

BS-316

Gas detection control panel up to 16 inputs



Installation – operation manual

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1 Operation instructions

This section contains general information and information regarding the use of the panel. All users of the panel should read these instructions very carefully in order to be able to act in the event of an alarm or a fault condition.

1.1 Description

The BS-316 is a gas detection panel with 16 inputs. On each input it can be connected only one gas detector 4-20 mA.

1.2 Indications and Controls

The panel incorporates one liquid crystal display (LCD) and a series of indication LEDs that informs the user about its status. The indication LEDs give general information (i.e. if an alarm becomes true, then the general alarm indicator LED will be turned ON.) and on display appears information about each event (i.e. Alarm sensor 1, that means alarm from sensor 1) .

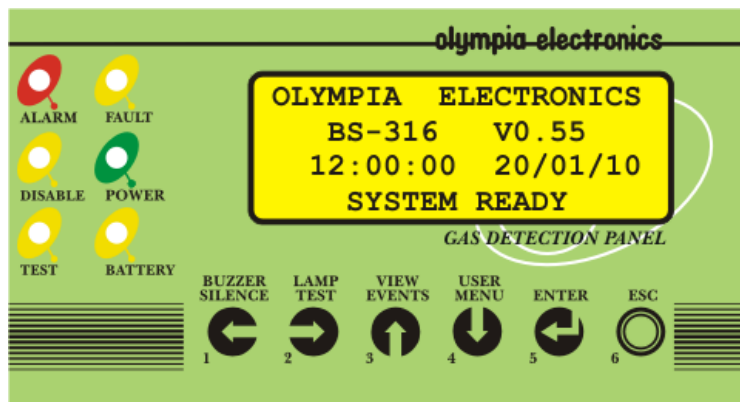


Figure 1: Main screen of BS-316

Under the display there are 6 buttons for controlling the panel. On each button there is a number 1-6 and corresponds to the functions left, right, up, down, enter, escape (exit or one step back). Generally by pushing a button one action happens immediately or one menu appears with some functions. Inside the menu the buttons 1, 2, 3, 4 operate as dimension buttons and we can move inside the menu, the button 5 (enter) to select and button 6 (esc) to come back.

During the next pages we will refer to the buttons using the corresponding numbers. All LEDs are grouped for easier indication. In detail the LEDs show the following:

General Alarm (RED)	General Fault (Yellow)
General alarm indicator	Lights in the event of a Fault
Disable Point (Yellow)	Power (Green)
Lights to show a disabled inputs	General operation indicator of the panel
Test (Yellow)	Fault Battery (Yellow)
Lights to show that we are in TEST mode	Lights to show a battery problem

1.3 Access level 1

This level contains 2 functions that can be implemented by pressing a single key.

- In the event of an Alarm or Fault condition, if the key number (1) is pressed then the internal buzzer is silenced. For as long as the event is in effect the internal buzzer sounds once in every 30 seconds. Should the panel see a new event in this state then the buzzer will start to sound continuously.
- When the panel is in standby mode (no alarm or fault events have occurred) then if the key number (2) (lamp test) is pressed the system conducts a sequential LED and Display test.

When the system is in quiescence state, the lcd screen shows info about the system. The below screen shows some information about the system

```

OLYMPIA ELECTRONICS
  BS-316   V.055
12:00:00  20/01/10
SYSTEM READY
    
```

The below screen shows the panel name and the technician information.

```

PANEL NAME
MAIN BUILDING
TECHNICIAN INFO
OLYMPIA ELECTRONICS
    
```

The next screen shows the condition of each sensor (input)

```

1:   0%LIE NORMAL
2:  NO CONFIGURATION
3:  NO CONFIGURATION
4:   5ppm  NORMAL
    
```

The sensors 4-20mA incorporates the current have the next situations:

FAULT - (<1 mA)

UNDERFLOW (from 1 to 3.5 mA)

NORMAL (from 3.5 to 21 mA) inside these limits we can do the setup of alarm 1, alarm 2 and alarm 3)

OVERFLOW (from 21 to 24mA)

FAULT+ (24mA and Higher).

There is the disable situation (**NO CONFIGURATION**)

In case alarm or fault the LCD display shows the corresponding message.

<pre> EVENTS IN SYSTEM ALARMS 10 FAULTS 5 </pre>	<p>This screen shows a summary of the events in the system.</p>
<pre> ALARM 10 4: 14%LIE ALARM 2 9: 60ppm ALARM 3 16: 20ppm ALARM 1 </pre>	<p>The alarm screen show which inputs are in alarm condition. For example the second line 4: 14% LIE ALARM 2 means that the 4th input sensor has detected 14% LIE of a gas and it is at ALARM 2 state.</p>
<pre> FAULT 5 1: FAULT + 3: FAULT - BATTERY </pre>	<p>The screen on the left shows the faults of the system. For example the second line 1: FAULT + means that the 1st input sensor has a FAULT +.</p>

1.3.1 Events Menu

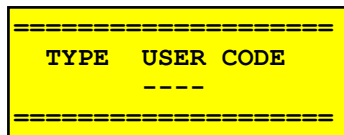
All the events of the system can be shown by pressing the key “3” View Events and then the key Enter.

<pre>ALARM 1 (59/ 59) 15%LIE S= 4 Z= 2 11:03:45 20/01/10 CAR PARKING - LPG</pre>	<p>This screen on the left shows that the system has recorded 59 events. The event shown in the example shows that this event is a ALARM 2 of the 4th sensor (S=4) which belong to zone 2 (Z=2). The third line in the timestamp when the event occurred. The last line is the name of the sensor.</p>
<pre>FAULT (13/ 59) BATTERY 11:00:05 18/01/10 BATTERY DISCONNECTED</pre>	<p>This screen on the left shows that the battery was disconnected at 11:00 on 18/01/10.</p>
<pre>GENERAL (5/ 59) PANEL 09:07:00 10/01/10 START</pre>	<p>The screen on the left shows the panel start operating from 09:00 on 10/01/10.</p>

1.4 Access level 2 (User access level)

All the functions of access level 2 can be accessed from a menu that is displayed when we push the button “4” User menu.

