



BX216 Gas Detector



- Microprocessor control
- Wall mounted
- 16 zone protection (across 1 or 2 zones)
- 4 - 20mA signal input
- Relay outputs (incl. fire alarm interface)
- Positive safety feature
- Measuring range 0 - 20% LEL/0 - 300ppm
- IP65 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 BX216 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

The BX216 can detect both explosive and toxic gases. 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 BX216 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 gas reaches a preset level, the main alarm relay is activated to break the electrical supply to the gas safety shut-off valve (SSOV). The BX216 also has a separate volt-free sensor fault relay that actuates if the correct return signal is not sensed by the detector. There is also the provision of a fire alarm interface. This controller can be interlinked with a fire alarm so that in the event of a fire, it would shut down the gas supply.

Features

The BX216 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 the on board menu:

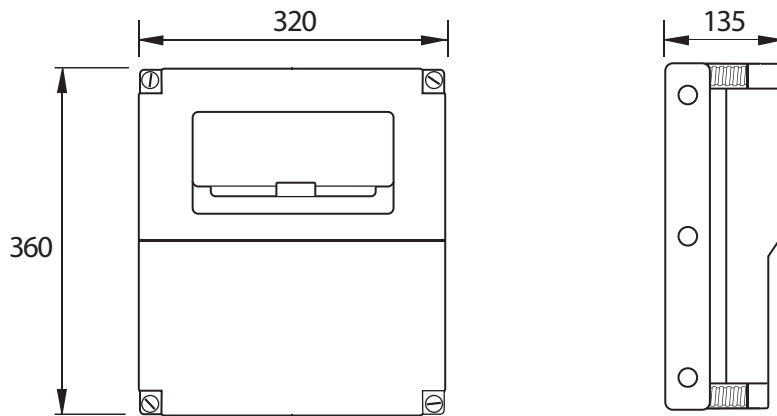
- Number of sensors from 1 to 16
- Type of gas to be sensed (explosive or toxic)
- Pre-alarm level for each sensor
- The number of zones (1 or 2)
- Main alarm relay action (latching or auto-reset)
- Positive safety feature
- Alarm logging function
- Event history

The BX216 has five main terminal blocks for the following;

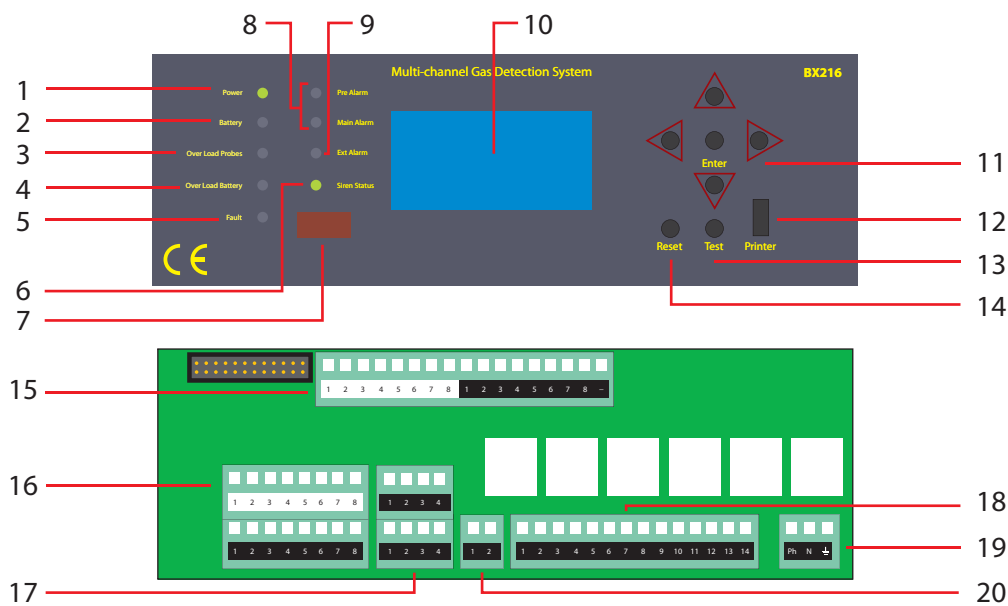
- The incoming mains supply
- The alarm circuit wiring (including fault, siren, pre-alarm and main alarm relays)
- The power supply to the sensors
- The 4 - 20mA return cable from the sensors
- A 0 - 10V output to BMS proportional to the 4 - 20mA return signal

The front panel has an LCD display showing the date, time, current sensor levels and much more. LED's on the panel indicate what alarm status the unit is in, as well as any faults present on the connected sensors.

