SIEMENS

CENTRALIZED SYSTEM FOR GAS LEAK DETECTION IN INDUSTRIAL ENVIRONMENTS

LYC40

USER MANUAL

TABLE OF CONTENTS

WARNING:

The installation of a gas leak detection system for methane or liquid petroleum gas (LPG) does not exempt from the compliance to the safety rules and to all the laws in force concerning the installation and use of gas equipment, for ventilation of the rooms and for the discharge of flue gases.
The installation, the periodic inspections or the substitution of the devices must be done by qualified technicians.

1 GENERAL INFORMATION

Before describing the LYC40, some information about general characteristics of gases and installation criteria of gas detection systems.
Reading this chapter is not indispensable for installation and commissioning of the system. People who already know the argument can skip this chapter.

1.1 Meaning of Symbols

The symbols used in this manuals have the following meaning:

1. ppm: Parts Per Million gas
2. LEL%: Lower Explosivity Limit
3. VOL%: gas percentage by unit of volume
4. S: Sensor
5. RM: Relay Module (LZY40)
6. DM: Display Module (LZD40)
7. s: switch threshold
8. Pa: pre-alarm threshold
9. 1T: first alarm threshold
10. 2T: second alarm threshold

1.2 Gas degree of risk

Risk conditions for gases and combustible vapors start from a threshold called “Lower Explosivity Limit” (LEL) that represents the minimum gas concentration value beyond which, in case there is a primer, the mixture explodes. This values varies from a gas to another. The following table lists LEL values for the most common gases.

	LEL (100%)	
GAS TYPE	**ppm**	**VOL%**
METHANE (CH4)	50.000	5%
ISOBUTANE (iso-C4H10)	18.000	1,8%
BUTANE (C4H10)	18.600	1,86%
LPG MIXTURE	19.000	1,9%
HYDROGEN (H2)	40.000	4%

Table 1.1

As to toxic gases, like carbon monoxide (CO), the risk level is to be considered in relation with personal exposition time in the polluted environment.
Alarm thresholds of methane and LPG detectors varies from 5% to 50% LEL while for carbon monoxide varies from 5 to 500ppm.
The following table shows the risks from exposition to carbon monoxide (CO). The carbon monoxide is generates everywhere there is a combustion process and is quickly absorbed by the lungs diffusing in the capillary alveolar membrane and is irreversibly bound with the hemoglobin as “carboxilhemoglobin” (COHb). Moreover, it is colorless and odorless, therefore one cannot realize naturally it is present. For this purpose dedicated detectors are necessary.

These effects on health of COHb in the blood of sane adults are recognized.

% COHb	EFFECTS
0.3-0.7	Normal rate in non smokers due to internal production of CO
0.7- 2.9	Physical troubles, not detectable
2.9-4.5	Heart troubles in patients affected by heart disease
4-6	Usual values for smokers, problems in psychomotor tests
7-10	Troubles in patients not affected by heart disease (increase in heart throughput and blood flow in coronaries)
10-20	Light headache, weakness, possible effects on the fetus
20-30	Heavy headache, nausea, reduction in hand motion capacity
30-40	Heavy headache, irritability, confusion, reduction of sight capacity, nausea, muscular weakness, dizziness
40-50	Convulsion and state of unconsciousness
60-70	Coma, collapse, death

Table 1.2

Similar tables and a wide literature on this subject are available. The publication “Air quality for CO” by the US Health, Education and Welfare department, deals with sight capacity decrease with 3% COHb and other psychomotor tests with 5% COHb.

More recently a reduction of motion capacity in people exposed to a dose of 100 ppm for one hour has been demonstrated.

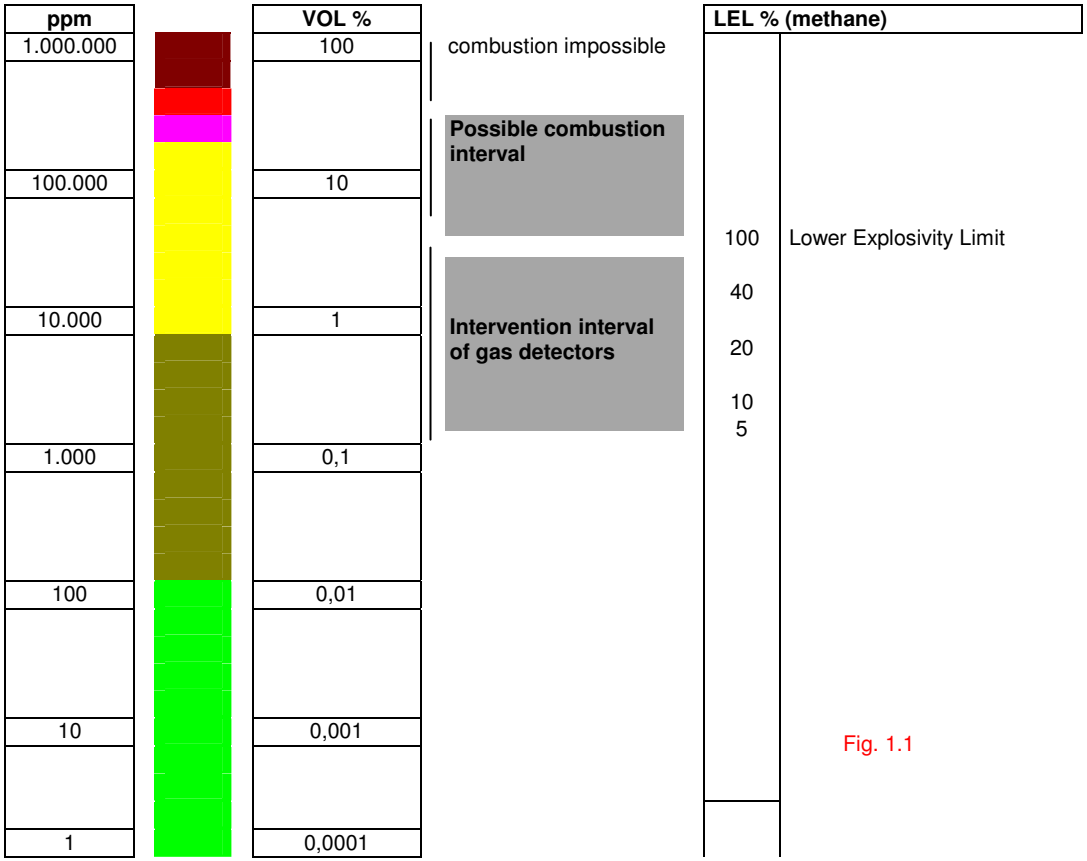

ppm
VOL %
LEL % (methane)
1.000.000
100
combustion impossible
Possible combustion interval
100.000
10
100
Lower Explosivity Limit
40
10.000
1
20
Intervention interval of gas detectors
10
5
1.000
0,1
100
0,01
10
0,001
1
0,0001

Fig. 1.1

2 SYSTEM DESCRIPTION

The system is set up by a Central Unit LYC40 and some peripherals communicating each other through a common line (BUS) and a dedicated protocol PYC40.

Each Central Unit has its own, factory defined, ID code.
These types of peripherals are available:

1. Relay Module (LZY40)
2. Display Module (LZD40)
3. Sensors QA . . 40 . . — For complete list of sensors please refer to table at page 86

- Type of sensor
  - G= methane
  - P= LPG
  - O= carbon monoxide
  - B= gasoline vapors
- P= catalytic professional sensor (Pellistor)
- S= catalytic standard sensor
- E= EExdIIC T6 housing
- S= IP55 housing

In normal operating conditions the Central Unit receives information about measurements from the sensors, for which three switching thresholds and a fault condition are defined:

1. pre-alarm: Pa
2. first alarm threshold: 1T
3. second alarm threshold: 2T
4. failure: FA

Figure 2.1 available sensor types.

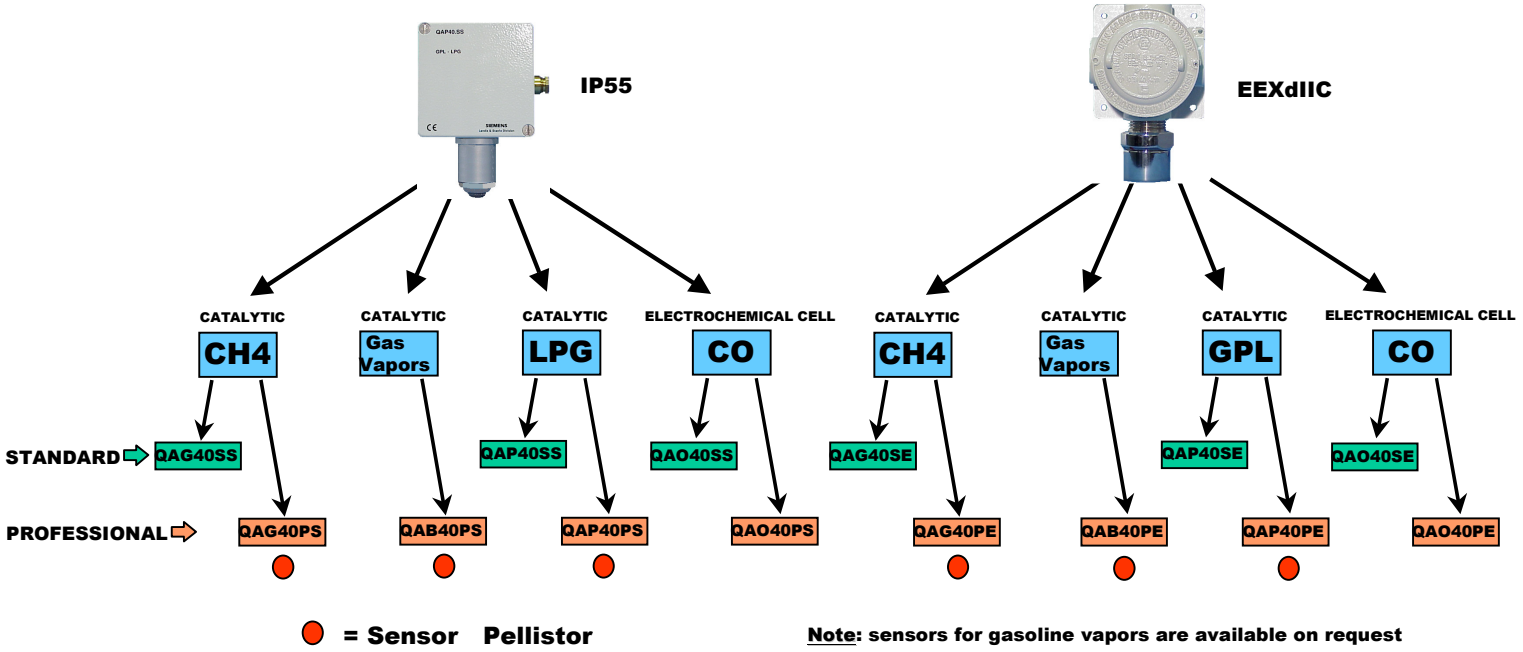


Fig. 2.1

If the gas concentration exceeds these thresholds (Pa, 1T, 2T), the Central Unit sends a command to the Relay Modules LZY40 associated to activate the correspondent alarm relay.
The Central Unit transfers the alarm information also to associated Display Modules.

The maximum number of peripherals that can be connected to each Central Unit is 99. As number of peripherals we mean the total amount of sensors, Relay Modules and Display Modules. These latter cannot be more than 16.

3 INSTALLATION

3.1 Installation of Central Unit LYC 40

The case has four flexible supports for front panel mounting (fig. 3.2). The supporting panel should have a thickness of 1.5 to 6 mm and the Central Unit is secured by pressure (from outside to inside of the panel).
Needed tools: No. 1 flat head, medium size screwdriver

Act as follows:

1 Make an opening of 234 x 138 mm on the panel front side
2 Insert the Central Unit in this opening and push it until the hooks perfectly fit in the panel. The Central Unit is to be securely fit
3 Remove the plastic covers on the cable entrance point using a screwdriver.
4 Check that the control panel conditions meet with temperature and humidity installation requirements (see technical data).

In case the internal power supply is used, it is advisable to remove all the plastic covers on cable in holes in order to facilitate an air cooling flow.

Flexible supports for front panel mounting

Fig. 3.1

Opening to be made on front panel for securing the LYC40

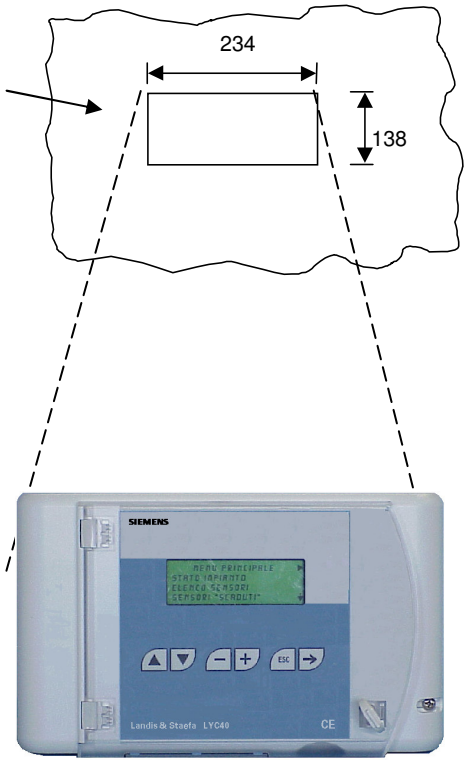


Fig. 3.2

3.2 Sensor installation

The sensors should be installed at different heights, in accordance with the type of gas to be detected (see fig. 3.3).

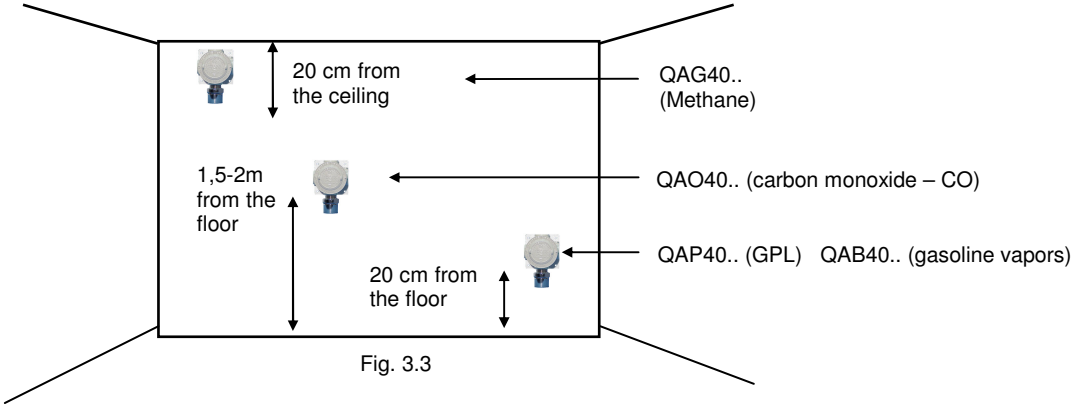


Fig. 3.3

For sensor positioning follow these general rules:

1. at 20 cm from the floor for gases heavier than air (LPG)
2. at 20 cm from the ceiling for gases lighter than air (Methane)
3. at medium height (1.5 - 2m) for gases as heavy as air (carbon monoxide - CO)

The sensor can be only installed on a wall using some plugs and screws. Sensor orientation is always downwards.

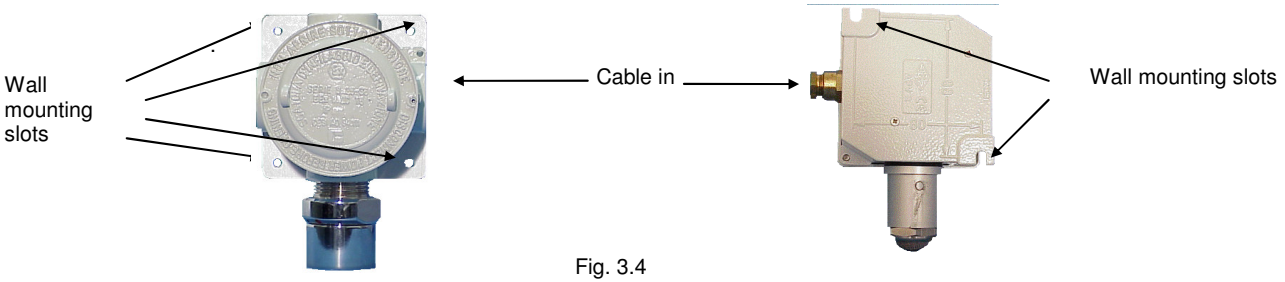


Fig. 3.4

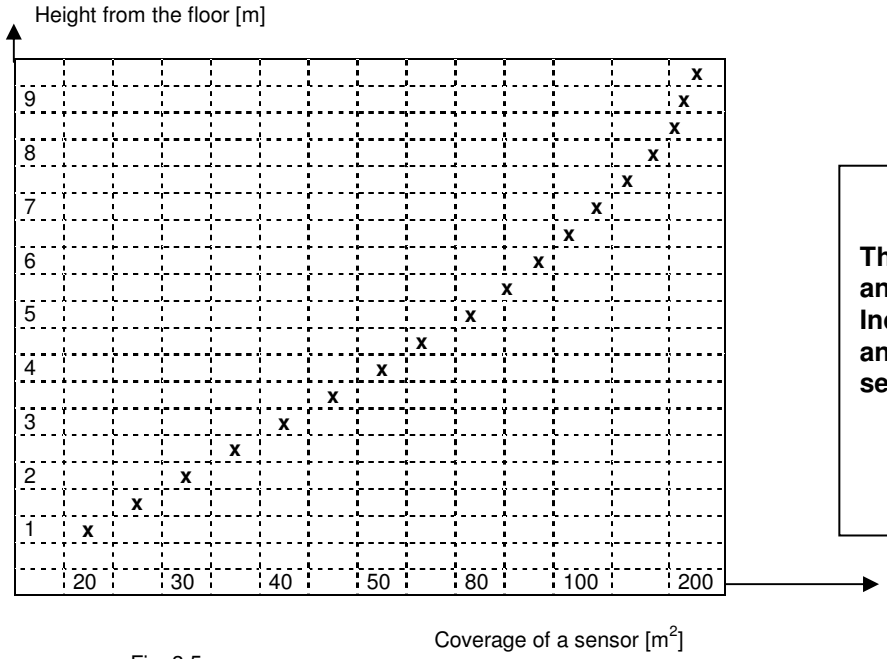
For cable entrance in EExdIIC sensors use an explosion proof cable stretcher. Using other cable stretchers would declass the installation degree.

