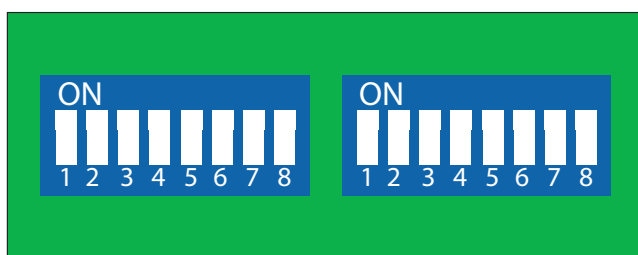
Sensor Zone 2	Micro Switch			
	1	2	3	4
9	ON	OFF	OFF	OFF
10	ON	OFF	OFF	ON
11	ON	OFF	ON	OFF
12	ON	OFF	ON	ON
13	ON	ON	OFF	OFF
14	ON	ON	OFF	ON
15	ON	ON	ON	OFF
16	ON	ON	ON	ON

For example if you have 11 sensors connected, the DIP switches would need to be set to the following;

ON - OFF - ON - OFF

Disabling or uninstalling sensors

The BX116 can accept up to 16 sensors, divided into two zones. You should deselect the DIP switch for any sensors that are not connected. Not doing so could cause the unit to go into fault. If you experience a faulty sensor, disabling it via its corresponding switch will return the BX116 to normal operation, allowing you to fix the sensor with uninterrupted coverage. PLEASE NOTE: In order to turn the sensor ON, the switch must be in the DOWN position.



Pre alarm threshold

The pre alarm on the BX116 can be altered to one of three thresholds;



13% LEL



15% LEL



18% LEL

Turn the potentiometer all the way to the right for 18%, to the middle for 15% and all the way to the left for 13%.

Changing display units

The BX116 can display the current gas concentration detected in either LEL or ppm.

This is done by closing one of two jumpers on the PCB on the rear of the door of the unit. Closing the upper jumper sets the unit to LEL. Closing the lower jumper sets the unit to ppm.



BX116 operation

Before powering up the BX116 once again check that all electrical connections are correct.

1. Apply 230V supply to the Ph and N terminals. Ensure that the correct fuse is used in the supply. (3 or 5A max.)
2. All of the lights on the fascia will light up in turn. This will take approximately 20 seconds. This checks the function of all the LED's.
3. The ON LED will remain flashing for about 90 seconds. This is the sensor warm-up period. The gas detector will not provide gas detection during this period. When the ON light becomes constant the detector is in operation.
4. By pushing and maintaining pressure on the manual TEST button a function test can be performed for all pre-alarm relays and main alarm relay, together with LED's and audible alarm.

The sequence will be:

- a) The 13/15/18% LEL / 195/225/270ppm (user selected) and Pre-Alarm 1 LED will be actuated. The Pre-Alarm 1 relay will be changed over.
- b) The 20% LEL / 300ppm and Main Alarm LED will be actuated. The Main Alarm relay will be changed over. The relevant Alarm LED's will light to show which zones are in alarm.

By releasing the the manual TEST button the lights will go out and the audible alarm will cease. If a latched alarm function on the main relay is configured this will remain on until the RESET button is pressed.

5. In order to conduct a full function test it is essential to use Duomo or equivalent calibrated test gas. The maximum concentrations are;
 - 40% LEL for methane in air
 - 350ppm for carbon monoxide
 - 0.85% (MOL) for propane

Any higher than this can reduce sensor life. NOTE: NEVER TEST USING NEAT GAS. THIS WILL POISON THE SENSOR.

6. To simulate a sensor fault situation disconnect the sensor plug. The detector will go into a FAULT alarm and the sensor fault relay will be actuated. This will close the contacts between terminals 4 and 5 and open the contacts between

Maintenance procedure

This detector must be function checked as described above using calibrated test gas every 6 months. To arrange for a Duomo engineer to conduct this work or to arrange a service contract please call 01905 797989.