Overall Dimensions



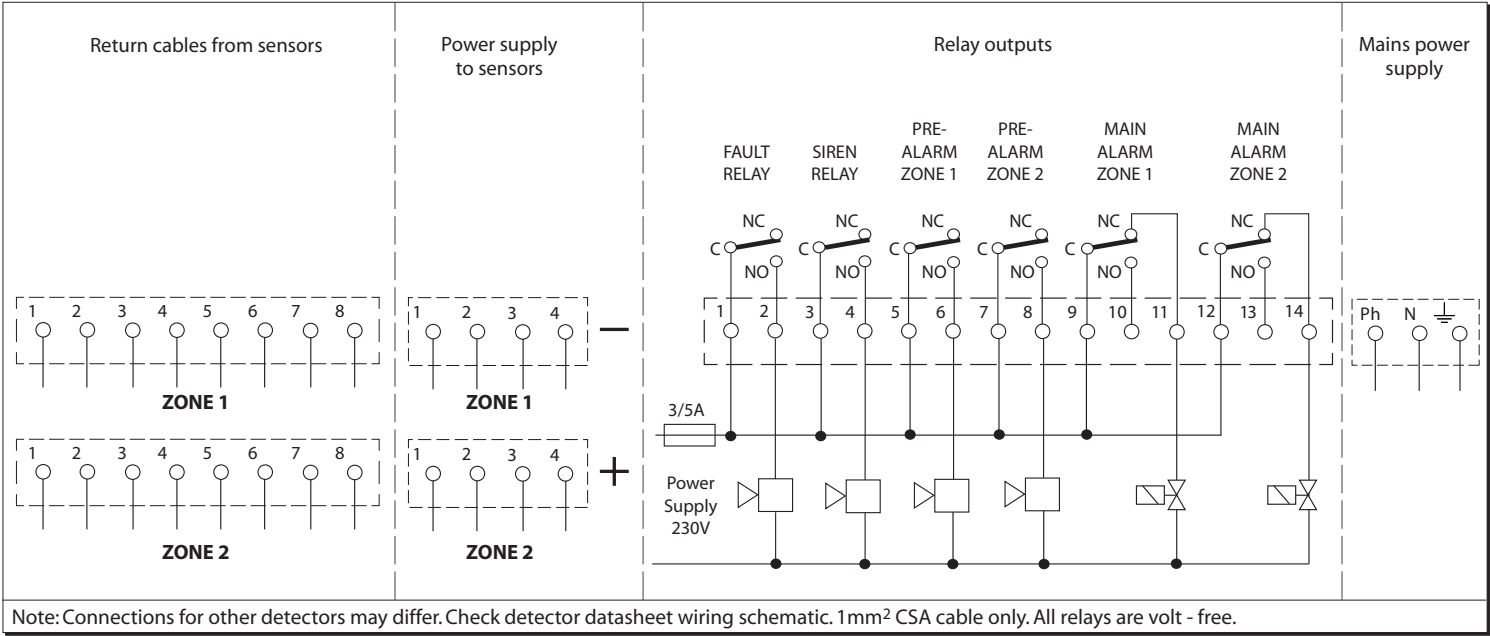
BX216 Fascia & PCB Layout



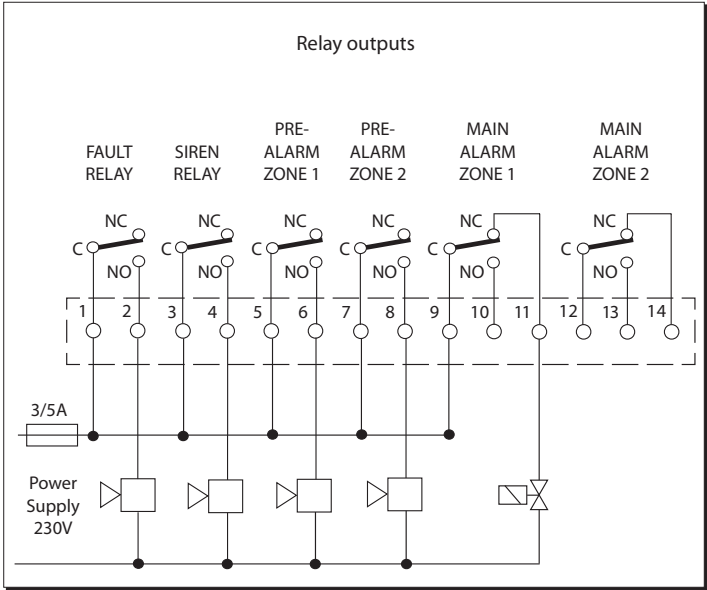
Key

- 1. Power On** - Lights when supply voltage is applied. This light flashes during self diagnostics start up.
- 2. Battery** - Lights when the BX216 is powered by a battery (optional). When flashing, the standby battery has low charge.
- 3. Overload Probes** - Indicates a short circuit or that one of the connected sensors is absorbing too much current.
- 4. Overload Battery** - Indicates that the battery supply (optional) is not properly connected or is faulty.
- 5. Fault** - Indicates a sensor fault, loss of signal or incorrect connection of the sensor. When on, the system will enter a full alarm status until the faulty sensor has been removed or replaced.
- 6. Siren Status** - Shows green when the external siren is enabled; red when it is disabled.
- 7. IR Transmitter** - Can be used to transmit the contents of the internal memory to an external device.
- 8. Pre / Main Alarm** - Illuminate when the pre or main alarm gas threshold has been reached.
- 9. External Alarm** - If an externally fitted device (e.g. fire alarm or emergency stop) has activated, this LED illuminates.
- 10. Display** - Backlit display that shows details of the unit, connected sensors and internal programming menus.
- 11. Keypad** - Used to navigate through the various programming menus.
- 12. Printer Port** - Allows a printer to be attached to print off all the data stored in memory.
- 13. Test Button** - This button simulates a gas leak and tests the full functionality of the BX216.
- 14. Reset Button** - When pressed it resets all internal memory.
- 15. Output Terminal Block** - Converts the 4 - 20mA return signal from the sensors to a 0 - 10V output connection for BMS.
- 16. Sensor Return Terminal Block** - Connections for the incoming return cable from the sensors.
- 17. Sensor Supply Terminal Block** - Connections for the outgoing power supply to the sensors.
- 18. Relay Terminal Block** - Connections for fault, siren, pre-alarm and main alarm relays.
- 19. Mains Supply Terminal Block** - Connections for the incoming mains supply.
- 20. External Alarm Terminal Block** - Connections for a fire alarm / external emergency stop etc.