To assure a correct plant operation, sensor positioning is to be made considering the following **installation rules**, besides the general rules listed above:

The sensor is to be mounted:

1. close to possible gas leak points
2. at least at 1.5 m from heat sources
3. never in bad ventilated areas where gas pockets may take place
4. at least at 1.5 m from vent openings
5. far from any hindrance to natural gas flow
6. in rooms where air temperature is within 0°C and 50°C and relative humidity is less than 90% non condensing

The number of sensors to be installed in order to obtain a correct coverage of a room is proportional to its surface area and its height. Given the many variables affecting this parameter (see installation rules) the following graph should be considered as a simple help and **not as AN INSTALLATION RULE**



WARNING

This graph indicates simple units and gives indicative information. Indicates the volume (floor area and ceiling height) covered by a sensor

Fig. 3.5

3.3 Installation of Relay Modules and Display Modules

Relay Modules (MR) are called LZY40 and Display Modules (MD) are called LZD40; they can be mounted both on a supporting guide and on a wall.

3.3.1 Installation on supporting guide EN 50.022

Needed tools: No. 1 medium-small size flat head screwdriver

Set and secure horizontally a supporting guide long not less than 100mm and lean the module to the upper end of the guide. Then, slowly but firmly, push down until you hear the spring click against the lower guide end (see figures 3.6 and 3.7).

Fig. 3.6

Fig. 3.7

To disengage the sensors from a guide pry with a small screwdriver in the special opening inside the case (fig. 3.8 and 3.9) .
The cables should enter through the special opening in the case lower side. These openings are closed by some plastic covers to be removed with a screwdriver. Pay attention not to damage the electronics.

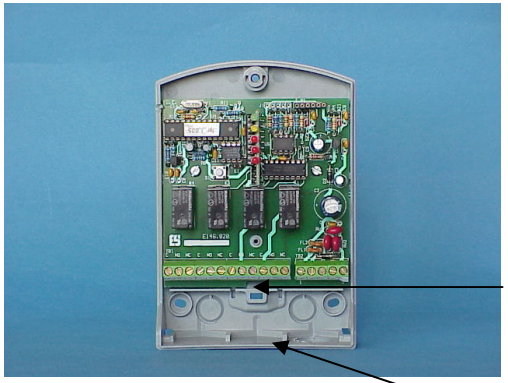


Fig. 3.8

Pry with a screwdriver to disengage the device.

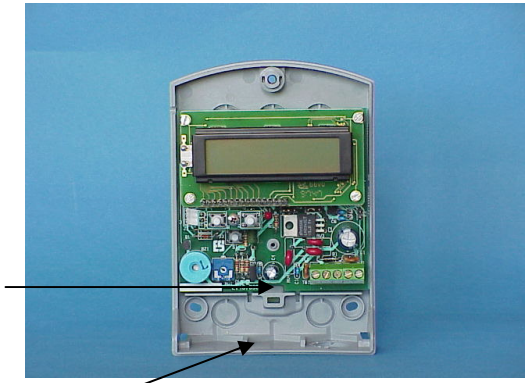


Fig. 3.9

Cable in

3.3.2 Wall mounting

Needed tools:

1. No.1 small-medium size crosshead screwdriver
2. No.3 wall plugs, 6mm dia.
3. No.3 screws for wall plugs 6mm
4. No.1 drill
5. No.1 wall drill bit 6mm

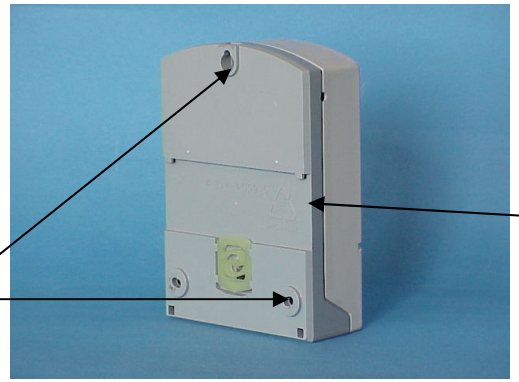


Fig. 3.10

Three wall holes in correspondence with the three holes on the case back side. The higher one is slot shaped; the lower ones are to used after the upper screw has been securely fastened.

3.4 Numbering of peripherals

After installation number all the peripherals as follows:

1. Fit a label to each sensor in a visible position, and write on it a progressive ID number from 1 through N where N is the number of installed sensors. Any numbering criterion can be adopted (for example, you can group the sensors by type, or by area, or by any other way) fig 3.13.
2. Use the same numbering system both for Relay Modules (LZY40) and Display Modules (LZD40). In both cases, like for the sensors, numbering starts from 1 (see figures 3.11 and 3.12).

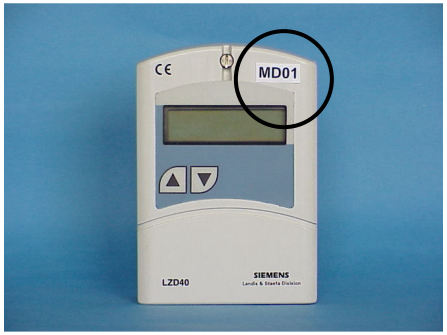


Fig. 3.11

Fig. 3.12

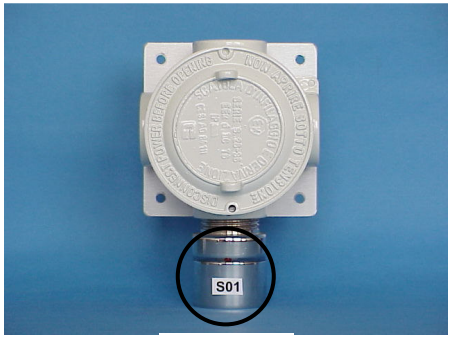


Fig. 3.13

The following table can be filled in with all of the data listed above. For wide plants it could not be sufficient, ad should be expanded.

PLANT CONFIGURATION and ELEMENT NUMBERING							
SENSORS							
Number	Type of detected gas	Sensor location		Number	Type of detected gas	Sensor location	
1				7			
2				8			
3				9			
4				10			
5				11			
6				12			
RELAY MODULES							
Number	Relay Module location	Associated sensors	Relay outputs	Number	Relay Module location	Associated sensors	Relay outputs
1			Pa	3			Pa
			1T				1T
			2T				2T
			FA				FA
Number	Relay Module location	Associated sensors	Relay outputs	Number	Relay Module location	Associated sensors	Relay outputs
2			Pa	4			Pa
			1T				1T
			2T				2T
			FA				FA
DISPLAY MODULES							
Number	Display Module location		Associated sensors	Number	Display Module location		Associated sensors
1				3			
2				4			

Table 3.1

With reference to the plant shown in Fig. 4.14 this is an example of filling of table 3.1

PLANT CONFIGURATION and ELEMENT NUMBERING							
SENSORS							
Number	Type of detected gas	Sensor location		Number	Type of detected gas	Sensor location	
1	METHANE	ROOM 1 BOILER 1		7			
2	METHANE	ROOM 1 BOILER 2		8			
3	METHANE	ROOM 1 BOILER 3		9			
4	CARBON MONOXIDE	ROOM 1 AT CENTER		10			
5				11			
6				12			
RELAY MODULES							
Number	Relay Module location	Associated sensors	Relay outputs		Number	Relay Module location	Associated sensors	Relay outputs	
1	ROOM 1	1,4	Pa	LAMP 1	3	ROOM 1	3,4	Pa	LAMP 3
			1T	VALVE 1				1T	VALVE 3
			2T	MAIN VALVE				2T	MAIN VALVE
			FA					FA	
Number	Relay Module location	Associated sensors	Relay outputs		Number	Relay Module location	Associated sensors	Relay outputs	
2	ROOM 1	2,4	Pa	LAMP 2	4			Pa	
			1T	VALVE 2				1T	
			2T	MAIN VALVE				2T	
			FA					FA	
DISPLAY MODULES									
Number	Display Module location		Associated sensors		Number	Display Module location		Associated sensors	
1	ROOM 1 ENTRANCE		1,2,3,4		3				
2					4				

Table 3.2

4 WIRING

After installing the Central Unit and peripherals and filling the table 3.1, carry out the required wiring. This operation is to be made by skilled personnel, and complying with local safety regulations.

Further observe these minimal rules for a correct plant operation:

1. Power cable can be placed together with other existing cables, provided they are not a high frequency line;
2. The communications BUS is to be placed in a dedicated or double metal housing, and far enough from power cables and high frequency lines.
3. The shield should be grounded or connected to power negative 12V- (selected by internal jumper). Any grounding should be made on an end only and close to the power supply, while connection of the next sections is shown in Fig. 4.3

Note: maximum allowable length for communications BUS is 1000m.

4.1 Cable types

1. **Power cable**: use flameproof cable N07VK of cross section suitable for the loads connected to the Central Unit (see table 4.1). We suggest not to exceed 3A/mm² current density.
2. **Communications BUS**: BUS connections should be made using a shielded twisted pair with features equivalent to Belden cables type 9841 or 3105A.

TYPE	N° OF PAIRS	RESISTANCE IN DC		NOMINAL IMPEDANCE Ω	NOMINAL CAPACITY		AWG	
		LEADS Ω/Km	SHIELD Ω/Km		BETWEEN LEADS pF/m	LEAD/SHIELD pF/m		
BELDEN 9841	1	78.7	11.0	120	42.0	75.5	24	
BELDEN 3105A	1	48.2	9.5	120	36.1	65.5	22	

Communication bus structure

- Maximum length of BUS line should not exceed 1000 m
- Maximum distance for BUS connection between branch point and Peripheral should not exceed 8 m
- Connection line should be unique and peripherals are to be connected to it. No braches are allowed.
- BUS cable shield is to be grounded on one point only (eg near to Central unit). A further grounding along the line would not assure cable shield equipotential.
- Shield of the BUS cable portion between branch and peripheral should be connected, through terminal box, to main BUS line shield.
- On the last peripheral, and only on it, is to be closed BUS termination Jumper (fig 4.4).

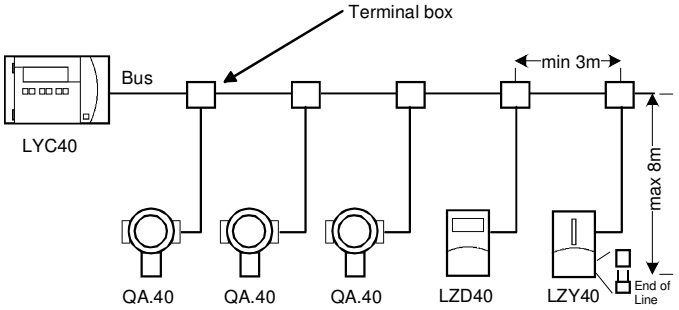


Fig 4.1 CORRECT WIRING

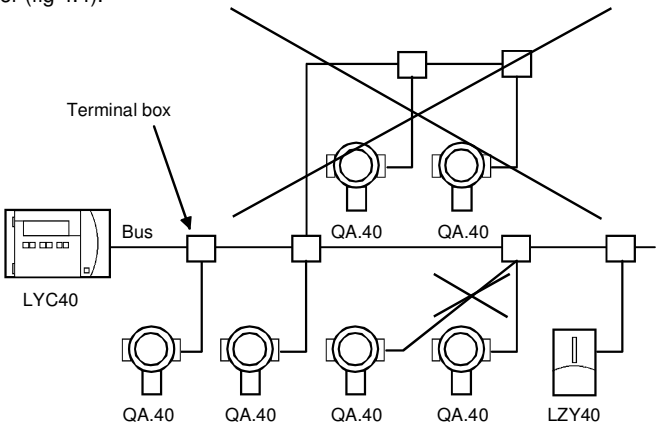


Fig 4.2 WRONG WIRING

Figure. 4.3 shows a possible layout of the terminal box.

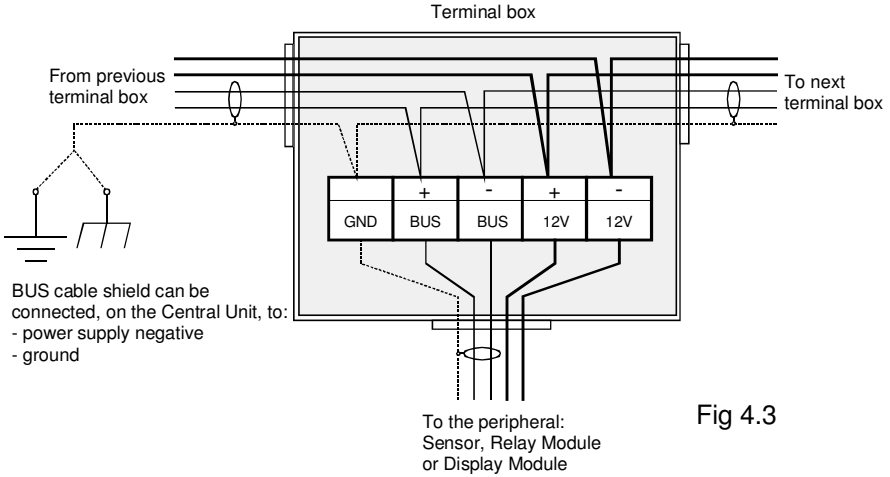


Fig 4.3

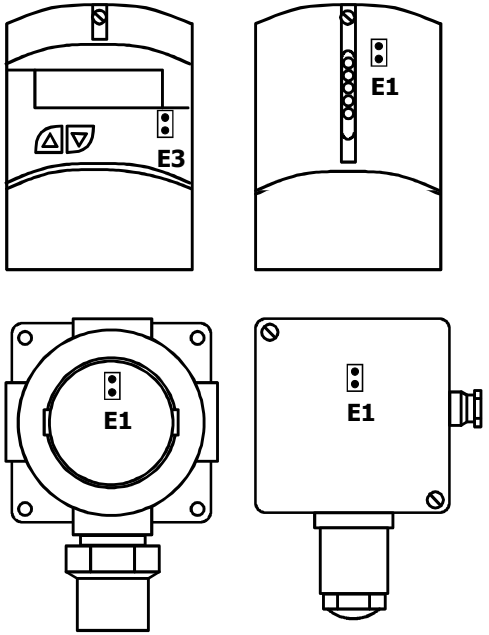


Fig 4.4

End of line Jumper on the peripherals

4.2 Cable sizing and consumption

The calculation of consumption of each peripheral, added to those of other loads powered at 12V (valves, hooters, blinkers, etc.), is fundamental to decide how the plant must be supplied.

In particular, if the sum of consumptions is lower than 30W+/- 1W it is possible to supply the plant directly from the Central Unit. On the contrary an external supply through an UPS (Uninterruptible Power Service) is needed.

Power and current of each peripheral and some loads are listed in the following table:

LOAD	POWER Watt	CURRENT Ampere	LOAD	POWER Watt	CURRENT Ampere
LYC40 Electronics	6	0,5	Solenoid valve	12	1
LZY40	2.5	0.208	12V 6Ah BATTERY	7	0.583
LZD40	2	0.166			
QAG40SS QAP40SS QAG40SE QAP40SE	1.6	0.133	QAO40SS QAO40SE	0.7	0.058
QAG40PS QAP40PS QAG40PE QAP40PE	1.5	0.125	QAO40PS QAO40PE	0.6	0.05
ACOUSTIC SIGNAL	4	0.333	SIGNAL LAMP	2	0.166

Table 4.1

Total power calculation is made as follows:

P (total)= P1+P2+P3+…….Pn (Watt)
Current(total)= P(total)/12….(Ampere)

The power cable cross section is calculated with the following formula, rounded to the next existing cross section value.
In any case the minimum section should not be lower than 2.5 mm²

Cable section = Current(total) / 3 (mm²)

If, for example, we consider the plant in Fig. 4.13 equipped with:

1. three methane sensors
2. one carbon monoxide sensor
3. one Relay Module
4. solenoid valve
5. hooter
6. signal lamp
7. battery

Absorbed power are shown in table 4.2

CONSUMPTION	Qty.	UNIT POWER	TOTAL POWER	TOTAL CURRENT
Sensor QAG40SS	3	1.6W	4.8W	0.4
Sensor QAO40SS	1	0.7W	0.7W	0.058
Relay Module LZY40	1	2.5W	2.5W	0.208
Solenoid valve	1	12W	12W	1
Hooter	1	2W	2W	0.166
Signal lamp	1	2W	2W	0.166
Battery	1	7W	7W	0.583
TOTAL			**31W**	**2.581**

Table 4.2

The power cable cross section is:

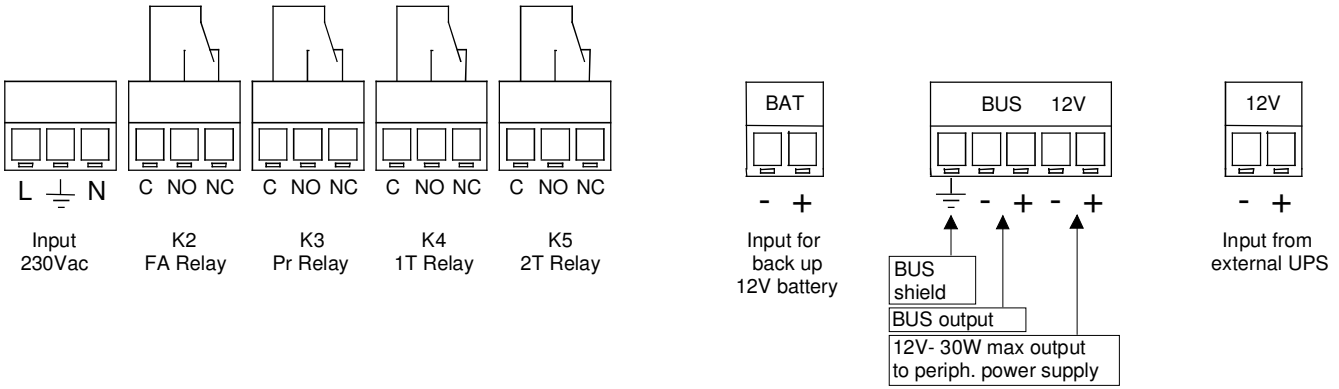
S= 2,581/3= 0,860; since the calculated value is lower than 2.5mm², we choose 2.5mm² leads anyway

4.3 Terminal box recognition

All the terminal boxes clearly show both power and BUS terminal polarity. Never change polarity.