To Reset the panel, from the central menu, we press button “5” and button “ENTER” and the next message is displayed.



The user code is 1-1-1-1. So the key “1” must be pressed four times. After this the panel resets.

2 Installation instructions

In this section there is information about the connectivity of panel, its peripherals, the programming of all the functions and troubleshooting. All installers who want to connect and enable the gas detection panel must read this manual carefully. The whole knowledge of the panel and its peripherals is necessary for work and installation.

2.1 General description

Input peripheral analysis for panel BS-316 :

- **BS-380. LPG detector waterproof IP65.**
- **BS-381. Methane gas detector waterproof IP65.**
- **BS-382. Carbon monoxide detector waterproof IP65.**
- **BS-383. Ammonia detector waterproof IP65.**
- **BS-390. LPG detector anti-explosive type.**
- **BS-391. Methane gas detector anti-explosive type.**
- **BS-393. Ammonia detector anti-explosive type.**

On the AUX input we can connect fire detection buttons, like the BS-536, BS-7000 (IP-65). We can program and work the panel by using only the buttons that are on its keyboard.

2.2 Security

The panel cannot be installed correctly if the installation guide is not read.

This product must be installed, operated and maintained by skilled technician:

- Using all rules of electrical product installation in buildings.
 - Installation guide.
- The operation voltage is 220-240V AC / 50-60Hz.
- Must be connected to the electrical panel of the building, but with a separate fuse.

2.3 Mounting

The mounting of panel must be in a visible place with easy access by the users. The panel BS-316 is a product for easy wall mounting and indoor use. The mounting on the wall can be done by using plugs and screws that are included in the panel package.

2.4 Description of the internal parts of the panel

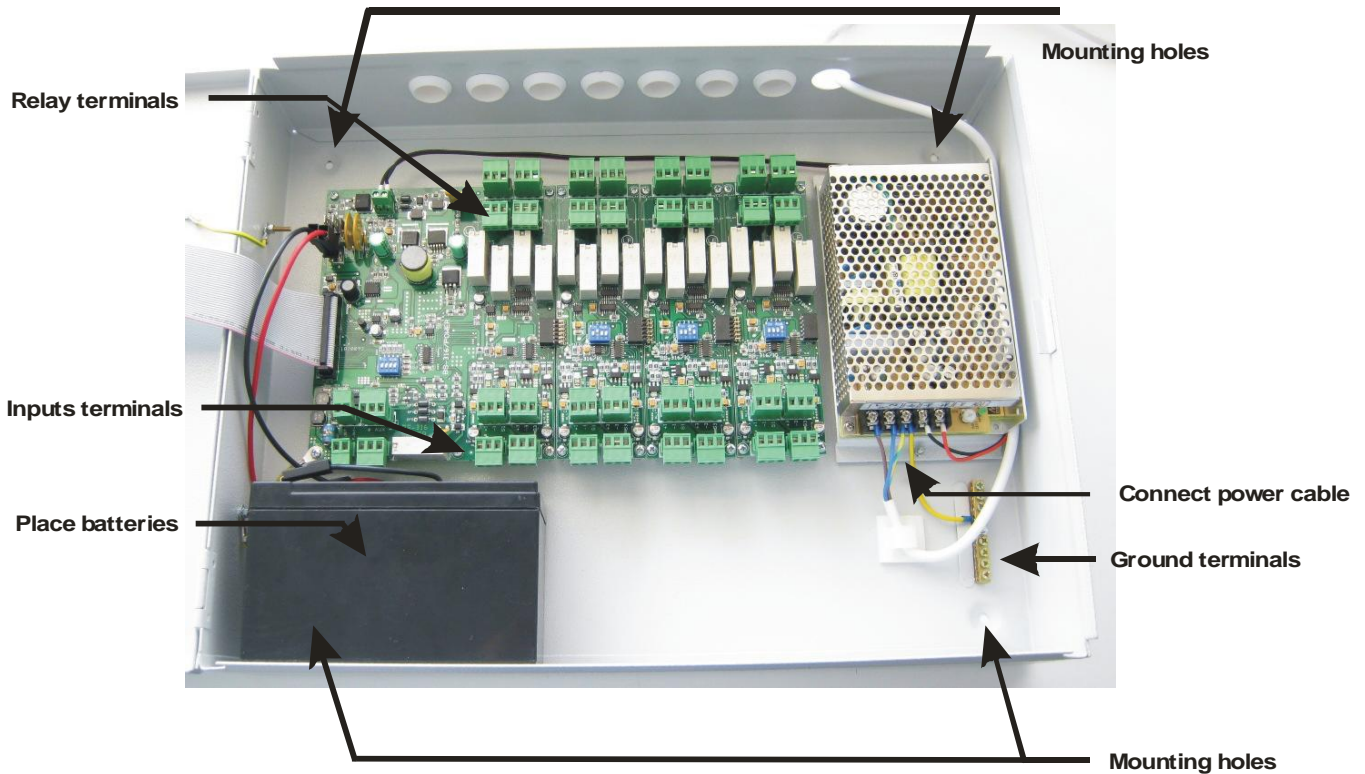


Figure 2: Inside the panel

2.5 Cabling

The panel has pre-opened passages from where the installation cables will enter the panel. The terminal blocks of the panel are capable of handling cable with a cross-section of up-to 2.5mm.

2.5.1 Connecting the panels with the mains power supply (230V AC) and with the battery

To connect the cable with the mains power supply, a cable with double insulation must be used. The connection is done using the special terminals found on the right side of the panel as shown in the. The battery can be placed on the bottom side of the panel.

The battery A-986 of olympia electronics can be used. The charging circuit of the panel is also calculated for the specific battery type. In case of replacement, the new battery must be of the same type.

Two cables with connectors are used to connect the battery to the panel. The black cable is connected to the negative pole of the battery (marked with (-) or with black color) and the red cable is connected to the positive pole of the battery (marked (+) or with red color).

Warnings.