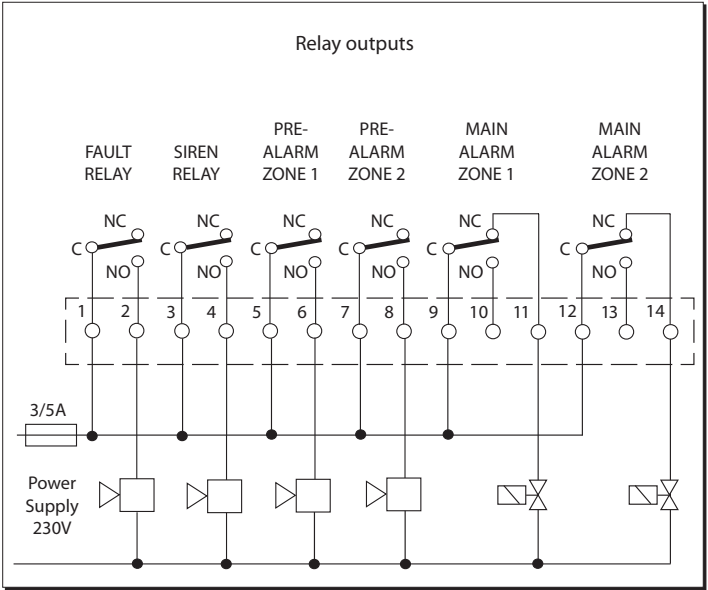
Typical Wiring Schematic for BX216



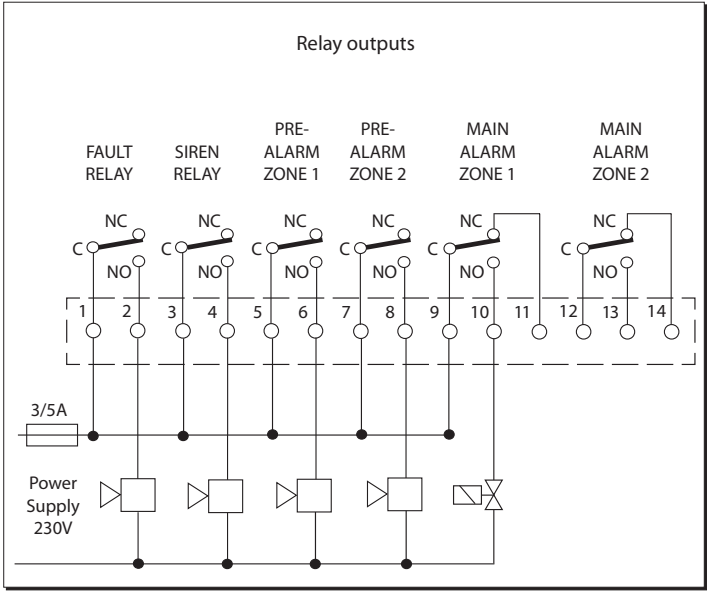
Without positive safety (1 zone)



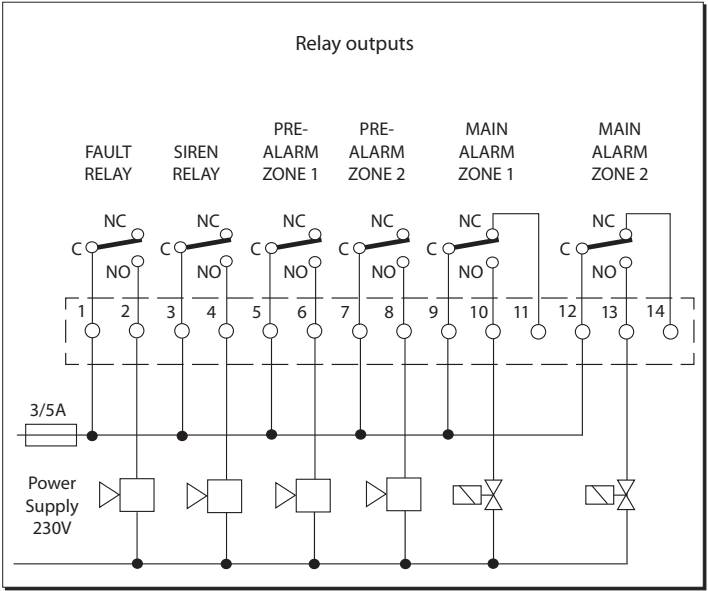
Without positive safety (2 zone)



With positive safety (1 zone)

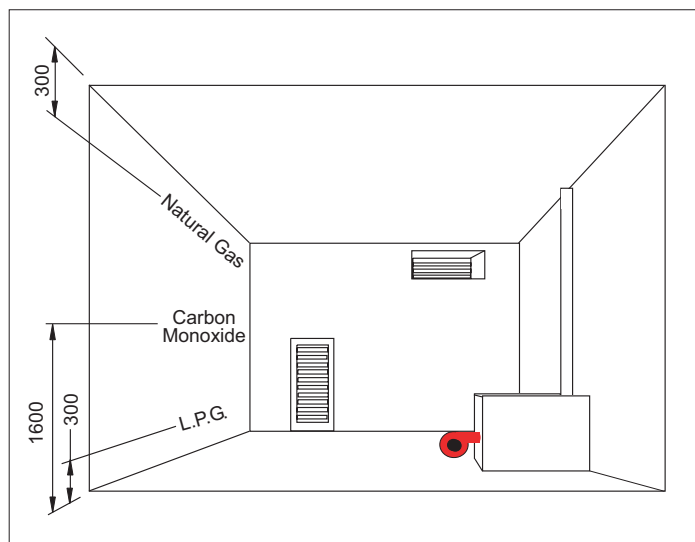


With positive safety (2 zone)