4.3.1 Central Unit terminal boxes

Terminal box layout on the Central Unit is shown below:



Note: the FA relay on Central Unit energizes in case of fault of any peripheral (sensors and/or Relay-Display Modules).

4.3.2 Sensor terminal box

Figures. 4.6, 4.7 and 4.8 show terminal box layout for the two sensor types

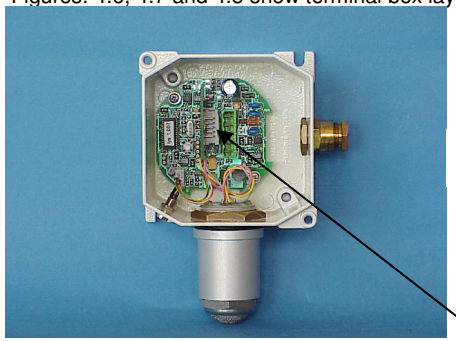


Fig. 4.7

Terminal boxes

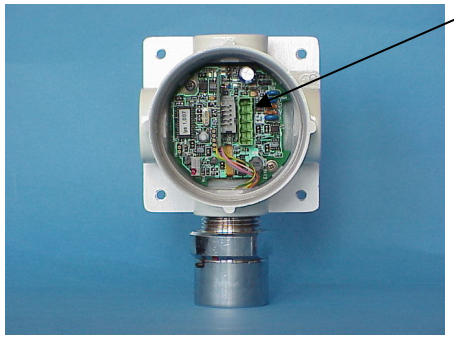


Fig. 4.8

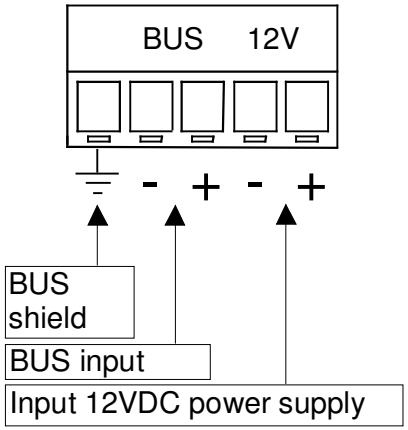


Fig. 4.6

4.3.3 Display Module terminal box

The Display Module terminal box is shown in figures. 4.9 and 4.10

Fig. 4.9

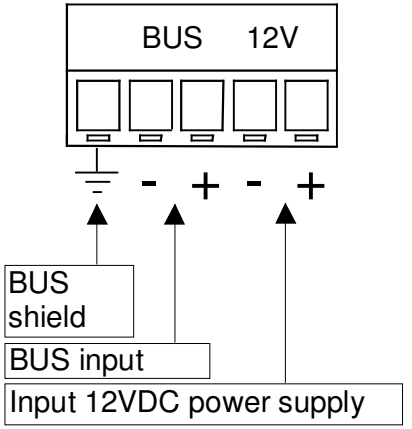


Fig. 4.10

4.3.4 Relay Module terminal box

The Relay Module terminal box is shown in figures 4.11 and 4.12

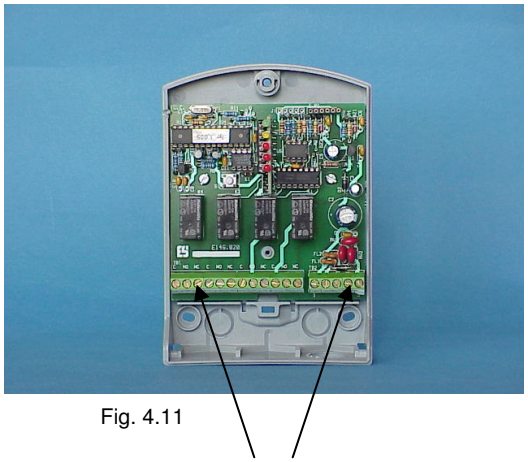


Fig. 4.11

Relay Module terminal boxes

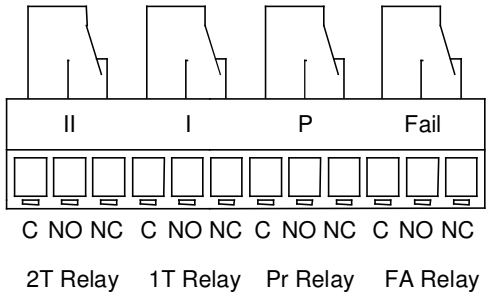
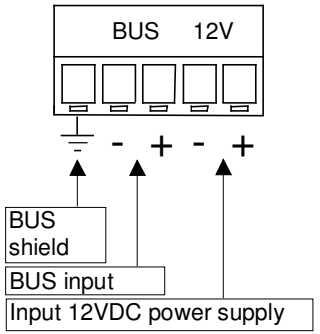


Fig. 4.12



Note The module FA relay energizes only in case of electrical fault of the same module and not if an associated sensor fails.

4.4 Plant structure

Central Unit LYC40 can supply external loads up to power 30W ±1W. Over this limit an external UPS is required. In the first case we have a “basic structure”, in the second case we have an “extended structure”

4.4.1 Basic structure

Fig. 4.13 shows a possible application for a basic structure equipped with three methane sensors, one carbon monoxide sensor, one Relay Module, one alarm hooter, one solenoid valve for gas cut-off and one signal lamp.

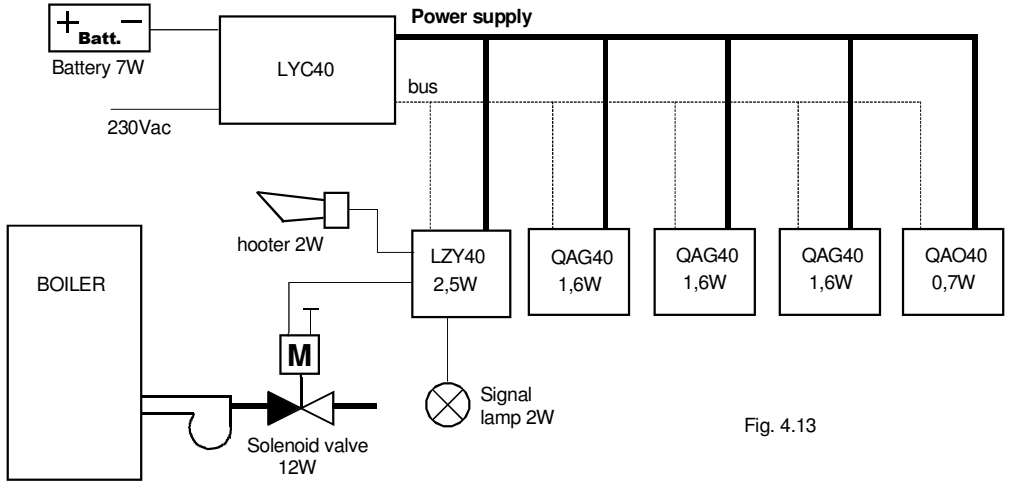


Fig. 4.13

Wiring between Central Unit and peripherals should be made as shown in figures 4.1 and 4.3, power and communications cable should be connected as indicated in terminal box figures.

With reference to table 4.1, the next example shows the total power calculation.

CONSUMPTION	Qty.	UNIT POWER	TOTAL POWER	TOTAL CURRENT
Sensor QAG40SS	3	1,6W	4,8W	0,4
Sensor QAO40SS	1	0,7W	0,7W	0,058
Relay Module LZY40	1	2,5W	2,5W	0,208
Solenoid valve	1	12W	12W	1
Hooter	1	2W	2W	0,166
Signal lamp	1	2W	2W	0,166
Buffer Battery	1	7W	7W	0,583
TOTAL			**31W**	**2,581**

Table 4.3

Power cable cross section will be:

S= 2,581/3= 0,860; since the calculated value is lower than 2.5mm² we choose 2,5mm² leads anyway

4.4.2 Extended structure

When the loads exceed the maximum Central Unit power (30W) fit an UPS. The following example shows a plant with three boilers, each provided with a gas solenoid valve.

Near each boiler there is a methane detector QAG40..: one carbon monoxide detector QAO40.. is sufficient for the whole room. One Display Module is installed at room entrance for status plant control without using the Central Unit.

Each methane detector is associated with a Relay Module that, in case of pre-alarm, feeds an acoustic signal, in case of first alarm threshold closes the solenoid valve associated to the boiler and in case of second threshold alarm closes the main gas valve.

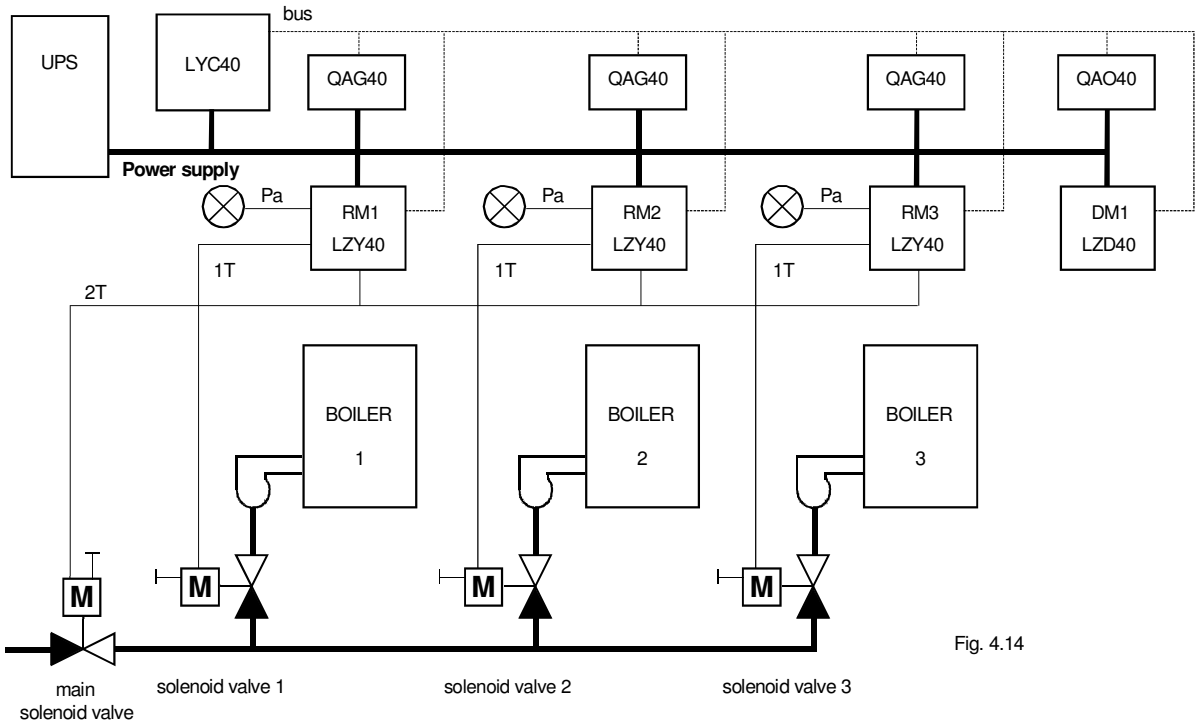
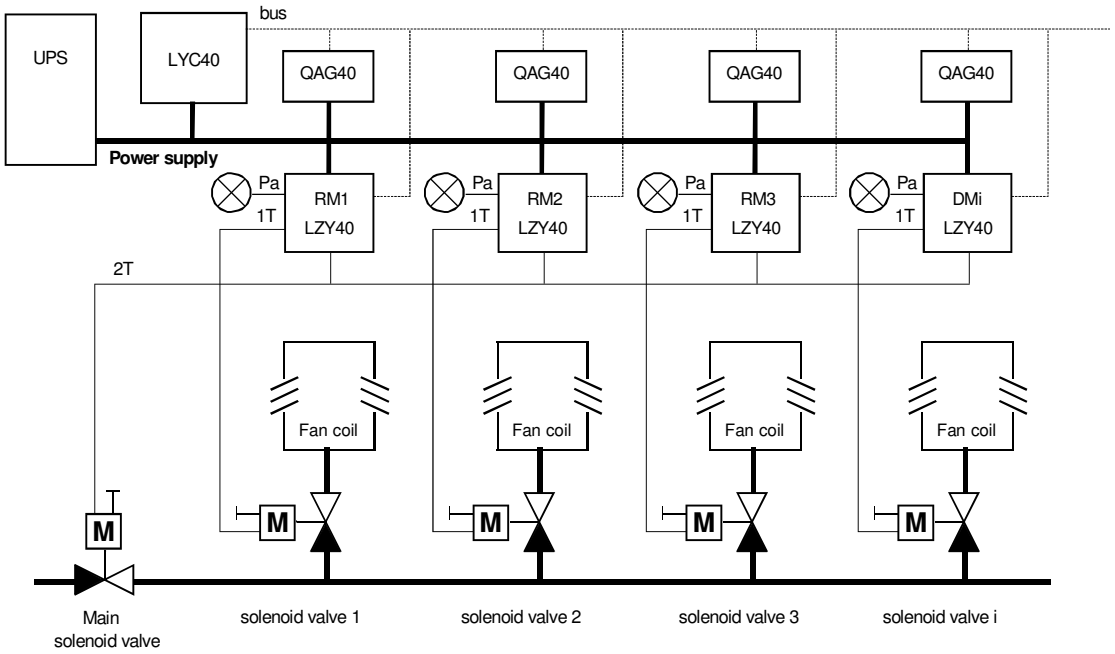


Fig. 4.14

Caution: **The Central Unit can be powered both from 230V~ and from an external UPS at 12V- (through the special terminal box). These power sources are to be used alternatively and never at the same time (see fig 4.16).**

Fig. 4.15 shows a heating plant made with fan coils distributed in a building. Each fan coil has a gas valve and a methane sensor. If a detector signals a gas leak, the associated Relay Module activates as follows:

1. in case of pre-alarm activates a light signal
2. in case of first alarm threshold closes the gas valve for the controlled fan coil
3. if at least one sensor exceeds the second alarm threshold the main gas valve is closed



5 PLANT SUPPLY

After installation and wiring and after checking they have been correctly carried out, it is possible to supply the plant.

CAUTION

PLANT SUPPLY IS TO BE MADE BY SKILLED AND CERTIFIED PERSONNEL, AWARE OF THE RISKS INVOLVED IN ELECTRICAL SHOCK RISKS. ANY OPERATION MUST BE MADE UNDER POWER OFF CONDITIONS.

5.1 Operation

First step is to supply power (230Vac, 50Hz) to the Central Unit in case of a basic structure, or to the UPS in case of an extended structure.

This condition is expected:

1. The Central Unit display shows:

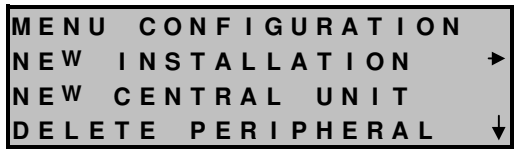
Fig. 5.1

In this phase the Central Unit checks all the peripherals and this can take also some minutes.

Warning:

- **all the sensors have their status red LED blinking fast**
- **the Relay Modules have three red LEDs and the yellow LED ON and the red status LED blinking fast**
- **the Display Modules have the display OFF and the red status LED (internal) blinking fast**

When the Central Unit finishes checking the plant, its display shows:



Fig, 5.2

In this phase the Central Unit recognizes the peripherals and presets them for configuration (status LED blinking fast)

The Central Unit expects the operator goes on with configuration as indicated at par. 6.2. After a 30 minute timeout (timeout starting again at each button pressure), the display looks like the following figure, called “main page”.

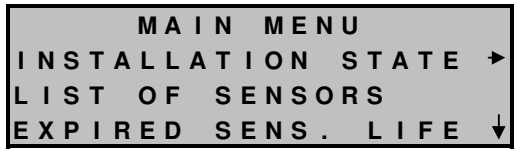


Fig. 5.3

To revert to the display in figure 5.2 switch the system off and switch it on again after some seconds.

5.2 Troubleshooting

Any wiring error can be evidenced as follows.