1. During the installation, the connections to the mains power supply and the battery must be done after all other connections are finished.
2. The panel connection with the mains supply must be done via a 16A external fuse or an automatic circuit breaker rated at 16A.
3. Always use cables with double insulation.
4. The diameter of the cable must be at least 1mm.
5. The inner insulation of each cable must not be cut more than 1cm
6. The outer insulation must not be cut more than 1cm away from the internal insulation.

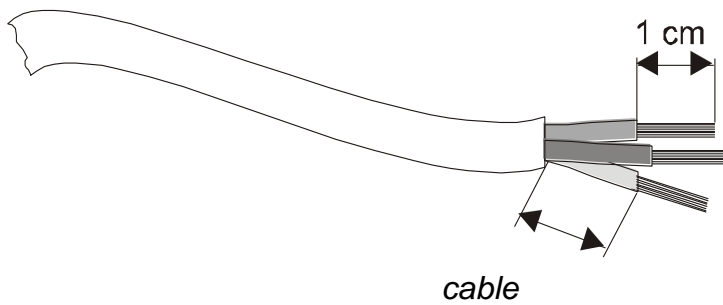


Figure 3: Power

2.5.2 Sensor connectivity

Before connecting any sensor to the panel, the main power supply must be disconnected. There are two ways of connect the sensors depending on the number of contacts.

A) Sensor with 2 contacts 4+20mA

The connection of sensors with 2 contacts 4+20mA must be between «+» and «-» of the sensor connector, that correspond to «+» and “S” of the panel as shown in figure 4.

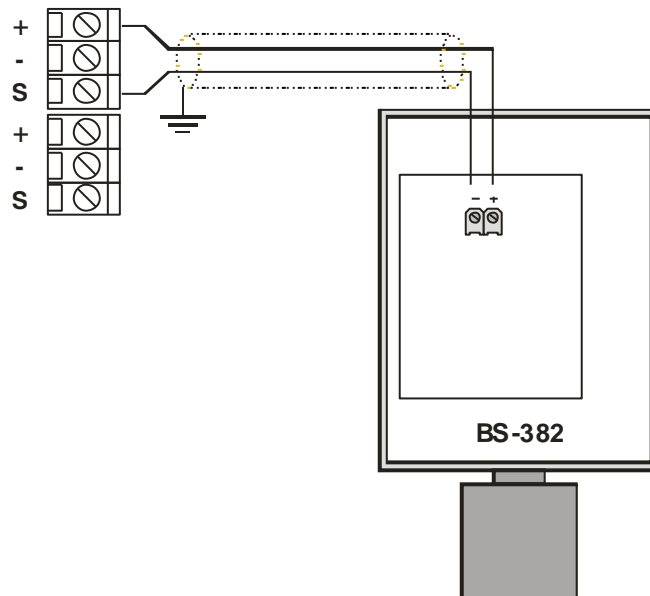


Figure 4: Connection diagram with two contact sensors

The cross-section of the cable depends on the length (see next table). On all sensors with 2 contacts you must connect a coaxial cable. The shielding of the cable must be connected to the «-» of sensor.

Sensors with two contacts	
Ranges	Cable type
From 0 to 100 meters	2 x 0,5 mm ² shielded
From 100 to 200 meters	2 x 1 mm ² shielded
From 200 to 500 meters	2 x 1,5 mm ² shielded
From 500 to 1000 meters	2 x 2,5 mm ² shielded

B) Sensors with 3 contacts 4+20mA

The connection of sensors with 3 contacts 4+20mA, must be between «+», «-» and “S” of sensor that correspond to «+», «-» and “S” of panel as shown in figure 5.

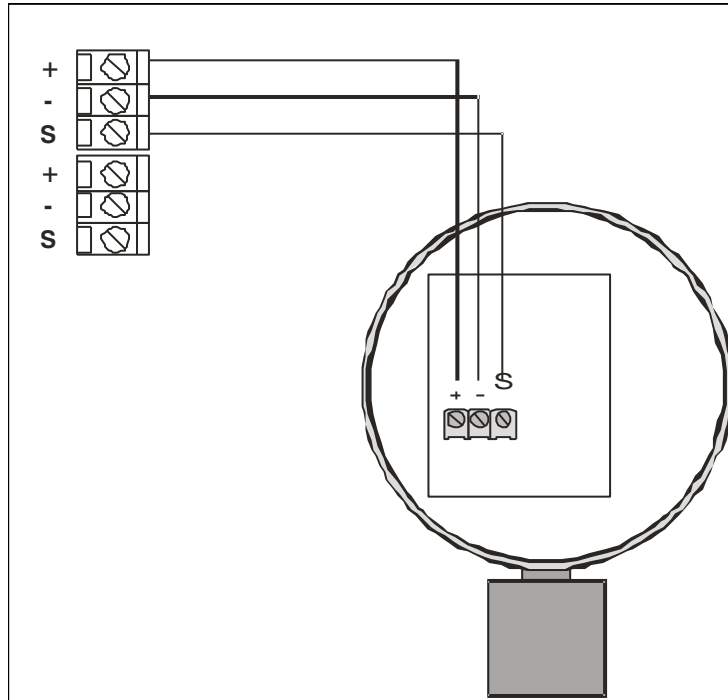


Figure 5: Connection diagram with three pad sensor

The cross-section of the cable depends on the cable length (see next table). The sensors with 3 contacts do not require coaxial cables.