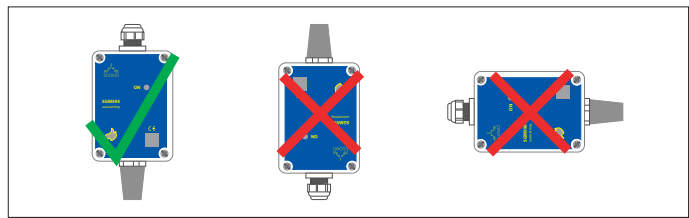
Electrical Installation

The BX216 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 terminal rails 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 IP65. 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 '**BX216 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

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.

Powering Up

```
Duomo          SN  J00046
20/Sep/11      09:29
== BX216 ver.  1.2 ==
Countdown: 90
```

When the unit is first powered up you will see the above screen as it counts down for 90 seconds during initial warm up.

```
SN  J00046    20/Sep/11
Zone  2        09:29
Probe 01 - Toxic
000 ppm
```

Once completed, the unit is ready and shows the above screen including; serial number, date and time, the number of zones set, the current detected zone (including the type of gas) and the current level of gas. Each zone is displayed for 8 seconds in turn. To cycle through the zones, use the left and right keys on the keypad. To pause on a zone, press the Enter key. Press the Enter again to move on and continue cycling through.

Initial Setup

```
Insert Password
0 1 2 3 4 5 6 7 8 9
```

To set the BX216 up you will need to enter the menu system. Press and hold Enter for 5 seconds and the screen above will appear. The default password is "1 2 3 4". Move the cursor left and right using the keys, pressing enter to select each number. When you have entered the correct password the screens below appear.

```
Insert Password
0 1 2 3 4 5 6 7 8 9
          * * * *
```

```
Insert Password
0 1 2 3 4 5 6 7 8 9
Password Accepted
```

Time Settings Probes Settings General functions Exit

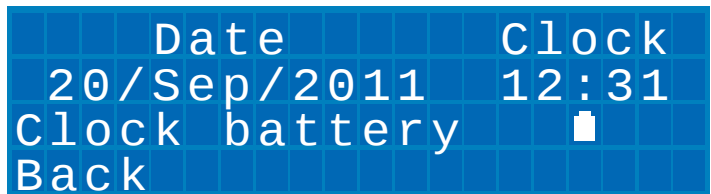
Use the up and down keys and then Enter to select an option;

- Time Settings lets you alter the current date and time of the unit.
- Probes Settings lets you select the number of zones to operate in, the number of sensors attached to the unit and the pre-alarm gas percentage of each sensor.
- General functions lets you control; the relay function, positive safety function, zone alarm logging function, external siren and Advanced Features.

(Advanced Features include changing the system password, viewing the datalogger, printing the log and testing the sensors).

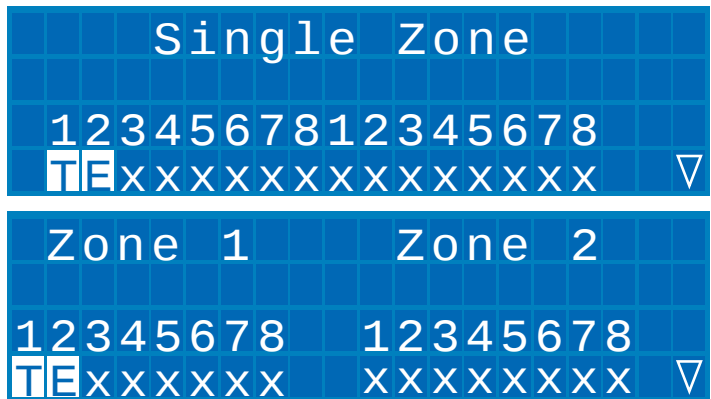
- Exit takes you out of the setup mode and back to the normal screen.