CAUSE	EFFECT
BUS connections exchanged on the Central Unit	The Central Unit beeps three times, then waits until a correct connection is restored (to be made after switching the plant off). The display shows an error message like figure 5.4.
BUS connections exchanged on one or more peripherals	The peripherals cannot be configured.
Power leads exchanged to peripherals	The unit(s) concerned has(have) all its(their) LEDs OFF
Power leads exchanged BUS leads	Possible component damage, peripherals OFF
Branches on communications line	Possible lack of communications between Central Unit and peripherals.
End of line jumper close on an intermediate peripheral	Peripherals cannot be configured at the end of the BUS line
Communication BUS length more than 1000m	Peripherals cannot be configured at the end of the BUS line

Table 5.1

NOTE

If a peripheral has BUS connections exchanged the Central Unit, since configuration button is depressed, does not recognize the peripheral signal on the BUS. Several trial are made to establish a correct communications link, but after a timeout (that can be long also some minutes) this message is shown cyclically:

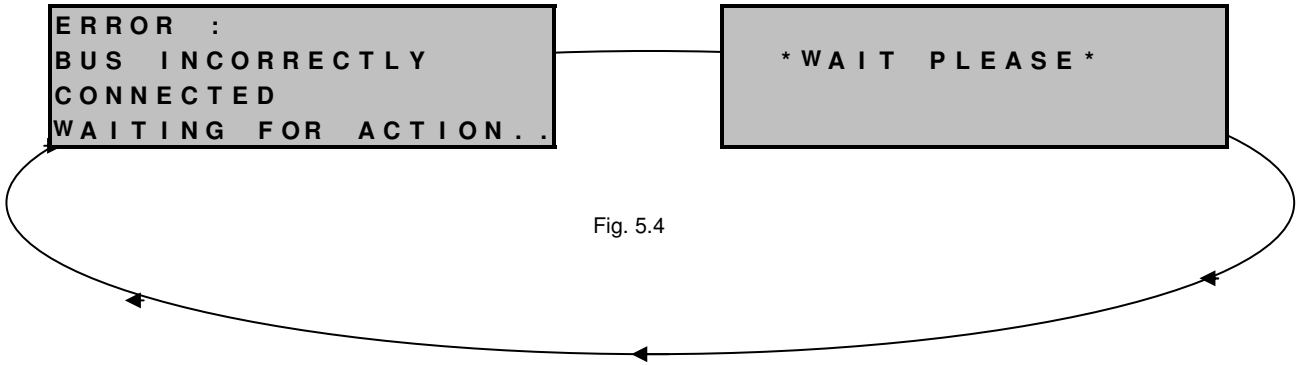


Fig. 5.4

The concerned peripheral can be detected through its status red LED steady on. Moreover the Central Unit FA relay is de-energized cyclically, with the same period of messages in fig 5.4.
IMPORTANT: If the peripheral with exchanged BUS connections were, for example, number 5, the Central Unit, at the next startup after reset, keeps the configuration of the first 4 peripherals showing the “main page”. All the remaining peripherals from number 5 on, needs to be configured. You can act in two ways:

1) If the configured peripherals are few it is better to RESET the plant and start the configuration again (see chapter 10.5)
2) If the configured peripherals are many it is better to keep them as they are and configure the remaining with the ADD PERIPHERAL command (see chapter 10.4).

6 COMMISSIONING A NEW PLANT

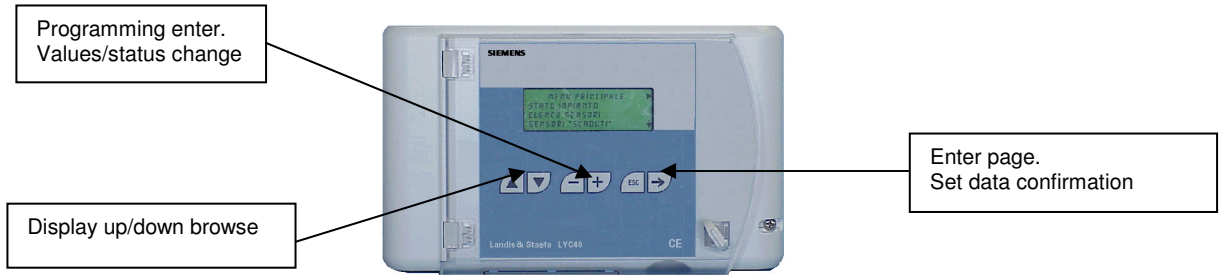
Before starting up the plant it is better to familiarize with its different components.

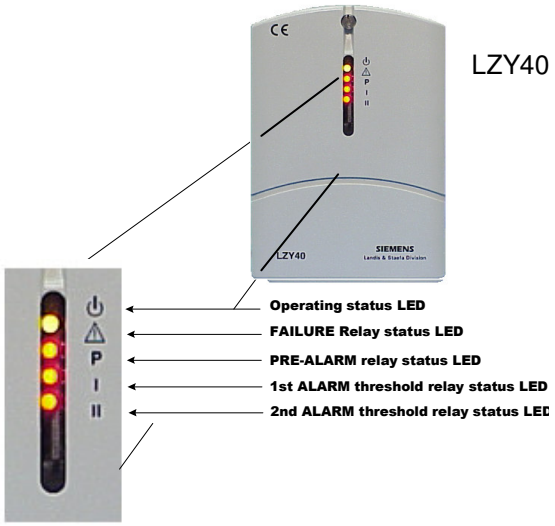
CAUTION

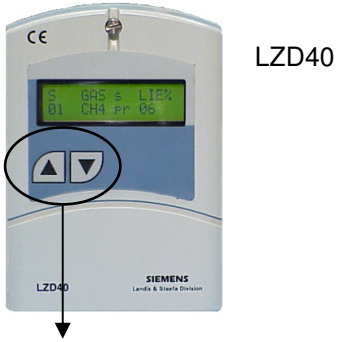
BEFORE STARTING UP CAREFULLY READ THE PROCEDURE DESCRIBED IN THIS CHAPTER AND FOLLOW THE RULES POINT BY POINT.

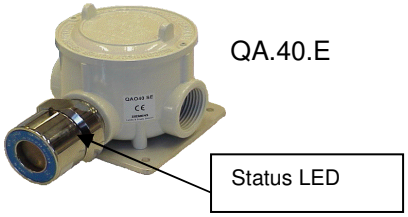
6.1 Button and LED functions

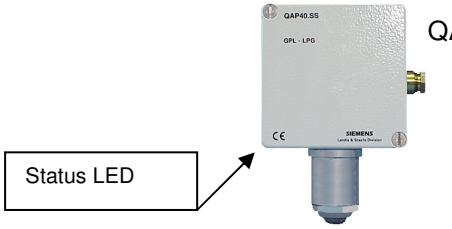
The Central Unit has a keyboard and an alphanumerical backlit display (4 lines by 20 columns). Key functions are indicated in the following figures.




LZY40
Operating status LED
FAILURE Relay status LED
PRE-ALARM relay status LED
1st ALARM threshold relay status LED
2nd ALARM threshold relay status LED


LZD40
Display browse keys if current alarms are more than one.


QA.40.E
Status LED


QA.40.S
Status LED

6.2 Configuration

This operation starts from the status of the Central Unit and peripherals as per chapter 5 and consists in recognizing all the peripherals setting up the new plant (by the Central Unit).

After turning on the system, the various components are in this status:

- RELAY MODULES: all relays energized (relevant LEDs ON) and status LED blinking fast
- DISPLAY MODULES: display OFF and status LED (inside) blinking fast
- SENSORS: status LEDs blinking fast
- CENTRAL UNIT: all relays energized (relevant internal LEDs ON)

NOTE

If a new plant includes a peripheral already configured on another plant, when this latter is turned on it excludes itself setting its status LED to fast blinking and waits for being reconfigured.

As already shown at paragraph 5.1 the Central Unit, at first start up, automatically sets to “NEW INSTALLATION” command line

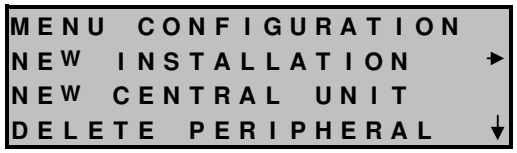
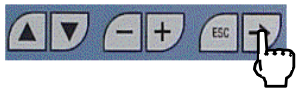


Fig. 6.2



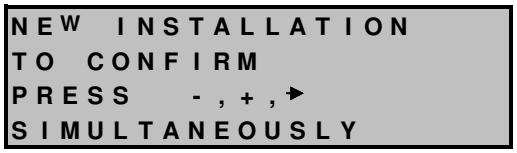


Fig. 6.3

5 sec

Fig. 6.4

Fig. 6.5

Figure shows the configuration display.

IMPORTANT: When configuring follow the order indicated in compiled table 3.1.

WARNING : The Central Unit automatically exits configuration status 15 minutes after the last button on a peripheral has been depressed, or manually pressing ESC button.

To complete configuration act as follows:

Go to each sensor installation site, remove the cover and press the inner configuration button for about 2s waiting the status LED blinks slow (one flash every 10 seconds).

Every time a peripheral is recognized the page updates and indicates the last accepted peripheral, thus confirming it has been acknowledged by the Central Unit.

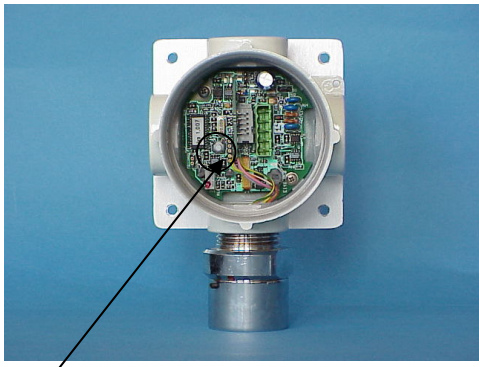


Fig. 6.6

Press configuration button

Fig. 6.7 Display after configuration of the first sensor

```
NEW INSTALLATION
 S01     RM__     DM__
PRESS PERIPH. BUTTON
S01
```

Fig. 6.8 Display after configuration of the fourth sensor

```
NEW INSTALLATION
 S04     RM__     DM__
PRESS PERIPH. BUTTON
S04
```

After configuring all the sensors go near the Relay Modules, remove their front cover, and press, following the filled table order, configuration button for about 2s: the status LED starts blinking slow.

Press this button to configure the Relay Module

Fig. 6.9

```
NEW INSTALLATION
 S04     RM01     DM__
PRESS PERIPH. BUTTON
RM01
```

After configuring the Relay Modules configure Display Modules in a similar way.

Fig. 6.11

```
NEW  INSTALLATION
 S04     RM01     DM01
PRESS  PERIPH.  BUTTON
DM01
```

Press this button to configure the Display Module

After finishing the configurations and making certain all the peripheral LEDs are ON and blinking slow (one flash every 10s), close all the front covers and carry out the “ASSIGNEMENTS” between sensors, Relay and Display Modules.

Press ESC to revert to “main page”: otherwise the Central Unit displays the last configuration page until a 15 minutes timeout.

2 times

Fig. 6.12 Display after configuration of four sensors, one Relay Module and one Display Module

```
      MAIN MENU
INSTALLATION STATE →
LIST OF SENSORS
EXPIRED SENS. LIFE ↓
```

Fig. 6.13

6.3 Assignements

A simply configured plant, in case of alarm, cannot activate the various devices (solenoid valves, hooters, etc.) since the alarm commands of the sensors are not transferred (assigneded) to any Relay Module. Assignement with the Display Modules has the purpose of displaying the sensor status in a place different from the Central Unit installation site.
Starting from the main menu, press down arrow key until the cursor moves to “ASSIGNEMENTS”
You get the following display, and from here you enter programming mode pressing keys + and – simultaneously until you hear a beep.

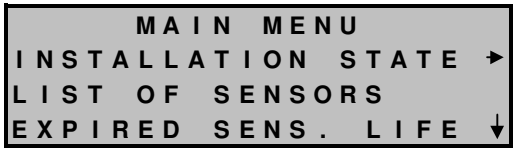


Fig. 6.14

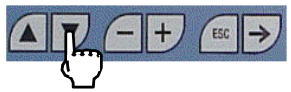
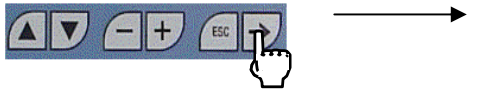
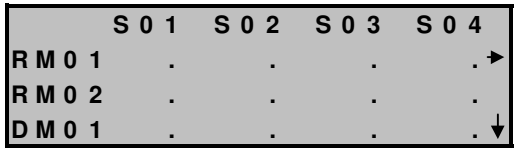


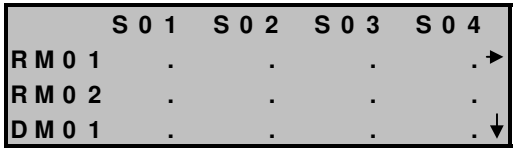
Fig. 6.16

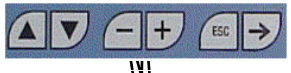
Fig. 6.15

Please note that assignement table is initially blank. Enter programming mode as follows.









Press for 5sec until you hear a beep.

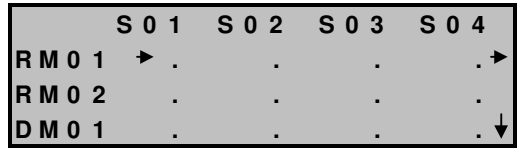
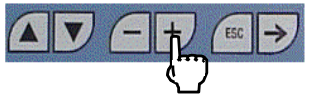


Fig. 6.17

	S01	S02	S03	S04	
RM01	→ .	.	.	.	→
RM02	.	.	.	.	
DM01	.	.	.	.	↓

Fig. 6.19

Programming cursor

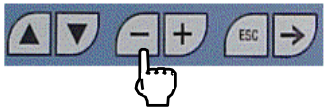


Pressing key (+), an X appears at right of the cursor. In this case indicates that sensor S01 is assigned with relay module RM01.

Fig. 6.18

	S01	S02	S03	S04	
RM01	→ X	.	.	.	→
RM02	.	.	.	.	
DM01	.	.	.	.	↓

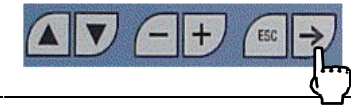
Fig. 6.20



	S01	S02	S03	S04	
RM01	→ .	.	.	.	→
RM02	.	.	.	.	
DM01	.	.	.	.	↓

Fig. 6.21

To remove the assignement (the X), press key (-) as shown above



	S02	S03	S04	S05	
RM01	→ .	.	.	.	→
RM02	.	.	.	.	
DM01	.	.	.	.	↓

Press the key as shown above to move the cursor right

Fig. 6.22

When a sensor exceeds the preset pre-alarm threshold (PR), or first alarm threshold (1s), or second alarm threshold (2s) the corresponding relays of the assigned Relay Module are energized.

To browse horizontally, press key → to browse down press ▼ to browse up press ▲

If, for example, there were a fifth sensor to be assigned, move the cursor right as indicated below.

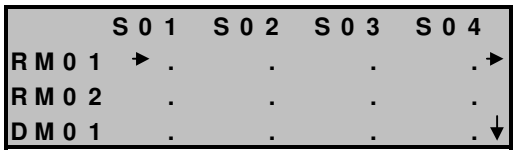
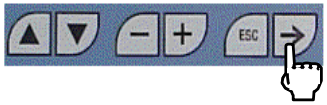


Fig. 6.23



Press the key shown above to move the cursor right

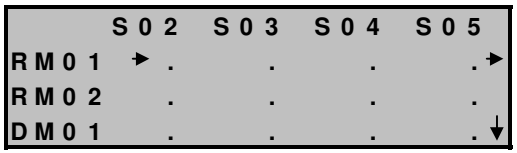


Fig. 6.24

Press ESC to confirm the assignements and revert to “main page”

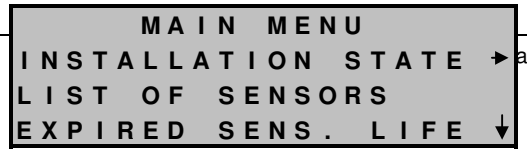


Fig. 6.25

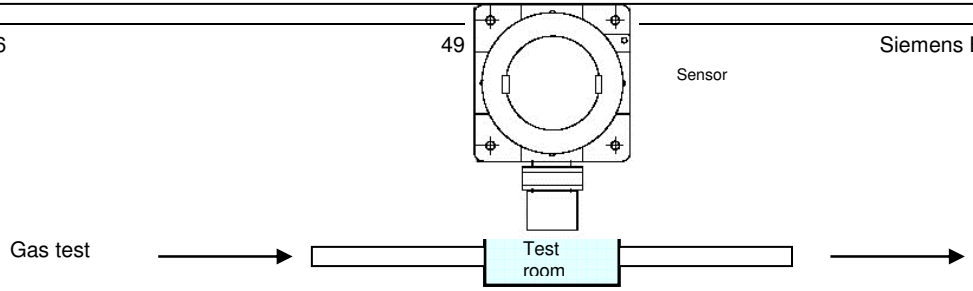
Once the assignement task is finished, the plant is ready to operate.

6.4 Checking the correct operation of the sensors

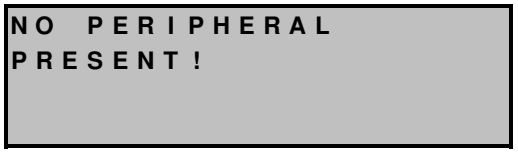
To verify the correct operation of the sensors is necessary to follow carefully the information below to prevent wrong actions that could damage in permanent way the sensing element.

- To test the sensor use the same type of gas for which the sensor is built;
- The gas test bottle must be calibrated to a concentration lower than the maximum measurable by the sensor;
- The gas flow must reach the sensing element for diffusion or however with very low speed. To obtain this it can be used a special flow box as explained in the picture below ;
- Gas test is detected by the sensing element with a delay of 10 or more seconds: this is due to the syntherized filter. The same delay may occur when the gas flow stops until the sensor doesn't detect it anymore.

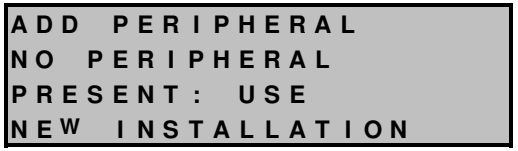
NOTE: If a plant is not designed for Relay and Display Modules, the "ASSIGNEMENTS" page is not active. All installed sensor will be always assigned with the Central Unit internal relay RM0.