Sensor series with three contacts	
Ranges	Cable type
From 0 to 300 meters	3 x 0,75 mm ²
Up to 400 meters	3 x 1 mm ²
Up to 500 meters	3 x 1.5 mm ²
Up to 600 meters	3 x 2.5 mm ²

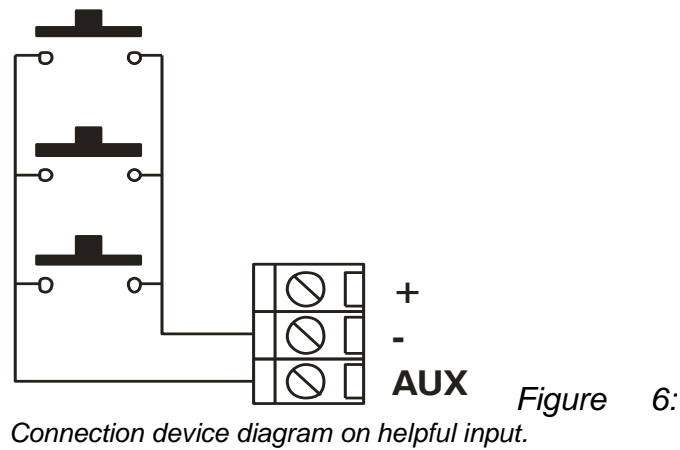
The gas sensors, need a preheat time, in clear air, for about 20 seconds. After this time the sensor can sense gases, but the maximum sense ability is after 3 hours of continuous operation. So a sample gas test should be done after 3 hours.

The sensors BS-382, BS-383 have maximum sense ability, in clear air, after about 1-2 hours of continuous operation.

After the electrical connection of the sensors, the technician must power the panel and setup all sensors.

About sensor setup see paragraph 2.6.1.

Finally on the AUX input we can connect fire detection buttons between inputs «-» and “S” of (Figure 6).



2.5.3 Output connectivity

On the panel there are 16 programmable outputs relay. Each relay have a triple connector NO, NC, C. For more information about output setup see paragraph 2.7.1.

2.5.4 Other outputs and their use

The panel has the following outputs:

- **Output AUX.** This is an auxiliary power output (between «-» and «+») that has the capability of providing 20Vdc for maximum load of 300mA.
- **Connectors V_P.** Voltage 20Vdc (up to 300mA) for other devices power that cannot be powered from the loop (i.e. gas detector or fire detection door electromagnets).
- **Connectors F_OUT.** Open collector output. If there is a general fault (Fault) it is enabled (0V).

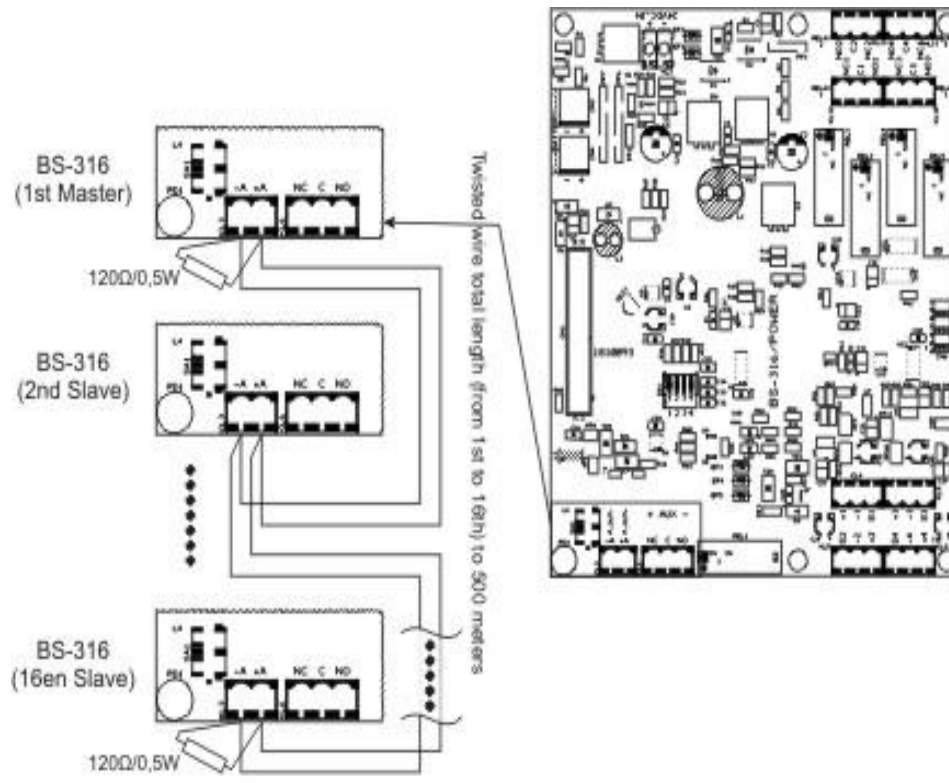
NOTE The maximum drawn from outputs “V_P” and “AUX” together must not be more than 300mA.

2.6 Network connection

It is possible to have network of panels. In each network each panel has a unique address . The central panel has address 1 and sub-panels have address from 2 to 16. The figure below shows the network connection.

The interface cable is two cable twisted. The connection topology is parallel, for example should the cable from one table to go to another and there are no interconnections

Caution resistors 120Ohm / 0,5 W should be placed at the beginning and end of the cable.



Networking (Panels up to 16)

Σχήμα 7: Network connections

3 Technician menu

3.1 Access Technician menu

All the functions of access level 3 can be accessed from the menu that displayed when we press button "5" in the technician menu.

The panel prompts for the technician code



The technician code is 2-3-3-3.

After the code is entered, the operator has access to level 3 functions.