Time Settings



To set the date and time use the left and right keys to select day, month, year, hour or minutes and then the Enter key to change the value. To exit this function scroll down using the keypad until Back flashes and press Enter.

Probes Settings



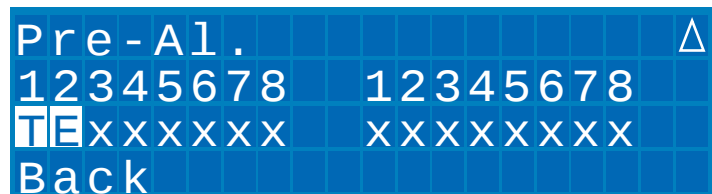
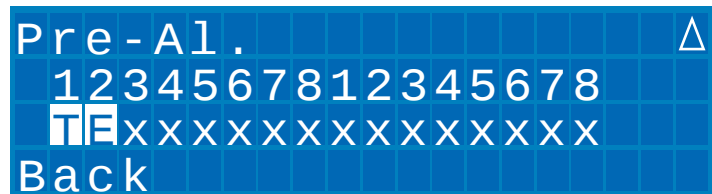
The BX216 can be configured to control one or two zones. Pressing the Enter key (while the top line is flashing) switches between these two options.

Pressing the down key on the keypad then lets you set each individual zone. An x means that that zone has been disabled i.e. there is no sensor detected. A  means it has

been set to detect toxic gas i.e. carbon monoxide. An  means it has been set to detect explosive gas i.e. methane.

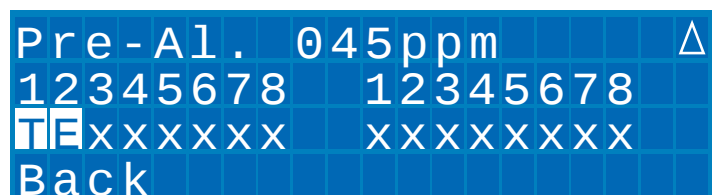
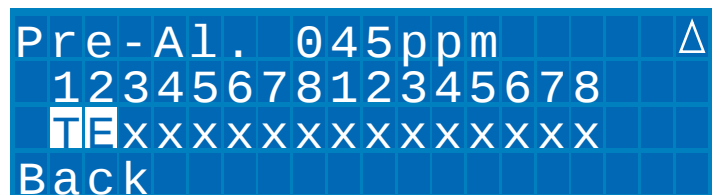
Once you have set each zone up, move down to the  and press Enter. This will move you into the next screen that allows you to set the pre-alarm level for each sensor.

(Note: If no sensor is attached to a particular zone you will not be able to set a pre-alarm level).



The top screen shows the pre-alarm setup for a one zone system, the bottom screen shows the two zone system.

Use the left and right keys to select a zone that has a sensor attached and press enter to select the required pre-alarm level.



The level appears at the top of the screen as shown above and cycles through the following values;

- For explosive gases - 45 - 240ppm in 15ppm intervals
- For toxic gases - 3% - 16% LEL in 1% LEL intervals

Once you have finished you can either go back to the previous screen to change the number of zones using , or Back to go back to the first menu screen.

General Functions

The general function menu allows you to make changes to the way that the BX216 functions when it is in an alarm condition.

Use the up and down keys to navigate through each of the five main options. Press Enter on any one to alter it. The last option is the Advanced Features menu.



The top screen shows the pre-alarm setup for a one zone system, the bottom screen shows the two zone system.

The parameters for each option are as follows;

■ **Relay:** Continuous or Impulse

Controls how the main alarm relay operates in an alarm condition. Continuous means the relay will remain activated after the alarm has passed. Impulse means the relay will activate for 20 seconds and then revert back to its normal state.

■ **Positive Safety:** ON or OFF

ON enables Positive Safety which controls how the main alarm relay operates. It is advisable to enable this function as it works as a fail safe should you lose power to the BX216. NOTE: Changing this option alters how you wire the unit to the gas valve, refer to wiring diagrams.

■ **Latch Zone 1 / Latching:** ON or OFF

Determines whether the main alarm LED remains lit after the alarm has passed. If set to ON the LED will remain lit after an alarm condition until the Reset button is pressed. If set to OFF the LED will turn off as soon as the alarm condition has passed.