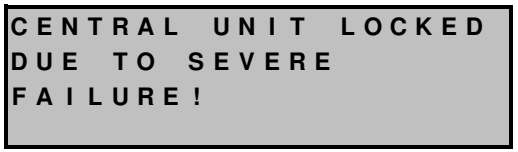
6.5 Error messages



It appears when, in a not configured installation, the command "DELETE PERIPHERAL" is selected.



It appears when, in a not configured installation, the command "ADD PERIPHERAL" is selected



It appears when the Central Unit detect an internal failure that cannot be repaired. It is necessary to call the service.

6.6 Display Module visualization

The Display Module shows any alarm detected by the assigned sensors.
A Display Module not configured and not assigned has its display off.

Fig. 6.26
Display Module ON, not configured, and not assigned

Fig. 6.27
Display Module ON, configured, and assigned

If the Display Module is correctly configured and assigned the display shows some dashes if no assigned sensor is under alarm condition: otherwise shows status and main features of alarmed sensors.

Normally, if more alarms are present, the Display Module scans the alarms in order of importance (2T, 1T, Pa). A new alarm , or a variation of a current alarm (for example passing from 1T to 2T), gets display priority until a normal scanning cycle starts again.

Fig. 6.28

If arrows ↓ and ↑ are displayed, it means that other sensors are under alarm condition and can be displayed before and after the current one. Press keys ▼ ▲ to browse vertically the alarm conditions.

In case of problems on the communications BUS line, or internal fault, that prevent information exchange with the Central Unit, the Display Module shows this message.

Fig 6.29

7 Operation Logic

There are two operating modes, selectable from the " MENU CONFIGURATION ":

1. Positive Logic (factory preset) = in case of no alarm all the relays (of Relay Modules and Central Unit) are energized and are de-energized in alarm, or fault, condition.
2. Negative Logic = in case of no alarm all the relays (of Relay Modules and Central Unit) are de-energized and are energized in alarm, or fault, condition.

It is possible to change the operation logic following this procedure:

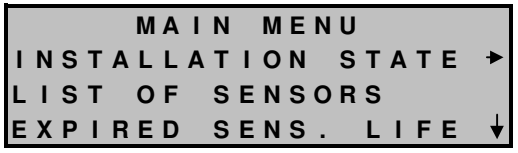
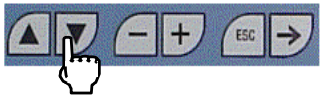


Fig. 7.1



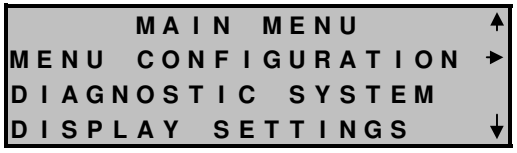


Fig. 7.2

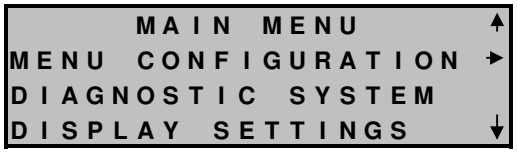


Fig. 7.3

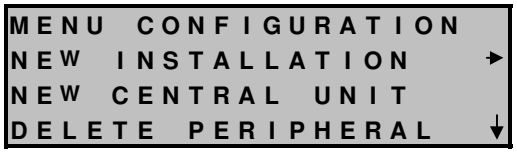


Fig. 7.4

Fig. 7.5

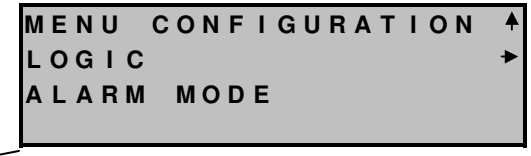


Fig. 7.6

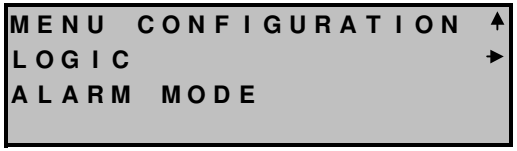


Fig. 7.7

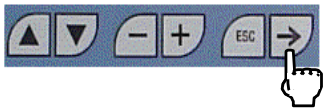


Fig. 7.8

To change the logic type enter programming mode.

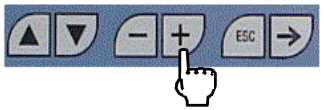
Fig. 7.9

Press for 5sec until you hear a beep

Programming cursor

Fig. 7.10

Fig. 7.11



Press the key shown above to change logic from positive to negative

Fig. 7.12

Press key  to revert to positive logic.

Press ESC two times to confirm and revert to main page

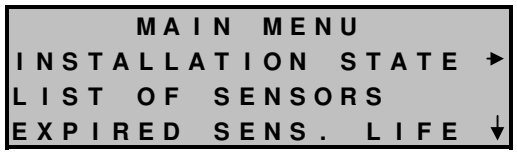


Fig. 7.13

8 PLANT STATUS

Information given in this chapter is useful to understand the next chapter.

The peripherals can have the following status:

- FA (fault)
- A (activated)
- D (deactivated)
- EP (expired) sensors only

Their meaning is explained below.

8.1 Fault status

A peripheral that does not answer a call from the Central Unit is automatically set to fault status.
The operator can manually preset a peripheral to fault status (FA) just for programming time and with the only aim to physically detect it in the plant (its status LED is steady on).
The Central Unit keeps track of all the peripherals in FA status, including their addresses.
A peripheral removed without being previously erased (for example to be replaced later), is recognized by the Central Unit as FA.
In particular, if a sensor is in FA status, the Central Unit disables all its associations.

8.2 Activated status

This is the normal operating status, factory preset for each peripheral.

8.3 Deactivated status

A peripheral can be deactivated only manually by the operator. It has a different meaning depending on the type of peripheral considered:

- sensors deactivation of a sensor causes its deassociation with all assigned Display and Relay Modules (including the Central Unit relays) though keeping available other data like gas concentration reading, lifetime, threshold setup values, etc.
- DM and RM deactivation of a Relay Module or Display Module causes deassociation with all assigned sensors

A faulty peripheral cannot be deactivated.

8.4 Expired status

The Central Unit can display the residual lifetime of each sensor, indicated in weeks: this value can be read in programming page at “LIFE” field. When the lifetime reaches zero its sign becomes negative: the system continues operating and counting lifetime weeks, but there is no warranty that the sensor works correctly.

From the “MAIN PAGE” menu go to “EXPIRED SENS LIFE” line and press  . All sensors whose guaranteed lifetime is expired are listed.
If there is no expired sensor the display shows the message in figure 8.1.

```
LIST OF EXPIRED SENS
(NONE)
```

Fig. 8.1

If there are some expired sensors, a page like figure 8.2 is shown

```
LIST OF EXPIRED SENS
S03 -012 WEEKS
S01 -009 WEEKS
S07 -002 WEEKS
```

Fig. 8.2

Press key 

to revert to main page

8.5 Display and change of a peripheral parameters

The operator can display the features of a peripheral in order to get more practice about the plant status. Moreover he or she can change such parameters like thresholds and operating status to tailor the plant for his/her requirements. It is also possible to make alarm simulations to check that wiring for solenoid valves, blinkers, etc. is correct.

From main page act as follows.

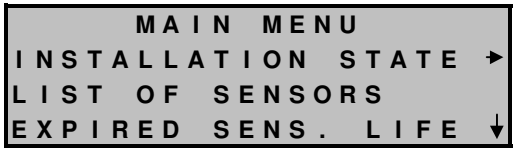


Fig. 8.3

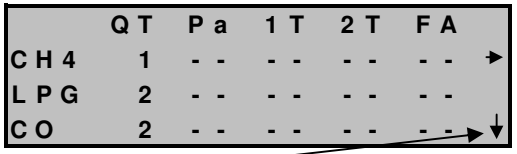


Fig. 8.4

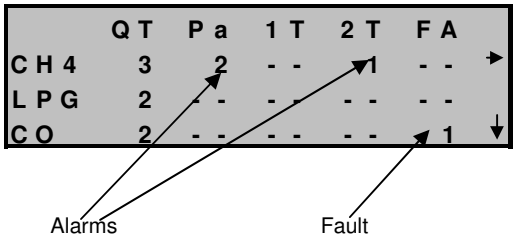
the arrow indicates that the table continues below

The page indicates that the plant includes:

1. one methane sensor
2. two LPG sensors
3. two carbon monoxide sensor
4. one Relay Module (visible pressing key τ from fig 8.4).
5. two Display Modules (visible pressing key τ from fig 8.4).

Symbols (--) indicate that no alarm threshold has been exceeded and no device is faulty.

The following example shows the display in case two methane sensors in pre-alarm status, the third sensor in alarm status and the carbon monoxide sensor in fault status.



To access information below, act as follows.

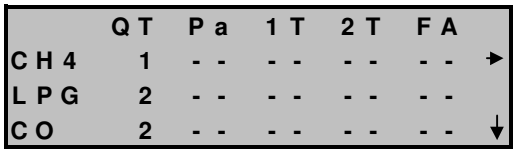
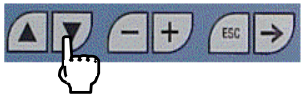


Fig. 8.6



2 times

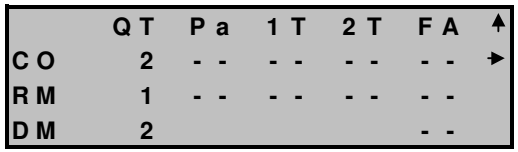


Fig. 8.7

To display the features of a peripheral, move “up” and “down” using the proper keys in order to align it with the cursor, then act as follows.

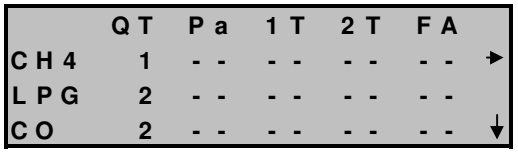
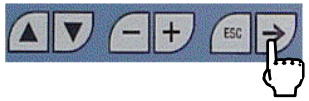


Fig. 8.8



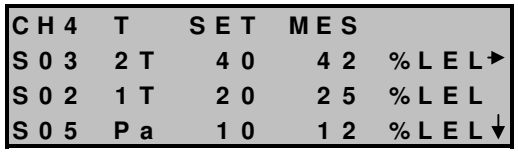


Fig. 8.9

Figure 8.9 lists all the peripherals in order of alarm importance

.

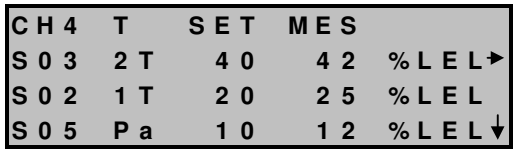


Fig. 8.10

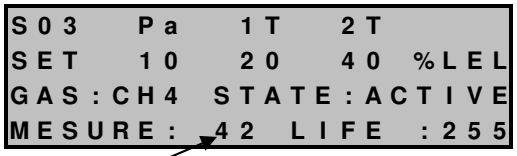


Fig. 8.11

Current measure of gas concentration

To change sensor threshold or status parameters, enter programming mode and act as follows.

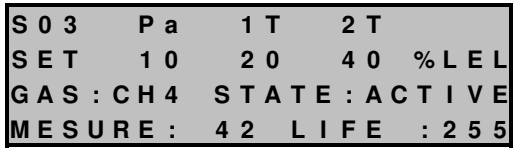
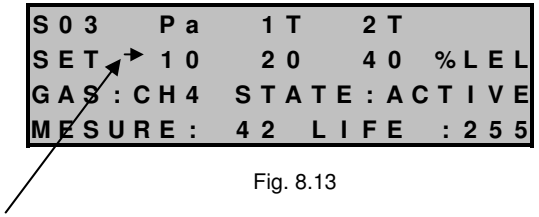


Fig. 8.13

Press for 5sec until
you hear a beep



Programming cursor

Fig. 8.13

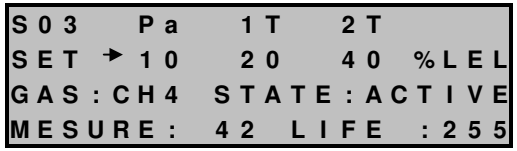
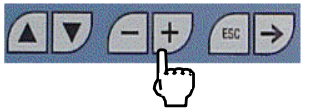


Fig. 8.14



press (+) to increase and (-) to decrease

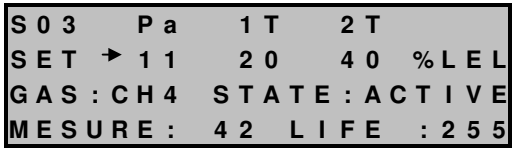


Fig. 8.15

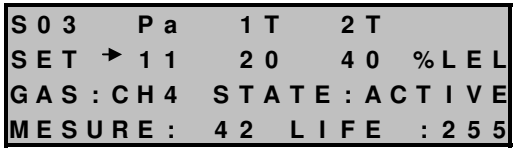
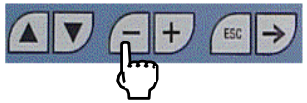


Fig. 8.16



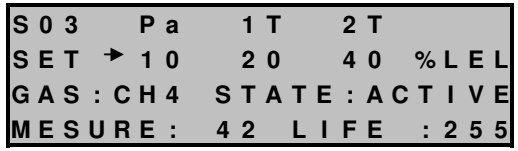


Fig. 8.17

Pressing key  you move the cursor right, and using +/- keys it is possible to change the other sensor thresholds.

To change the operating status move programming cursor as in fig. 8.18 and act as follows:

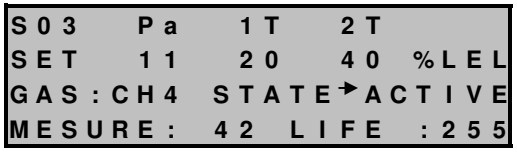
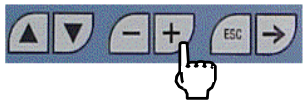


Fig. 8.18



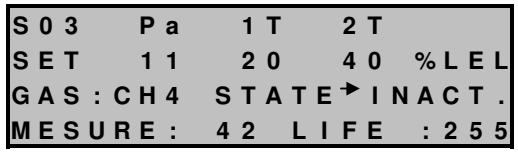


Fig. 8.19

Pressing key (+) again the status becomes “FAIL” and pressing once again you revert to “ACTIVE”. Press ESC to confirm the operating status chosen and to exit programming page. For more details about “ACTIVE”, “INACTIVE” and “FAIL” please refer to chapters 8.1, 8.2, 8.3.
It’s possible to view the operating status of Relay and Display Modules following the same procedure used for the sensors.

Starting from main page go to the page shown in fig.8.6 and act as follows.

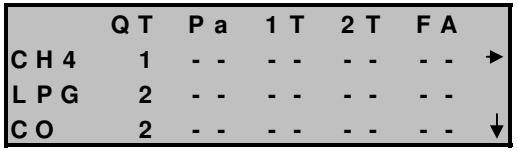
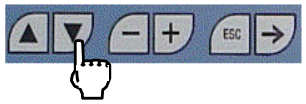


Fig. 8.20



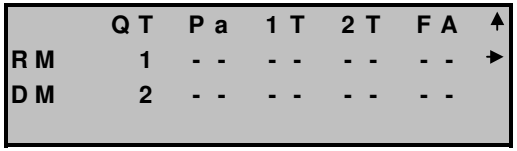


Fig. 8.21

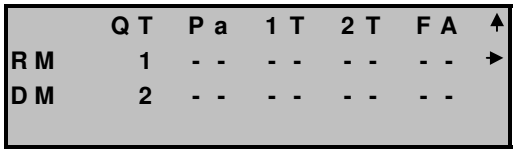


Fig. 8.22

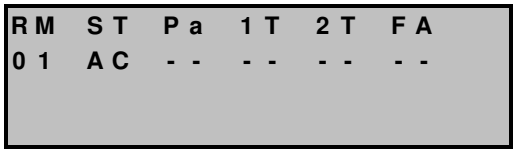


Fig. 8.23

This example easily explains that the only Relay Module in the plant is activated and no alarm threshold has been exceeded.

WARNING

Now the operator can carry out a functional plant test. Enter programming mode (by pressing + and – keys for at least 5s) and manually force all the Relay Module relays. Consequently all connected devices should activate in turn (hooters, solenoid valves, etc.).

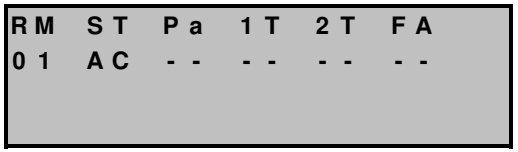
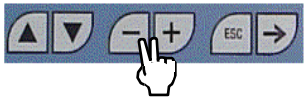


Fig. 8.24



press the two buttons simultaneously for 5sec until you hear a beep

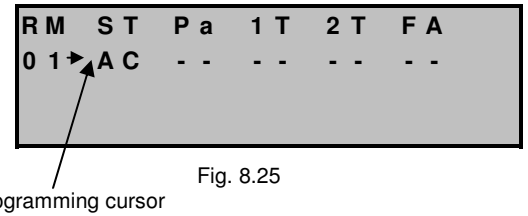


Fig. 8.25

It is also possible to change operating status for Relay and Display Modules. While the cursor is in the position shown in fig. 8.25 press key (+): the “AC” (RM activated) is replaced by a “D” (RM deactivated). Pressing key (+) again causes a temporary fault (FA) for the physical identification of the Relay Module (status red LED steady on). Pressing key (+) further show again the sequence “AC” , “D” , “FA”

Press key  to shift the cursor right on the pre-alarm (Pa) column

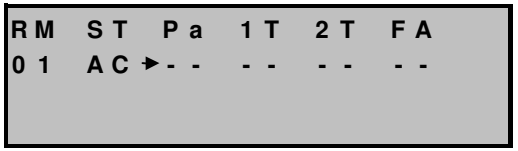
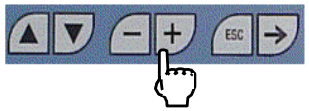


Fig. 8.26



press key (+) to activate prealarm relay (a XX appears)

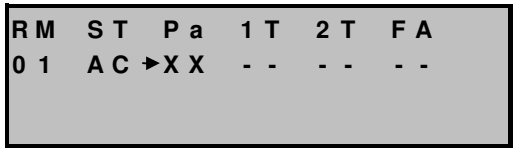


Fig. 8.27

The relay associated with the pre-alarm is activated, its contact closes and, in the following example showing a basic structure, a signal lamp turns on. Pressing key (-) the XX disappear and is replaced by (--) while the pre-alarm relay reverts to rest position.