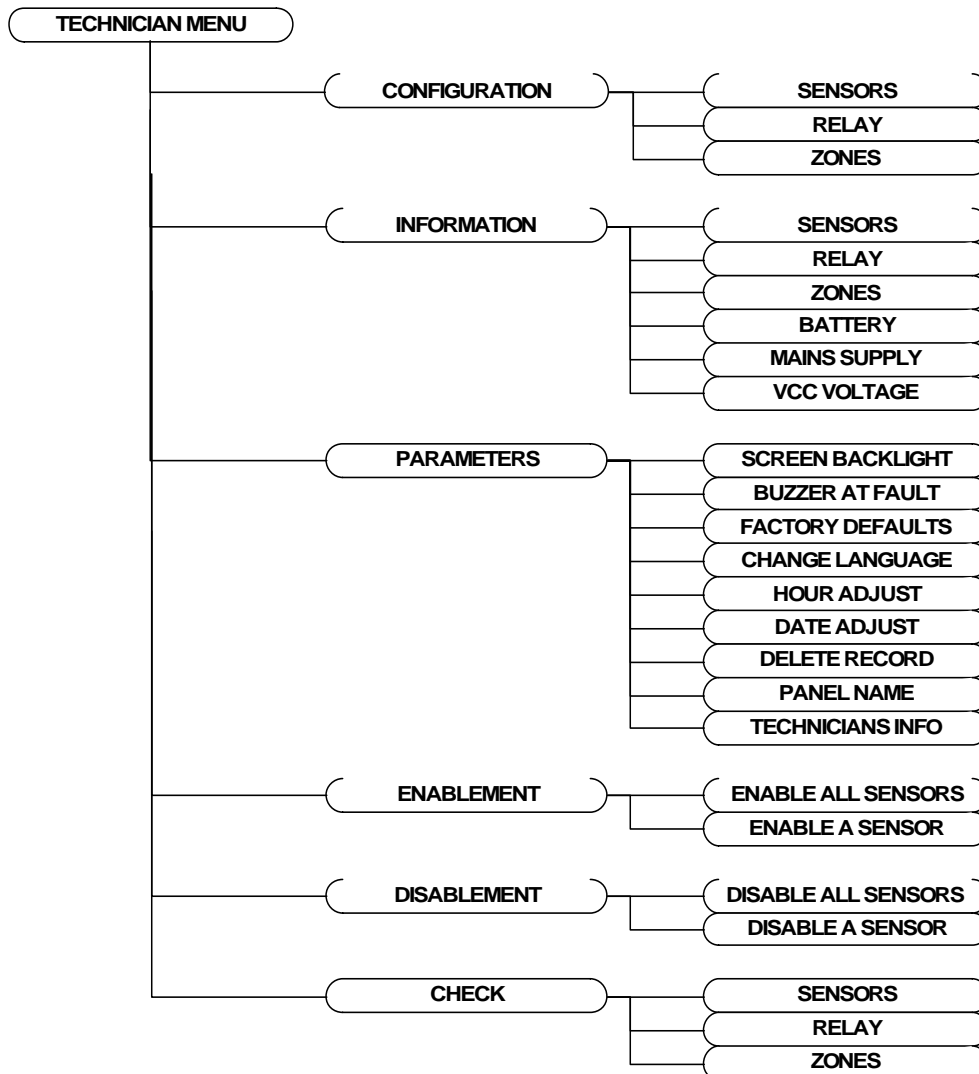


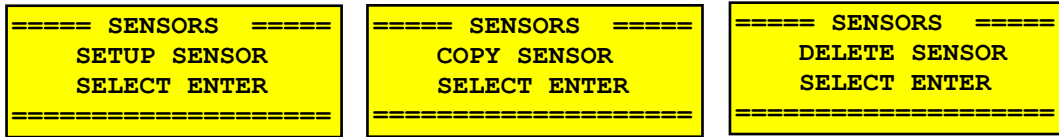
Figure 8: Technician menu

3.2 Configuration

In the configuration menu the technician can configure the sensors, the relays and the zones.

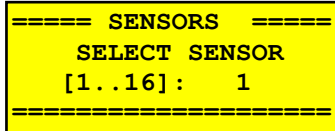
3.2.1 Sensor configuration

The available options in the configuration sensor menu, are shown below,



with Setup you can setup a sensor from scratch, with Copy you can copy the setup from one sensor to another and with Delete you can delete the setup of a sensor.

If you choose the setup a sensor the next screen is shown:



where you can choose which sensor you want to setup.

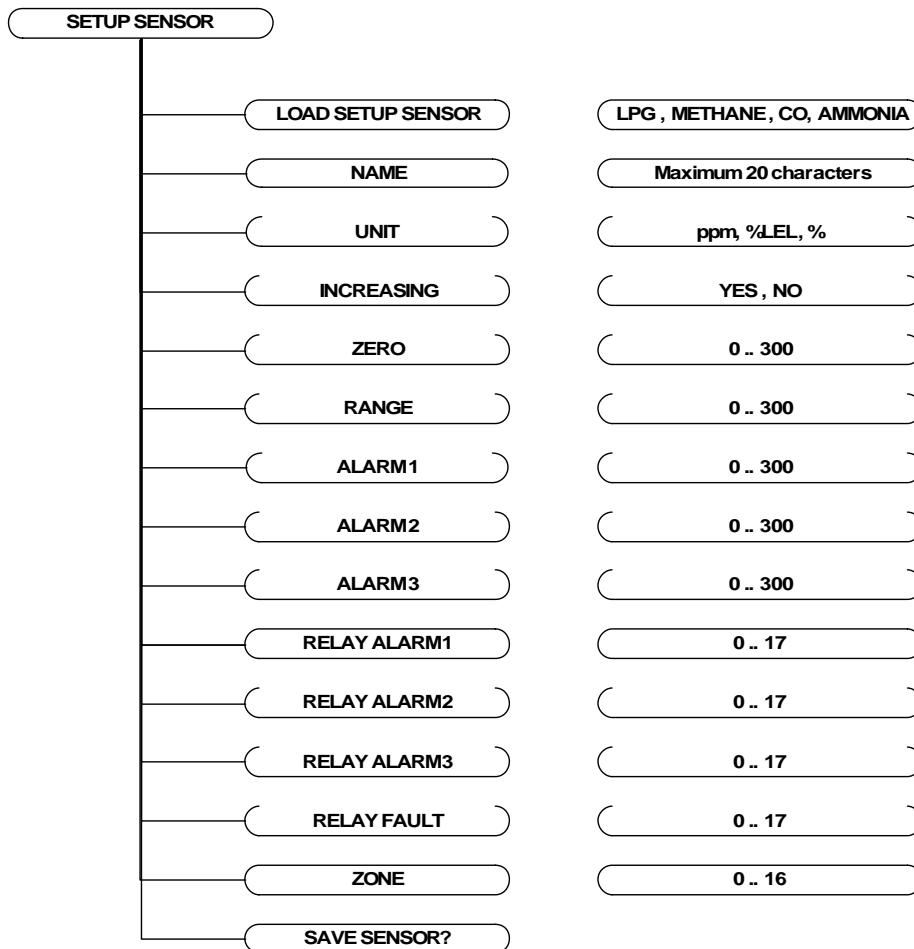


Figure 9: Menu to setup a sensor

The above picture shows the menu to setup a sensor. With the help of the first selection “LOAD SETUP SENSOR” the defaults values are loaded to the variables of the sensor.