■ **Latch Zone 2:** ON or OFF

As above.

Moving the cursor down to the  and pressing Enter will move you down to the next screen shown below.



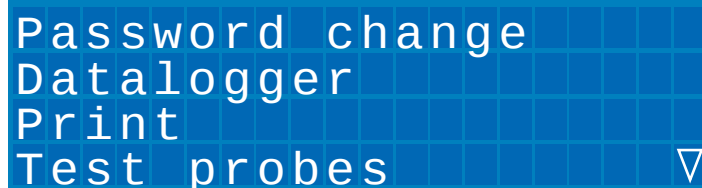
■ **Siren:** Active or Mute

Active will enable the onboard audible siren in the event of an alarm. Mute disables it.

You can check the status of the siren by looking at the Siren LED on the fascia. If it is green it is enabled, if it is red it has been disabled.

To go back to the top menu, press Enter when on .

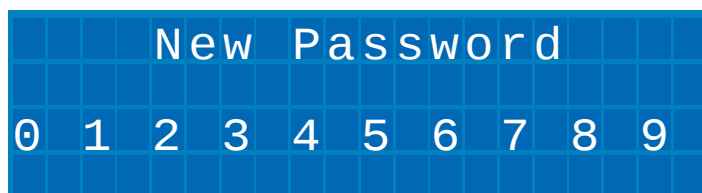
Advanced Features



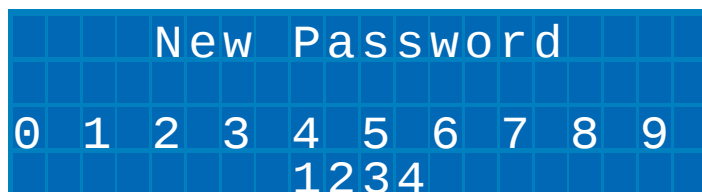
The advanced features menu has five options as detailed in the two screens above. Scroll down to the  and press Enter to move down to the second screen and  to go back to the first screen. Select Back to go to the first menu screen.

Password Change

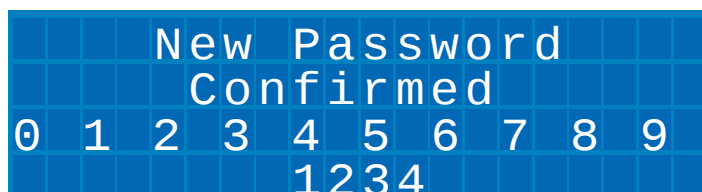
Select this option to change the password that you use to access the setup menu of the BX216.



The screen above appears. Use the left and right keys and the Enter key to select a four character password. As each number is selected it appears as below.



Once you have selected your four characters 'Confirmed' will appear on the screen and the password is set.



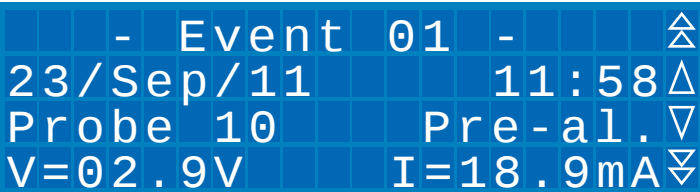
Datalogger

The BX216 stores information on board about the attached sensors and any detected alarms since installation.

The complete list of events stored by the datalogger is; pre-alarms, alarms, faults, blackouts, resets, low battery, probes enabled / disabled, hard reset.

Use the up and down keys on the keypad to move

Use the up and down keys on the keypad to move through the events as shown below.



Pressing the or key will scroll down/up through recorded events one by one. Pressing the or key will scroll down/up through five events at a time.