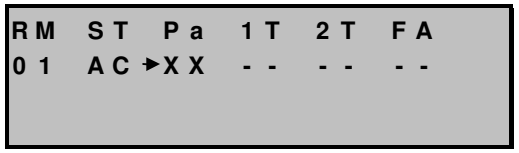
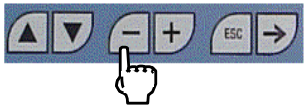


Fig. 8.28



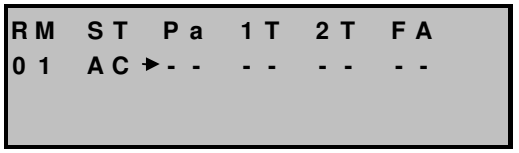


Fig. 8.29

Now move the cursor right pressing key  up to relay 1T.

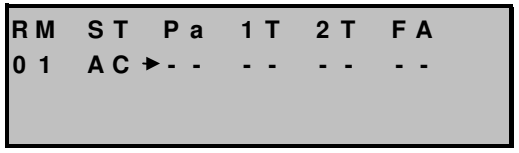


Fig. 8.30

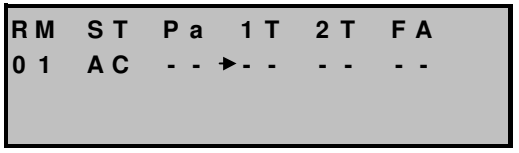


Fig. 8.31

Acting as described above activate and deactivate relays 1T, 2T and FA and check that connected devices are correctly driven.

Once tests are finished press key 

until the main page is displayed: any relays left activated during tests will be deactivated anyway when exiting the page.

Please remember that exiting the page using key ESC confirms any changes made to the operating status.

9 AUXILIARY FUNCTIONS

The LYC40 allows to access further detail information useful to the operator both to know the plant status at any time, and to make any changes to alarm parameters and assignements.

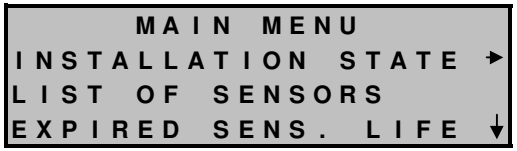


Fig. 9.1

Any operation made on the Central Unit starts from the first page (main page).

9.1 List of sensors

From main page press key ▼ until the cursor reaches the line “LIST OF SENSORS”.

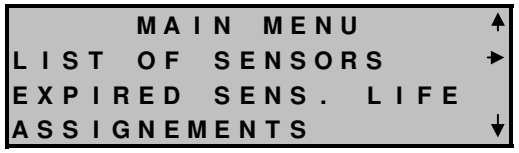


Fig. 9.2

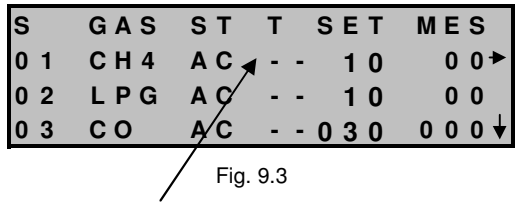


Fig. 9.3

Alarm thresholds exceeded (Pa, 1T, 2T)

To access the individual features of the selected sensor set the cursor to its line and act as follows:

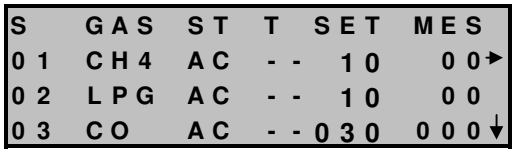
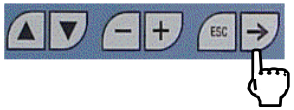


Fig. 9.4



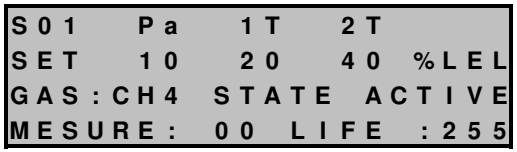


Fig. 9.5

Figure 9.4 lists the sensors in numerical order that coincides with the order listed in the table filled in before.

9.2 Diagnostics

The Central Unit features can be read under “DIAGNOSTIC SYSTEM” that can be accessed from the main page pressing key 

Fig. 9.6

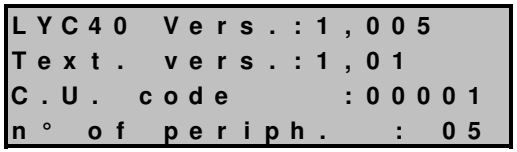


Fig. 9.7

9.3 Display adjustment

It is possible to change display contrast and back light from the following page, accessible pressing key ▼ from the main page.

Fig. 9.9

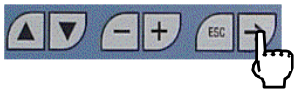


Fig. 9.10

Fig. 9.10

press the two keys simultaneously for 5sec until you hear a beep

Fig. 9.10

Using keys (+) and (–) you increase/decrease the number right of the cursor, while key → moves the cursor to the desired line. Once achieved optimum contrast values press ESC to confirm and exit the page.

9.4 Alarm mode

The LYC40 allows to alarm reset modes:

1. manual
2. automatic

The factory default is “manual reset”.

9.4.1 Manual reset

In this mode any time an alarm is generated, it is stored and keeps active until the operator does not deactivate it manually (see ALARM RESET chapter 9.5).

WARNING

In manual reset mode, if an alarm activates a hooter, this will continue sounding until the operator stops it. Consequently, in an unattended plant, a long lasting alarm can cause police or firemen intervention.

The “ALARM MODE ” is reached from main page pressing key ▼ until “MENU CONFIGURATION” is displayed. Acting as follows:

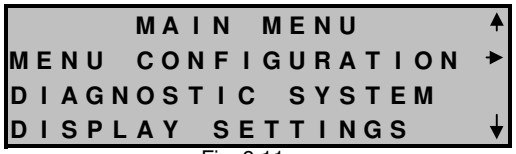


Fig. 9.11

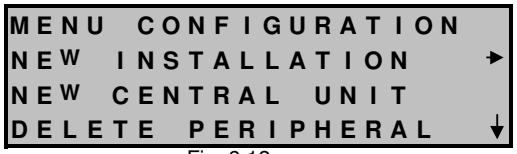


Fig. 9.12

Press key ▼ to move the cursor to “ALARM MODE”

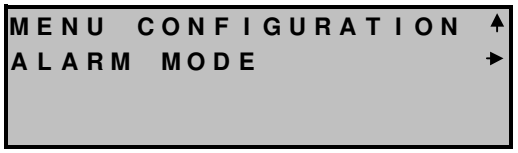


Fig. 9.13

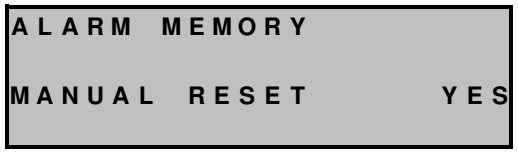


Fig. 9.14

9.4.2 Automatic reset

Enter programming mode to change “YES” with “NO”

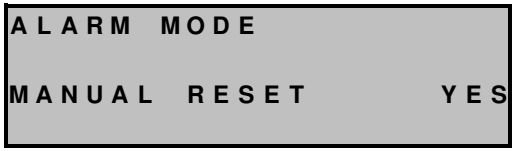


Fig. 9.15

press the two keys
simultaneously for 5s
until you hear a beep

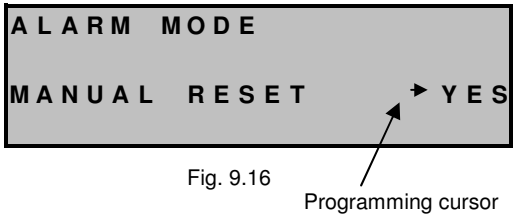
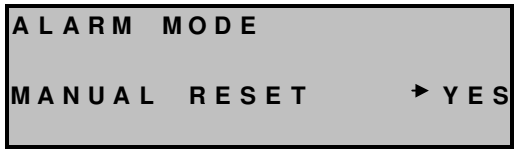


Fig. 9.16



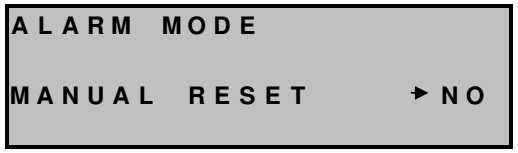


Fig. 9.17

Fig. 9.18

Key (+) sets “NO”. Press ESC to confirm automatic alarm reset. In this case the achieved alarm status keeps until its cause is removed.

9.5 ALARM RESET

It has the aim of recognizing activated alarms and restore normal operation (see previous paragraph). “ALARM RESET ” is effective only if manual alarm reset has been selected.

From main page press key ▼ until you see “ALARM RESET ”.

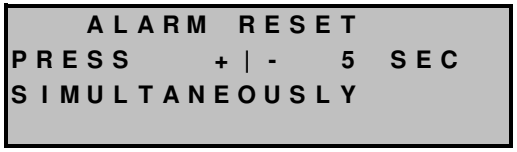


Fig. 9.19

Fig. 9.20

for 5 sec.

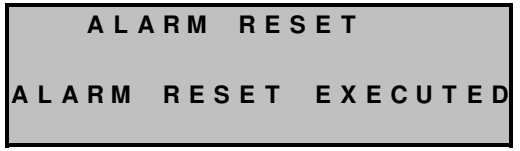


Fig. 9.21

NOTE:
The ALARM RESET is effective only when the alarm cause is terminated: otherwise, i.e. gas is still present, the Central Unit will signal alarm conditions again.

10 CHANGES ON AN OPERATING PLANT

This chapter deals with any changes to be made to an already operating plant. There are special commands to add or replace peripherals (sensors or Relay / Display Module) and to replace the Central Unit. From “MAIN MENU”, go to “ MENU CONFIGURATION ”

10.1 New Central Unit

This operation is needed when it is necessary to replace the Central Unit with a new one. This command allows to keep all the plant configuration and to automatically transfer them to the new Central Unit avoiding to reconfigure the whole plant. Act as follows:

Turn the plant off, disconnect the old Central Unit, replace it with a new one and turn the system on again.

From the Central Unit "MENU CONFIGURATION" use key ▼ to reach "NEW CENTRAL UNIT" line, then press key →.

```
NEW CENTRAL UNIT
TO CONFIRM
PRESS  -, +, →
SIMULTANEOUSLY
```

Fig. 10.1

Press until the beep

```
NEW CENTRAL UNIT
  *WAIT PLEASE*
```

Fig. 10.2

In automatic mode, the Central Unit recognizes the peripherals reconstructing the same configuration of the old Central Unit. This operation can last some minutes while status LEDs are blinking fast.

It appears when the automatic procedure " NEW CENTRAL UNIT " cannot be correctly executed (some sensors are new and is not possible to recognize them)

```
NEW CENTRAL UNIT
 S--    RM--    DM--
SELF CONFIGURATION
S--
```

Fig. 10.3

In this phase the respective number of pheriperals will incease as the Central Unit proceeds in the self configuration

```
NEW CENTRAL UNIT
 S03    RM01    DM01
SELF CONFIGURATION
DM01
```

Fig. 10.4

```
NEW CENTRAL UNIT
  *WAIT PLEASE*
```

Fig. 10.5

When the self configuration is completed the Central Unit displays the main page.

```
      MAIN MENU
INSTALLATION STATE →
LIST OF SENSORS
EXPIRED SENS. LIFE ↓
```

Fig. 10.6

```
AUTOMATIC PROCEDURE
NOT POSSIBLE!
MAKE
RESET OF INSTALLAT.
```

10.2 Delete peripheral

The need to delete a peripheral arises when it is necessary to change the plant, for example removing a sensor that is no more required, or when you want to replace a peripheral with an new one.

Start from " MENU CONFIGURATION ", select field "DELETE PERIPHERAL" and press key  : This page is shown:

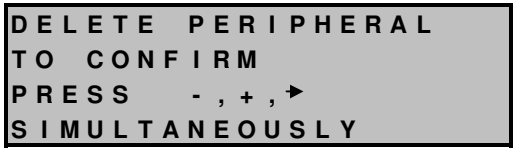


Fig. 10.7

Press the three keys for 5s simultaneously until you hear a beep

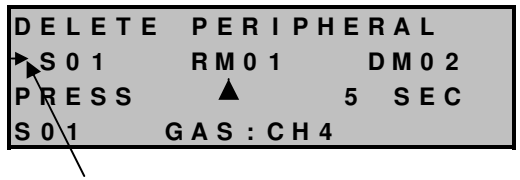


Fig. 10.8

To select the peripheral, move the cursor right pressing key  until it is placed left of the device to be deleted.

Example: if you want to delete sensor S02 press key (+) to increase the peripheral ID number. Press key (-) to decrease this number.

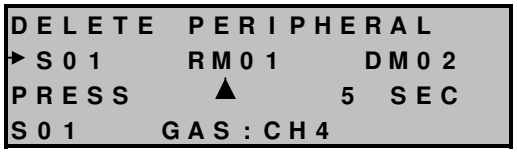
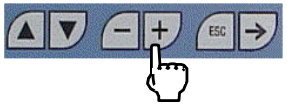


Fig. 10.9



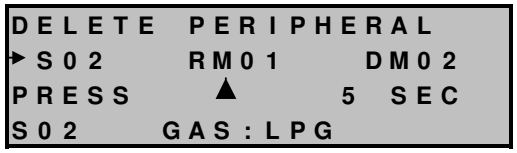


Fig. 10.10

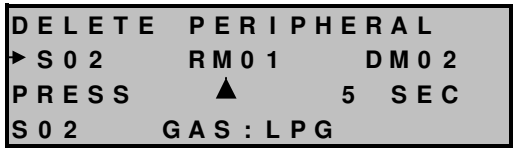
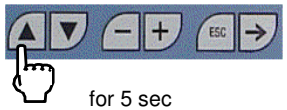


Fig. 10.12



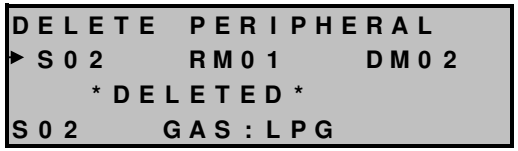


Fig. 10.13

When a peripheral is deleted, its address becomes available. It is presented in case of peripheral replacement with a new one of the same type (see “REPLACE PERIPHERAL” command). After deletion press ESC to exit the page.

10.3 Replace peripheral

This operation is needed when you want to replace a peripheral with a new one of the same type.
The replaced peripheral keeps the configuration of the old one. This operation is accomplished in five steps:

1. Delete the peripheral to be replaced using command “DELETE PERIPHERAL” (chapter 10.2)
2. Switch the plant OFF
3. Remove the peripheral and replace it with a new one
4. Switch the plant ON
5. Give “REPLACE PERIPHERAL” command from the Central Unit

As to deletion act as described above, then select “REPLACE PERIPHERAL” from “ MENU CONFIGURATION ”

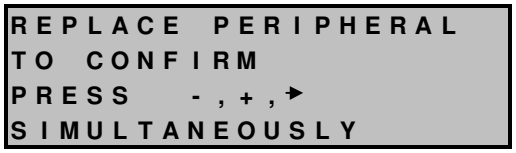
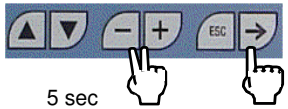


Fig. 10.14



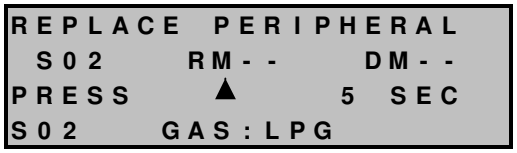


Fig. 10.15

Please note that the Central Unit offers only the already deleted peripheral addresses (in this example, sensor S02). Press the button displayed and then the peripheral button. Please remember that it is possible to replace a peripheral keeping the same address, only using a peripheral of the same type and model (a CH4 sensor can be replaced only by another CH4 sensor). When finished, if S02 was the only deleted peripheral, the page will look like this:

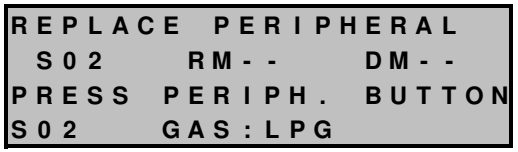


Fig. 10.16

If no peripheral was previously deleted and you activate “REPLACE PERIPHERAL” command, the page look like the figure at right

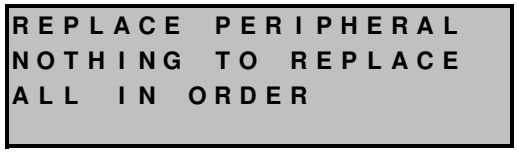


Fig. 10.17

10.4 Add peripheral

A new peripheral can be added when you need to expand a plant. In this case reconsider consumption table and check that the new situation complies with power source and cable cross section is still adequate.
This command can be used also in case of incomplete initial configuration (see page 43).
From “MAIN MENU” go to “ADD PERIPHERAL” in this way:

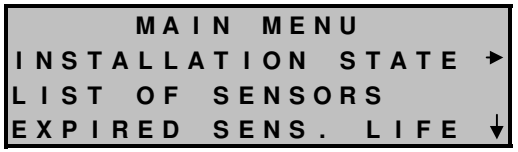


Fig. 10.18

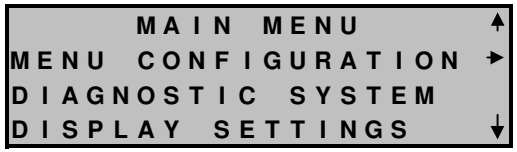


Fig. 10.19

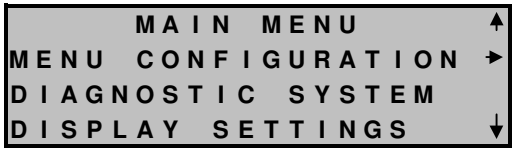


Fig. 10.20

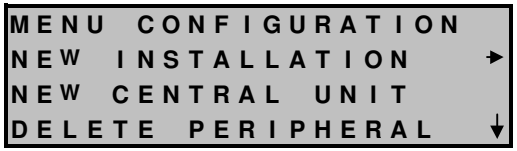


Fig. 10.21

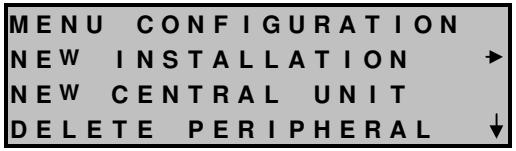
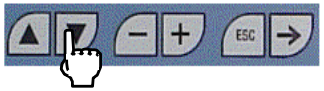


Fig. 10.22



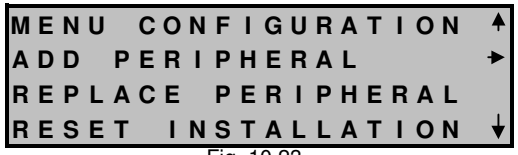


Fig. 10.23

Press key  to access “ADD PERIPHERAL”

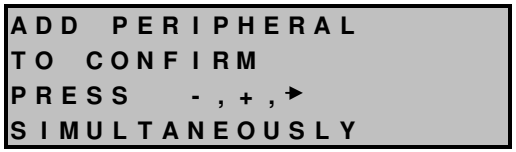


Fig. 10.24

Fig. 10.25

For example suppose the operator is adding a Display Module and that, for this, it presses the configuration button on the same peripheral. Right after, the page becomes:

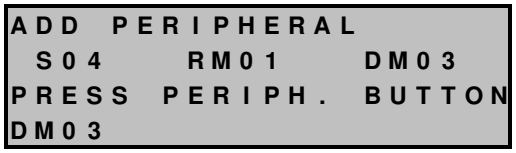


Fig. 10.26

Please remember that added peripherals should be preferably assigned with other plant peripherals. To assign please refer to chapter 6.3.