The variables above are:

NAME: the name of the sensor. You can put up to 20 characters.

UNIT: Units to meter the gas. There are two kinds of units in ppm or %LIE or %.

INCREASING: if the value is increasing or decreasing.

ZERO: Minimum (start up of scale). Default is 0.

RANGE: Maximum (maximum value of scale). The value range is from 20 to 300.

ALARM 1: Alarm 1 level.

ALARM 2: Alarm 2 level.

ALARM 3: Alarm 3 level.

RELAY ALARM 1: the relay that will be activated when there is an Alarm 1 level at the sensor.

RELAY ALARM 2: the relay that will be activated when there is an Alarm 2 level at the sensor.

RELAY ALARM 3: the relay that will be activated when there is an Alarm 3 level at the sensor.

RELAY FAULT: the relay that will be activated when there is a fault at the sensor.

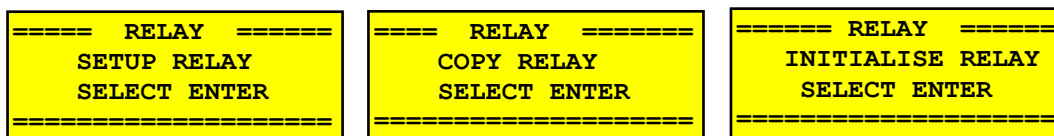
ZONE: the zone of the sensor.

At next table we can see some typical values.

Type	Gas	Zero	Limit	Unit	Alarm 1	Alarm 2	Alarm 3
BS-380	LPG	0	20	%LIE	7	10	20
BS-381	Methane gas	0	20	%LIE	6	10	20
BS-382	Carbon Monoxide	0	300	ppm	25:50	100	200
BS-383	Ammonia	0	300	ppm	10	20	50:100
BS-390	LPG	0	20	%LIE	7	10	20
BS-391	Methane gas	0	20	%LIE	6	10	20
BS-393	Ammonia	0	300	ppm	10	20	50:100

3.2.2 Relay programming

All the relays of panel are programmable for connecting any application. The relay programming options in the configuration of relay menu are shown below,



with Setup you can setup the relay from scratch, with Copy you can copy the setup from one relay to another, and with Initialise you can load the default values.

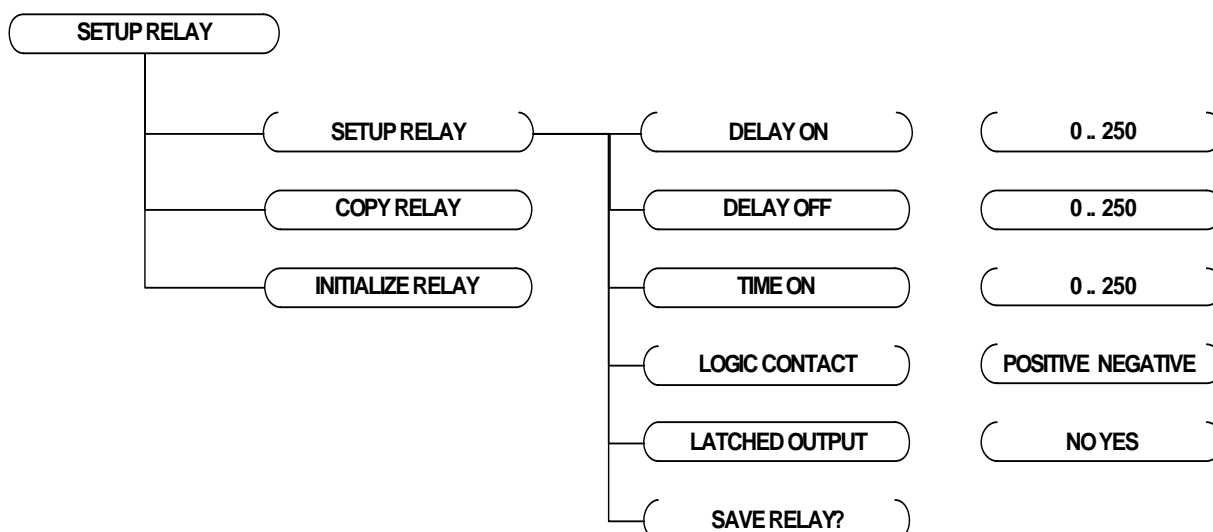


Figure 10: Diagram menu setup relay

The above diagram shows the menu for the configuration of a relay:

The parameters are:

DELAY ON : it is the delay time (max 250 seconds) of the output activation from the moment when the gas concentration is in the alarm setting.

DELAY OFF : it is the delay time (max 250 seconds) of the output deactivation from the moment when the gas concentration returns under the alarm setting.

TIME ON : it is the maximum time (max 250 seconds) of the output activation when the sensor is in an alarm condition. After this time the relay is deactivated.

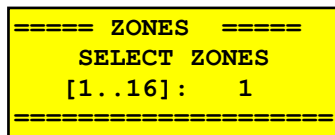
LOGIC CONTACT: it indicates if the relay works normally activated (Positive Logic) (NC) or normally deactivated (Negative Logic) (NO).

LATCHED OUTPUT: it indicates if you want to keep the output active even if the gas concentration returns under the alarm setting.

3.2.3 Zones configuration

Zones configuration is a useful procedure to unify the procedures when a sensor is activated. When some sensors belong to the same zone they activate the same relays, as the zone configuration indicates.