Troubleshooting

The Problem	The Solution
No lights are illuminated on the fascia of the detector	Check that the electrical supply is reaching the device and that the plug in terminal rail is pushed into place.
One or all of the sensor fault lights are illuminated	Check that the plug is inserted correctly. Check that the sensor wiring is correctly terminated at both the sensor and detector. Check that 12V DC is present at the sensor. The green light on the sensor should be illuminated. Pressing the TEST button it is possible to check the efficiency of the device and if the sensors have been connected correctly.
Sensor fault continues to alarm	Check the sensor wiring. If the red Overload LED is lit a short circuit or overload has occurred on the sensor or the connecting cable.
The detector is subject to repeated alarms	Ensure that there is not an occasional gas leak. This may be due to a valve or joint which leaks under pressure.
The detector is in a main alarm condition and the main gas valve is not closing	Check that the connections are correct and that power is supplied to the valve i.e. the valve is not stuck in the open position. The function of the alarm relays both Pre-Alarm and Main Alarm can be checked by pressing the TEST button on the detector fascia. Check that the main alarm action is configured for a latching alarm (Switch 2 on 4th DIP switch).
There is no supply to the solenoid valve	The Main Alarm relay is a volt-free contact, therefore you must connect the live supply to the common of the main alarm relay contacts terminal 10. A supply will then come from terminal 12 to the solenoid valve.
Sensor is connected, but no LED is lit on the front fascia	Check that the DIP switch is set to the ON position

If you are experiencing difficulties, having made the checks listed above call Duomo on 01905 797989 for technical assistance.

In case of alarm

- Extinguish any naked flames.
- Do not switch lights or electrical devices on or off.
- Open all windows and doors to increase ventilation.
- If the 'ALARM' LED is off the levels of gas have dropped. A responsible, qualified person is now safe to find the cause of the alarm.
- If the alarm sound remains constant, and the cause is not evident or possible to eliminate turn off the emergency isolation valves to the area and contact your gas provider emergency line. They will advise accordingly.

Commissioning

It is strongly recommended that this detector should be commissioned by Duomo Commissioning Engineers or engineers approved by Duomo to carry out this work. A quotation for commissioning or service will be provided upon request. Fax site details and preferred date for commissioning to 01905 774296 and the Duomo Service Department will fax back confirmation.

The benefits of this equipment being commissioned by Duomo are:

On board spares. If for whatever reason this equipment doesn't function correctly Duomo engineers will have spares on board to ensure that the commissioning is successful.

A Duomo Commissioning Certificate is provided.

It is prudent to make electrical connection to the detector terminal plus when withdrawn and leave the plug off the detector so that the Duomo Engineer is the first to power up the unit on site. This allows wiring to be checked prior to commissioning and avoids damage due to incorrect connection. Guarantees for this product will become void if damage is caused by the installer.

Technical specification

Power Supply	230V AC 50Hz +/- 10%
Secondary Battery	12V DC +/- 10%
Power Consumption	30W maximum @ 230V
Power Consumption	25W maximum @ 12V
Relay contact range	10A 230V resistive - 5A 30V DC resistive
1 st pre-alarm	Can be set from 13% LEL (195ppm) to 18% (270ppm) of LEL
Main alarm	Fixed at 20% LEL / 300ppm
Sensor fault	Short circuit, interruption, sensor deterioration
No. of remote sensors	16
Micro switches to include/exclude sensors	1 per sensor
Monitored gas indication	Through illuminated display
Input signal	4 - 20mA
Device precision	1% FS
Reaction time	<10 seconds
Microprocessor	8 bytes
Working temperature	-10 °C to 45 °C
Start-up self diagnostic delay	90 seconds
Suitable for use with sensor type	SGM595, CO100A, CO200A, SG895
Maximum distance for sensor connection	100m
Cable diameter for sensors	1mm ² CSA
Dimensions	360mm x 320mm x 135mm
Protective rating	IP55
Guarantee	3 years from date of manufacture