After adding the peripheral press key ESC to confirm and exit the page.

WARNING:

If you add a Display Module on a plant that already includes 16 Display Modules, the Central Unit displays this page.

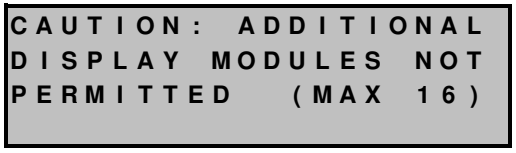


Fig. 10.27

WARNING:

If you try to add a peripheral on a plant including 99 peripherals, the Central Unit shows this message.

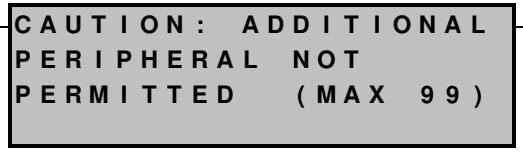


Fig. 10.28

Press key 

repeatedly, until the Central Unit shows the main page.

10.5 Plant Reset

If the operator should realize he/she made serious mistakes compromising a regular installation, or think the plant configuration is not suitable with his/her requirements, the Central Unit allows to reset the whole plant. In this case all the peripherals, including the Central Unit, revert to their default configuration (like they had never been installed). Then proceed as for a NEW INSTALLATION.

For a plant RESET act as follows:

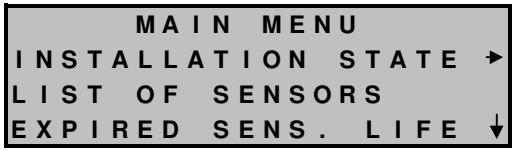


Fig. 10.29

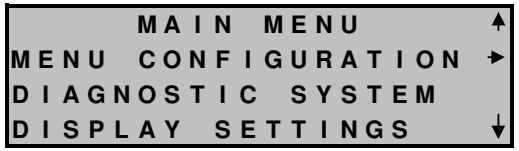


Fig. 10.30

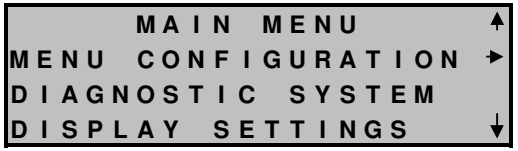


Fig. 10.31

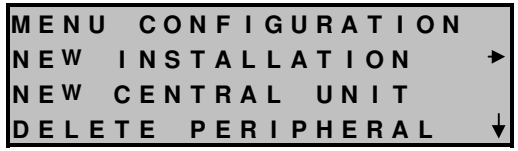


Fig. 10.32

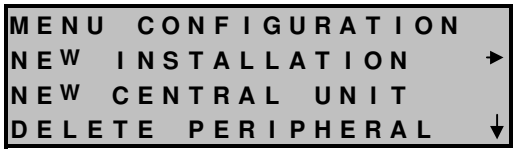


Fig. 10.33

Fig. 10.34

Press key  to enter " RESET INSTALLATION". When entering this page you hear a beep.

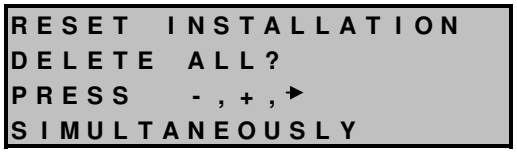
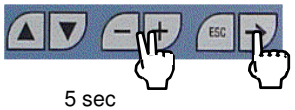


Fig. 10.35



5 sec

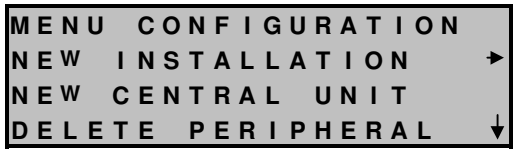


Fig. 10.36

RESET operation can last some minutes, while the Central Unit shows this message:

Fig. 10.37

11 TECHNICAL DATA

11.1 Central Unit

The Central Unit is enclosed in a plastic case for panel mounting, with transparent display and keyboard cover.
Main features:

1. Power supply/battery charger:
- Input 230VAC +10% / -15% 50/60Hz
- input 12VDC from external UPS to be used as an alternative to 230VAC
- power consumption: 6VA
- output to peripherals: 12VDC./2,5A.
- output to buffer battery: 13.8VDC

2. Control and communications electronics
3. Selectable alarm reset: manual (default) or automatic
4. Selectable relays operation logic: positive (default) or negative
5. Automatic check of sensor operating time with lifetime display

6. Internal BUS output for communications with peripherals (max 99)
7. RS232, or RS485 output to upper level (optional)
8. Relay Module (RM0), always assigned with all plant peripherals, consisting of four relays with these functions:

- K3: energized if any sensor is in pre-alarm conditions (Pa)
- K4: energized if any sensor is in first threshold alarm (1T)
- K5: energized if any sensor is in second threshold alarm (2T)
- K2: energized if any peripheral is out of order (FA), that is does not communicate with the Central Unit (power fault or BUS interruption)

Each relay is provided with voltage free exchange contact 230VAC, 5A.

9. User interface through a backlight display, 4 lines by 20 columns and 6 control keys
10. Maximum BUS allowable length: 1000m
11. Degree of protection: IP40
12. Allowable room temperature: 0…50°C
13. Allowable room humidity: 20…90% RH non condensing

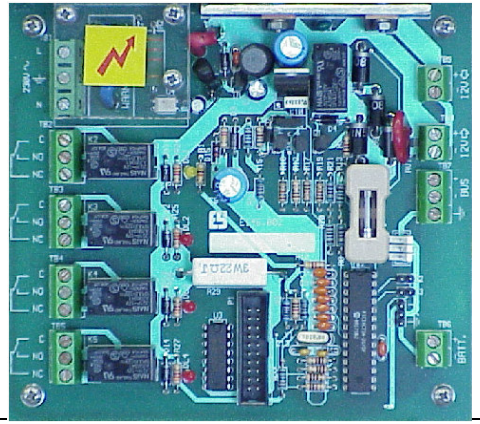
Function keyboard with these commands:

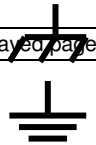
	Display up and down browse
	<enter> To move from page to next information level.
	<escape> Press in programming mode to revert to previous page and store any modified parameters. During normal operation is used to revert to previous page.

- +	If pressed simultaneously for at least 5sec set the Central Unit to programming mode (where provided). While in programming mode control increment / decrement of the value or operating status change.
→	Programming cursor
⇑	Indicates there is further information above the displayed page
⇒	Cursor
⇓	Indicates there is further information below the displayed page

Table 10.1

11.1.1 Internal Jumper function





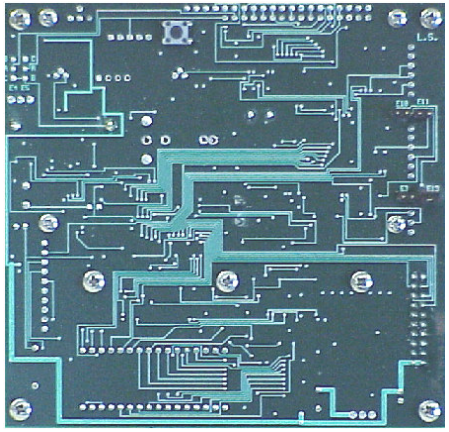
E2 e E3 = Not used

Selects BUS shield connection type:

= BUS shield connected to power negative

= BUS shield grounded

E10 = RS485 termination
E11 = RS485 termination
E13 = CAN BUS termination
E3 = Connect CAN BUS shield to power negative



11.2 Peripherals

Each peripheral has a power supply input (12VDC), a communications BUS line, an internal configuration button and a 3-status LED:

- Fast blinking: peripheral to be configured
- Slow blinking: peripheral configured (one flash every 10sec.)
- Steady on: sensor under alarm or fault condition (Pa, 1T, 2T or FA)

The LED can be forced “steady on” on the Central Unit (see chapter 8.1) This helps finding the configured peripheral in the plant.

11.2.1 Sensors (Qax.40.yz)

The sensors need a 12VDC power supply and have their control logic for communications and electronics aimed to gas concentration measurement and alarm management.

Explosion proof versions (EExd IIC T6) have a round die cast aluminum case with two threaded connections placed at 90°: The sensor is placed down (6 hours) and cable entrance right (3 hours). The sensing element is placed inside the case in a threaded connection of approved type.
IP55 versions have a square aluminum case with the same sensor positions (6 hours) and cable entrance (3) of Eexd version.

Allowable room temperature: 0…50°C
Allowable room humidity: 20…90% RH non condensing
Expected life time Catalytic sensor: 255 weeks (in clean air)
Expected life time Electrochemical cell: 150 weeks (in clean air)

TYPE	TYPE OF GAS	SENSING ELEMENT	POWER SUPPLY	CONSUMPT.	INTERVENTION THRESHOLDS (3)	DEGREE OF PROTECTION
QAG40SS	CH4	CATALYTIC	12VDC	1.6VA	0,,,50% LEL CH4	IP55
QAP40SS	LPG	CATALYTIC	12VDC	1.6VA	0,,,50% LEL GPL	IP55
QAO40SS	CO	ELECTROCHEMICAL CELL 2 TERMINALS	12VDC	0,7VA	0,,,500 ppm CO	IP55
QAG40PS	CH4	PELLISTOR	12VDC	1,5VA	0,,,50% LEL CH4	IP55
QAP40PS	LPG	PELLISTOR	12VDC	1,5VA	0,,,50% LEL GPL	IP55
QAB40PS	Gasoline vapors	PELLISTOR	12VDC	1,5VA	0,,,50% LIE Gasoline vapors	IP55
QAO40PS	CO	ELECTROCHEMICAL CELL 3 TERMINALS	12VDC	0,6VA	0,,,500 ppm CO	IP55
QAG40SE	CH4	CATALYTIC	12VDC	1.6VA	0,,,50% LEL CH4	EExdIIC
QAP40SE	LPG	CATALYTIC	12VDC	1.6VA	0,,,50% LEL GPL	EExdIIC
QAO40SE	CO	ELECTROCHEMICAL CELL 2 TERMINALS	12VDC	0,7VA	0,,,500 ppm CO	EExdIIC
QAG40PE	CH4	PELLISTOR	12VDC	1,5VA	0,,,50% LEL CH4	EExdIIC
QAP40PE	LPG	PELLISTOR	12VDC	1,5VA	0,,,50% LEL GPL	EExdIIC
QAB40PE	Gasoline vapors	PELLISTOR	12VDC	1,5VA	0,,,50% LIE Gasoline vapors	EExdIIC
QAO40PE	CO	ELECTROCHEMICAL CELL 3 TERMINALS	12VDC	0,6VA	0,,,500 ppm CO	EExdIIC

(*) Gasoline vapours sensor QAB40.. only on request

Methane and **LPG** sensors have these default threshold values:

- Pa = 10% LEL
- 1T = 20% LEL
- 2T = 40% LEL

They can be changed, for each sensor, by the operator from the Central Unit within these values:

- Pa = 0 …1T (from zero to the value set for 1T)
- 1T = Pa…2T (from Pa value to 2T value)
- 2T = 1T…50%LEL (from 1T value to al 50% LEL)

Measurement range: 0 ÷ 51,2 % LEL
Accuracy: 1% LEL

CO sensors have these default threshold values:

- Pa = 30ppm
- 1T = 100ppm
- 2T = 200ppm

They can be changed by the operator from the Central Unit within these values:

- Pa = 0…1T (from zero to 1T value)
- 1T = Pa..2T (from Pa to 2T value)
- 2T = 1T…500ppm (from 1T to 500ppm)

NOTE : for sensors operating checking refer to relevant chapter on page 51

11.2.2 Relay Module (LZY40)

The Relay Module is the plant actuator. When one assigned sensor detects gas presence, the LZY40 activates the corresponding internal relay, provided with a voltage free changeover contact 250VAC, 5A:

1. K2: Pa (pre-alarm)
2. K3: 1T (first alarm threshold)
3. K4: 2T (second alarm threshold)
4. K1: fault (FA)

The relay operation logic can be selected from the Central Unit (positive or negative)
There are 5 front panel LEDs for relay and operating status monitoring:

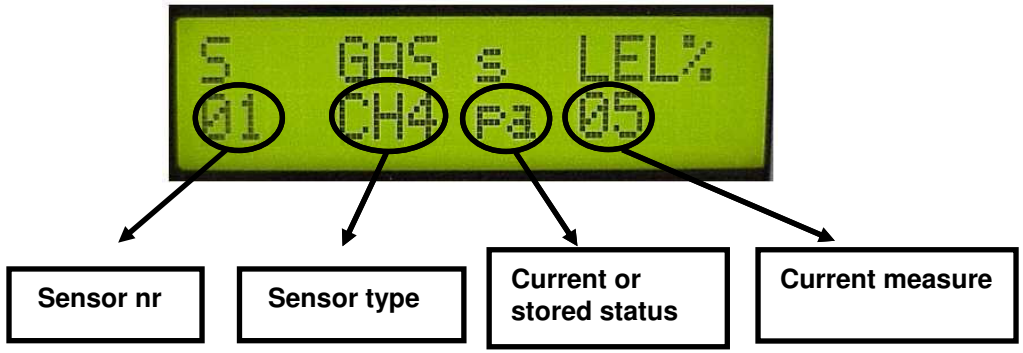
- Red LED (high)	Operating status:	fast blinking = LZY40 not configured slow blinking = LZY40 configured steady on = alarm or fault
- Yellow LED	Module fault relay status (FA)	
- Red LED (3)	Pre-alarm relay status (Pa) First alarm threshold relay status (1T) Second alarm threshold relay status (2T)	
Power supply	12VDC	
Power consumption	2.5VA max	
Protection degree	IP42 (vertical mounting)	
Allowable room temperature	0…50°C	
Allowable room humidity	20…90% RH non condensing	

11.2.3 Display Module (LZD40)

The Display Module allows a remote view of the current or still unrecognized alarms in order of importance (2T, 1T, Pa) for a maximum of 8 messages.
Alphanumerical backlight display 2 lines by 16 columns that automatically turns off if there is no current or happened alarm.