The meaning of the various events is as follows;

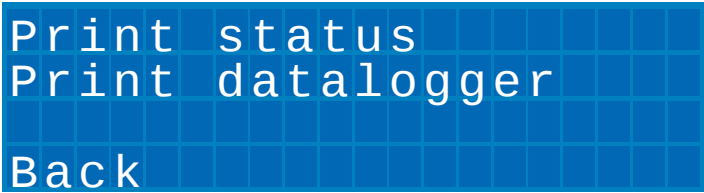
- **Pre-Alarm**
The probe stated on the screen has entered pre-alarm on the date shown and returned the voltage and current stated.
- **Alarm**
The probe stated on the screen has entered alarm on the date shown and returned the voltage and current stated.
- **Fault**
There is a fault with the indicated sensor.
- **Blackout**
Power to the BX216 has been lost. Check incoming 230V power supply.
- **Reset**
The BX216 has been reset using the button on the fascia following an alarm condition.
- **Low Battery**
The backup battery (not supplied) is running low.
- **Probe Enabled**
The sensor indicated has been enabled using the internal setup.
- **Probe Disabled**
The sensor indicated has been disabled using the internal setup.
- **Hard Reset**
The BX216 has been completely reset using the internal setup. All internal data has been reset (including sensor setup).

When you reach the end of the datalogger, select Back to return to the previous menu.



Print

Select this option to print information contained within the BX216. (NOTE: These options will only be available when a printer is connected. Printer not included).



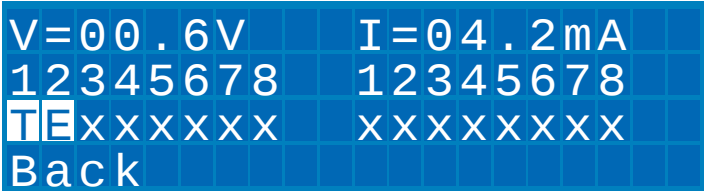
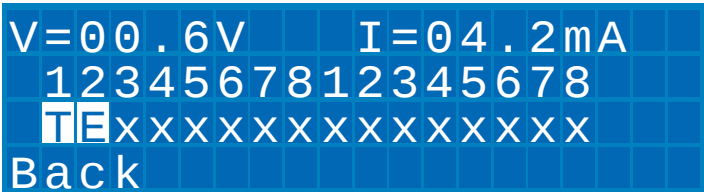
There are two options within this menu; print status and print datalogger.

'Print status' will print the current status of all zones. It will show whether or not a sensor is attached and if one is, what state it is currently in.

'Print datalogger' will print the entire contents of the datalogger, showing you all events recorded by the BX216.

Test Probes

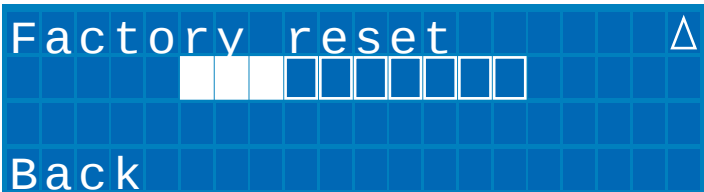
This option shows the voltage and current readings of the return signals from any attached sensor.



Engineers can use this information to ascertain the accuracy of the attached sensors and determine if they need calibrating / trimming. Select Back to return the previous menu.

Factory Reset

Select this option, then press and hold Enter for 4 seconds until you see the screen below appear.



Continue to hold Enter and the bars will gradually fill in from left to right until they are all filled white. At this point the unit will turn itself off and on again and the factory reset will be complete.

Select Back to return the previous menu.

BX216 operation

Before powering up the BX216 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 pre-alarm threshold (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.

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.

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.

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.
The sensor fault light is illuminated	Check that the wiring is correct. 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 (see setting on internal menu).
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. Check the wiring diagram in this manual.
Sensor is connected, but no information is shown on the display.	Check that the sensor is enabled in the internal menu.

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.

Technical specification

Power Supply	230V AC 50Hz +/- 10%
Secondary Battery (Not supplied)	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 3% LEL (45ppm) to 16% (240ppm) of LEL
Main alarm	Fixed at 20% LEL / 300ppm
Sensor fault	Short circuit, interruption, sensor deterioration
No. of remote sensors	16
No. of selectable zones	2
Monitored gas indication	Through illuminated display
Input signal	4 - 20mA
Device precision	1% FS
Reaction time	<2 seconds
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
Dimemnsions	360mm x 320mm x 135mm
Protective rating	IP65
Guarantee	3 years from date of manufacture