This menu is used for the configuration of the zone. First you must choose which zone you want to change



Below is the zone menu

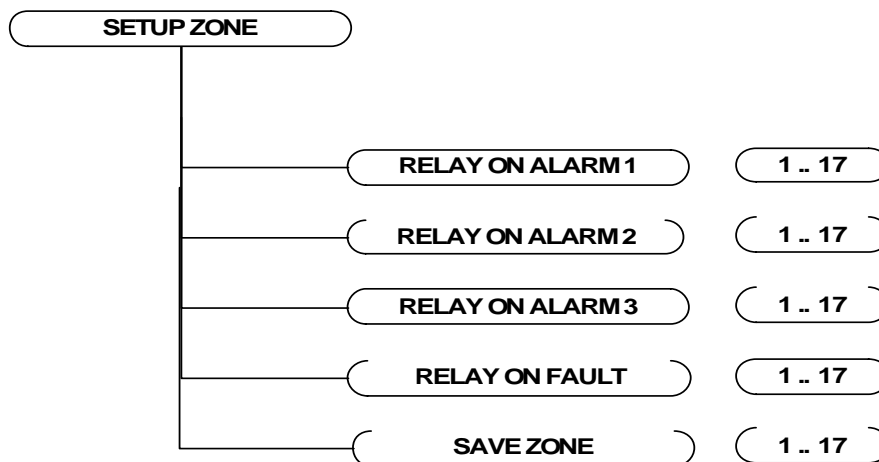


Figure 11: Diagram menu of the zone configuration.

3.3 Information menu

From this selection the technician can be informed for all the system. The below diagram shows the menu

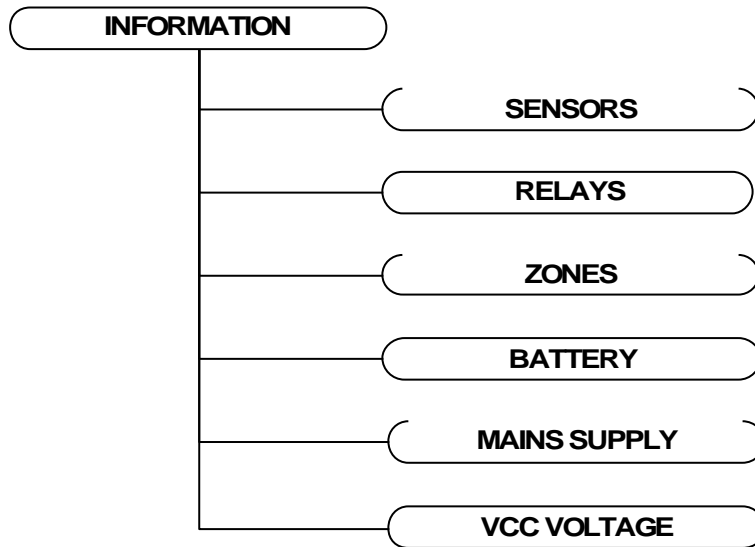


Figure 12: Information menu

- An example of the information of a sensor screen are

```

4:  FAULT -
      I =  2.0 mA
LPG FLOOR 1
=====
  
```

```

4: Z=0  R=20  (+)
A1= 7  A2= 10  A3= 20
O1= 1  O2= 2  O3 = 3
OF= 4  ZONE = 0
  
```

The above left screen shows the number of the sensor, the condition (FAULT -), the current consumption and the name of the sensor.

The right screen shows the ZERO, RANGE, ALARM1, ALARM2,ALARM3, RELAY ON ALARM1, RELAY ON ALARM2, RELAY ON ALARM3, RELAY ON FAULT and ZONE respectively.

To change the sensor, use the button “3” or “4”.

- An example of the information relay screen is

```

===== RELAY 2 =====
D0= 10 DF= 40 TO=20
LOGIC = NO
=====
  
```

the above screen shows the delay on, delay off, time on and positive logic respectively
To change the relay, use the button “3” or “4”.

- An example of the information zone screen is

```

===== ZONES 8 =====
O1= 10 O2= 4  O3= 2
OF= 0
=====
  
```

the above screen shows the relay on alarm 1, relay on alarm 2, relay on alarm 3 and relay on fault respectively

To change the relay, use the button “3” or “4”.

- An example of the battery information

```
==== INFORMATION ====  
VOLTAGE OF BATTERY  
IS           12,2V
```

- An example of the main supply information

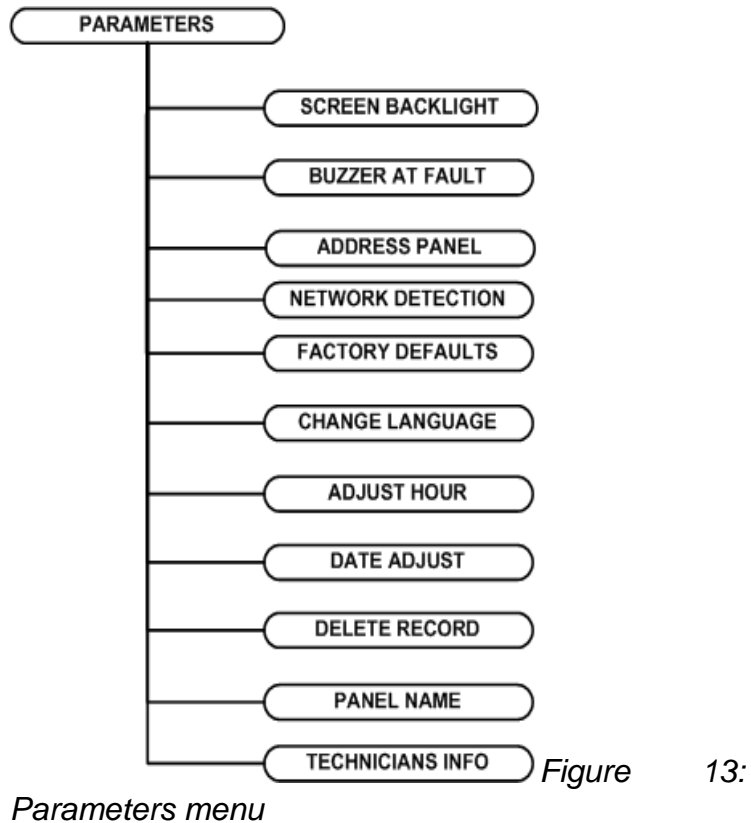
```
==== INFORMATION ====  
MAINS SUPPLY  
IS    GOOD
```

- An example of the VCC voltage

```
==== INFORMATION ====  
VCC VOLTAGE  
IS           24,3V
```

3.4 Parameters menu

The parameters menu is for configuration of the general parameters of the system.