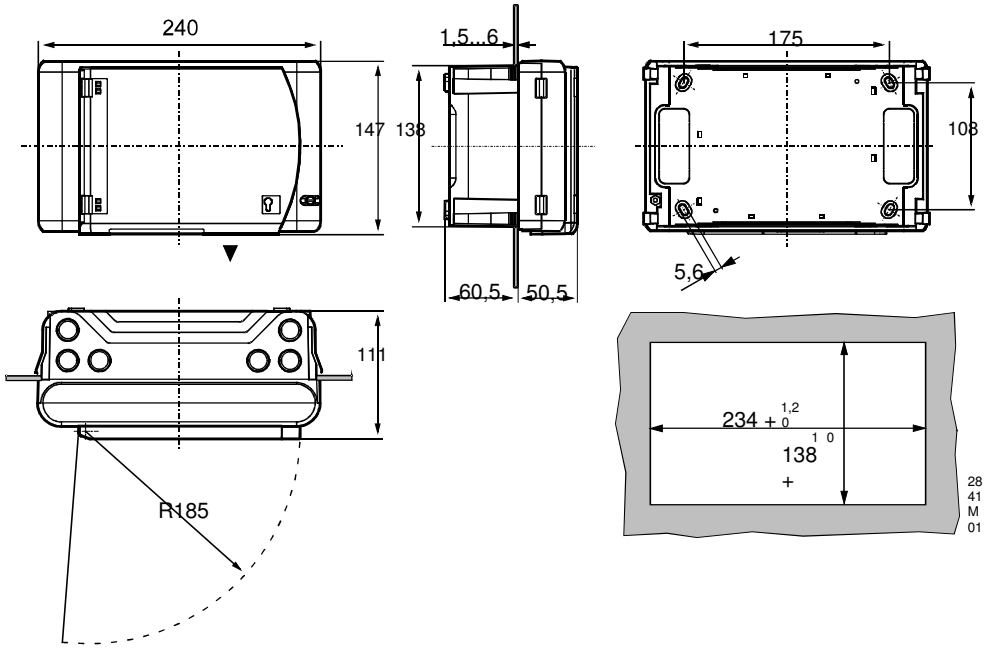
Power supply	12VDC
Absorbed Power	2VA max
Protection degree	IP42 (vertical mounting)
Allowable room temperature	0…50°C
Allowable room humidity	20…90% RH non condensing

In case of alarm this information is displayed:

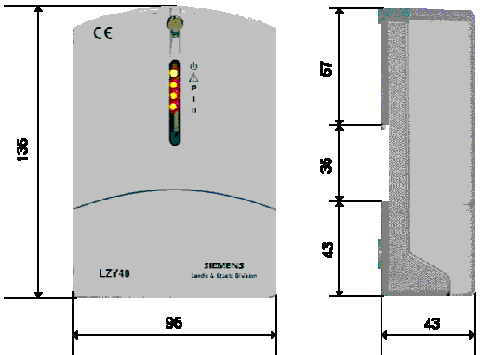


12 DIMENSIONS

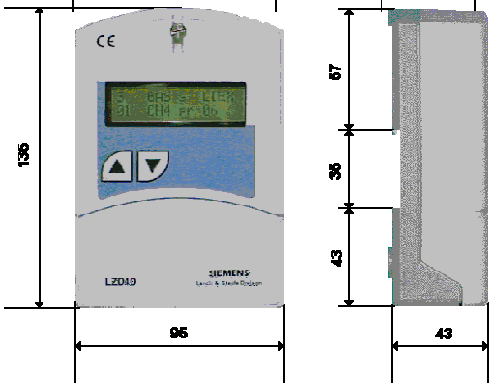
12.1 Central Unit LYC40



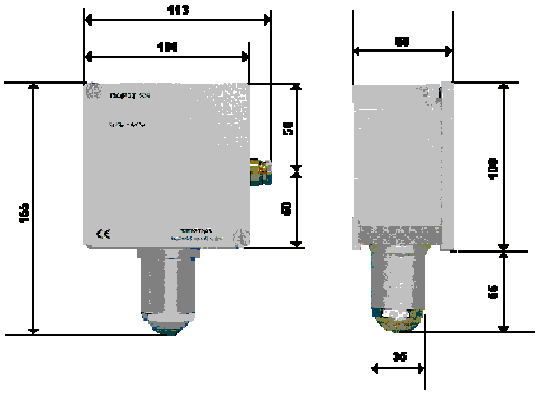
12.2 Relay Module LZY40



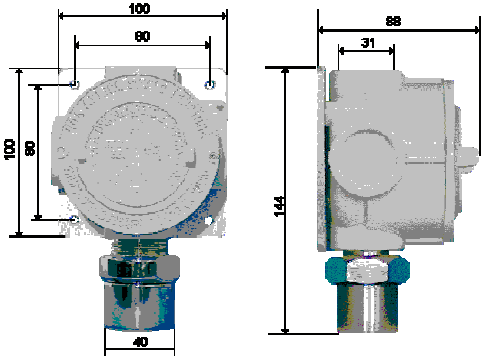
12.3 Display Module LZD40



12.4 Sensors QA..40..S

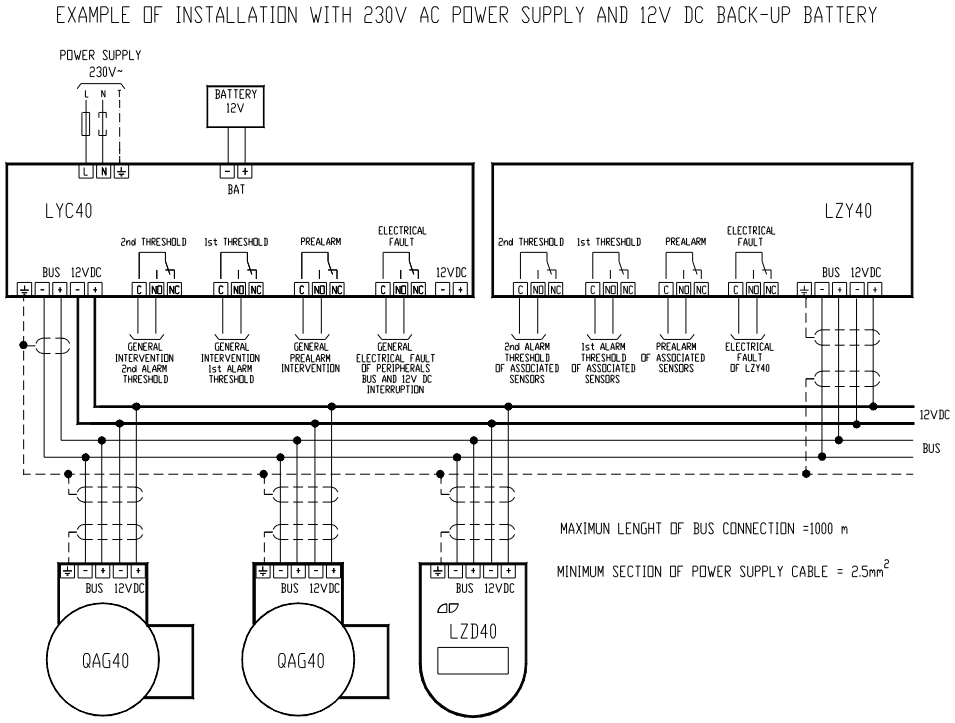


12.5 Sensors QA..40..E

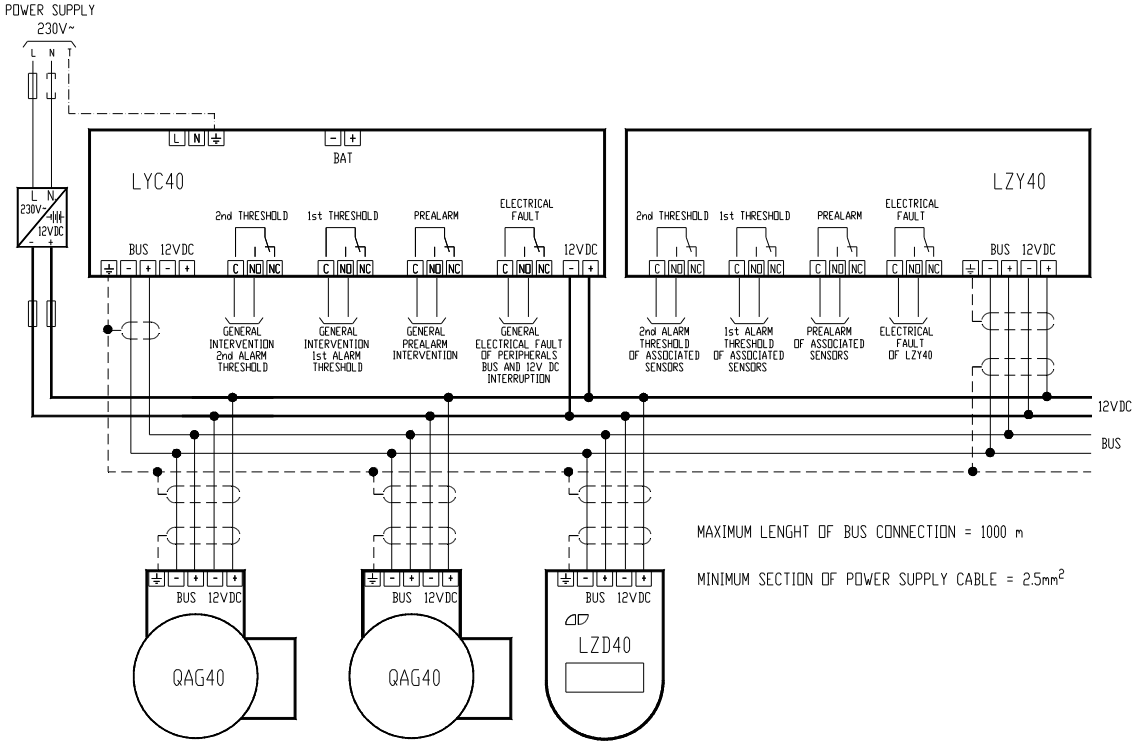


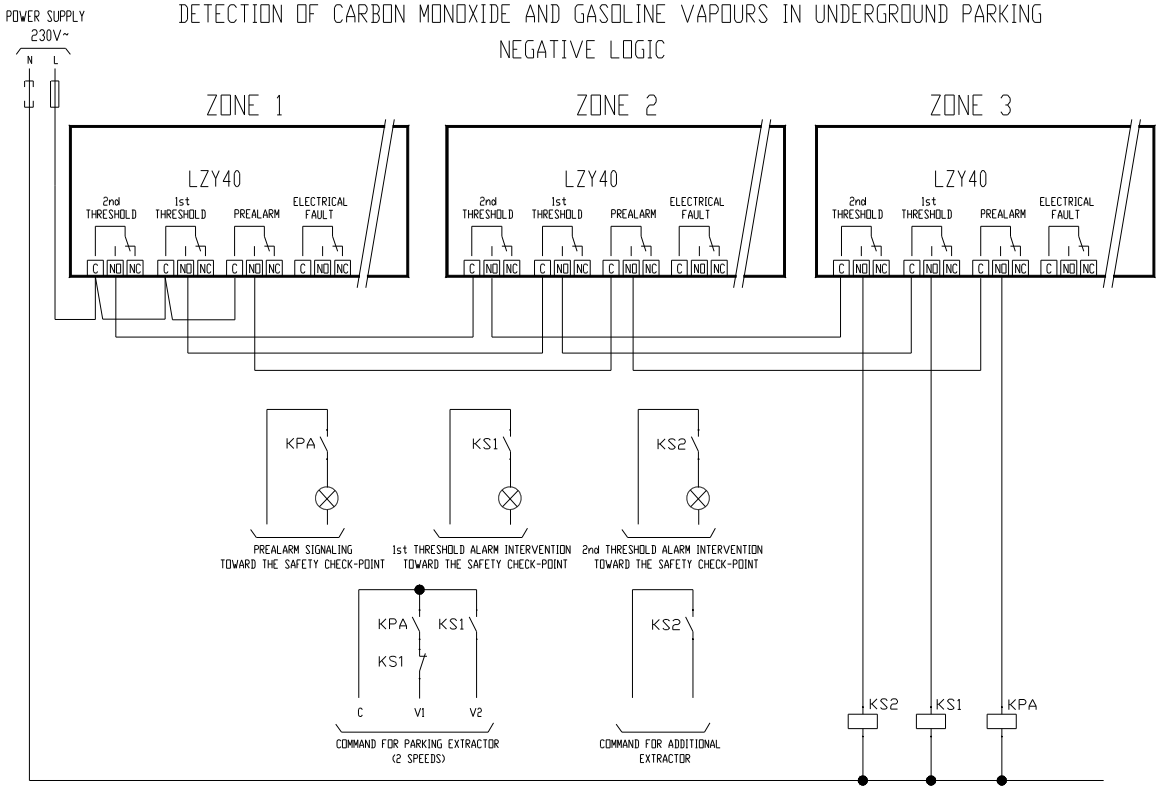
PLANT CONFIGURATION AND DEVICE NUMBERING							
SENSORS							
Number	Type of detected gas	Sensor location		Number	Type of detected gas	Sensor location	
1				6			
2				7			
3				8			
4				9			
5				10			
RELAY MODULES							
Number	Relay Module location	Associated sensors	Relay outputs	Number	Relay Module location	Associated sensors	Relay outputs
1			Pr	3			Pr
			1s				1s
			2s				2s
			FA				FA
Number	Relay Module location	Associated sensors	Relay outputs	Number	Relay Module location	Associated sensors	Relay outputs
2			Pr	4			Pr
			1s				1s
			2s				2s
			FA				FA
DISPLAY MODULES							
Number	Display Module location		Associated sensors	Number	Display Module location		Associated sensors
1				3			
2				4			

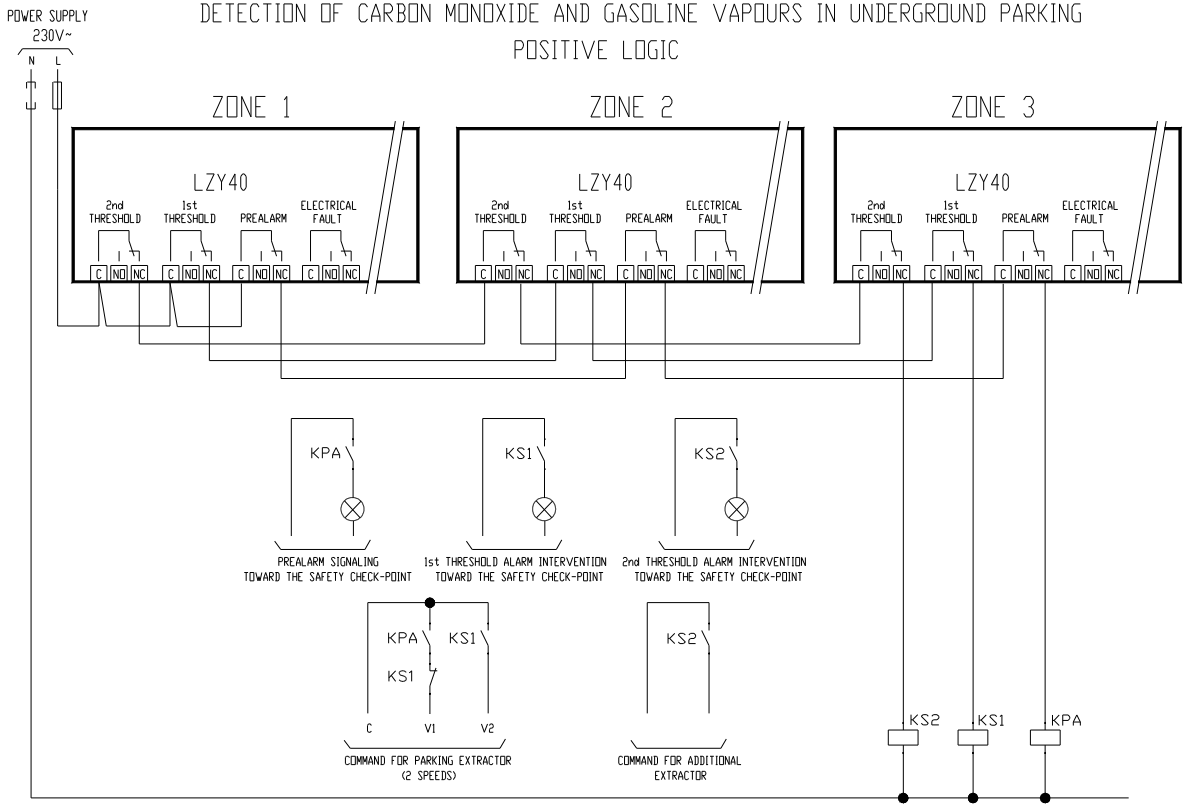
13 ELECTRICAL DIAGRAM



EXAMPLE OF INSTALLATION WITH 12V DC EXTERNAL POWER SUPPLY WITHOUT BACK-UP BATTERY




DETECTION OF CARBON MONOXIDE AND GASOLINE VAPOURS IN UNDERGROUND PARKING
NEGATIVE LOGIC
POWER SUPPLY
230V~
N
L
ZONE 1
ZONE 2
ZONE 3
LZY40
2nd THRESHOLD
1st THRESHOLD
PREALARM
ELECTRICAL FAULT
C
NO
NC
KPA
KS1
KS2
PREALARM SIGNALING TOWARD THE SAFETY CHECK-POINT
1st THRESHOLD ALARM INTERVENTION TOWARD THE SAFETY CHECK-POINT
2nd THRESHOLD ALARM INTERVENTION TOWARD THE SAFETY CHECK-POINT
V1
V2
COMMAND FOR PARKING EXTRACTOR (2 SPEEDS)
COMMAND FOR ADDITIONAL EXTRACTOR


DETECTION OF CARBON MONOXIDE AND GASOLINE VAPOURS IN UNDERGROUND PARKING
POSITIVE LOGIC
POWER SUPPLY
230V~
N
L
ZONE 1
ZONE 2
ZONE 3
LZY40
2nd THRESHOLD
1st THRESHOLD
PREALARM
ELECTRICAL FAULT
C
NO
NC
KPA
KS1
KS2
PREALARM SIGNALING TOWARD THE SAFETY CHECK-POINT
1st THRESHOLD ALARM INTERVENTION TOWARD THE SAFETY CHECK-POINT
2nd THRESHOLD ALARM INTERVENTION TOWARD THE SAFETY CHECK-POINT
V1
V2
COMMAND FOR PARKING EXTRACTOR (2 SPEEDS)
COMMAND FOR ADDITIONAL EXTRACTOR

In an underground parking the intervention of the devices (air extractors, valves, fans…) must happen only if more than one gas detector are in alarm state for gas or gasoline vapours presence. This to avoid that local and not dangerous events (a car that starts its engine near to a gas detector) cause the inopportune intervention of these devices.

Electrical diagrams in previous pages are only an example of applications.

NOTE

SIEMENS

SIEMENS

Siemens Building Technologies SpA
HVAC Products
Via Caldera, 21/D
I - 20153 Milano I
Tel +39 02 2431.1
Fax +39 02 243 65750