The selections are:

- **SCREEN BACKLIGHT:** “CONTINUOUS” means that the screen panel is lighting continually (this selection reduces the autonomy of the system) “NO CONTINUOUS” means the backlight of the display will be ON when there are events or one button is pressed.
- **BUZZER AT FAULT:** “NO SOUND” no sound if there is a fault only on alarm. “SOUNDS” the panel buzzer sounds on alarms and on faults.
- **ADDRESS PANEL:** we can change the address of the panel

```

==== MODIFICATION ====
ADDRESS PANEL
[0..16]: 1
=====
  
```

If we put address 0 the network is disabled. If the address is the panel is a master panel. If the the address is from 2 to 16 the panel is a subpanel.

- **NETWORK DETECTION:** if the panel is a master panel (address 1) we can make a network detection.

```

PANEL IN NETWORK :
1 2      5
TOTAL ==> 3
  
```

- **FACTORY DEFAULTS:** Load factory defaults to the panel.
- **CHANGE LANGUAGE:** change the language of the screen (Greek or English)
- **ADJUST HOUR :** adjust the time of the panel
- **DATE ADJUST:** adjust the date of the panel.
- **DELETE RECORD :** this option deletes all the recorded events from memory.
- **PANEL NAME:** the name of the panel with a maximum of 20 characters.
- **TECHNICIAN INFO:** change the technician information with a maximum of 20 characters.

3.5 Enable menu

The enable menu is used to enable a sensor or all the sensors:

```

=====
ENABLEMENT
=====
ENABLE ALL SENSORS
SELECT → ENTER
=====

```

```

=====
ENABLEMENT
=====
ENABLE A SENSOR
SELECT → ENTER
=====

```

3.6 Disable menu

The disable menu is used to disable a sensor or all the sensors:

```

=====
DISABLEMENT
=====
DISABLE ALL SENSORS
SELECT → ENTER
=====

```

```

=====
DISABLEMENT
=====
DISABLE A SENSOR
SELECT → ENTER
=====

```

3.7 Check menu

This menu is used to check the hardware of the panel

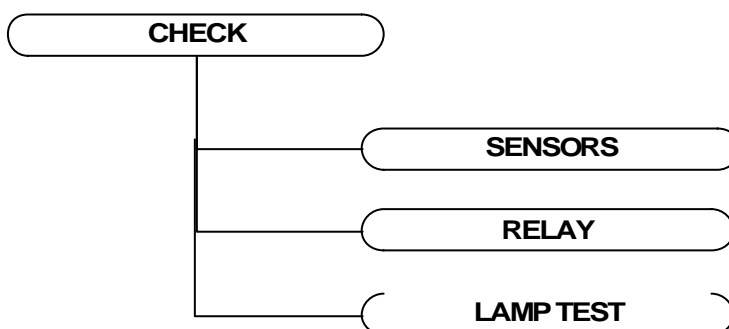


Figure 14: Check menu

- On Check sensors the below screen appears

```

=====
1: I= 5,0 mA
2: I= 11,1 mA
3: I= 4,3 mA
4: I= 4,0 mA
=====

```

to see the other sensors press “3” or “4”

- The screen to check the relay is

```

=====
CHECK
=====
RELAY 1
STATUS ACTIVE
=====

```

To change the relay press button “3” or “4”. To change the status press button “ENTER”.

- With lamp test you can test all the LEDs and LCD backlight for correct operation.

3.8 Useful notes to setup the panel BS-316

For the correct mounting and setup of the panel BS-316, the user must do some basic steps:

- 1) First of all, the technician has to design the schematic which includes the way of installation of the panel and the devices, the length of the cable and the point where the device is connected. This diagram will be useful for the fault detection (short-circuits, alarms and faults).
- 2) The user disables all the system.

- 3) Next the user configures the sensors and the inputs.
- 4) When finished the user enables the inputs that are required.
- 5) The panel must be isolated from the main power supply when we install the sensors. After all connections are finished, the power to the panel is restored.
- 6) Leave the panel working for about 20 minutes without cutting off the power supply. Check the current of every sensor. The current must not be over 4mA. If it isn't, wait about 1 hour and then re-check. If the current of the sensor is not about 4mA, then perhaps the sensor needs setup.
- 7) If there is one short circuit in the power supply of a sensor (terminals +,-) for a moment, the panel shows a fault. To clear the fault first we have to correct the short circuit and then to reset the panel via the keyboard.

In case there is a fault you must check point to point, which is out of communication.

4 Technical Characteristics

	BS-316 Gas detection control panel up to 16 inputs
Power Supply	220-240V AC / 50-60Hz
Consumption	60VA
Battery type	12V / 7Ah Pb or 2X12V/7Ah
Charge Circuit	Power supply 13.8V / 500mA
Outputs	17 programmable relays (5A/230VAC), Standard output 20V/300mA
Wrap protection class	IP 40
Operating temperature range	0 to 40 °C
Humidity	Up to 95% humidity
Dimensions	445 x 345 x 95 mm
Weight	6160 gr
Produced by	EN 50057, EN 60335, EN 61000-3-2, EN 61000-3-3
Warranty	2 years

4.1 Record Setup

We suggest completing the next tables for your setup and keep them for future reference.

Title :

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Sensor's Model																
ZERO																
RANGE																
UNIT																
Alarm 1																
OUTPUT 1																
Alarm 2																
OUTPUT 2																
Alarm 3																
OUTPUT 3																

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DELAY ON																
DELAY OFF																
TIME ON																
POSITIVE (YES/NO)																
LATCHED																

Notes

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Operator Code 1 1 1 1 Technicians Code 2 3 3 3